

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR 1.4 MMTPA GREENFIELD RE-ROLLING STEEL PLANT AT CUMILLA ECONOMIC ZONE, CUMILLA, BANGLADESH



FINAL REPORT

JULY 2024

DOCUMENT DETAILS

Document Title	Environmental and Social Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh
Document Type	Final ESIA Report
Project Ref. No.	2051240793
Date	31 July 2024
Author	EQMS Consulting Limited
Client Name	Meghna Group of Industries (MGI)
Country	Bangladesh

DISTRIBUTION LIST

Hardcopy	Softcopy	CDs	Other form
x	✓	x	x

DOCUMENT HISTORY

Version	Date	Description	Reviewed by	Approved by
V-1	21 March 2024	Draft ESIA report: Issued for Client Review	TH, MZI	KFI
V-2	22 April 2024	Draft ESIA report: Issued for Client Review	TH, MZI	KFI
V-3	12 June 2024	Draft Final ESIA report: Issued for Client Review	TH, MZI	KFI
V-4	31 July 2024	Final ESIA report: Issued for Client Approval	TH, MZI	KFI

SIGNATURE PAGE

31 July 2024

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR 1.4 MMTPA GREENFIELD RE-ROLLING STEEL PLANT AT CUMILLA ECONOMIC ZONE, CUMILLA, BANGLADESH

Reviewed by:

Tauhidul Hasan, Principal Consultant

Approved by:



Kazi Farhed Iqbal,
Executive Director

EQMS Consulting Limited

House #53, Road #4, Block-C, Banani, Dhaka-1213

Country: Bangladesh

info@eqms.com.bd | www.eqms.com.bd

This document has been prepared and reviewed by EQMS Consulting Limited with all responsible skill, care, and diligence within the terms of the contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This document is confidential to the client, and we accept no responsibility of whatsoever nature to third parties to whom this document, or any part thereof, is made known. Any such party relies on the document at their own risk.

TABLE OF CONTENTS

TABLE OF CONTENTS	iii
LIST OF FIGURES.....	viii
LIST OF TABLES.....	xi
LIST OF APPENDIXES.....	xvi
ACRONYMS AND ABBREVIATIONS.....	xviii
EXECUTIVE SUMMARY	xxii
1 INTRODUCTION.....	1-1
1.1 Background	1-1
1.2 Overview of the Project	1-1
1.3 Objective of the Study	1-2
1.4 Scope of ESIA Study.....	1-2
1.5 Applicable Reference Framework	1-4
1.6 Approach and Methodology	1-5
1.6.1 Approach of ESIA Study.....	1-5
1.6.2 Methodology for the ESIA Study	1-7
1.7 Limitations	1-11
1.8 ESIA Team	1-12
1.9 ESIA Report Structure.....	1-12
2 PROJECT DESCRIPTION.....	2-1
2.1 Location of the Project.....	2-1
2.2 Accessibility	2-1
2.3 Key Features of the Site and Surroundings	2-3
2.4 The Project	2-5
2.5 Process Flow	2-7
2.6 Process Description	2-7
2.6.1 Steel Meltshop (Electric Arc Furnace and Ladle Furnace)	2-7
2.6.2 Fume Treatment System.....	2-8
2.6.3 Continuous Casting Machine (CCM).....	2-8
2.6.4 Reheating Furnace (RHF) and Rolling Mill (RM)	2-8
2.7 Final Product & their Capacity.....	2-10
2.8 Resource Requirement	2-10
2.8.1 Land Requirement.....	2-10
2.8.2 Water Requirement	2-13
2.8.3 Electricity Requirement	2-14
2.8.4 Gas	2-14
2.8.5 Fuel Requirement and Transportation	2-14
2.8.6 Manpower.....	2-14
2.9 Raw Materials.....	2-16
2.9.1 Scrap Steel, Pig Iron and Direct Reduced Iron	2-16
2.9.2 Ferrous Alloys	2-16
2.9.3 Lime and Dolomite	2-16

2.9.4	Refractory Materials	2-16
2.10	Supply Chain of Imported Scrap Material	2-16
2.11	Site Logistics	2-18
2.11.1	Road	2-18
2.11.2	Other [e.g. waterways / airports]	2-18
2.11.3	Raw Material Reception and Preparation	2-18
2.12	Auxiliary Facilities	2-19
2.12.1	Water Treatment Facility	2-19
2.12.2	Oxygen Generating Station	2-19
2.12.3	Air Compressor Station	2-21
2.12.4	Machine Repair Facilities	2-21
2.12.5	Warehousing Facilities	2-21
2.12.6	Inspection and Testing Facilities	2-21
2.12.7	Ferroalloy Library	2-21
2.12.8	Sanitary Wastewater Disposal System	2-22
2.12.9	Fume Treatment Plant.....	2-22
2.12.10	Fire Fighting System	2-23
2.12.11	Stormwater and Drainage	2-23
2.12.12	Solid Waste Management	2-24
2.12.13	Hazardous Waste Generation & Management	2-24
2.12.14	Slag Treatment Plant and Management	2-25
2.13	Associated Facilities	2-27
2.13.1	Wharf for Material Transportation	2-27
2.14	Capital Dredging.....	2-30
2.15	Shared Facilities	2-31
2.15.1	Effluents, Treatment and Management.....	2-31
2.15.2	Multi Storied Admin Cum Officer's Dormitory Building.....	2-33
2.15.3	230kV/33kV Substation	2-33
2.15.4	Natural Gas Station and Gas Pipeline	2-34
2.16	Key Project Components.....	2-34
2.17	Project Life Cycle	2-35
2.18	Estimated Project Cost and Project Schedule	2-36
3	ADMINISTRATIVE AND LEGAL FRAMEWORK.....	3-1
3.1	Environment and Social Related Legislation in Bangladesh.....	3-1
3.2	Environment and Social Related Policies in Bangladesh	3-12
3.3	Environmental Standards.....	3-16
3.4	Administrative Setup Related to Environment and Social in Bangladesh.....	3-16
3.4.1	Department of Environment (DOE), Bangladesh	3-16
3.4.2	Procedure for obtaining ECC from DOE, Bangladesh	3-16
3.5	International Treaties, Conventions, and Agreements	3-19
3.6	IFC Performance Standards	3-19
3.6.1	IFC Project Categorizations	3-23
3.7	IFC Environmental, Health and Safety Guidelines.....	3-23
3.7.1	IFC Environmental, Health and Safety General Guidelines, 2007	3-23

3.7.2	WBG Environmental, Health, and Safety Guidelines for Integrated Steel Mills, 2007	3-24
3.7.3	WBG Environmental, Health, and Safety Guidelines for Ports, Harbors, and Terminals, 2017.....	3-25
3.7.4	WBG Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution, 2007	3-27
3.7.5	IFC / EBRD Standards for Workers' Accommodation: Processes and Standards	3-28
3.8	Comparison of Safeguard Principles.....	3-30
3.8.1	Gap Analysis –Environment Safeguard	3-30
3.8.2	Gap Analysis –Social Safeguard.....	3-34
3.9	Project Screening and Categorization.....	3-37
3.9.1	Project Classification as per DOE, MOEFCC, Bangladesh	3-37
3.9.2	Project Classification as per IFC Standard	3-37
4	ANALYSIS OF ALTERNATIVES.....	4-1
4.1	Introduction.....	4-1
4.2	Site Selection Alternatives.....	4-1
4.3	Selection of Process Technology	4-1
4.3.1	Basic Oxygen Steel Making (BOS)	4-2
4.3.2	Electric Induction Furnace (EIF)	4-2
4.3.3	Electrical Arc Furnaces (EAF)	4-3
4.4	No Project Scenario	4-3
4.4.1	Environmental Impact.....	4-4
4.4.2	Economic Impact.....	4-4
4.4.3	Social Impact	4-4
4.4.4	Industrial Development.....	4-4
4.4.5	Infrastructure and Utilities.....	4-5
4.4.6	Land Use and Zoning	4-5
4.4.7	Strategic Considerations	4-5
5	ENVIRONMENTAL AND SOCIAL BASELINE.....	5-1
5.1	Site Details	5-1
5.1.1	Project Location.....	5-1
5.2	Study Area and Methodology	5-2
5.2.1	Area of Influence (AOI).....	5-2
5.2.2	Gaps in Previous EIA Study	5-4
5.2.3	Methodology	5-6
5.3	Physical Environment	5-6
5.3.1	Physiography.....	5-6
5.3.2	Topography	5-7
5.3.3	Geology	5-8
5.3.4	Land Use	5-10
5.3.5	Geomorphology	5-11
5.3.6	Agro-ecology	5-13
5.3.7	Soil Condition	5-14

5.3.8	Hydrology and Drainage.....	5-15
5.4	Meteorology.....	5-16
5.4.1	Climate	5-16
5.4.2	Temperature	5-18
5.4.3	Rainfall.....	5-19
5.4.4	Relative Humidity	5-20
5.4.5	Wind Speed and Direction.....	5-21
5.5	Environmental Quality	5-22
5.5.1	Ambient Air Quality.....	5-22
5.5.2	Ambient Noise Quality	5-34
5.5.3	Water Quality.....	5-39
5.5.4	Soil Quality	5-48
5.5.5	Sediment Quality	5-51
5.5.6	Traffic Volume	5-55
5.6	Biological Environment.....	5-58
5.6.1	Bio-ecological Zone.....	5-58
5.6.2	Terrestrial Ecosystem.....	5-60
5.6.3	Aquatic Ecosystem.....	5-72
5.6.4	Areas of Higher Biodiversity and Conservation Significance	5-82
5.6.5	Critical Habitat Assessment	5-86
5.7	Natural Hazards, Vulnerability for the Project	5-96
5.7.1	Earthquake	5-96
5.7.2	Flood.....	5-98
5.7.3	Cyclone.....	5-99
5.8	Socio-economic Environment	5-100
5.8.1	Approach and Methodology	5-100
5.8.2	Study Area.....	5-101
5.8.3	Socioeconomic Profile of Project Area of Influence	5-103
5.8.4	Socioeconomic Profile of Landowners	5-117
5.8.5	Katha (Brush Pile) Fishing Survey	5-128
6	IDENTIFICATION OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS	6-1
6.1	Introduction.....	6-1
6.2	Impact Assessment Methodology	6-1
6.2.1	Potential Impact Prediction.....	6-2
6.2.2	Impact Evaluation.....	6-3
6.2.3	Mitigation and Enhancement Measures	6-8
6.3	Impact Identification	6-8
6.4	Potential Environmental and Social Impacts and Risks	6-11
6.4.1	Impacts during Pre-construction Phase	6-11
6.4.2	Impacts during Construction Phase	6-13
6.4.3	Impacts during Operation Phase.....	6-40
6.5	Cumulative Impact Assessment.....	6-116
7	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	7-1
7.1	Introduction.....	7-1

7.2	Objectives of the Environmental and Social Management Plan	7-1
7.3	Environmental Mitigation Measures	7-1
7.3.1	During Construction Phase	7-1
7.3.2	During Operation Phase.....	7-21
7.4	Environmental Monitoring Plan	7-37
7.4.1	During Construction Phase	7-37
7.4.2	During Operation Phase.....	7-39
7.5	Budget Plan for Environmental and Social Management	7-42
7.6	Institutional Arrangements.....	7-43
8	STAKEHOLDER ENGAGEMENT, PUBLIC CONSULTATION AND DISCLOSURE	8-1
8.1	Introduction.....	8-1
8.2	Scope and Specific Objectives.....	8-1
8.3	Approach and Methodology for Stakeholder Mapping and Analysis	8-2
8.4	Information Disclosure, Consultation, and Participation	8-3
8.4.1	Communication Methods.....	8-4
8.4.2	Proposed Strategy for Stakeholder Engagement	8-27
8.5	Grievance Redress Mechanism	8-30
8.5.1	Grievance Redress Mechanism for Workers	8-30
8.5.2	Grievance Redress Mechanism for Community People	8-35
9	RISK ASSESSMENT	9-1
9.1	Introduction.....	9-1
9.2	Risk Assessment.....	9-1
9.2.1	Objectives.....	9-1
9.2.2	Rational	9-1
9.2.3	Definition of Risks.....	9-2
9.2.4	Identification of Hazards.....	9-2
9.2.5	Risk Evaluation.....	9-3
9.2.6	Safety During Construction	9-5
9.2.7	Risk Management Measures	9-5
9.2.8	On-Site Emergency Plan.....	9-6
9.2.9	Disaster Management Plan (DMP)	9-6
9.3	Flood Risk Assessment (FRA) of the Project Site	9-7
9.3.1	Scope of Works	9-7
9.3.2	Approach and Methodology of FRA	9-8
9.3.3	Environmental Conditions	9-9
9.3.4	Hydro-Meteorological Condition	9-16
9.3.5	Hydrological Analysis	9-17
9.3.6	Assumptions and Recommendations.....	9-30
9.4	Climate Change Risk Assessment.....	9-30
9.4.1	Introduction.....	9-30
9.4.2	Objectives.....	9-31
9.4.3	Scope of Assessment.....	9-31
9.4.4	Definitions.....	9-31
9.4.5	Physical Climate Context of the Study Area	9-32

9.4.6	Climate Change Policy Context	9-32
9.4.7	Assessment Methodology	9-34
9.4.8	Assessment Findings	9-40
9.4.9	Assumptions and Recommendations	9-43
10	CONCLUSIONS AND RECOMMENDATIONS	10-1
10.1	Conclusions	10-1
10.2	Recommendations	10-2
11	APPENDIX	A-1

LIST OF FIGURES

Figure 1-1: Approach to the ESIA study	1-6
Figure 1-2: Impact Assessment Process for the ESIA Study	1-10
Figure 2-1: Location Map of the Proposed Project	2-2
Figure 2-2: Photographs of existing road communication to the project area	2-3
Figure 2-3: The general layout of the proposed steel manufacturing plant	2-6
Figure 2-4: Main Process Flow Diagram.....	2-7
Figure 2-5 Land Procurement Process	2-12
Figure 2-6: Water Balance Diagram for the Process of MRSML	2-13
Figure 2-7: Flue Gas Treatment System.....	2-22
Figure 2-8: Stormwater Drainage Layout Plan.....	2-24
Figure 2-9: Steel slag magnetic separation line process flow.....	2-26
Figure 2-10: Location of the Wharf	2-28
Figure 2-11: Sketch of the Proposed Wharf.....	2-29
Figure 2-12: Layout of the Central Sewage Treatment Plant (CSTP)	2-31
Figure 2-13: Process Flow of the CETP	2-32
Figure 2-14: The Path of the Power Supply Lines	2-33
Figure 3-1: DoE Environmental Clearance Applicability and Procedure	3-17
Figure 3-2: Clearance Procedure for RED Category Projects	3-18
Figure 5-1: Site location map for the proposed project	5-1
Figure 5-2: Study area map	5-3
Figure 5-3: Physiography of the study area	5-7
Figure 5-4: Topography of the study area.....	5-8
Figure 5-5: Geology of the study area	5-10
Figure 5-6: Land use map of the study area	5-11
Figure 5-7: Geomorphology of the study area	5-13
Figure 5-8: Agro-ecological Zone of the study area.....	5-14
Figure 5-9: Soil map of the study area	5-15
Figure 5-10: River System map of the study area	5-16
Figure 5-11: Climatic sub-regions of the study area	5-18
Figure 5-12: Temperature variation at Dhaka Meteorological Station (1992 to 2022).....	5-19
Figure 5-13: Rainfall variation at Dhaka Meteorological Station (1992 to 2022) in mm	5-20

Figure 5-14: Monthly Average Relative Humidity at Dhaka Meteorological Station (1992 to 2022) ..	5-20
Figure 5-15: Seasonal Wind Rose Diagram at Dhaka Met Station, 2022	5-21
Figure 5-16: Ambient air quality monitoring location map.....	5-23
Figure 5-17: Photographs of Ambient Air Quality Monitoring in 1 st week	5-24
Figure 5-18: Photographs of Ambient Air Quality Monitoring in 2 nd Week	5-25
Figure 5-19: Photographs of Ambient Air Quality Monitoring in 3 rd Week	5-27
Figure 5-20: Photographs of Ambient Air Quality Monitoring in 4 th Week	5-28
Figure 5-21: Concentrations of PM _{2.5} in study area	5-31
Figure 5-22: Concentrations of PM ₁₀ in study area.....	5-32
Figure 5-23: Concentrations of SO ₂ in study area	5-32
Figure 5-24: Concentrations of NO ₂ in study area	5-33
Figure 5-25: Concentrations of CO in study area	5-33
Figure 5-26: Ambient noise monitoring location map	5-35
Figure 5-27: Pictures taken during noise monitoring in the project area.	5-36
Figure 5-28: Surface Water Sampling Locations	5-40
Figure 5-29: Photographs taken during surface water sampling	5-40
Figure 5-30: Ground water sampling locations	5-45
Figure 5-31: Photographs taken during ground water sampling.....	5-46
Figure 5-32: Soil sampling location map.....	5-49
Figure 5-33: Photographs taken during Soil Sampling	5-49
Figure 5-34: Sediment sampling location map.....	5-52
Figure 5-35: Photographs taken during Sediment Sampling	5-53
Figure 5-36: Road Traffic Condition	5-56
Figure 5-37: River Traffic Condition	5-57
Figure 5-38: Bio-ecological Zone of the Study Area	5-60
Figure 5-39 Map Showing the Historic Land Use Pattern of the Project Site	5-61
Figure 5-40: Photographs of Different Types of Terrestrial Habitats	5-62
Figure 5-41: Map of Quadrates for Floral Assessment.....	5-63
Figure 5-42 Comparison of Number of Floral Species by Family	5-64
Figure 5-43: Transect Sampling Locations Map for Avifauna Survey.....	5-67
Figure 5-44: Number of Avian species Based on Family.....	5-68
Figure 5-45: Migratory Bird Sighting Area Present in the AOI	5-69
Figure 5-46: Map of East Asia-Australasia Flyway	5-70
Figure 5-47: Observed Herpetofauna in the Project AOI	5-71
Figure 5-48: Photoplate of Observed Terrestrial Mammals in the AOI.....	5-72
Figure 5-49: Different Aquatic Habitat in the AOI.....	5-73
Figure 5-50: Fishing method in project adjacent river area	5-74
Figure 5-51: Consultation and Fisheries Survey Activities in the Study Area.....	5-75
Figure 5-52: Family-Based Fish Species Diversity in the AOI	5-77
Figure 5-53: Map showing plankton and macrobenthos sampling locations	5-78
Figure 5-54: Diversity indices of phytoplankton	5-79

Figure 5-55: Diversity indices of zooplankton	5-80
Figure 5-56: Diversity indices of benthos	5-81
Figure 5-57 Stakeholder Consultation Regarding the Dolphin Issue in the Project AoI	5-82
Figure 5-58: Protected Areas Nearest to the Project Site	5-83
Figure 5-59: Ecologically Critical Areas Nearest to the Project Site	5-84
Figure 5-60: Ramsar sites map	5-85
Figure 5-61: Nearest IBAs from the Project site	5-86
Figure 5-62: Map showing seismic zoning map of Bangladesh with project area	5-98
Figure 5-63: Flood Prone Area map of the study area	5-99
Figure 5-64: Cyclone affected zone map of the study area	5-100
Figure 5-65: Buffer Map for Socio-economic Study	5-102
Figure 5-66: Religious Profile of the Project Area of Influence	5-105
Figure 5-67: Education Profile of the Project Area of Influence	5-106
Figure 5-68: Access to Water in the Project Area of Influence	5-107
Figure 5-69: Source of Energy	5-108
Figure 5-70: Sanitation Facilities in the Study Area	5-109
Figure 5-71: Economic Engagement of Local People	5-111
Figure 5-72: Monthly Income of the Study Area	5-112
Figure 5-73: Gender Analysis based on Household Head	5-113
Figure 5-74: Awareness about the Project	5-116
Figure 5-75: Perceived Impact of Local People	5-117
Figure 5-76: Education Profile of the Landowners	5-119
Figure 5-77: Source of Water for Landowners	5-120
Figure 5-78: Source of Cooking Fuel	5-120
Figure 5-79: Sanitation Facilities of the Landowners	5-121
Figure 5-80: Economic Engagement of Landowners	5-122
Figure 5-81: Monthly income of the Landowners	5-123
Figure 5-82: Gender Analysis based on Household Head	5-124
Figure 5-83: Usage of Land Selling Money	5-127
Figure 5-84: Perceived Impact of Local People	5-128
Figure 5-85: Location of katha Fishing	5-129
Figure 6-1: Impact Assessment Process for the ESIA Study	6-2
Figure 6-2: Annual Wind Rose of the Study Area	6-46
Figure 6-3: Wind Class Frequency Distribution of Meteorological Data (Jan. 1, 2020 – Dec. 31, 2023)	6-46
Figure 6-4: Land Elevation of the Study Area	6-48
Figure 6-5: Location of Sensitive Receptors	6-49
Figure 6-6: NO ₂ Isopleths- 24 Hourly Average Maximum GLC for Proposed Steel Mill	6-53
Figure 6-7: NO ₂ Isopleths- Annual Maximum GLC for Proposed Steel Mill	6-54
Figure 6-8: SO ₂ Isopleths- 1 Hourly Average Maximum GLC for the Proposed Steel Mill	6-57
Figure 6-9: SO ₂ Isopleths- 24 Hourly Average Maximum GLC for the Proposed Steel Mill	6-58

Figure 6-10: CO Isopleths- 1 Hourly Average Maximum GLC for the Proposed Steel Mill Operation	6-61
Figure 6-11: CO Isopleths- 8 Hourly Average Maximum GLC for the Proposed Steel Mill Operation	6-62
Figure 6-12: PM ₁₀ Isopleths- 24 Hourly Maximum GLC for the Proposed Steel Mill	6-65
Figure 6-13: PM ₁₀ Isopleths- Annual Maximum GLC for the Proposed Steel Mill	6-66
Figure 6-14: PM _{2.5} Isopleths- 24 Hourly Average Maximum GLC for the Proposed Steel Mill	6-69
Figure 6-15: PM _{2.5} Isopleths- Annual Maximum GLC for the Proposed Steel Mill	6-70
Figure 6-16: Locations of the Sources of Emissions	6-74
Figure 6-17: Noise contour map for MRSML operation during daytime (Leq day)	6-84
Figure 6-18: Noise contour map for MRSML operation during nighttime (Leq night)	6-85
Figure 6-19: Noise contour map for MRSML and MGIL combined operation during daytime (Leq day)	6-86
Figure 6-20: Noise contour map for MRSML and MGIL combined operation during nighttime (Leq night)	6-87
Figure 7-1: Organogram Meghna Re-rolling & Steel Mills Limited	7-44
Figure 8-1: Photographs of PCM	8-21
Figure 9-1: Flow-diagram of Quantitative Risk Analysis	9-3
Figure 9-2: MRSML project inside area and outside area from the river location in CuEZ.	9-9
Figure 9-3: Flood category mapping of the study area in Cumilla.	9-10
Figure 9-4: Flood Marking area at the Meghna Branch River beside the MRSML project.	9-11
Figure 9-5: River and canal systems round the MRSML project in Cumilla Economic Zone.	9-12
Figure 9-6: Road Elevation of the Project Site	9-13
Figure 9-7: Digital Elevation Model (DEM) of the MRSML project area in CuEZ, Cumilla.	9-14
Figure 9-8: MRRSL Project boundary and some elevation points.	9-15
Figure 9-9: Digital Elevation Model (DEM) map of the 2km study area.	9-16
Figure 9-10: Cyclonic risk zone for the MRSML project area in Cumilla.	9-17
Figure 9-11: Location of Water level gauge station and MRSML project area in Cumilla.	9-18
Figure 9-12: Flood hydrographs for the year 1974, 1988, 1998 and 2004.	9-21
Figure 9-13: Water and danger level at Meghna River in June 2023 from BWDB source.	9-22
Figure 9-14: Flood frequency distribution curve at upper and lower 95% confidence interval.	9-24
Figure 9-15: River Bankline shifting from the year 2004-2009.	9-25
Figure 9-16: River Bankline shifting from the year 2009-2014.	9-26
Figure 9-17: Representative Concentration Pathways to predict the Future Climate Impact	9-34

LIST OF TABLES

Table 1-1: Primary Baseline Data for the ESIA	1-8
Table 1-2: ESIA team composition	1-12
Table 2-1: Salient features of the project site and surroundings	2-3
Table 2-2: Manpower requirements during construction phase	2-14
Table 2-3: Manpower requirements during operation phase	2-15

Table 2-4: Steel Slag Management	2-25
Table 2-5: Activities during different phases of the Project.....	2-35
Table 2-6: Investment Estimate for A Steel Project with an Annual Output Of 1.4 million Tons	2-36
Table 2-7: Tentative Project Schedule	2-37
Table 3-1: National Legal Provisions Applicable to the Proposed Project.....	3-2
Table 3-2: Policies and Plans Relevant to the Project.....	3-12
Table 3-3: IFC Performance Standards	3-19
Table 3-4: Applicability to IFC Performance Standards	3-20
Table 3-5: Organization of the WBG General EHS Guidelines	3-24
Table 5-1: Land use pattern for the study area	5-10
Table 5-2: Ambient air quality monitoring locations	5-22
Table 5-3: Summary of ambient air quality monitoring results for four weeks	5-30
Table 5-4: Ambient noise monitoring locations	5-34
Table 5-5: Ambient noise level in the study area	5-38
Table 5-6: Surface water sampling location	5-39
Table 5-7: Surface water analysis result.....	5-42
Table 5-8: Ground water sampling location	5-45
Table 5-9: Groundwater analysis results	5-47
Table 5-10: Soil sampling locations	5-48
Table 5-11: Analysis result of soil sample.....	5-50
Table 5-12: Sediment Sampling Location	5-52
Table 5-13: Analysis Result of Sediment Sample.....	5-54
Table 5-14: Locations of traffic survey	5-55
Table 5-15: Road traffic observed in the study area	5-55
Table 5-16: Locations of river traffic survey	5-56
Table 5-17: River traffic observed in the study area	5-57
Table 5-18: Typical Characteristics of Bio-ecological Zones of AOI.....	5-59
Table 5-19: Details of Quadrates for Floral Species	5-62
Table 5-20: Biodiversity Indices of Different Quadrats	5-65
Table 5-21: Details of Transects for Avian Species.....	5-66
Table 5-22: Fishing gear used in Meghna River branch and seasonal waterbodies.....	5-74
Table 5-23: Details of Fish market surveyed adjacent to the Project site.....	5-75
Table 5-24: Checklist of Recorded Fish Species in Meghna River Branch from the Fisheries Survey	5-76
Table 5-25: Sampling points for plankton and benthos survey	5-78
Table 5-26: A checklist of phytoplankton found in the study area	5-79
Table 5-27: A checklist of zooplankton found in the study area	5-79
Table 5-28: A checklist of benthos organisms identified in the study area	5-80
Table 5-29 Description of the Ecologically Appropriate Areas of Analysis (EAAA) used to determine the presence of Critical Habitat for different Species.....	5-89
Table 5-30 Species screening shortlist considered against IFC PS6 Critical Habitat criteria, and assessment conclusions	5-91

Table 5-31: Summary of Assessment of Habitats in the Project Site Against Criterion IFC 4	5-95
Table 5-32: Description of Seismic Zones	5-97
Table 5-33: Study Area	5-102
Table 5-34: Demographic Information of the Project Area of Influence	5-103
Table 5-35: Profile- Age, Marital Status and Health Status of the Project Area of Influence	5-104
Table 5-36: Access to Social Institutions	5-110
Table 5-37: Economically Active and Inactive Populations Occupation Profile	5-111
Table 5-38: Gender Analysis based on Decision Making Power	5-113
Table 5-39: Perception regarding Gender Based Violence	5-113
Table 5-40: Present Social Issues in the Study Area	5-114
Table 5-41: Present Status of Environmental Issues in the Study Area	5-115
Table 5-42: Demographic Information of the Landowners	5-117
Table 5-43: Profile- Age, Marital Status and Health Status of the Study Area	5-118
Table 5-44: Access to Social Institutions (Landowners)	5-121
Table 5-45: Economically Active and Inactive Populations Occupation Profile	5-122
Table 5-46: Gender Analysis	5-124
Table 5-47: Gender Based Violence	5-124
Table 5-48: Present Social Issues in the Study Area	5-125
Table 5-49: Present Status of Environmental Issues in the Study Area	5-126
Table 6-1: Impact characteristics terminology	6-3
Table 6-2: Geographical extent of impacts	6-4
Table 6-3: Duration of impacts	6-4
Table 6-4: Intensity of impacts	6-5
Table 6-5: Potential for irreplaceable loss of resources	6-5
Table 6-6: Probability of impacts	6-5
Table 6-7: Significance of issues (based on environmental parameters)	6-6
Table 6-8: Potential social impact significance	6-7
Table 6-9: Potential public health impact significance	6-7
Table 6-10: Impact identification matrix for the proposed project	6-9
Table 6-11: Emission Inventory of Proposed Steel Mill	6-42
Table 6-12: Stack Location of Proposed Steel Mill	6-43
Table 6-13: Source Input Parameter and Emission Rate of the Steel Mill	6-43
Table 6-14: Maximum Background Concentration of Criteria Pollutants	6-44
Table 6-15: Project Site Coordinates	6-47
Table 6-16: Multi-Tier Grid Receptors	6-47
Table 6-17: Air Quality Monitoring Location	6-48
Table 6-18: Input Data Considered for Air Dispersion Modeling Exercise	6-50
Table 6-19: Results of Air Quality Modeling for NO ₂ due to Proposed Steel Mill Operation	6-51
Table 6-20: Predicted Concentration of NO ₂ at Air Quality Monitoring Locations due to Plant Operation	6-55
Table 6-21: Results of Air Quality Modeling for SO ₂ due to Proposed Steel Mill Operation	6-56

Table 6-22: Predicted Concentration of SO ₂ at Air Quality Monitoring Locations due to Proposed Steel Mill Operation	6-59
Table 6-23: Results of Air Quality Modeling for CO due to Proposed Steel Mill Operation	6-60
Table 6-24: Predicted Concentration of CO at Air Quality Monitoring Locations	6-63
Table 6-25: Results of Air Quality Modeling for PM ₁₀	6-64
Table 6-26: Predicted Concentration of PM ₁₀ at Air Quality Monitoring Locations	6-67
Table 6-27: Results of Air Quality Modeling for PM _{2.5}	6-68
Table 6-28: Predicted Concentration of PM _{2.5} at Air Quality Monitoring Locations	6-71
Table 6-29: Bangladesh Standard values and WHO guideline value	6-73
Table 6-30: A Summary of Information on the Emission Sources	6-74
Table 6-31: Predicted 24-Hourly Maximum Ground Level Concentration of PM ₁₀	6-76
Table 6-32: Predicted 24-Hourly Maximum Ground Level Concentration of NO ₂	6-78
Table 6-33: Noise standard for Bangladesh	6-80
Table 6-34: IFC noise level guidelines	6-80
Table 6-35: Noise generated from major sources at MRSML.	6-80
Table 6-36: Predicted Noise Levels at Receptors during operation of MRSML	6-82
Table 6-37: Predicted Noise Levels at Receptors during operation of MRSML and MGIL	6-83
Table 6-38: Predicted Noise Levels at Sensitive Receptors during operation of MRSML	6-88
Table 6-39: Predicted Noise Levels at Sensitive Receptors during operation of MRSML and MGIL.....	6-90
Table 6-40: Details about Loss and Compensation for the Impacted Katha Owners	6-105
Table 7-1: Mitigation measures during construction phase	7-2
Table 7-2: Mitigation measures during operation phase	7-22
Table 7-3: Monitoring plan during construction phase/year	7-38
Table 7-4: Monitoring plan during operation phase	7-39
Table 7-5: Summary of costs for environmental management	7-42
Table 8-1: Stakeholder mapping matrix	8-2
Table 8-2 Stakeholder Mapping for the project Table	8-2
Table 8-3 Participant Details of Key Informant Interview	8-4
Table 8-4: Details of Key Informant Interviews and Individual consultations held for the project	8-6
Table 8-5: Details of the Public Consultation Meeting	8-19
Table 8-6 Details of FGD Participants	8-22
Table 8-7 Details of Focus Group Discussion	8-22
Table 8-8 Proposed Strategy for Stakeholder Engagement	8-28
Table 9-1: Hazard Identification of the Proposed Steel Plant	9-2
Table 9-2: Determination of Risk Potential	9-4
Table 9-3: Potential Environmental Risk Evaluation	9-4
Table 9-4: Elevation ranges for the MRSML project area	9-13
Table 9-5: Historical water level data from Jan 1968 to Jan 2024, unit are in meter MSL.	9-18
Table 9-6: Statistical parameters for the above annual maximum water level series	9-20
Table 9-7: Flood frequency analysis for 2, 5, 10, 20, 50 and 100-years flood return periods.	9-24
Table 9-8: River Bankline shifting analysis results for the year between 2004 and 2024.	9-25

Table 9-9: Riverbank erosion and deposition changes from 2004-2024.	9-29
Table 9-10: Description of the level/rating of hazard	9-36
Table 9-11: Overall Physical and Transition Risk Rating.....	9-37
Table 9-12: Consequence Rating Criteria.....	9-39
Table 9-13: Overall Transition Opportunities Rating.....	9-39
Table 9-14: Climate-related data pertaining to temperature for scenario RCP 4.5 and RCP 8.5.....	9-40
Table 9-15: Climate-related data pertaining to precipitation for scenario RCP 4.5 and RCP 8.5.....	9-41
Table 11-1: Sample Training Plan	F-7

LIST OF APPENDIXES

Appendix A: References	A-1
Appendix B: Checklist of Flora and Fauna Species.....	B-1
Appendix B-1: Tree Species Recorded from the AOI	B-1
Appendix B-2: Herb and Shrub Species Recorded from the AOI	B-2
Appendix B-3: Checklist of All Recorded Avifauna Species	B-3
Appendix B-4: A Checklist of Recorded Migratory Avifauna Species in the AOI.....	B-5
Appendix B-5: Checklist of Herpetofauna Species in the AOI	B-6
Appendix B-6: Checklist of Terrestrial Mammals Species in the AOI	B-7
Appendix B-7: A Checklist of Recorded Fish Species in the Study area (Fish Market Survey) B-8	
Appendix B-8: Checklist of Crustacean Species Recorded in the AOI.....	B-10
Appendix B-9: IUCN Red List of Threatened Species – CR & EN Screened through IBAT ...	B-11
Appendix C: Photo Plate of Flora and Fauna Species	C-1
Appendix C-1: Photographs of Tree Species Recorded from the AOI	C-1
Appendix C-2: Photographs of Observed Avian Species Recorded from the AOI	C-2
Appendix C-3: Photographs of Observed Fish Species Recorded from the Fisheries Survey .	C-7
Appendix C-4: A Photoplate of Plankton Sample Collection.....	C-8
Appendix C-5: A Photoplate of Macrobenthos Sample Collection.....	C-9
Appendix D: Photographs of KII & FGD	D-1
Appendix D-1: Photographs of the KII and Focus Group Discussion	D-1
Appendix D-2: Photographs of Socio-economic Survey	D-4
Appendix D-3: Grievance Register.....	D-6
Appendix D-4: Household Survey Questionnaire for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh.....	D-0
Appendix D-5: Consultation Checklist for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh	D-7
Appendix D-6: The Protection and Conservation of Fish Act, 1950	D-9
Appendix D-7: The Protection and Conservation of Fish Act, 1950, Amendment 2013.....	D-16
Appendix D-8: Photographs of Kathas.....	D-18
Appendix D-9: Consultation Notes	D-0
Appendix D-10: Photographs of Consultations with Katha owners.....	D-10
Appendix E: Applicable Standards of DOE, WHO and IFC	E-1
Appendix E-1: Air Quality Standards/Guidelines.....	E-1
Appendix E-2: Standards for Odor in Bangladesh	E-1
Appendix E-3: Noise Level Standards/Guidelines	E-2
Appendix E-3.1: WHO Ambient Noise Level Standards	E-2
Appendix E-3.2: Standards for Sound in Bangladesh.....	E-2
Appendix E-4: Standards for Water Quality	E-3
Appendix E-4.1: Standards for Inland Surface Water in Bangladesh	E-3
Appendix E-4.2: Standards for Drinking Water	E-4
Appendix E-5: Standards for Sewage Discharge in Bangladesh.....	E-5
Appendix E-6: Standards for Waste from Industrial Units or Projects	E-6

Appendix E-7: Australian Standards for Segment Quality	E-8
Appendix F: Standalone Environmental and Social Management Plans	F-1
Appendix F-1: Construction Stage EHS Plan.....	F-1
Appendix F-2: Biodiversity Management Plan	F-9
Appendix F-3: Labour Management Plan	F-14
Appendix F-4: Security Management Plan.....	F-17
Appendix F-5: Emergency Preparedness and Response Plan.....	F-21
Appendix G: Environmental Quality Monitoring Results (Lab Sheet)	G-1
Appendix H: Pollution Concentration on Sensitive Receptors	H-1
Appendix H-1: NO ₂ Concentration on Sensitive Receptors	H-1
Appendix H-2: SO ₂ Concentration on Sensitive Receptors	H-8
Appendix H-3: CO Concentration on Sensitive Receptors	H-15
Appendix H-4: PM=PM ₁₀ =PM _{2.5} Concentration on Sensitive Receptors	H-23
Appendix H-5: Plant Emission Concentration	H-31
Appendix H-6: Statement of Compliance Air Emissions Levels.....	H-32
Appendix H-7: Emission Sources for PM ₁₀	H-33
Appendix H-8: Appendix A- Emission Sources for NO ₂	H-34
Appendix I: Environmental Quality Monitoring Results of the previously conducted regulatory EIA Report of the Steel Plant	I-1
Appendix I-1: Ambient Air Quality	I-1
Appendix I-2: Noise Quality	I-2
Appendix I-3: Surface Water Quality	I-2
Appendix I-4: Ground Water Quality	I-3
Appendix J: Rapid Construction Phase E&S Audit.....	J-1
Appendix K: Detailed Description of Fume Treatment Plant	K-1

ACRONYMS AND ABBREVIATIONS

AOI	Area of Influence
ARIPA	Acquisition and Requisition of Immovable Property Act
As	Arsenic
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BDT	Bangladeshi Taka
Be	Beryllium
BEZA	Bangladesh Economic Zone Authority
BFRI	Bangladesh Forest Research Institute
BIWTA	Bangladesh Inland Water Transport Authority
BMD	Bangladesh Meteorological Department
BNBC	Bangladesh National Building Code
BNH	Bangladesh National Herbarium
BOD	Biological Oxygen Demand
Ca	Calcium
CCM	Continuous Casting Machine
Cl	Chlorine
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
COD	Chemical Oxygen Demand
Cr	Chromium
CRC	Cold Rolled Coil
CSP	Compact Strip Production
CSR	Corporate Social Responsibility
Cu	Copper
dB	Decibel
DC	Deputy Commissioner
DDM	Department of Disaster Management
DEM	Digital Elevation Model
DG	Diesel Generator
DMP	Disaster Management Plan
DO	Dissolved Oxygen
DOE	Department of Environment
DOF	Department of Fisheries
DPHE	Department of Public Health Engineering
DRI	Direct Reduced Iron
EAF	Electric Arc Furnace
EC	Electrical Conductivity
EC	Environmental Clearance
ECA	Environment Conservation Act
ECA	Ecologically Critical Areas
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rules
EHS	Environment, Health, and Safety

EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EMP	Environmental Management Plan
EMS	Environmental Management System
EPC	Engineering, Procurement, and Construction
EQS	Environmental Quality Standards
ETP	Effluent Treatment Plant
FAO	Food and Agriculture Organization
FC	Fecal Coliform
FD	Forest Department
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GOB	Government of Bangladesh
GPS	Global Positioning System
GSB	Geological Survey of Bangladesh
HBI	Hot Briquetted Iron
Hg	Hydrargyrum (Mercury)
HH	Households
HRC	Hot Rolled Coil
HSE	Health, Safety and Environment
IBAs	Important Bird and Biodiversity Areas
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
KII	Key Informant Interview
km	Kilometer
kW	Kilowatt
Leq	Level Equivalent
LF	Ladle Furnace
LGED	Local Government Engineering Department
LNG	Liquefied Natural Gas
m	Meter
m ³	Cubic Meter
MOEFCC	Ministry of Environment, Forest and Climate Change
MOFL	Ministry of Fisheries and Livestock
MRSML	Meghna Re-rolling and Steel Mills Limited
MSDS	Material Safety Data Sheet
MSL	Mean Sea Level
MW	Megawatt
NEMAP	National Environment Management Action Plan
NGOs	Non-Governmental Organization
NH ₃	Ammonia
NOC	No Objection Certificate
NOx	Oxides of Nitrogen

NP	National Park
NWMP	National Water Management Plan
O ₃	Ozone
OHS	Occupational Health and Safety
PA	Protected Area
Pb	Plumbum (Lead)
PM	Particulate Matter
PM ₁₀	Particulate Matter of 10 Microns in diameter or smaller
PM _{2.5}	Particulate Matter of 2.5 Microns in diameter or smaller
PPE	Personal Protective Equipment
PPM	Parts Per Million
RFI	Request for Information
RO	Reverse Osmosis
ROW	Right of Way
SCR	Selective Catalytic Reduction
SO ₂	Sulfur Dioxide
SPARRSO	Space Research and Remote Sensing Organization
SPL	Sound Pressure Level
SPM	Suspended Particulate Matter
SRDI	Soil Resource Development Institute
STD	Sexually Transmitted Disease
STP	Sewage Treatment Plant
TC	Total Coliform
TDS	Total Dissolve Solids
TMP	Traffic Management Plan
TOR	Terms of Reference
TSS	Total Suspended Solids
UNDP	United Nation Development Program
UNO	Upazilla Nirbahi Officer
USD	United States Dollar
USEPA	United States Environmental Protection Agency
WARPO	Water Resources Planning Organization
WB	World Bank
WHO	World Health Organization
WS	Wildlife Sanctuary
WTP	Water Treatment Plant
Zn	Zinc

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

E-1 Introduction

Bangladesh aims to achieve the status of a High-Income country by 2041 and an upper Middle-Income Country by 2031, as outlined in the main objective of the Perspective Plan 2041. This plan is designed to eliminate extreme poverty and is a continuation of the Vision 2021 (GED, 2020). Additionally, the country is committed to fulfilling the Sustainable Development Goals (SDGs). Bangladesh is on track to transition from a Least Developed Country (LDC) to a Developing Country by 2024.

The growth of steel production and consumption plays a crucial role in assessing a country's development. Over the past decade, Bangladesh has experienced a significant increase in both steel production and consumption, indicating rapid development. The country currently consumes over 7 million metric tons of steel, and the steel sector directly or indirectly employs around 1 million people.

With these ideas in mind, Meghna Re-Rolling and Steel Mills Ltd. (MRSML), a concern of the Meghna Group of Industries (MGI), one of the largest conglomerates in the country, has taken significant strides towards establishing a Greenfield Re-Rolling Steel Plant with a capacity of 1.4 million Metric Tonnes per Annum (MMTPA). The production capacity will be 1.4 million Metric Tonnes per year and a billet capacity of 0.9 million Metric Tonnes per year, featuring various grades. The proposed project will be situated at Cumilla Economic Zone (CuEZ), Luterchar, Meghna, Cumilla, under the jurisdiction of the Bangladesh Economic Zones Authority (BEZA) (Latitude: 23°34'59.46"N, Longitude: 90°39'0.58"E), covering a total project area of 71 acres.

A comprehensive Environmental and Social Impact Assessment has been conducted, complying with the requirements of the International Finance Corporation (IFC) Performance Standards and the relevant World Bank Group (WBG) Environmental, Health, and Safety (EHS) guidelines. This assessment includes an in-depth analysis of potential environmental impacts, social implications, and health and safety considerations associated with the project. It also involves stakeholder consultations, risk mitigation strategies, and a detailed management plan to ensure that all activities adhere to the highest international standards for sustainability and corporate responsibility. Additionally, the assessment addresses issues such as biodiversity conservation, pollution prevention, resource efficiency, labor conditions, and community health and safety, ensuring a holistic approach to sustainable development.

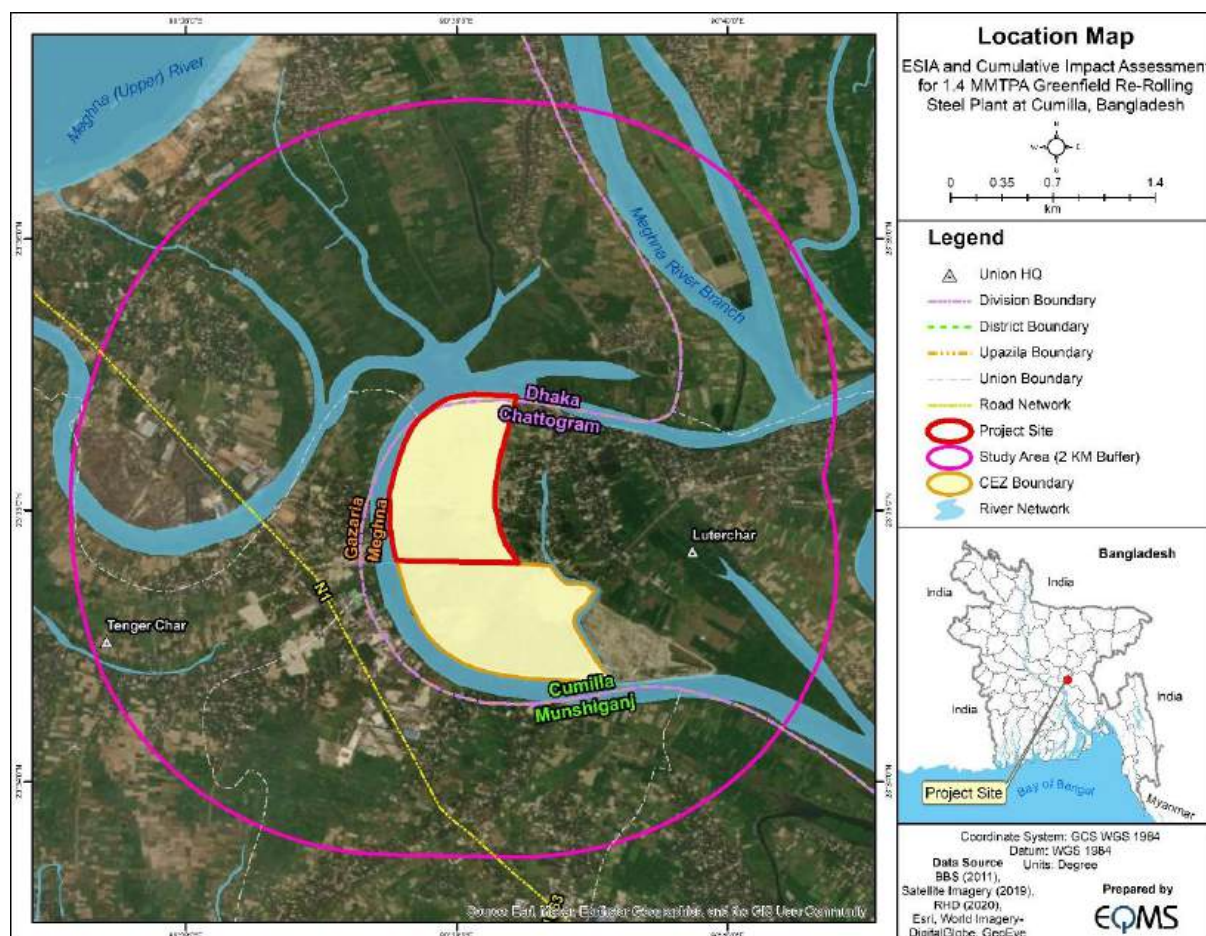
EQMS Consulting Limited (hereinafter referred to as "EQMS") was engaged by the Meghna Group of Industries (MGI) to carry out the Environmental and Social Impact Assessment (ESIA) for the Project.

E-2 Project Description

The proposed Meghna Re-Rolling & Steel Mills Ltd. is situated within the Cumilla Economic Zone, specifically in Block A, Plot No. # 1 - 7, 12 – 35, which falls under the Luterchar union within Meghna Upazila of Cumilla District under the Chattogram Division. The proposed project site is located between 23°35'25.10"N, 90°39'1.68"E and 23°34'48.55"N, 90°39'1.64"E. The tentative area of the proposed project is about 71 acres.

The proposed project site is accessible via an access road originating from Gazaria bus stand on the Dhaka-Chattogram Highway (N1). The national Dhaka-Chattogram highway runs adjacent to the western boundary of the project site, with a mere 1 km distance from the site. Additionally, the Cumilla Economic Zone is intersected by the Meghna-Homna Road.

Figure E-1: Location Map of the Study Area



Source: MGI and EQMS, 2024

The details of the site setting, and surroundings of the proposed project site are:

Table E-1: Details of site setting and surroundings of the proposed project site

SL #	Particulars	Details
1.	Geographical Location	Latitude: 23°35'25.10"N to 23°34'48.55"N and Longitude: 90°39'1.68"E to 90°39'1.64"E
2.	Relative Location	North: Branch of Meghna River, Balukandi union; West: Branch of Meghna River and Tenger Char; East and South-East: Luter Char union and South and South-West: Meghna Glass Industry, Branch of Meghna River, and Bashundhara Paper Mills
3.	Administrative Location	Union: Luter Char, Upazilla: Meghna, District: Cumilla, Division: Chattogram
4.	Climatic Condition	Temperature: The annual average temperature varies from a maximum of 34.3°C to a minimum of 12.7°C. Humidity: Average relative humidity is 76.50% Rainfall: The average annual rainfall is recorded at 2551 mm
5.	Area of the project	Approximately 71 acres

SL #	Particulars	Details
6.	Present Land Use	Area for proposed industries, Branch of Meghna River, vegetation, and open land area
7.	Plant Site Elevation	Average 17 m from ASL
8.	Plant Site Topography	Medium low land, the project area is barren and less productive land.
9.	Nearest Water Bodies	Meghna River (2.8km) and Branches of Meghna River (adjacent-3.9km), Kathalia River in the Meghna Upazila (8.7km).
10.	Nearest Highway	Dhaka-Chattogram Highway (N-1) at 1 km West
11.	Nearest Railway Station	Kamalapur Railway Station (33.7 km)
12.	Nearest Airport	Hazrat Shahjalal International Airport (55 km)
13.	Nearest Port	Chittagong Port (227 km, South-East); Bibir Bazar Land Port (71.3 km, East)
14.	Hills/valleys	None within 10 km
15.	Protected Areas (Pas)	No reserve or protected forest area was found in the study area. There are no national parks or wildlife sanctuaries in the district of Cumilla. The nearest Protected Areas are Mirpur Botanical Garden National Park (40km) and Bhawal National Park (56km).
16.	Marine Reserves	None within 10 km
17.	Ecologically Critical Area (ECAs)	None within a 10 km radius. The nearest Ecologically Critical Area is the Shitalakshya River (12km, West)
18.	Ramsar Sites	None within 10 km. The nearest Ramsar Site is the Sundarban Reserve Forest (160km)
19.	Important Bird Areas (IBAs)	None within 10 km. The nearest IBA is Jamuna-Brahmaputra River (91km)
20.	Archaeological Important Places	None within a 5 km radius
21.	Seismicity	As per the Bangladesh National Building Code (BNBC) 2020, the project site is situated in Zone-2 (seismic coefficient is 0.20 g)
22.	Risk	River Flood, Seismicity/Earthquake, Lightning, etc.
23.	Major Industries within a 5 KM radius	Meghna Glass Industry, Bashundhara Pulp and Paper Industries-Unit 3, JMI Industrial Park, Meghna Economic Zone, Meghnaghat Power Plant, Unique Power Plant, Fresh Cement.
24.	Socio-economic factors	No resettlement and rehabilitation

The Project is proposed to operate using a scrap-fed Electric Arc Furnace (EAF) based melt shop with a hot rolling mill. The production capacity will be 1.4 million Metric Tons/year and billet capacity of 0.9 million Metric Tons/year with different grades. The process starts with the unloading of the scrap materials from the wharf to scrap yard, followed by processing in the melt shop and rolling mill and finishes at the storage facility. At the beginning the scrap materials will be unloaded from the vessel and

stored in the scrap storage. In the steel making process, scrap is heated, melted, reduced in an electric arc furnace. It is then refined further in a ladle furnace, and the molten steel is then transferred to a continuous caster (CC), to produce billets. The billets are reheated and transferred to rolling process to produce MS Rods.

The project scope include:

- 1) Main production facilities:
 - Scrap steel workshop: including open-air storage yard, scrap steel shearing line, and scrap steel room.
 - Smelting workshop: 1150t DC electric furnace, 1150t ladle refining furnace, 1 set of flue gas treatment facilities.
 - Continuous casting workshop: 1 R9m5 flow billet continuous casting machine.
 - Steel rolling workshop: 1 bar production line with an annual output of 1 million tons; and
 - Steel slag processing workshop: 1 steel slag processing line with a capacity of processing 30 tons of steel slag per hour.
- 2) Auxiliary production facilities:
 - Water Treatment Plant (WTP)
 - Fume Treatment Plant
 - Oxygen station
 - Air compressor station
 - Machine repair facilities
 - Inspection and laboratory facilities
 - Warehousing facilities
 - Living service facilities
 - Steel library
- 3) Associated facilities:
 - A wharf with an operational capacity of 2 MMT/ year for raw material transportation.
- 4) Shared facilities:
 - A multistoried (G+10) office cum staff accommodation facility for operation phase.
 - Central Effluent Treatment Plant (CETP)
 - Central Sewage Treatment Plant (CSTP)
 - 230kV/33kV GIS substation and Transmission Line
 - Natural Gas Station and the 600m gas pipeline

Apart from the MRSML, the other proposed industry that shall be coming up is the Float Glass Factory (under construction) in the CuEZ.

According to the Feasibility Study Report, 2023, the total cost of the Project is estimated to be US\$ 396,693,606 after financing, including contingency. According to the MGI, it has been assumed that the completion of the proposed project will be finished within 3 years. The possible completion time of the proposed project is the end of 2025.

E-3 Administrative and Legal Framework

In order to ensure that all project activities to be implemented under the project are environmentally sound, socially acceptable and sustainable, an environmental and social assessment is conducted as per the IFC Performance Standards. The project will also comply the national law and standards, relevant to the project, covering national environmental, cultural, health, and safety legislation, as well as international standards including the WBG Environmental, Health and Safety General Guidelines, 2007, WBG Environmental, Health, and Safety Guidelines for Integrated Steel Mills, 2007, WBG Environmental, Health, and Safety Guidelines for Ports, Harbors, and Terminals, 2017, WBG Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution, 2007, IFC / EBRD Standards for Workers' Accommodation: Processes and Standards and Good International Industry Practice (GIIP).

Depending upon the location, size, and severity of pollution loads, projects activities, the overall project is categorized as “Red” as per ECR, 2023 of Department of Environment (DoE).

As per IFC Sustainability Framework, 2012, the project is categorized as “B” with respect to environmental and social categorization and the specific requirement of IFC.

E-4 Analysis of Alternatives

The alternatives to the project have been assessed based on the available sites and technology. No alternate sites have been considered as the steel manufacturing unit is being installed inside the economic zone. As per the ESIA of CuEZ 2023 or regulatory EIA, no other potential locations for the economic zone were considered apart from the existing location.

The Cumilla Economic Zone (CuEZ) location has been selected based on the availability and suitability of the communication system. CuEZ is situated south of the Meghna Bridge, adjacent to the Meghna-Homna Road in Meghna Upazila. It is conveniently located just 600 meters from the Dhaka-Chittagong highway and 4.5 kilometers from Meghna Bridge 1, making it highly accessible for potential investors. The zone's proximity to a branch of the Meghna River enhances its appeal, providing a reliable water source and facilitating transportation. The ongoing development of the economic zone is expected to attract significant interest, as establishing and operating industries here will be relatively straightforward. The zone will feature CETP, STP, and WTP facilities to treat industrial wastewater to national standards before discharge into the Meghna River branch, minimizing any negative impact on terrestrial and aquatic biodiversity. The land for the zone is owned by Cumilla Economic Zone Ltd, was purchased long ago, and has been designated for economic zone development by a BEZA gazette notification, eliminating any land acquisition issues. Located above flood levels, the site is ideal for the project's construction. Therefore, the site selection for CuEZL is highly suitable and offers several advantages over other locations.

The land area for the MRSML project was allocated by Cumilla Economic Zone (CuEZ) and location has been finalized based on the following considerations:

- Availability of adequate land for the proposed plant. A total of 71 acres of land is required for the plant area.
- Sources of supply of raw material.
- Existence road connections in the vicinity for transportation of incoming and outgoing materials.

The technological options have been considered keeping in view the following criteria:

- Adoption of modern technology
- Capacity of the plant
- Selected product mix
- Conservation of scarce and costly energy input
- Suitability of available raw materials
- Cost considerations.

MRSML is adopting the latest modern technology for the proposed steel manufacturing unit.

E-5 Environmental and Social Baseline

The description of the existing environment provides the baseline case against which any potential impacts of the Project can then be assessed. For the steel manufacturing plant, a 5 km radial zone around the site has been considered for ESIA to ascertain the presence of sensitivities/ sensitive receptors in this region. The description of the existing environment section of this report is presented in two main parts. First, the environmental aspects of the Project area are presented covering physical environments (i.e., soil quality, ambient air quality, water and groundwater quality and quantity aspects, etc.) and biological environments (i.e., flora, fauna, and ecological aspects) are presented.

Ambient air quality baseline monitoring has been performed via six monitoring locations based on prevailing wind direction and locations of the social receptors have been taken into consideration. The monitoring results including Particulate Matters (PM₁₀ and PM_{2.5}), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂) and Carbon Monoxide (CO), indicate compliance with the national ambient air quality standards and WHO guidelines.

Noise monitoring was conducted at ten locations for four days within the study area during the baseline survey in February 2024. Social sensitive receptors have been considered for selection on the locations for monitoring. Noise levels of all locations have been found below the national Noise Pollution Control Rules, 2006 Standards except ANL-1, ANL-3 and ANL-10. Based on the noise monitoring locations, these locations mostly emerge as the closest point to the Dhaka-Chittagong Highway and close to marketplaces. The primary contributor to the elevated noise levels there is the substantial traffic flow.

Two (2) surface water samples have been collected from Meghna River branch during the baseline survey from the proposed project area. The parameters were found well within the limits of the national standards. Three (3) groundwater (deep wells) samples have been collected during the baseline survey from the proposed project area. All the parameters were found to be well below the national standards.

As part of this study, soil quality was monitored in three locations - at nearby open fields. Also, five sediment samples were collected from different locations for sediment quality analysis. The parameters were found well within the limits of the national standards.

There are no ecologically critical areas, protected areas, national parks, world heritage sites, important bird and biodiversity areas, etc. in the project site and within a 10 km radius of the project site. Therefore, it is expected that the project will not impact ecologically sensitive areas. No Critically Endangered species were found during the ecological baseline survey.

The social and economic aspects of the Project area (i.e., demographics, employment, cultural aspects, etc.) are presented in the baseline. The social and economic environment, the Project area is categorized by its relatively medium population density and presence of several small settlements. There is a prevalence of low to medium average incomes, and the area's social infrastructure is poorly developed. Low literacy rates and high rates of unemployment around the Project area are common.

E-6 Impact Assessment and Evaluation

Preconstruction and Construction Phase

The major activity of the construction phase will involve site preparation, civil construction for the furnace shed, and clearing of obstacles if necessary. The major impact in these phases will be on ambient air quality due to dust generation, use of fuel oil like diesel for operating generators. To minimize the impacts on ambient air quality, it is suggested that while doing the earthworks the spoiled soil should be kept with proper cover, use one road for carrying loose raw materials for construction, regular sprinkling of water to avoid dust, etc.

Impact on ambient noise level will be due to construction work noise, operation of the generator, excavator, etc. One mitigation measure would be to use noise barriers to minimize the noise. Another measure is to do these kinds of works in the daytime from 8 AM to 6 PM

Surface water quality can be affected by run-offs from the construction site, mixing rainwater with sediments. Improper management of waste from construction activities and workers facilities may cause short-term impacts of surface water quality. Waste will be generated on the project site which might create odor and needs to be properly cleaned.

During construction, the project will generate a limited amount of hazardous and non-hazardous waste, which could temporarily affect air, soil, and surface water quality.

There is a possible positive impact in this phase as employment generation will be there due to the various project activities.

Occupational health and safety are another important impact of this phase as heavy machinery will be operated.

During the construction phase, the contractor will develop and implement site -specific management plans to monitor and manage the impacts. Below is the set of site-specific management plans:

Dust Management Plan; Traffic Safety Management Plan; Noise and Vibration Management Plan; Soil and Groundwater Management Plan; Waste Management Plan (Hazardous and non-Hazardous Waste); Oil and Chemical Spill Contingency Management Plan; Emergency Response Plan (including Community Emergency Response Plan); Community Health Management Plan; Occupational Health and Safety Management Plan; Workers' Accommodation Management Plan; Local Recruitment and Procurement Plan; Influx Management Plan; Cultural Heritage, Chance Find Procedure; Security Plan; and Contractor Management Plan etc.

Operation Phase

The major impact on the operation phase of this project will be on noise, air, and water availability. During the operation phase generation of slag and other solid wastes will have impact on environment. Handling heavy machinery, cranes, hazardous materials will need proper monitoring and use of PPE.

If air emissions are not regulated or managed properly, it could lead to adverse effects on the health of the community. Such emissions may include particulate matter, heavy metals, and other pollutants, which can pose significant health risks such as respiratory ailments, cardiovascular problems, and even long-term chronic conditions. Therefore, it stresses the critical importance of implementing effective control measures to mitigate the impact of industrial emissions on community health. In order to deal with the flue gas and dust generated by the electric furnace, LF furnace, feeding system and continuous casting respectively, the project will set up flue gas treatment facilities (such as fume treatment plant, dust removal system) to purify the flue gas, smoke and dust during the operation of furnaces and casting, to improve the sanitary conditions of the operating positions and protect the staff of physical and mental health. Also, to prevent and control noise, the project will take measures such as installing mufflers, shock absorbers, and vibration isolation pads. On the premise of meeting the process design, low-noise mechanical equipment, pumps and other equipment will be selected. For process equipment that produces larger noise (such as electric furnaces, LF furnaces, etc.), soundproof doors and windows will be used in the operating rooms near the sound source. The combustion air fan room of the heating furnace shall be muffled, and a silencer shall be installed at the entrance of the combustion air fan to reduce the noise level 1m outside the fan room. ≤85dB (A).

The positive impact in is phase will be permanent employment for more manpower required to operate the plant.

The impacts of the project decommissioning phase will be similar to the construction phase. The main impact will be on the handling of construction debris. Air pollution is anticipated during this stage due to the demolition of structures. Proper covering of waste material (debris) will reduce air pollution to some extent. As per the IFC EHS Guidelines for Construction and Decommissioning (2007), during demolition, a waste management hierarchy will be established that considers prevention, reduction, reuse, recovery, recycling, removal, and finally disposal of wastes. This includes the use of adequate secondary containment for fuel storage tanks, portable spill containment, and cleanup equipment on-site during demolition. Workers will be trained in the correct transfer and handling of demolition waste. Other domestic trash and garbage, as well as inert demolition materials such as metal scrap and empty containers, will be transported and disposed of properly.

Energy consumption per ton of steel production is 3.1 Gj for MRSML which is little more than international best practice value of 2.6 Gj¹. The following table summarizes the different impacts of the projects.

¹ Industrial Energy Efficiency Benchmarking Report for Iron and Steel Sector, Australian Energy Agency

Table E-2: Summary of different potential impacts from the project activities.

Project Activity	Environmental Resources/Receptors	Environmental Components																												
		Physical Environment													Biological Environment						Social Environment									
		Aesthetic & Visual Impact	Land use/Land Resources	Landscape/Topography	Soil quality/Resources	Sediment Quality	Surface Water Quality	Surface Water Quantity	Ground Water Quality	Ground Water Quantity	Ambient Air Quality	GHG Emission	Ambient Noise Level	Vibration level	Hydrology/Drainage Pattern	Vegetation /Flora	Fish Fauna	Avifauna & Chiropter fauna	Herpetofauna	Terrestrial Mammals	Aquatic Mammals	Occupational Health & safety	Economy and Livelihood	Employment	Traffic (Road & River)	Population Displacement	Infrastructure and services	Community Health & Safety	Social Conflict	Archaeology & Cultural Heritage
Pre-construction Phase																														
Preliminary survey and licensing process																														
Land Purchase/ lease																														
Site cleaning/trees/vegetation removal																														
Soil collection and transportation to the site																														
Land filling, soil compaction & levelling																														
Construction Phase																														
Establishment of labor camp & accommodation																														
Solid waste handling & disposal																														
Sewage disposal																														
Transportation, unloading, storage, and handling of construction materials, machinery																														
Preparation/mixing of construction material																														
Construction of wharf																														
Civil Construction																														
Mechanical and Electrical Activities																														
Maintenance and replacement of machinery																														
Demobilization of construction machinery																														
Disposal of construction wastes																														
Operation Phase																														
Transportation of steel scrap and metal																														
Unloading and transfer operations and storage in the stockyard																														
Emission generated from the operation of furnace, maintenance of equipment and machinery.																														
Fugitive emissions																														
Noise and vibration from the operation of the furnace and rolling mill, sorting of scrap and loading, storage and transport of finished product																														
Utilization of wharf and transportation of material via Meghna River																														
Utilization of Surface and groundwater for plant operation																														

Project Activity \ Environmental Resources/Receptors	Environmental Components																												
	Physical Environment														Biological Environment						Social Environment								
	Aesthetic & Visual Impact	Land use/Land Resources	Landscape/Topography	Soil quality/Resources	Sediment Quality	Surface Water Quality	Surface Water Quantity	Ground Water Quality	Ground Water Quantity	Ambient Air Quality	GHG Emission	Ambient Noise Level	Vibration level	Hydrology/Drainage Pattern	Vegetation /Flora	Fish Fauna	Avifauna & Chiropter fauna	Herpetofauna	Terrestrial Mammals	Aquatic Mammals	Occupational Health & safety	Economy and Livelihood	Employment	Traffic (Road & River)	Population Displacement	Infrastructure and services	Community Health & Safety	Social Conflict	Archaeology & Cultural Heritage
Generation, treatment, and disposal of effluent																													
Domestic, solid, and other non-hazardous waste handling, storage, and disposal																													
Hazardous material and waste storage																													
Maintenance and replacement of equipment																													
Greenbelt development																													
Emergency due to natural disasters																													
Decommissioning Phase																													
Dismantling of infrastructure and replacement of dysfunctional equipment and installations																													
Waste disposal																													

E-7 Environmental and Social Management Plan

An ESMP forms the primary mechanism for management, accountability, monitoring, and reporting on a number of mitigation measures to manage adverse impacts and recommendations to enhance benefits are captured in the Environmental and Social Management Plan (ESMP). The ESMP also includes the following:

- Environmental and Social Mitigation Plan
- Environmental and Social Monitoring Plan

Environmental and Social Mitigation Plan

The ESMP and other management plans have been developed in accordance with the requirements of national and PSs and WBG general and sector-specific EHS guidelines. The ESMP consists of the set of mitigation, monitoring, and institutional measures to be taken during the implementation and operation of a project to eliminate adverse environmental and social risks and impacts, offset them, or reduce them to acceptable levels. The ESMP also included the measures and actions needed to implement these measures. The ESMP and other plans will be implemented during construction and operation of the project. The ESMP takes each of the impacts identified in the impact assessment of the ESIA and sets out the management/mitigation measures needed to deal with the impacts as well as describing responsibility for implementing these.

The environmental and social management plan has been described elaborately in Chapter-7 in this report.

During the construction phase, the responsibility of implementation of measures will be on contractor under the supervision of Project management team and designated HSE team of MRSML. For the operation phase, the implementation and supervision responsibility will be on the designated HSE team of MRSML.

Environmental and Social Monitoring Program

Successful implementation of the ESMP depends on regular monitoring with the selected indicators at specified locations in and around the project area. During all phases, ambient air quality, ambient noise level, water quality waste and other social issues will be monitored regularly as stipulated in the environmental monitoring plan per site-specific ESMPs.

The estimated cost for implementation of the mitigation and monitoring measures proposed in the ESMP is estimated to be BDT 5,620,000.

E-8 Stakeholder Engagement and Consultation

Stakeholder engagement is the continuing and iterative process by which the borrower identifies, communicates, and facilitates a two-way dialogue with the people affected by its decisions and activities, as well as others with an interest in the implementation and outcomes of its decisions and the project.

Stakeholder meetings for this project involved both affected and interested parties in line with the IFC's PS1. The purpose of the stakeholder meeting was to inform the people about the project briefly and obtain their views and opinions for a fruitful project design with mitigating impacts that are supposed to arise from the project. Stakeholders were engaged through Focus Group with community people (male, female, youth, farmer, land sellers and fisherman), Key Informant with Political and Administrative Officials and a consultation with various participants (elected representatives, local elites, political leader, religious leader, general people and youths) from the study area those who have keen knowledge about the project and interest as well.

More than ten key informant interviews, nine focus group discussions (both formal and informal) and one large-scale stakeholder consultation meetings were initially held. The study has addressed each

stakeholder's concern with the development of specific mitigation and management measures. A strategy for managing stakeholders has been proposed, like in which stage (construction, operation) who should be engaged as a stakeholder and how s/he should be managed with proper consultation. Who from the company will be responsible for the engagement process and the frequency of engagement including other factors also been described in line with the PS1.

E-9 Risk Assessment

A project specific risk assessment and emergency response plan has been developed in Chapter-9. A framework ERP has been developed in section 9 in the ESIA report. The major risks of the projects are gas leaks, accidental discharge of hydraulic oil under pressure, short circuit, slag handling etc. The ERP includes detailed step-by-step procedures to follow in emergencies situation such as fire or a major accident.

The ERP also includes information like whom to notify, who should do what, and location of emergency stock. The Emergency Response Plan includes any measures that should be in place at all facilities to combat an accident resulting from fire, explosion or due to any natural calamities (e.g., Earthquake, cyclones, fire).

E-10 Conclusion and Recommendation

After reviewing the detailed technical project documents on the steel plant, auxiliary and associated facilities, conducting site visits and carrying out detailed baseline surveys, and consulting with both the project proponent and the local community, no critical or red flag issues that warrant immediate concern have been identified. No major adverse environmental and social impact is to be associated during the construction, operation, and decommissioning phase of the Project. However, appropriate mitigation measures would be undertaken that would reduce the small to moderate impacts to an acceptable level as prescribed in the IFC PSs, WBG EHS guidelines and Environmental Quality Standards of Bangladesh. All these mitigating measures have been discussed in detail in this report.

The project also has a positive impact in terms of employment both its construction and operational and decommissioning phase. The most significant positive impacts of the project would be reduced pressure to meet domestic and industrial demand of steels of the country and to contribute largely to save foreign currency in establishing this industry.

Based on the findings of the ESIA study, it can be concluded that:

- Based on the air dispersion modelling of the stacks of the steel plant, predicted maximum concentrations of pollutants are well within the national ambient air standard levels and World Health Organizations (WHO) ambient air quality guidelines. Also, concentration of all pollutants at 5 km distance was found to be negligible.
- The "Fume Treatment Plant" aims to decrease air pollution, while the production process generates hazardous solid waste, known as slag. This waste will be managed by a "Slag Treatment Plant" for recovery and recycling.
- There is no wastewater discharge from the process. The cooling tower will be closed-loop and the blow-down from the tower will be connected to CETP of the CuEZ. A Central Sewage Treatment Plant (CSTP) to be installed under the CuEZ to treat the domestic sewage generated from the office building and labor accommodation. Zero discharge system will be adopted, and the treated water will be utilized in toilet flushing, vehicle washing and gardening purposes. Since the CETP and CSTP are shared facilities under the economic zone, the CuEZ will ensure that the other industries within the economic zone meet national and international compliance requirements.
- There are no ecologically critical areas, protected areas, national parks, world heritage sites, important bird and biodiversity areas, etc. in the project site and within a 10 km radius of the project site. Therefore, it is expected that the project will not impact ecologically sensitive areas.

- In terms of socio-economic environment, no direct effects on local households are anticipated by the project proponent as the proposed steel plant project is going to be established inside the Cumilla Economic Zone (CuEZ). During the site visit and interactions with landowners and project authority, it was confirmed that no physical and economical displacement had taken place. It was also confirmed that the procurement of land was based on a “willing buyer/willing seller,” process wherein the households had voluntarily sold their property and assets. Existing access roads will be used, and no physical relocation will be necessary for the implementation of the Project. There may be some risk of communicable and sexually transmitted diseases due to the possible labor influx during the construction and operation phase of the project. However, awareness and training will be carried out to mitigate the impact. Fishing activities in the river, especially near the wharf construction and operation site, water intake point, and WTP outlet point, may be impacted during the project's operation. The project will not have impact on the indigenous people and cultural heritage. During the ESIA, no excavation activities were taking place for the wharf.
- A detailed flood risk assessment for a proposed project is conducted to evaluate the potential impact of flooding on the project site and its surroundings. As per the assessment, the project area has no flooding history after the construction of MRSML project development area. Also, the drainage system of MRSML is sufficient. The topographic elevations inside the MRSML area have been found between 2.289m (MSL) to 11.403m (MSL). From the Flood Frequency Analysis (FFA) it has been found that the highest flood level for 2 (average), 5, 10, 20, 50 and a 100-years levels will be 4.67, 5.43, 6.05, 6.64, 7.41 and 7.99 m (MSL) respectively, according to Gumbel Extreme value analysis methods of hydro-statistics. From river Bankline shifting analysis, it has been found that the net riverward shifting was dominated during the years between 2004-2024, and no such drastic shifting due to bank erosion or heavy flood flow to MRSML project boundary, thus indicating no risk. Similarly, from the analysis of riverbank erosion-deposition, it was found that “No River Change” condition is dominated. Thus, no risk found.
- Cumulative impacts are expected from the proposed project, e.g., from the laying of the gas supply pipeline, substation and transmission line, strengthening of access roads and internal roads, wharf construction and operation, water intake from the river, discharge of water from WTP, existing other projects in the CuEZ and surrounding area, etc. However, as per the industry mapping most of the heavy industries are situated on the edge of the 5 km radius of MRSML and situated on the other side of the Meghna River. As per preliminary assessment of VESCs, cumulative impacts on physical, biological and socio-economic environmental conditions will be limited and largely reversible and can be minimized by implementing mitigation measures.

The implementation of Meghna Re-Rolling and Steel Mills Ltd. within the Cumilla Economic Zone, along with the adoption of mitigation measures, is expected to exert a limited and site-specific influence on both the physical and socio-economic aspects of the microenvironment and macro-environment in the project area. In order to mitigate the estimated environmental and social impacts, especially in the operational phase of the plant, the recommendations provided in the ESMP should be followed with due diligence. Additionally, some of important actions required are:

- The stack emission monitoring, considering the parameters HF, HCl, PAH, dioxin, and furans (PCDD/F), is recommended to be conducted during the operational phase of the plant. If any of these parameters are found at that time, MRSML will assess the impact using air dispersion modeling and adopt mitigation measures.
- MRSML is recommended to conduct periodic indoor air quality monitoring during the operational phase to identify the risks associated with occupational health.
- MRSML is recommended to carry out site-specific emergency response plan including disaster management plan prior to operation phase.
- Training of employees in occupational safety and health administration including available sewage facilities, sanitation, etc.

- Activation of grievance redress committee and prompt response to public and employee complaints.
- Installation of rainwater harvesting system.
- Allocation of adequate resources for implementation of ESMP.
- Construction and operation phase E&S verification audits to evaluate the environmental and social impacts from the project and compare those with the ESIA.

CHAPTER 1

Introduction

1 INTRODUCTION

1.1 Background

Bangladesh aims to achieve the status of a High-Income country by 2041 and an upper Middle-Income Country by 2031, as outlined in the main objective of the Perspective Plan 2041. This plan is designed to eliminate extreme poverty and is a continuation of the Vision 2021 (GED, 2020). Additionally, the country is committed to fulfilling the Sustainable Development Goals (SDGs). Bangladesh is on track to transition from a Least Developed Country (LDC) to a Developing Country by 2024.

The growth of steel production and consumption plays a crucial role in assessing a country's development. Over the past decade, Bangladesh has experienced a significant increase in both steel production and consumption, indicating rapid development. The country currently consumes over 7 million metric tons of steel, and the steel sector directly or indirectly employs around 1 million people.

Of the total production, 60% of steel is utilized in Bangladesh's public sector, 25% in households, and 15% in commercial construction. The demand for steel in Bangladesh is on a significant upswing. A decade ago, the demand stood at 1.6 million metric tons, but it surged to 7 million tons in 2018 and is projected to escalate further to 18 million tons by 2030.

1.2 Overview of the Project

The Meghna Group of Industries (MGI) stands as one of the largest conglomerates in Bangladesh, presently overseeing over 50 major concerns scattered across the country. Its diverse portfolio encompasses industries such as pulp & paper tissue, power plants, oil refineries, flour mills, polyvinyl chloride (PVC) resin plants, petrochemicals, ceramics, liquefied petroleum gas (LPG) facilities, beverage production, food items, fibre bags, steel construction, plastics, packaging film, pharmaceutical bottles, garments accessories, plastic items, and chemicals, among others.

Meghna Re-Rolling and Steel Mills Ltd. (MRSML), a concern of the Meghna Group of Industries (MGI), one of the largest conglomerates in the country, has taken significant strides towards establishing a Greenfield Re-Rolling Steel Plant with a capacity of 1.4 million Metric Tonnes per Annum (MMTPA). The production capacity will be 1.4 million Metric Tonnes per year, along with a billet capacity of 0.9 million Metric Tonnes per year, featuring various grades. The proposed project will be situated at Cumilla Economic Zone (CuEZ), Luterchar, Meghna, Cumilla, under the jurisdiction of the Bangladesh Economic Zones Authority (BEZA) (Latitude: 23°34'59.46"N, Longitude: 90°39'0.58"E), covering a total project area of 71 acres.

In accordance with regulatory requirements, Meghna Group of Industries (MGI) conducted an Environmental Impact Assessment (EIA) for the proposed project, obtaining environmental clearance on 18 December 2022. However, gaps were identified between the EIA conducted per national requirements and the requirements of IFC Performance Standards (PSs). These gaps include the absence of detailed alternative analysis, robust baseline data collection, modelling and risk assessment, analysis of the impact of associated facilities like wharf, and shared facilities such as G+10 accommodation units, CETP, CSTP etc., lack of consideration for fire and life safety risk assessment and management, examination of climate change impacts, including flooding, thorough public and stakeholder consultations, and the absence of a Cumulative Impact Assessment (CIA) performed in line with the requirements of IFC PS1, among others.

The project will also comply the national law and standards, relevant to the project, covering national environmental, cultural, health, and safety legislation, as well as international standards including the WBG Environmental, Health and Safety General Guidelines, 2007, WBG Environmental, Health, and Safety Guidelines for Integrated Steel Mills, 2007, WBG Environmental, Health, and Safety Guidelines for Ports, Harbors, and Terminals, 2017, WBG Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution, 2007, IFC / EBRD Standards for Workers' Accommodation:

Processes and Good International Industry Practice (GIIP).EQMS Consulting Limited (hereinafter referred to as “EQMS”) was engaged by the Meghna Group of Industries (MGI) to carry out the Environmental and Social Impact Assessment (ESIA) for the Project.

This report entails the Environmental and Social Impact Assessment of the 1.4 MMTPA Greenfield Re-Rolling Steel Plant that uses an Electric Arc Furnace (EAF). The report has been prepared based on the review of the detailed project information, site reconnaissance of the AOI, primary environmental and social survey, review of secondary environmental and socio-economic data available for the Project site and surrounding areas.

1.3 Objective of the Study

As per the Terms of References (ToR), the principal objective of this assignment is to carry out an ESIA to (i) assess the E&S impact of the Project through the project lifecycle, (ii) evaluate alternatives, and (iii) design appropriate mitigation, management and monitoring measures. The ESIA will provide E&S mitigation related design inputs, which shall be integrated into the project technical design following the E&S risks and impacts avoidance strategy. The ESIA will be conducted in accordance with the requirements of IFC PS1 and WBG EHS guidelines will consider, in an integrated way, all relevant direct, indirect, and cumulative E&S risks and impacts of the project, including those specifically identified in IFC PS1 – 8.

The ESIA assignment will be executed in a phased approach comprising an initial Environment and Social (E&S) scoping study followed by the comprehensive Environmental and Social Impact assessment study (ESIA).

The key objectives of the ESIA are to:

- Provide critical input to MGI and its Contractors to adopt E&S risk management hierarchy of avoidance, reduction, mitigation and management strategy through the project life cycle.
- Determine the environmental and social (E&S) baseline conditions at the project's primary and secondary Areas of Influence (AOI) and identify any significant environmental & Social issues.
- Analyze all feasible project design and development alternatives that can align to E&S risk management hierarchy of avoid, reduce, mitigate and manage.
- Prepare an inventory of biodiversity (flora and fauna) affected due to project activity (if any)
- Identify natural habitat and critical habitat values according to the IFC Performance Standards (PS) 6 Guidance Notes (2019).
- Assess the E&S risks and impacts (direct; indirect; cumulative; and impacts on vulnerable project affected persons/groups, impacts on aquatic and terrestrial biodiversity) resulting from the construction and operation of the project, within the project's primary and secondary AOI.
- Identify appropriate/effective/practicable mitigation measures, and develop E&S management and monitoring programs, based on a clearly articulated avoid/ minimize/ mitigate/ compensate and/or offset mitigation hierarchy.
- Effectively and representatively identify and consult key stakeholders through the ESIA scoping and impact assessment process, in relation to potential project benefits and negative E&S impacts and demonstrate that stakeholder views have been incorporated into the project's E&S design.
- Critically evaluate all possible catastrophic accident and emergency scenarios through the project life cycle and provide critical inputs to MGI and formulate appropriate safeguards for associated quantitative risks & disasters.

1.4 Scope of ESIA Study

As per the ToR, scope of the ESIA is to:

- i. Determine the Environmental and Social and Economic baseline conditions in the project's area of influence. The ESIA shall detail the baseline data relevant to decisions about project location, design, operation, or mitigation measures. This should include a discussion of the accuracy, reliability, and sources of the data and information about dates surrounding project identification, planning and implementation.
- ii. Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions.
- iii. Based on current information, assesses the scope of the area to be studied and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences.
- iv. Takes into account current and proposed development activities that are not funded as part of the Project, within the project area but not directly connected to the project.
- v. Analyze all feasible project alternatives including but not limited to: (a) no project alternative; (b) Plant location alternatives; and (c) different technology options for the plant storage and transport. The ESIA shall systematically compare feasible alternatives to the proposed project site, technology, design, and operation including the "without project" situation in terms of their potential environmental and social impacts. It shall also assess the alternatives' feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of alternative mitigation measures, and their suitability under local conditions; and the institutional, training, and monitoring requirements for the alternative mitigation measures. For each of the alternatives, the ESIA shall quantify the environmental and social impacts to the extent possible and attach economic values wherever feasible.
- vi. Assess the E&S risks and impacts (direct; indirect; induced; cumulative; including impacts on vulnerable project affected persons/groups) resulting from the construction, operation and decommissioning of the project including its associated facilities.
- vii. Identify appropriate/effective/practicable mitigation measures, and develop E&S management and monitoring programs, based on a clearly articulated mitigation hierarchy (avoid/minimize/mitigate/compensate and/or offset) that meets national and international standards, requirements and guidelines. The ESIA shall also identify mitigation measures and significant residual negative impacts that cannot be mitigated and, to the extent possible, assesses the acceptability of those residual negative impacts, identify differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, assesses the feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of proposed mitigation measures, and their suitability under local conditions; and the institutional, training, and monitoring requirements for the proposed mitigation measures and specify issues that do not require further attention, providing the basis for this determination.
- viii. The ESMPs should identify measures and actions in accordance with the mitigation hierarchy that reduce potentially adverse environmental and social impacts to acceptable levels. The plan will include compensatory measures, if applicable. Specifically, the ESMPs: (i) identifies and summarizes all anticipated adverse environmental and social impacts (including those involving indigenous people or involuntary resettlement); (ii) describes with technical details each mitigation measure, including the type of impact to which it relates and the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate; (iii) estimates any potential environmental and social impacts of these measures; and (iv) takes into account, and is consistent with, other mitigation plans required for the project (e.g., for involuntary resettlement, indigenous peoples, or cultural heritage).
- ix. Throughout the ESIA process, effectively identify and consult with project affected persons (PAPs), if any and local community members of the general public, and other key stakeholders

in relation to potential project benefits and adverse E&S impacts and demonstrate that stakeholder views have been incorporated into the project design.

The ESIA Consultant shall undertake the following work:

- Propose a specialized team of experts required to undertake the ESIA study with the team specifically (including international experts) having specialized experience in hazardous chemical, process safety, biodiversity, environmental pollution and social risk management.
- Review all available existing information on environmental and social baseline conditions and potential impacts related to the Project, and ancillary and associated facilities.
- Review, analyze and provide the policy, legal, and administrative framework for this Project as part of the ESIA report.
- Based on E&S scoping outcome discussed earlier, identify key E&S risk issues/impacts and potential legacy contamination risks (soil and groundwater), if any for the Project.
- Clearly define the project's area of influence (Aol), including auxiliary and supporting facilities that are part of the project, and the area of influence related to associated facilities.
- Conduct detailed E&S desktop and field based social and environmental baseline studies.
- Conduct site visits, with the team of experts, including for formal and informal discussions/meetings with local communities, government entities and other key stakeholders, in the project affected area/ Aol (community, village, union level and Upazila & district levels). Consultations will enable both verification of the information reviewed from existing sources about the project's social and environmental context, an initial screening of likely environmental and social impacts and sensitivities, and for all relevant stakeholders to be informed about the project. Any contact or interviews for preparation of baselines or social assessment should be planned and carried out in a culturally appropriate manner, in a language acceptable and used by the communities and, if relevant, in coordination with any other preparation work being carried out in relation to the project. Consultations shall be held in Bengali language (both original and translated versions shall be annexed in the report).
- Conduct, using the specialized team of experts, baseline studies, covering the all the relevant aspects, risks and impacts; and analysis including modelling for appropriate design (air emission, ambient noise and ambient air quality as a minimum), construction and operation of the project.
- Based on the above, prepare the ESIA report consistently with the requirements of PS1 to PS8, applicable WBG EHS guidelines and the applicable national law.
- Design, carry out, and document the public/stakeholder consultations and engagement throughout the ESIA process. This will lead to preparation of: (i) the project's grievance redress mechanisms and channels; and (ii) a project Stakeholder Engagement Plan (SEP), annexed to the ESIA main report. Men, women and vulnerable groups/persons should be included in the stakeholder identification and analysis. This will ensure the impacts and mitigation measures are properly consulted with affected communities and any feedback received is incorporated into the project design, mitigation and management measures.
- The ESIA should include detailed Environmental and Social Management Plans (ESMPs) in compliance with the applicable requirements covering both construction and operation and maintenance (O&M) phases of the project.

1.5 Applicable Reference Framework

The following reference framework will be followed in this study:

- **National Standards and Guidelines:**
 - Environmental Conservation Act, 1995, and its subsequent amendments
 - Environmental Conservation Rules, 2023
 - EIA Guidelines for Industries, 2021

- Noise Pollution (Control) Rules, 2006
 - Air Pollution (Control) Rules, 2022
 - Solid Waste Management Regulations, 2021
 - National Occupational Safety and Health Policy, 2013
 - Explosives Act, 1888, and Factories Act, 1965
 - Bangladesh Labor Law, 2006 and its amendments
 - The Building Construction Act, 1952 (with subsequent amendments)
 - Standing Orders on Disaster, 2010 and Disaster Management Act, 2012
 - National environment standards/guidelines on air, water quality, liquid effluent discharges, and ambient noise standards.
 - Other national policies, laws, regulations, and standards belonging to environmental quality, health and safety, wildlife conservation, protected areas, land use control, land acquisition, involuntary resettlement, water resources management, etc., and socio-economic and cultural issues at the national and local levels.
- **International Standards and Guidelines:**
 - IFC Performance Standards, 2012.
 - World Bank Group (WBG) General Environmental, Health, and Safety (EHS) Guidelines (2007).
 - WBG EHS Guidelines for Ports, Harbors and Terminals (2017).
 - WBG EHS Guidelines for Electric Power Transmission and Distribution (2007).
 - WBG EHS Guidelines for Integrated Steel Mills (2007).
 - All ILO conventions signed and ratified by the country, all ILO conventions covering core labor standards, and all ILO conventions covering the basic terms and conditions of employment.
 - IFC / EBRD Standards for Worker's Accommodation (2009)
 - **Good Practice Guidance**
 - Applicable International Regulations/Conventions/Good International Industry Practices (GIIP) on the Scrap Steel industry.
 - IFC's Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets, 2013.

1.6 Approach and Methodology

The approach and methodology are outlined based on available information about the proposed project, our prior experience in comprehending similar projects, and compliance with regulatory requirements in Bangladesh, as well as complying the criteria set forth by the International Finance Corporation (IFC).

1.6.1 Approach of ESIA Study

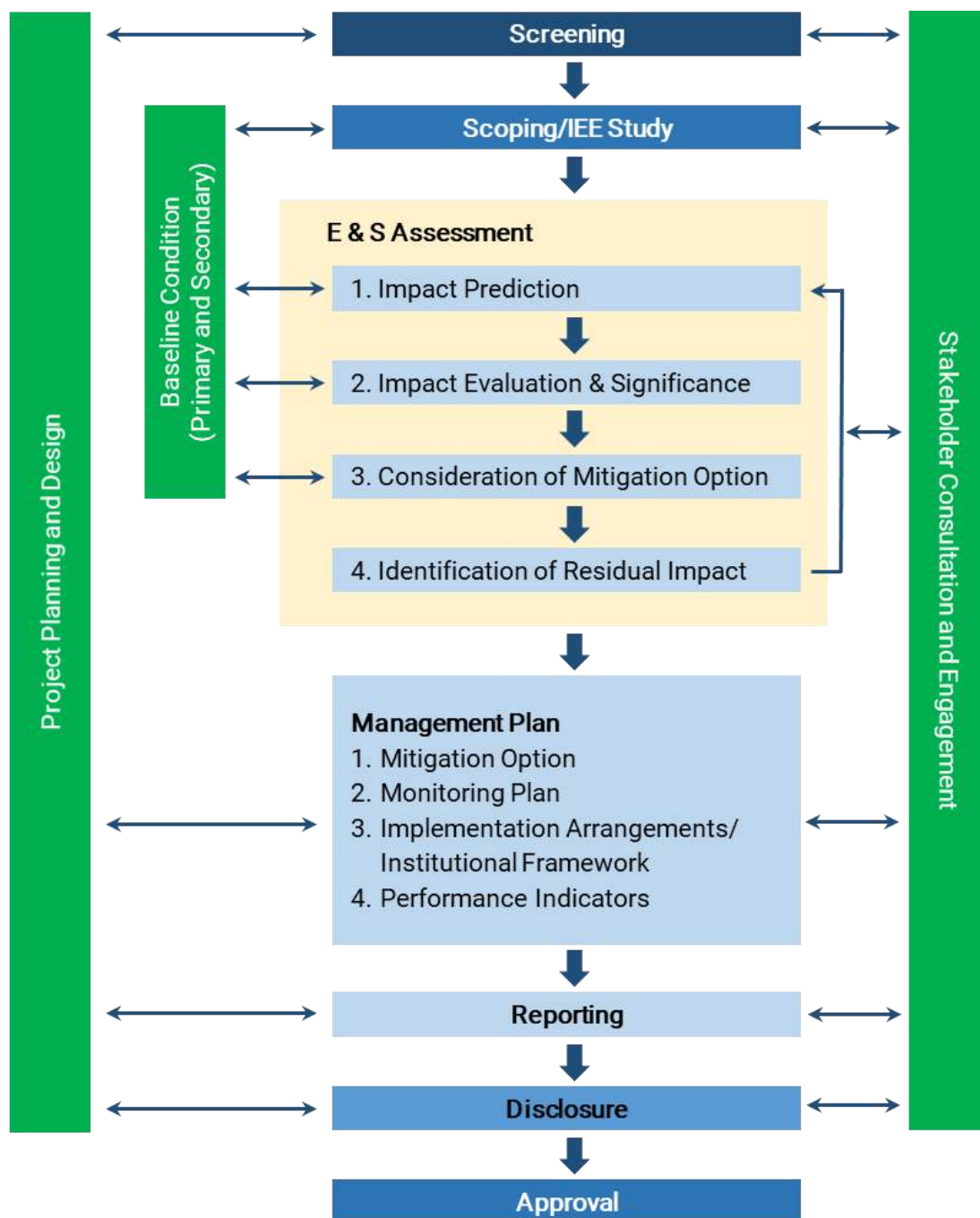
The ESIA of the project has followed a systematic process of:

- **Screening Study:** The proposed project falls under the "Red" Category as per Schedule-1 of the Environment Conservation Rules, 2023. Also, the project has been categorized as category "B" with respect to environmental and social categorization and the specific requirement of IFC.
- Conduction of **environmental and social baseline conditions** against which the assessment has undertaken.
- **Consultation with stakeholders** and integrate their views into the project design and mitigation.
- Systematically **predict and evaluate the positive and negative changes** in these baseline conditions.

- All impacts and benefits of the project should be documented and fully explained within the **ESIA report**.
- **Identification of the mitigation measures** that the client to avoid, reduce, remedy offset, or compensate for adverse impacts, and to provide or enhance benefits from the project.
- Development of an **Environmental and Social Management Plan (ESMP)**.

The approach proposed for conducting the Environmental and Social Impact Assessment (ESIA) study for the selected project is presented in Figure 1-1.

Figure 1-1: Approach to the ESIA study



Source: EQMS, 2024

1.6.2 Methodology for the ESIA Study

To fulfill the scope of work, the Environmental and Social Impact Assessment (ESIA) study relied on existing document review, both collecting primary and secondary baseline information, conducting impact assessments, and outlining the Environmental and Social Management Plan (ESMP).

1.6.2.1 Desktop Review

To assess potential impacts resulting from project interventions, baseline environmental and social conditions relevant to project impacts and risks have been described for the Area of Influence (AOI), including any associated facilities and areas that may be indirectly affected. The baseline information is pertinent to significant primary and secondary project risks and impacts, with a level of detail commensurate with the significance of the associated risks and impacts in terms of type, scale, and location. The study encompasses a range of physical, biological, socioeconomic, and cultural features likely to be affected. Baseline information has been presented at different spatial levels, such as site-specific, AOI, district-wide, and nationwide, where applicable.

Secondary data, when relevant, have been utilized, incorporating statistical records, census data, government reports, NGO publications, academic studies and texts, topographic maps, aerial photos, and satellite imagery. Additionally, project engineering studies have been scrutinized to gather quantitative information on environmental elements, including geotechnical investigations and assessments of underground and overhead utilities.

The following desktop reviews were undertaken for the Project:

- Technical details of the Project and the associated Project components.
- EIA of Meghna Re-Rolling and Steel Mills Ltd.
- ESIA of Comilla Economic Zone (CuEZ).
- Land procurement process; and
- All designs and drawings of the steel plant, auxiliary facilities and associated facilities.
- Project timelines and execution plan.

1.6.2.2 Baseline Environmental and Social Surveys

The study team has gathered and presented baseline information regarding the environmental and social characteristics of the current situation in and around the proposed project site, auxiliary, and associated facilities. This compilation is founded on sufficient and appropriate quantitative and qualitative data, encompassing both primary and secondary sources relevant to the pertinent aspects. In addition to serving as a basis for determining and assessing impacts, this data will be utilized as a baseline against which future changes induced by the project can be measured and monitored. The collected information incorporates any anticipated changes before the project commences. This description involves but not be limited to:

- a. **Physical environment** (topography, land use/land cover, geology, soil, agroecology, climate and meteorology, ambient air quality, ambient noise level, water quality, hydrology and drainage, natural hazards/disasters, etc.)
- b. **Biological environment** (i.e., flora and fauna types and diversity, endangered species, sensitive habitats, protected areas, forest parks, RAMSAR sites, IBA, etc.)
- c. **Social and cultural environment**, including present and projected. Where appropriate (i.e., population, land use, land ownership, planned development activities, community social structure, employment, and labor market, sources and distribution of income, cultural/religious sites and properties, demographic data, employment, gender-based violence and vulnerable groups, etc.).
- d. **Economic activities**, agriculture, livestock, fisheries, small-scale industries, etc.

Primary Baseline Data Collection:

The baseline information on ambient air quality, surface, and groundwater quality, soil and sediment quality, ambient noise quality as per aspects detailed in the following Table 1-1.

Table 1-1: Primary Baseline Data for the ESIA

S/N	Environmental Attribute	Locations	Frequency	Remarks
1	Ambient Air Quality	6 locations	4 weeks monitoring during the baseline survey	Undertaken at the project site, and any sensitive off-site locations which may be impacted by the project (Figure 5-16).
2	Ambient Noise Quality	10 locations	Once during the baseline survey	Undertaken at the project site, and closest off-site sensitive social receptors which may be impacted by the project (Figure 5-26). A 24-hour baseline noise is required to compare the results with the Bangladesh Standard. For IFC, 1-hour equivalent noise data is required. According to IFC, 48-hourly noise monitoring may be performed to collect sufficient data. As there is no variation in sources in the area, noise monitoring has been performed for 24 hours, aiming to gather sufficient data for statistical analysis (1-minute interval).
3	Surface Water Quality	2 locations	Once during the baseline survey	Surface water samples within 500m upstream and downstream from the jetty in the Meghna branch river (Figure 5-28).
4	Groundwater Quality	3 locations	Once during the baseline survey	Groundwater samples in and around the project area (Figure 5-30).
5	Soil Quality	3 locations	Once during the baseline survey	Soil samples in and around the study area (Figure 5-32).
6	Sediment Quality	5 locations	Once during the baseline survey	Sediment samples from the nearest water bodies (Figure 5-34).
7	Phytoplankton, Zooplankton, and Benthos	5 locations	Once during the baseline survey	In the study area

S/N	Environmental Attribute	Locations	Frequency	Remarks
8	Flora and Fauna	Study area	Once during the baseline survey	The ecological survey will be undertaken to assess the biodiversity aspects
9	Socio-economic	305 nos.	One-time survey	A sample survey of household
10	Public Consultation Meeting	1 no.	During the ESIA	Local community including different occupational groups
11	Stakeholder Consultations	-	Once during the Baseline survey	All the stakeholders

1.6.2.3 Stakeholder Engagement and Socio-economic Data Collection

A detailed stakeholder engagement has been conducted for the project. This process is essential to inform stakeholders about the project and to address data gaps necessary for a thorough impact assessment. The requirements for stakeholder engagement are summarized as follows:

1.6.2.3.1.1 Public Consultations for the ESIA

During the ESIA, public consultation and disclosure involve various stakeholder groups that have been identified. For potentially affected communities, consultation and disclosure have been conducted in proximity to the site.

1.6.2.3.1.2 Socio-economic Data Collection

As part of the ESIA process, detailed baseline data have been collected to update the baseline established in the scoping report and adequately assess the potential impacts of the project on local communities. This baseline was established through a questionnaire survey, Focus Group Discussions, and interviews with local communities and other interested stakeholders near the site. Stakeholders were asked questions using both checklists and informal interviews to gather information at the village and household levels concerning demographics, income, infrastructure, farming, fishing, gender-based violence, influx of laborers and truckers, and livelihoods.

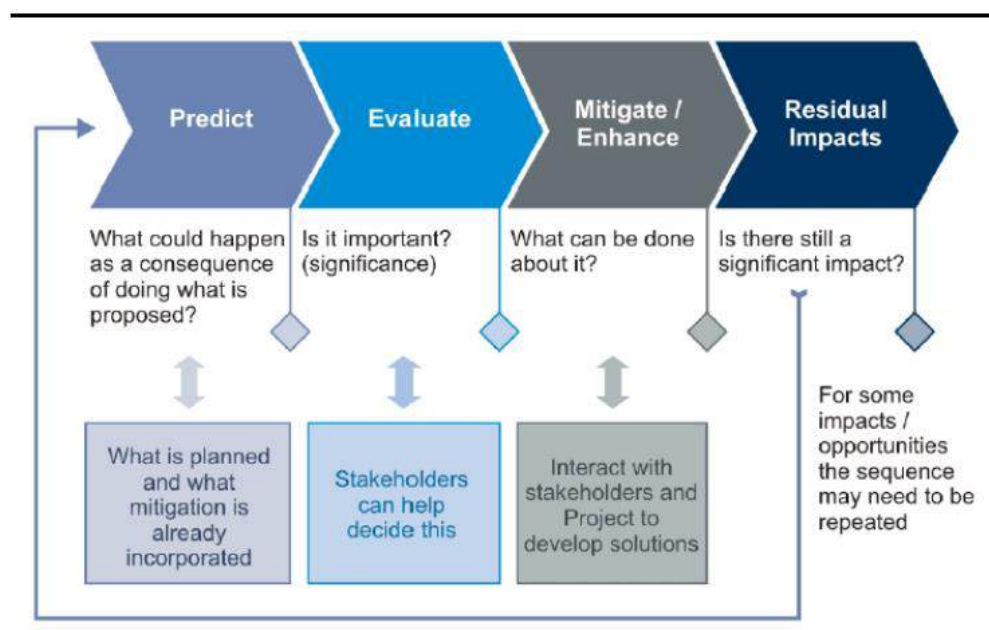
1.6.2.4 Impact Assessment

The principal impact assessment steps are summarized in Figure 1-2 and are described below.

- **Impact prediction:** To determine what could potentially happen to resources or receptors as a consequence of the Project and its associated activities.
- **Impact evaluation:** To evaluate the significance of the predicted impacts by considering their magnitude or likelihood of occurrence (for unplanned events), and the sensitivity, value and/or importance of the affected resource or receptor.
- **Mitigation and enhancement:** To identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- **Residual impact evaluation:** To evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

The below methodology has been used to predict, evaluate and assess potential impacts in the ESIA Report.

Figure 1-2: Impact Assessment Process for the ESIA Study



1.6.2.5 Modelling

Quantitative modelling has been required to identify the impact of the project's construction and operation on air quality and ambient noise levels.

1.6.2.5.1.1 Air Dispersion Modelling

Potential impacts on air quality resulting from emissions from the project, primarily NO_x, CO, particulate matters, and any other identified parameters, have been modeled for operations based on the fuel combinations. Air dispersion modeling using AERMOD has been conducted to assess the increase in concentration levels of pollutants in ambient air for different scenarios.

1.6.2.5.1.2 Noise Modelling

Potential impacts on ambient noise quality from sources such as plant machinery and auxiliaries have been assessed using a noise propagation model and sound plan. Noise impacts have also been mapped.

1.6.2.6 Analysis of Alternatives

The following alternatives have been analyzed for the Project:

- Site alternative.
- Layout options.
- Best Available Technology (BAT).
- Available options for resource supply (water, fuel etc.).
- Options available to mitigate high residual impact/risks; and
- No-Project scenario.

1.6.2.7 Risk Assessment

The risk assessment study covers the following:

- E&S impacts and risks identification to determine the incident scenarios, hazards and hazardous events and their causes and mechanisms and climate risks.

- Consequence analysis to determine the extent of the consequences of identified hazardous events.
- Frequency estimation to determine the frequency of occurrence of identified hazardous events and their consequences.
- Risk summation to determine risk levels and their significance, i.e., tolerable or intolerable, to identify and prioritize risk mitigation measures using techniques such as risk ranking and to give recommendations for risk mitigation.

1.6.2.8 Environmental and Social Management Plan

The results of the ESIA study form the basis for developing measures that have been incorporated into the Environmental and Social Management Plan (ESMP) and procedures for the short- and long-term environmental and social management of the project during its various stages.

The ESMP is formulated separately for both the construction and operation phases and includes, but is not limited to:

- Feasible control technologies and mitigation measures to minimize adverse impacts of proposed activities such as:
 - Pollution control measures to meet the emission, effluent air and noise standards.
 - Scheme for effluent treatment.
 - Solid and hazardous waste management.
 - Evaluation of the baseline environmental quality and suggestions for an environmental quality monitoring programme.
 - Mitigation measures related to occupational health, including an occupational health surveillance programme.
- Mitigation measures to manage social impacts at the community and household levels.
- Mitigation measures and management plans with defined timelines and responsibilities for implementation.
- Organisation required for the implementation of a management program during construction and operation phases of the Project.
- Training of the ESMP implementation team; and
- Monitoring and reporting mechanisms for regulatory compliance as well as internal assurance within MRSML.

1.7 Limitations

The following are a few of the limitations of the study:

- According to the Terms of Reference (ToR), the allotted timeline for preparing and submitting the Environmental and Social Impact Assessment (ESIA) including CIA and QRA was originally four months. However, the timeframe was subsequently shortened to less than two months without any reduction in the scope of work.
- Air Dispersion Modelling and Noise Modelling were prepared based on the available data provided by MRSML.
- The evaluation of the project is constrained by the availability and adequacy of the data at hand. Some sections of this report rely on conceptual design and technical details due to limitations in available data.
- In the event that the project design deviates from the assessed parameters due to design evolution, incorporation of new data, shifting motivations, or any other factor, it's important to

note that the outcomes of impact assessments or potential mitigation measures outlined in this report may become incongruent.

1.8 ESIA Team

The composition of the ESIA team is shown in Table 1-2.

Table 1-2: ESIA team composition

S/N	Name of Expert	Position
1.	Kazi Farhed Iqbal	Project Director
2.	Md. Zahidul Islam	Senior Environmental Specialist
3.	Tauhidul Hasan	Air Dispersion Modeling Expert
4.	Sk. Salahuddin Ahammad	Noise Modeling and QRA Expert
5.	K.M. Mijanur Rahman	Biodiversity Specialist
6.	Abdul Halim	Senior Social Specialist
7.	Sadman Khaled Monsur	Occupational Health and Safety Specialist
8.	Md. Mahfuzur Rahman	Social Development Specialist
9.	Ferdows Alam Quaraishi	Environmental Specialist
10.	Md. Saifur Rahman	Hydrologist and Flood Risk Expert
11.	Shihabuddin Ahmed	Environmental Monitoring Expert
12.	Farah Shamima Sultana	GIS and Remote Sensing Expert

1.9 ESIA Report Structure

As per ToR, the ESIA report has been organized according to the outline below:

- **Executive Summary:** It has concisely discussed the significant findings and recommended actions with readable maps and pictures.
- **Introduction:** This section briefly outlines the background, purpose, objectives of the study, scope of the study, and the adopted approach and methodology.
- **Project Description:** This section encompasses a process description illustrating the project layout, technology selection, process details, waste management system, greenbelt, etc., for the proposed steel manufacturing plant. Additionally, it incorporates the project data sheet, which includes details such as the project proponent, project location and area, nature and size of the project, project components, project activities and schedule, resources required and their quality, utilities demand, required manpower and tentative organogram, as well as tentative costing and funding.
- **Administrative and Legal Framework:** This section discusses the policy, legal, and administrative framework within which the ESIA is conducted. It explains the environmental and social requirements set forth by the International Finance Corporation (IFC)/World Bank and relevant international environmental agreements to which the country is a party.
- **Analysis of Alternatives:** Systematically compare feasible alternatives to the proposed project site, technology, design, and operation—including the "without project" situation in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their suitability under local conditions; and their institutional, training, and monitoring requirements.
- **Baseline Data:** This section assesses the study area and outlines the pertinent physical, biological, and socioeconomic conditions, incorporating any anticipated changes before the

project commences. It also considers current and proposed development activities within the project area that may not be directly connected to the project. All such data is essential for making informed decisions about project location, design, operation, or mitigation measures.

- **Environmental and Social Impacts:** This section predicts and evaluates the project's potential positive and negative impacts and risks, both quantitatively and qualitatively to the extent possible. It also identifies mitigation measures and any residual negative impacts that cannot be mitigated, exploring opportunities for improvement or offsetting such effects. Additionally, the cumulative impact has been assessed to predict the combined effects of existing projects, the proposed project, and anticipated future projects, considering significant adverse and/or beneficial impacts that may not be expected in the case of a stand-alone project.
- **Environmental and Social Management Plan:** The results of the ESIA study serve as the foundation for the delineation of the ESMP, which incorporates measures and procedures for the short- and long-term environmental management of the project during its various stages. The ESMP encompasses a hierarchy of measures, including avoidance, prevention, mitigation, and compensation/offset. It includes both generic construction measures and site-specific measures to address impacts on sensitive receptors. This section further outlines the environmental monitoring plan, the implementation of the monitoring plan, performance indicators, and the reporting and feedback mechanism.
- **Stakeholder Engagement, Public Consultation and Disclosure:** This section includes the results of public consultation and information disclosure including consultation with experts and representatives of institutions and selected focus group discussions.
- **Risk Assessment:** This section includes all possible hazards and risks associated with the proposed steel manufacturing plant, and management of the hazard and risks.
- **Conclusions and Recommendations:** Presents the main conclusions of the ESIA Report and recommendations for future actions.
- **Appendices:** These will include technical annexes with details of specific surveys and other required information.

CHAPTER 2

Project Description

2 PROJECT DESCRIPTION

Meghna Re-Rolling and Steel Mills Ltd. is a concern of Meghna Group of Industries (MGI), one of the largest conglomerates in the country, and has taken significant steps to establish 1.4 MMTPA Greenfield Re-Rolling Steel Plant. The proposed project will be located at Cumilla Economic Zone, Luterchar, Meghna, Cumilla, under the regulation of Bangladesh Economic Zones Authority (BEZA).

2.1 Location of the Project

The proposed Meghna Re-Rolling & Steel Mills Ltd. is situated within the Cumilla Economic Zone, specifically in Block A, Plot No. # 1 - 7, 12 – 35, which falls under the Luterchar union within Meghna Upazila of Cumilla District under the Chattogram Division. The proposed project site is located between 23°35'25.10"N, 90°39'1.68"E and 23°34'48.55"N, 90°39'1.64"E. The tentative area of the proposed project is about 71 acres.

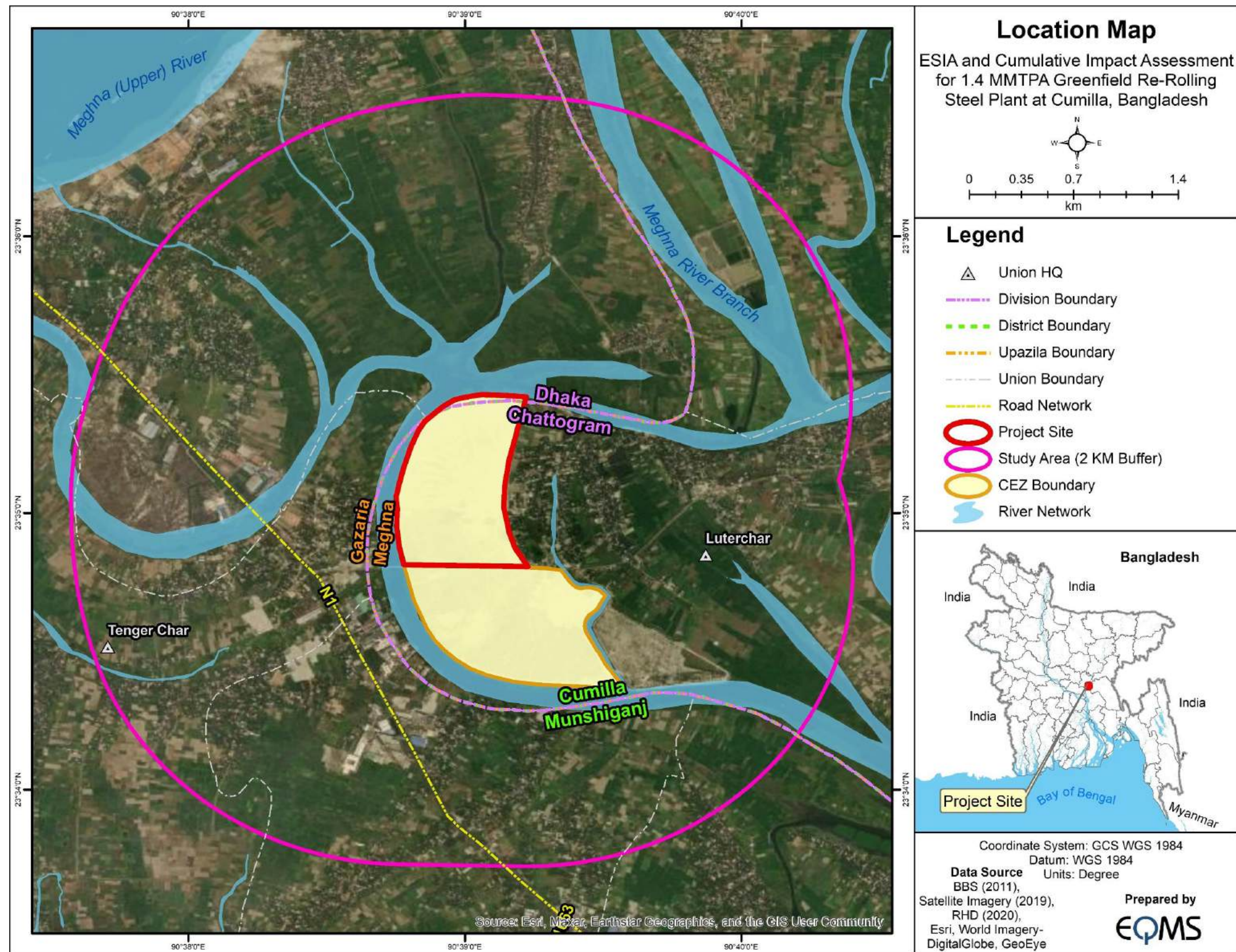
The general site location map is shown in Figure 2-1.

2.2 Accessibility

The proposed project site is accessible via an access road originating from Gazaria bus stand on the Dhaka-Chattogram Highway (N1). The national Dhaka-Chattogram highway runs adjacent to the western boundary of the project site, with a mere 1 km distance from the site. Additionally, the Cumilla Economic Zone is intersected by the Meghna-Homna Road. Furthermore, the project area is located approximately 4.35 km from the Meghna Ferry Ghat and nearly 8 km from the Daunkandi Launch Terminal. The nearest airport, Hazrat Shah Jalal International Airport, is situated about 55 km away from the project site. As for seaports, Chattagram Seaport is the closest, reachable 227 km by road.

Figure 2-2 shows the photographs of existing road communication to the project area.

Figure 2-1: Location Map of the Proposed Project



Source: MGI and EQMS, 2024

Figure 2-2: Photographs of existing road communication to the project area



Source: EQMS Field Visit, February 2024

2.3 Key Features of the Site and Surroundings

The details of the site setting and surroundings of the proposed project site are given in Table 2-1.

Table 2-1: Salient features of the project site and surroundings

SL#	Particulars	Details
1.	Geographical Location	Latitude: 23°35'25.10"N to 23°34'48.55"N and Longitude: 90°39'1.68"E to 90°39'1.64"E
2.	Relative Location	North: Branch of Meghna River, Balukandi union; West: Branch of Meghna River and Tenger Char; East and South-East: Luter Char union and South and South-West: Meghna Glass Industry, Branch of Meghna River, and Bashundhara Paper Mills
3.	Administrative Location	Union: Luter Char, Upazilla: Meghna, District: Cumilla, Division: Chattogram
4.	Climatic Condition	Temperature: The annual average temperature varies from a maximum of 34.3°C to a minimum of 12.7°C.

SL#	Particulars	Details
		Humidity: Average relative humidity is 76.50% Rainfall: The average annual rainfall is recorded at 2551 mm
5.	Area of the project	Approximately 71 acres
6.	Present Land Use	Area for proposed industries, Branch of Meghna River, vegetation, and open land area
7.	Plant Site Elevation	Average 17 m from ASL
8.	Plant Site Topography	Medium low land, the project area is barren and less productive land.
9.	Nearest villages/settlements	Luterchar village (200m)
10.	Nearest Water Bodies	Meghna River (2.8km) and Branches of Meghna River (adjacent), Kathalia River in the Meghna Upazila (8.7km).
11.	Nearest Highway	Dhaka-Chattogram Highway (N-1) at 1 km West
12.	Nearest Railway Station	Kamalapur Railway Station (33.7 km)
13.	Nearest Airport	Hazrat Shahjalal International Airport (55 km)
14.	Nearest Port	Chittagong Port (227 km, South-East); Bibir Bazar Land Port (71.3 km, East)
15.	Hills/valleys	None within 10 km
16.	Protected Areas (Pas)	No reserve or protected forest area was found in the study area. There are no national parks or wildlife sanctuaries in the district of Cumilla. The nearest Protected Areas are Mirpur Botanical Garden National Park (40km) and Bhawal National Park (56km).
17.	Marine Reserves	None within 10 km
18.	Ecologically Critical Area (ECAs)	None within a 10 km radius. The nearest Ecologically Critical Area is the Shitalakshya River (12km, West)
19.	Ramsar Sites	None within 10 km. The nearest Ramsar Site is the Sundarban Reserve Forest (160km)
20.	Important Bird Areas (IBAs)	None within 10 km. The nearest IBA is Jamuna-Brahmaputra River (91km)
21.	Archaeological Important Places	None within a 5 km radius
22.	Seismicity	As per the Bangladesh National Building Code (BNBC) 2020, the project site is situated in Zone-2 (seismic coefficient is 0.20 g)
23.	Risk	River Flood, Seismicity/Earthquake, Lightning, etc.
24.	Major Industries within a 5 KM radius	Meghna Glass Industry (300m), Bashundhara Pulp and Paper Industries-Unit 3 (2km), JMI Industrial Park (3km), Meghna Economic Zone (5km), Meghnaghat

SL#	Particulars	Details
		Power Plant (5km), Unique Power Plant (5km), Fresh Cement (4.8km).
25.	Socio-economic factors	No resettlement and rehabilitation

2.4 The Project

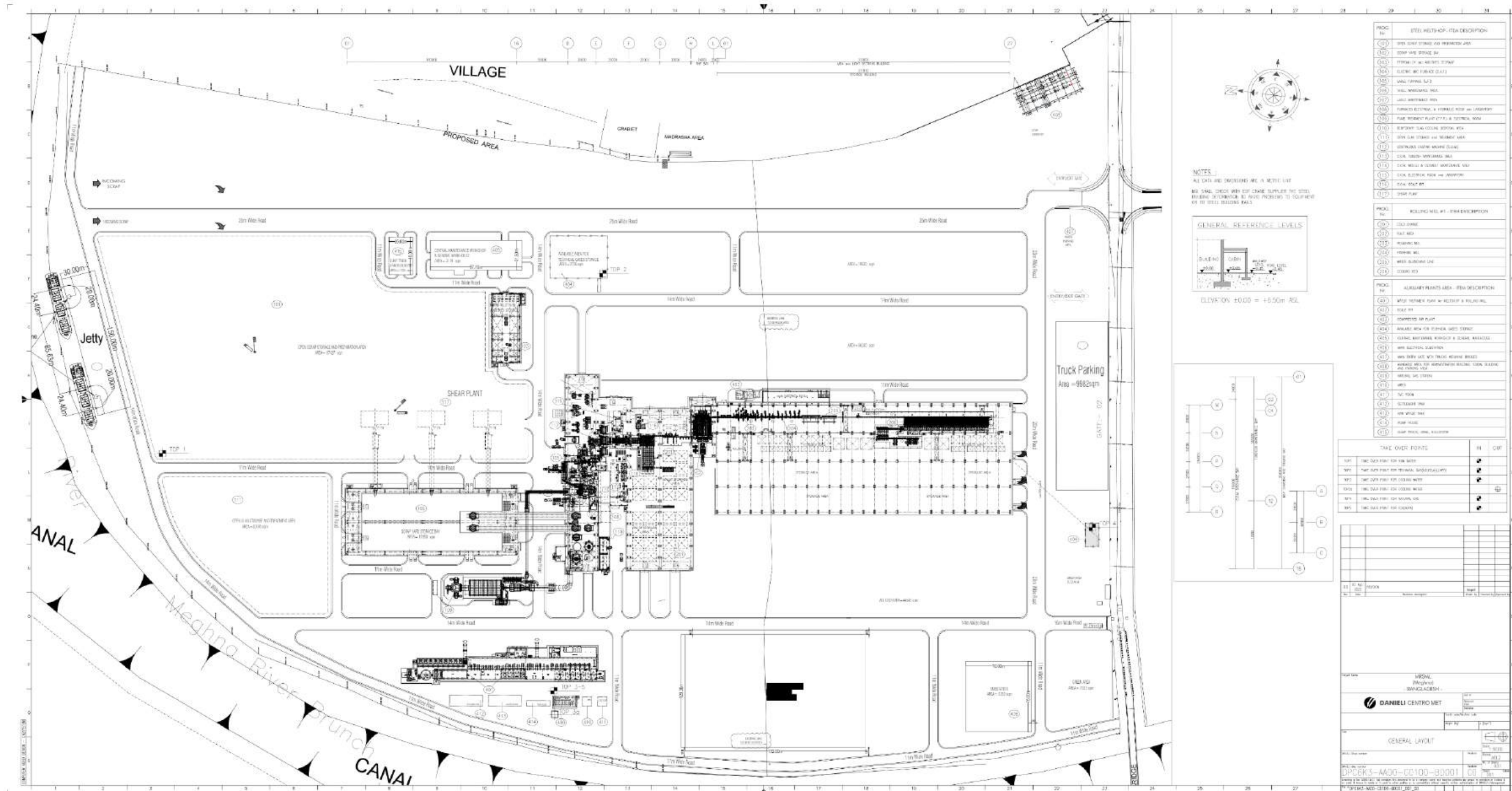
The Project is proposed to operate using a scrap-fed Electric Arc Furnace (EAF) based melt shop with a hot rolling mill. The production capacity will be 1.4 million Metric Tons/year and billet capacity of 0.9 million Metric Tons/year with different grades. The main process starts with the unloading of the scrap materials from large cargo ships at outer anchorage point in mid sea to smaller sized, light vessels which will bring the scrap to the captive wharf facility at project site using the Meghna River branches flowing next to project site. From Wharf the steel scrap will be shifted to scrap yard and then the materials to be processed in the melt shop and rolling mill and finishes at the storage facility. The project facilities are listed below.

- 1) Main production facilities:
 - Scrap steel workshop: including open-air storage yard, scrap steel shearing line, and scrap steel room.
 - Smelting workshop: 1150t DC electric furnace, 1150t ladle refining furnace, 1 set of flue gas treatment facilities.
 - Continuous casting workshop: 1 R9m5 flow billet continuous casting machine.
 - Steel rolling workshop: 1 bar production line with an annual output of 1 million tons; and
 - Steel slag processing workshop: 1 steel slag processing line with a capacity of processing 30 tons of steel slag per hour.
- 2) Auxiliary production facilities:
 - Water Treatment Plant (WTP)
 - Fume Treatment Plant
 - Oxygen station
 - Air compressor station
 - Machine repair facilities
 - Inspection and laboratory facilities
 - Warehousing facilities
 - Steel library
- 3) Associated facilities:
 - A wharf with an operational capacity of 2 MT/ year for raw material transportation.
- 4) Shared facilities:
 - A multistoried (G+10) office cum staff accommodation facility for operation phase.
 - Central Effluent Treatment Plant (CETP)
 - Central Sewage Treatment Plant (CSTP)
 - 230kV/33kV GIS substation and Transmission Line
 - Natural Gas Station and the 600m gas pipeline

Apart from the MRSML, the other proposed industry that shall be coming up is the Float Glass Factory (under construction).

The general layout of the plant is shown in Figure 2-3.

Figure 2-3: The general layout of the proposed steel manufacturing plant

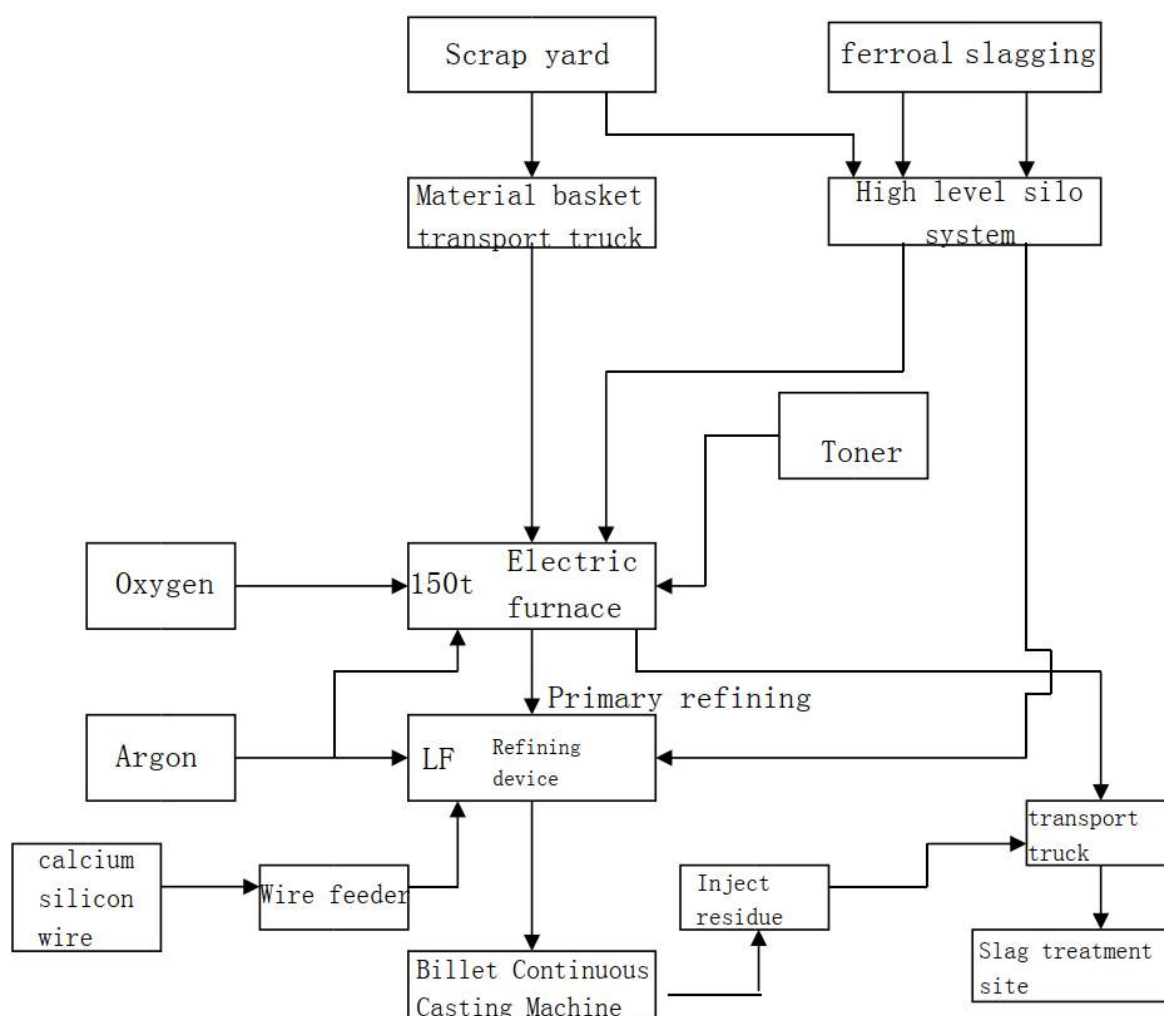


Source: MGI, February 2024

2.5 Process Flow

As per the MGI, February 2024, Manufacturing process of MS Rod Products through the following process depicted in Figure 2-4. The finished products will be removed by overhead EOT crane and stored in the storage area or dispatched through road vehicles. Initially the scrap materials will be unloaded from the vessel and stored in the scrap storage. In the steel making process, scrap is heated, melted, reduced in an electric arc furnace and then ladle furnace for further refining, and the molten steel is then transferred to a continuous caster (CC), to produce billets. The billets are reheated and transferred to rolling process to produce MS Rods.

Figure 2-4: Main Process Flow Diagram



Source: Technical Feasibility Study Report, September 2023

2.6 Process Description

2.6.1 Steel Meltshop (Electric Arc Furnace and Ladle Furnace)

MRSML will use the Continuous Charging Electric Arc Furnace Technology for the project. The 150-ton Electric Arc Furnace is designed to be charged with the following mix of materials.:

- 90% Scrap and 10% HBI
- 90% Scrap and 10% Pig Iron.

The 150-ton Ladle Furnace is designed to receive ladles from the Electric Arc Furnace (EAF) via an EOT Crane and then treat the contents before casting operations.

2.6.2 Fume Treatment System

Danieli Fume Treatment Plants are designed and built to give the plant green solutions and a high efficiency in capturing and treating the fumes developed during the different operative phases of the steel plant. As per MRSML, the plant process will also be designed to meet EU/US environmental standards along with national guidelines. Detail of the Fume Treatment Plant process has been shown in section 2.12.9.

All process fumes from EAF (4th hole and canopy), Ladle Furnace and Material Handling System are collected and cleaned in a dedicated main Fume Treatment Plant.

A settling and post-combustion chamber is foreseen for the oxidation of carbon monoxide and the settling of heavier particles contained in the primary fumes.

Suction design (negative pressure) used for the bag filter, no dust leakage underneath the filter hoppers (Pulse Jet type filter).

Main fans are installed on the clean side of the bag filter, which allows the use of high efficiency airfoil backward vane impellers, resulting in low energy consumption.

High consideration has been given to the environment inside the EAF bay, sizing the secondary suction as well as the Bag filter to provide the necessary ventilation and heat removal from the EAF area.

2.6.3 Continuous Casting Machine (CCM)

Danieli confirms continuous casting with the aim to reduce the human intervention on the equipment to promote safety and minimize human errors. Among the most modern equipment designed by Danieli, the main features and advantages of Danieli casting and process technology applied to this project:

- Tundish is designed to promote the non-metallic inclusions flotation.
- Mould Electromechanics Oscillation Designed for proper performance and easy maintenance.
- Mould design to guarantee uniform skin formation.
- State-of-the-art Electrical & Automation System Embeds the complete Danieli process technology for CCM and is equipped with all the up-to-date models and controllers.

2.6.4 Reheating Furnace (RHF) and Rolling Mill (RM)

Walking Beam type Re-Heating Furnace

The billets are charged and heated up to the required rolling temperature by means of a Walking Beam Type Reheating Furnace

Rolling Mill and Roll pass design

The Rolling line is composed of 18 rolling units.

The products are continuously rolled according to schedule with fixed rolling line. The roll pass design has been studied in accordance with:

- Self-centering groove shapes
- Roll pass design of intermediate and finishing mills optimized and arranged in families with common passes for several finished products.
- Reduction of programme changing time
- Use of the new series of Morgårdshammar guides

The smallest sizes of deformed bars are rolled using a system consisting of the DDS slitting of roll stock at the last two stands (slitting in two strands).

Main features:

- High stiffness and rolling loads.
- High rolling torque
- Interchangeability of the units among the same stand size
- Standardized components (spares saving)
- Short time for program changing thanks of the pre-setting of the cartridge unit in the workshop,
- High stiffness and rolling loads.
- High rolling torque
- Interchangeability of the units among the same stand size
- Standardized components (spares saving)
- Short time for program changing thanks of the pre-setting of the cartridge unit in the workshop,

A low-tension control system is provided on the roughing mill, while loopers are used in the intermediate-finishing mill to assure tension free rolling allowing the self-adjusting of the mill drives, to the actual rolling conditions.

Optimization of roll dressing and roll set-up to minimize the quantity of requested rolls with consequent reduction of consumable and transformation cost.

- Improvement of the Mill Utilization Factor
- Morgårdshammar guides with better reliability /performance and with longer life of rollers/ components (plus 15 %)

Roll pass design / pass sequence for slitting, particularly studied to allow a homogeneous division of the product at slitting pass, and for consequent optimal quality of the finished product.

Cropping and emergency shears

During the rolling process, nose and tail cropping are carried out automatically by a “start/stop” and rotary shears (at cooling bed entry side).

Shears features.

- Minimized crop length for high material yield.

Bar line – QTB quenching boxes

After the last rolling stand a QTB water quenching line for the concrete reinforcement bars has been provided.

The purpose of the QTB process is to drastically improve the mechanical properties of deformed bars, particularly the yield strength, using billets with poor chemical composition. Applying the QTB process to common carbon steel, final technological characteristics even superior to the micro alloyed steels or low alloyed steel are obtained at low production costs.

QTB is a surface quenching and self- tempering process directly executed from the rolling heat.

Cooling bed and entry services

At the entry side of the cooling bed a roller table with lifting aprons brakes and discharges the bars.

Aprons are operating through a driving shaft, which is working “in torsion” condition (not pulling) by means of a series of hydraulic cylinders, located along the whole length of the roller table. Therefore, the aprons operation is not affected at all, by variations of temperature and possible associated elongations of the shaft.

For quenched bars, magnetic aprons are needed to allow the breaking and the discharging of the cooled bars in the cooling bed in the same space and at the same cycle time as the hot bar.

The initial part of cooling bed is complete with straightening grid plates forming a series of continuous grooves which assure the bar straightness until its temperature is reduced such as to avoid any deformation.

A start-stop walking beam type cooling bed, is foreseen to collect and cool the bars multiples coming from the dividing shear.

The cooling bed is fitted with variable speed driving groups and multi-groove lining-up rollers.

The dimensions of the cooling bed (length/width) are such to allow a regular and suitable cooling of the range of products.

The bars already aligned by the lining-up roller table, are conveyed at the end of the cooling bed where, the automatic, regular formation and extraction.

Static cutting to length system

At the exit side of the cooling bed exit table the layer of sections is cut to length by means of a Heavy-Duty Cold Shear.

The cutting measurement is provided by cutting to length beams with moveable stoppers.

The cut to length layer is extracted from the roller table after the Shear.

Bar line – Bar finishing services

The layers of bars are regularly transferred from the inlet roller table and then deposited onto a series of chain transfers.

The bars are then regularly put into bundles in a “bundle forming Station” including a set of pockets and an aligning pusher in order to get a nice shape bundle.

Then the formed bundles are deposited onto a roller table with vertical idle roller. While the bundles move forward on the roller table, they are tied by binding machines arranged sideways.

The bundle final collecting system comprises a weighing station and collecting chain transfer to allow and facilitate the stacks/bundles removal in groups, by means of crane

2.7 Final Product & their Capacity

The proposed project is re-rolling and steel mills factory. The final product name and their capacity is:

- MS Rod, D-Form Bar and Plain Bar with different graded
- Annual production capacity: MS Rod (with various grades) 1.4 MMT, Billet 0.9 MMT.

2.8 Resource Requirement

2.8.1 Land Requirement

The Meghna Re-Rolling & Steel Mills Ltd (MRSML) is situated in the Cumilla Economic Zone Limited (CuEZ), about approximately 71 acres. The procurement of land entailed the CuEZ which was purchased from local community from Luterchar Union of Meghna Upazila of Cumilla district through a willing buying and willing selling process. In 2016, A purchase proposal was proposed to the landowners by the CuEZ. After the seller agreed to sell, negotiations regarding price and quantity were conducted by CuEZ. Subsequently, upon payment of the land price, registration and possession of the land were obtained from various individuals during the procurement process. Moreover, a land lease agreement was conducted between CuEZ and The MRSML for 10 years with a provision renewable for a further period of 10 years by mutual agreement.

Payment of the land price, registration and possession of the land – all these processes took place with the landowners' informed consent. The land price was selected as per the market price of land of that time. As per the consultation with the landowners, they were satisfied with the land price provided by the proposed project authorities.

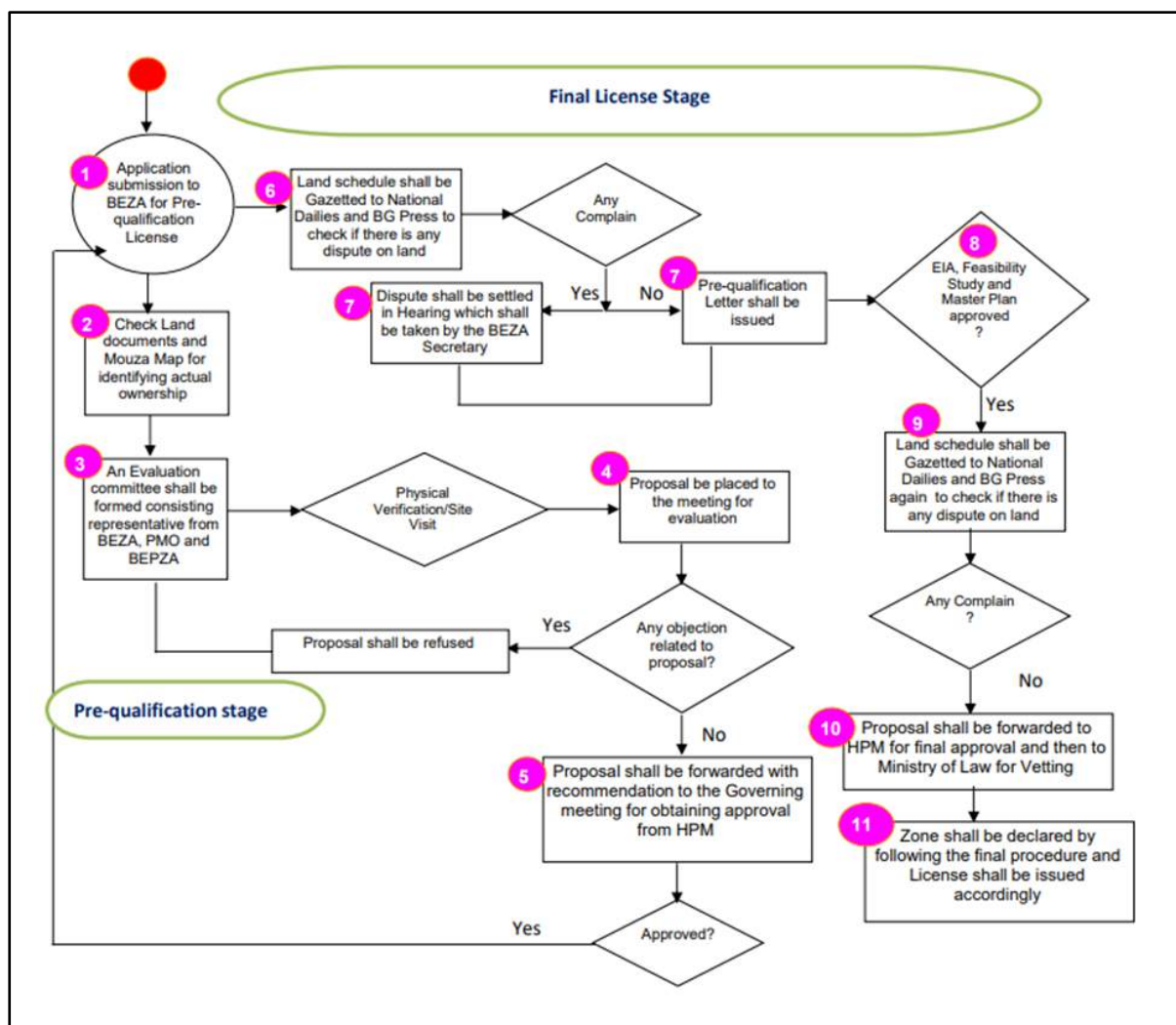
2.8.1.1 Land Procurement Process

All the lands belonging to MRSML are situated within a privately-owned economic zone named Cumilla Economic Zone (CuEZ), which is under the ownership of one of MGI's sister concerns. This economic zone has been officially approved by the Bangladesh Economic Zone Authority (BEZA), an autonomous body of the Bangladesh government. Before receiving BEZA's approval and the formal declaration of the economic zone, MGI underwent a thorough verification process mandated by the government. Cumilla Economic Zone (CuEZ) was incorporated in 2017, which obtained the prequalification license to establish the Economic Zone at Meghna Upazila, Cumilla in 2016.

As per consultation with BEZA and available secondary resources, to establish a Private Economic Zone at Sonachar Mouza of Meghna Upazilla under Cumilla District, MGI authorities applied to the Executive Chairman of Bangladesh Economic Zone in June 2015. The required amount of land was 246.37 acres. In response to this application, BEZA published a gazette on June 01, 2021, to raise grievances within 21 days for those who are likely to be impacted by the establishment of this private economic zone. BEZA confirmed that no grievances were raised, and no litigations were found within the given timeframe. After the cutoff date for raising grievances and completion of other verification processes, BEZA published another gazette on March 20, 2022, announcing the area as the Cumilla Economic Zone. BEZA issued the Private Economic Zone license to CuEZ on April 10, 2022. A systematic arrangement took place during the procurement of the land for CuEZ. The details of the land procurement process are depicted in Figure 2-5.

A land lease agreement between the CuEZ and MRSML was conducted in December 2022. As per the lease agreement, approximately 71 acres of land was required for the implementation of MRSML.

Figure 2-5 Land Procurement Process



Source: MGI, 2024

2.8.1.2 Investment of Land Sell Amount by the Landowner

During the socio-economic survey and consultations with landowners, it was identified that a satisfactory level of land price was ensured during the land procurement process. Regarding the investment of the proceeds from land sales by the landowners, they utilized the amount by simultaneously reconstructing houses, purchasing new land, and acquiring necessary materials. The landowners received the proceeds from CuEZ.

Furthermore, in terms of the rapid market assessment process of the land, consultations with landowners, local elites, and the local community of the project area also confirmed that the given land price was satisfactory compared to the market price. As a result, no grievances have been raised so far regarding the land price.

As part of the socioeconomic survey some sharecroppers (that developed cultivation in the CuEZ area prior the land acquisition) were identified. In further consultation with sharecroppers and landowners it was confirmed that informal arrangements were in place between them and that most of the PAPs leasing lands were at the same time owners of affected plots. The availability of additional land in the area was also confirmed during the consultations and it was also referred that compensation allowed them to access land in other areas to continue their economic activity.

2.8.2 Water Requirement

2.8.2.1 Construction Stage

As per MGI, during construction approximately 56.9 m³ /day water will be required. Both groundwater and surface water (Meghna River water) will be used to meet the requirement. During construction phase, the total water consumption will be 2,08,00,000 Ltr/Yr.

2.8.2.2 Operation Stage

2.8.2.2.1 Industrial use

The water supply will be sufficient to meet the projected plant requirements, with a primary focus on equipment and material cooling. The total water demand for the process during the operation phase is 13,582 m³/hr out of which 12,935 m³/h is circulating process water and 647 m³/h is make-up water including 5% evaporation and system-loss. In the proposed factory, six cooling towers will be installed, which will require continuous water. However, it's important to note that these volumes are not required on a daily basis. This water will be recirculated and only make up water will be added when. The cooling towers employ a closed-water cooling mechanism, and any process water losses will be compensated by adding make-up water of corresponding quality. This makeup water is exclusively utilized for machine cooling, and it is entirely recyclable. The water will be sourced from the branch of the Meghna River.

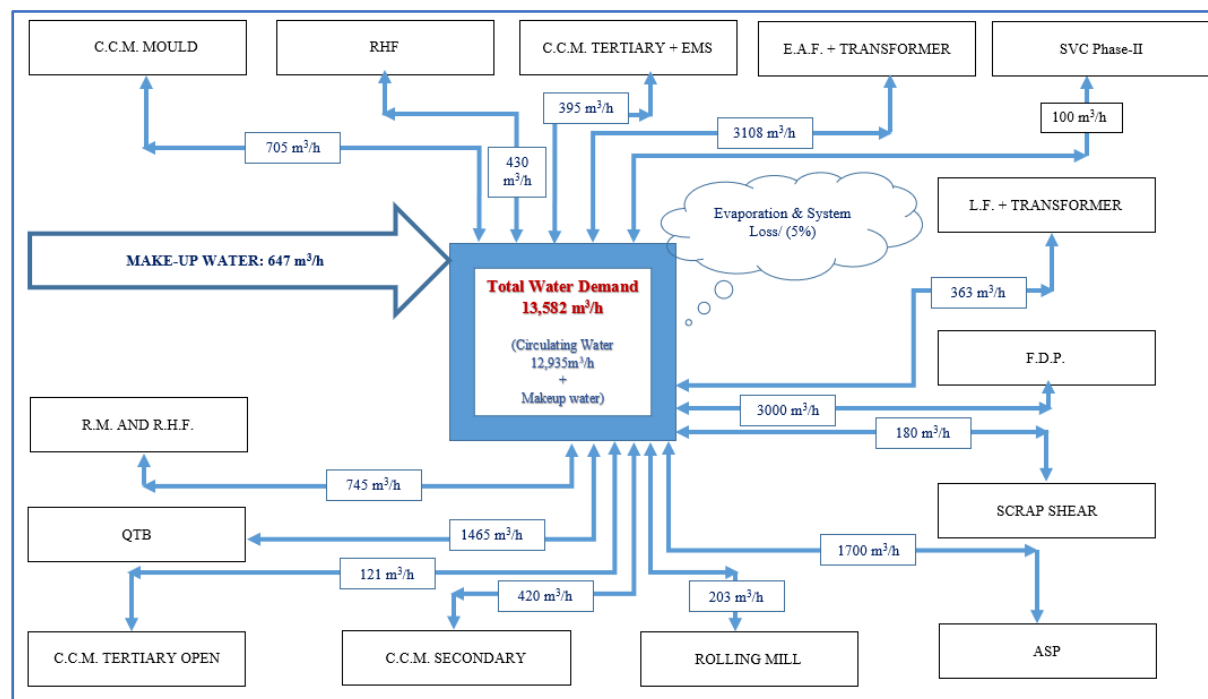
2.8.2.2.1.2 Domestic Purpose

The project will consume 50 m³ /day (maximum) water for domestic use. Underground water will be used to meet the domestic requirements.

2.8.2.3 Water Balance of the Proposed Steel Plant

The Figure 2-6 shows the water balance diagram of the proposed steel plant.

Figure 2-6: Water Balance Diagram for the Process of MRSML



Source: MGI, 2024

2.8.3 Electricity Requirement

2.8.3.1 Construction Stage

As per MGI, during construction stage the average power consumption 2,14,202 kWh and will be sourced by Bangladesh Rural Electrification Board (BREB).

2.8.3.2 Operation Stage

The project will require 254.6 MW (Maximum Load) of electricity. As per MGI, the electricity required for scrap to billet conversion will be 325 kWh per ton whereas electricity required for billet to MS rod conversion will be 60 kWh per ton and Electricity for other common equipment will be 110 kWh per ton.

The electricity will be sourced by Bangladesh Rural Electrification Board (BREB) dedicated for CuEZ. The Power Grid Company of Bangladesh will construct a new substation for the Cumilla Economic Zone (CuEZ), which will be connected to the existing substation at Gazaria via a 230kV double-circuit transmission line spanning a distance of 1.5 km. In addition to supplying power for the CuEZ project, this substation will also provide 33kV power for other enterprises within the Cumilla Economic Zone. As per MGI, the plan to construct a thermal power plant is currently shelved and they don't have any plan to construct it within the next 10 years to meet the electricity requirements of MRSML.

2.8.4 Gas

Natural gas will be the primary fuel used directly in the production process of steel during continuous casting. As per the Feasibility Study, September 2023, about 7,000 nm³/h of gas is required for production purposes which will be sent to the factory from the natural gas station. Natural Gas required for billet to MS rod conversion is 35 m³/ ton. The natural gas will be sourced from the Titas Gas Transmission and Distribution Company, Bangladesh.

2.8.5 Fuel Requirement and Transportation

For running plant equipment and machinery, there is no requirement for gasoline except engine oil (e.g. lubrication). Engine oil will be refilled at the time of commissioning of the plant and subsequently it will be refilled depending on the requirements (e.g. monthly, quarterly, half yearly, yearly). These engine oil will be mostly transported to the plant by road. The estimated volume is not known yet.

For raw material handling purposes, there are approximately 15-25 cranes, excavators, dump trucks etc. These heavy vehicles will utilize mostly gasoline (e.g. diesel). This gasoline will be purchased from government owned local suppliers like Padma, Meghna, Jamuna and will be supplied directly to the site through their oil lorries.

As per MGI, approximate diesel consumption for the construction phase would be 1,73,000 liters per year. MRSML will have a small oil pump station with the required capacity for storage.

2.8.6 Manpower

According to the Feasibility Study, 2023, the project requires a total labor capacity of 700 people, and the per capita labor productivity exceeds 2100t/person/year, which has high labor productivity.

According to MRSML, approximately 300-350 manpower/workers will be required during the time of construction.

Table 2-2: Manpower requirements during construction phase

Position	No. of employees
CEO	1
Project Head-Civil	1
Civil Team including engineers	12

Position	No. of employees
Design & Drawing Team	2
Mechanical Team	10
Electrical Team	8
HR & Admin Team	6
Health & Safety	2
E&S Team	2
Accounts & Store	10
Contract Labor-Third Parties	200-300
	300-350

Source: MGI, 2024

Table 2-3: Manpower requirements during operation phase

Position	No. of employees
Factory	
CEO	1
Melting Section	
Section Head	1
Section In-Charge	6
Team Member	18
Technical Operator	82
Re-Rolling Section	
Production Head	1
Production In-Charge	5
Jr. Engineer	46
Technician	26
Maintenance Section:	
Lead of Electrical Section	1
In Charge of Electrical Section	5
Team Member	2
Technician	25
Lead of Mechanical Section	1
In Charge of Mechanical Section	7
Team Member	2
Technician	16
Sub-Station	10
Contract Labor (Outsourced)	300
Administrative:	
General Manager	3
Sr. AGM	3
Manager	4
Assistant Manager	6
Sr. Executives	10
Executives	12
Sales & Marketing:	
GM	1
DGM	1
AGM	8
Manager	5

Position	No. of employees
Deputy Manager	5
Assistant Manager	5
Sr. Executives	20
Executives	25
Field Officer	40
Grand Total	700

Source: MGI, 2024

2.9 Raw Materials

Heavy melting steel (HMS) or heavy melting scrap and shredded scrap will both be significant feedstocks for the melt shop. As per MGI, approximately 55-60% of the feedstock will be HMS-based and 40-45% in the form of shredded scrap.

According to MRSML, 2024, HMS and shredded scrap will be sourced from the USA, Australia and Europe and will be transported by road to the main on-site storage area but could also be brought to the project site wharf via sea from Chattogram Port. The possible major suppliers are Global Metcorp Ltd. UK², M&A Metals Ltd. UK³, Ricova International Canada⁴, Radius Recycling U.S.A.⁵, European Metal Recycling (EMR) U. K.⁶, Atlas Commodities U.K.⁷ etc.

As per the Feasibility Study, September 2023, the following raw materials will be required for production for the proposed project.

2.9.1 Scrap Steel, Pig Iron and Direct Reduced Iron

The project will require a total of 1.6431 million tons of scrap steel, pig iron, and direct reduced iron annually, mainly imported from the United States and Europe. However, it was confirmed by MGI that Local sources shall be used only as a last option and in case of emergency.

2.9.2 Ferrous Alloys

As per the Feasibility Study, 2023, the project will require approximately 30,000 tons of ferroalloy annually, mainly imported from Europe.

2.9.3 Lime and Dolomite

The project requires 46,500 tons of lime and 18,000 tons of dolomite annually, primarily imported from Europe.

2.9.4 Refractory Materials

Refractory materials for electric furnaces, ladles, continuous casting tundishes, etc. are mainly imported from Europe.

2.10 Supply Chain of Imported Scrap Material

a) Raw Material:

² <https://www.globalmetcorp.com/modern-slavery-statement>.

³ <https://www.mandsmetals.com/about-us>

⁴ <https://ricova.com/en/>

⁵ <https://www.radiusrecycling.com/>

⁶ <https://uk.emrgroup.com/>

⁷ <https://www.atlascommodities.co.uk/>

- Steel scrap (grades HMS 1 & HMS 2)
 - Sourced from: U.S.A., Europe and Australia
- b) Raw Material Transportation:
- ❖ Waterway:
 - From Chittagong anchorage to MRSML via Hatiya-Sandeep channel, Meghna River (Chandpur), and Meghna River sub-branches.
 - Trans-shipment from large vessel to MGI-owned lighter vessel(s) (capacity: 1200-4000 MT) occurs at Chittagong outer anchorage.
 - ❖ Open-Air Storage Yard:
 - Unloading and loading are done using crawler-type steel grabbers with hydraulic grabs and magnetic disks.
- c) Pre-processing with PC/AC Shears:
- ❖ Function:
 - Pre-compression shears deform and press scrap before cutting it into smaller pieces.
 - ❖ Benefits:
 - Handles various scrap lengths due to the open-ended "hopper" design.
 - Reduces maintenance costs and downtime.
 - Increases process efficiency and scrap density.
 - ❖ Operation:
 - Scrap feeds continuously by gravity.
 - All processing (pressing, deforming, cutting) occurs in the main frame, minimizing wear and tear.
 - ❖ Cleaning System:

The cleaning system is an optional equipment designed by Vezzani SpA specifically to remove non-ferrous materials from steel scrap, whether processed or unprocessed.

The cleaning system itself consists of several key components:

- Vibrating Conveyor
 - Magnetic Drum
 - Non-Ferrous Material Conveyor
 - Bypass System for Heavy Material
 - ❖ Benefits:
 - Enhanced Scrap Quality: By removing contaminants like concrete, glass, rust, paint, and insulation, the cleaning system significantly improves the quality of the scrap fed into the furnace.
 - Reduced Melting Energy Consumption: Cleaner scrap requires less energy to melt in the furnace, leading to cost savings and a more environmentally friendly process.
 - Increased Production: Improved scrap quality can potentially boost production rates by optimizing furnace operation.
- d) Quality Control:

Standards: Steel scrap is traded according to international specifications, primarily the US- based ISRI. The most widely traded ferrous scrap is ISRI specs 200 to 211. The steel scrap mix shall be according to the European standards with a maximum quantity of contaminated scrap equal to 25% of the total scrap weight, with a uniform distribution in the buckets. The contaminated scrap shall have a maximum total content of combustible materials (i.e. grease, oil, rubbers, plastics, painting etc.) amounting to 0.25% of the total weight of the contaminated scrap.

- ❖ Quality Requirements:
 - The average scrap density shall be 944 kg/m³ with a maximum variation of $\pm 3\%$ Maximum scrap piece size is 1,5 x 0,5 x 0,5 m with a max section thickness of 0,1m. Maximum weight

of any piece of scrap is 1 t. Heavy pieces of scrap shall be properly embedded in lighter scrap according to Seller's instructions. The weight fraction of scrap pieces weighing more than 0,5 t each, shall not exceed 5%. The total amount of heavy scrap (HMS, bundles, heavy pieces) shall not exceed 45% of the whole charge. The total amount of turning scrap shall not exceed 7% of the whole scrap charge.

- Impurity limits: S \leq 0.032%, P \leq 0.025%, Cr \leq 0.15%, Ni \leq 0.12%, SiO₂ \leq 1.5%
- No closed vessels, explosives, or toxic substances allowed
- ❖ Cleanliness Requirements:
 - Minimal oxidation
 - Free of vitreous enamel, oil, and lime enclosures
 - Limited non-metallic fractions:
 - Dust < 1,3%
 - Moisture < 1,25%
 - Hydrocarbons < 0,19%
 - Inert < 2,66% (SiO₂ < 0,98%)

Scrap quality can be verified by means of magnetic separation or exposure to sun / flame of a sampled quantity.

2.11 Site Logistics

2.11.1 Road

The site will incorporate its own internal road network that is well-equipped to accommodate the transportation of heavy machinery required for material movement within the premises during operational phases. Additionally, the site benefits from the proximity to both regional and national highways. Local roads of a smaller scale link the site to these regional highways. However, it's important to note that as the broader industrial zone expands, these smaller roads might create challenges in terms of efficient logistics. Correspondingly, the regional and national highways are presently facing congestion issues, and this concern will exacerbate with the advancement of local and regional industrial growth.

2.11.2 Other [e.g. waterways / airports]

The local inland waterways are intended to be an important logistics artery for the plant. MRSML has advised that the site will be accessible for raw materials deliveries for 9 months of the year, with 3 months (spread over the year) of non-accessibility due to weather conditions.

2.11.3 Raw Material Reception and Preparation

Steel scrap will be significant feedstocks for the melt shop. Ferrous scrap purchased from the international markets will be delivered to the coast of Bangladesh by large cargo ships. The scrap will be trans-shipped from large cargo ships to barges/ medium sized cargo ships in mid-sea transfer at outer anchorage point of Chattogram Port. The barges/ medium sized cargo ships will then carry the scrap through the inland waterways to the wharf of the CuEZ. However, the scrap will also be brought to the site by road.

Scrap will, depending on size and source, be tracked and segregated due to its relatively high alloy content and known analysis, to be used in the melt shop. Scrap will be loaded directly into clam shell type baskets (opening on a pivot arrangement) for charging into the EAF for the start of a melting campaign. Once the campaign has begun and a hot heel is established, the scrap conveying system will be used to feed scrap to the EAF.

2.12 Auxiliary Facilities

2.12.1 Water Treatment Facility

2.12.1.1 Process Water Treatment Plant (WTP)

Iron and steelmaking are energy-intensive industries where materials undergo various cycles of heating and cooling. Water is predominantly used for equipment and material cooling. An Integrated Mini Steel Plant Central Water Treatment Facility will be installed to maintain the freshwater qualities for this project.

The main uses will be clean cooling water, turbid ring cooling water, closed-circuit cooling water, and emergency water.

As per the Feasibility Study, 2023, a soft water pool is set up in the new clean ring pump station. A water supply pump is installed in the pump station. The water enters the plate heat exchanger after heat exchange and cooling recycle.

The clean water system is an indirect cooling water system. After the equipment is used, only the water temperature rises. The residual pressure of the return water flows to the cooling tower installed in the water treatment room to cool down and is pressurized and recycled by the pump unit.

Direct cooling water is mainly used for conveying rollers and flushing oxidized iron sheets. The return water from the workshop flows into the iron sheet pit through the iron sheet ditch. A part of the treated water is sent back to the workshop with a lift pump for flushing the oxidized iron sheet, and the other part is sent to a complete set of turbid ring water purification device. After the effluent enters the regulating tank, it is sent to the filter by a lift pump, cooling tower, the cooled water is pressurized by the water supply pump group for recycling use by the equipment.

Once the water supply to electric furnaces, continuous casting machines and heating furnaces is interrupted, it will not only cause production to stop but also cause some cooling equipment to burn out. It is required to ensure safe water supply under power outage accidents. When a power outage occurs, the high-level water tower will provide water for 10 minutes, and the diesel engine pump will be started to ensure safe water supply for the equipment.

2.12.1.2 Raw Water Treatment Facility

Water is taken from the Meghna River branch through the water intake pumping station and used as supplementary water for the clean ring and turbid ring pumping stations. Taking into account the water quality conditions, geological conditions, and water intake of the river, a riverbed-type water pumping station that draws water directly from a water pump is adopted. The river water flows into the water inlet pipe through the water inlet hole at the water intake head and is lifted into the pool by the water pump in the pump station. It is then sent to the filter for treatment by the water pump and used as water replenishment for the purification system. The filter is set beyond the pipe, and whether to filter is selected according to the quality of the raw water dealt with.

2.12.2 Oxygen Generating Station

2.12.2.1 Oxygen, Nitrogen and Argon Requirements

In order to meet the demand for oxygen, nitrogen and argon in the electric furnace, continuous casting and other processes of the 1.4 million tons steel project, an oxygen production station needs to be built. According to the preliminary balance results of oxygen, nitrogen and argon, the oxygen requirement is 9800Nm³/h. As per the Feasibility Study, 2023, the oxygen, nitrogen, and argon balance results, a 10000Nm³/h oxygen generator needs to be built.

2.12.2.2 Oxygen, Nitrogen and Argon Gas Transmission and Distribution System

The oxygen, nitrogen and argon gas storage tank area are equipped with two 650m³ (3.0MPa) oxygen spherical tanks, a 650m³ (1.5MPa) nitrogen balloon tank, and a 200m³ (3.0MPa) argon balloon tank.

The process gas pipelines, and liquid pipelines are laid overhead, and the circulating cooling water pipelines are designed to be laid in trenches.

2.12.2.3 Process of Air Separation Unit

After dust and mechanical impurities are removed from the raw air in the air suction filter, it enters the air turbine compressor, where it is intercooled with the help of an intercooler to pressurize the air, and then enters the air-cooling tower for cooling. The air undergoes heat and mass exchange with water in a direct contact air cooling tower and then enters alternating molecular sieve adsorbers. There are two parts of water used to cool the air: one part is circulating water, which is pressurized by a pump and enters the middle of the air-cooling tower; the other part, called chilled water, comes from the circulating water network, first enters the water-cooling tower, and is obtained from the fractionation tower. The water-containing unsaturation of the exhaust gas (including waste nitrogen and excess nitrogen) initially reduces the water temperature, and then is pressurized by the water pump and enters the Freon chiller. After further cooling, it enters the top of the air-cooling tower. The air leaving the air-cooling tower enters the molecular sieve adsorber. The molecular sieve adsorber is a horizontal single-bed layer used to remove moisture, carbon dioxide and some hydrocarbons in the air to obtain clean and dry air. Two adsorbers are used alternately, that is, one adsorber absorbs impurities, and the other adsorber is regenerated by dirty nitrogen gas. The purified processing air is divided into two paths: one path is called expansion air, which first passes through a fine filter to remove mechanical impurities, and then enters the supercharger to be pressurized. The pressurized air is first cooled in the aftercooler of the supercharger. After being cooled, the chilled water enters the expansion air channel in the main heat exchanger. After being cooled by the reflux air in the adjacent channel, it is extracted from the middle of the main heat exchanger and enters the turbine expander. The expanded air enters the upper tower. The middle part participates in distillation; the other air directly enters the main heat exchanger and is cooled to the dew point temperature and enters the lower tower. The cooled air enters the lower tower to participate in distillation. The air entering the lower tower evaporates the liquid on the tray through the sieve holes on the tray. Due to the difference in the boiling points of oxygen, nitrogen, and argon, more nitrogen evaporates from the liquid. At the same time, the air passing through the tray evaporates.

More oxygen components are condensed down. Finally, oxygen-rich liquid air containing 38% oxygen is obtained at the bottom of the lower tower, and high-purity nitrogen is obtained at the top of the lower tower. The nitrogen at the top of the lower tower passes through the condensation evaporator and undergoes heat exchange with the liquid oxygen from the bottom of the upper tower. The liquid oxygen is evaporated, and the nitrogen is condensed. Part of the condensed liquid nitrogen returns to the lower tower as reflux liquid. The other part of the liquid nitrogen is subcooled in the sub cooler and then sent to the top of the upper tower as the reflux liquid of the upper tower. A small part of it is used as a cold source for the condenser of the refined argon tower. Part of the nitrogen is extracted from the upper part of the lower tower and sent to the evaporator of the purified argon tower as a heat source to maintain the distillation of the purified argon tower. The oxygen-rich liquid air is extracted from the bottom of the lower tower and subcooled in the sub cooler. Part of the oxygen-rich liquid air is provided to the crude argon tower condenser as a cold source, and the other part is sent to the middle of the upper tower to participate in distillation.

Each material entering the upper tower in different states: liquid air, liquid nitrogen, liquid air vapor from the crude argon tower condenser, is further separated by the upper tower, and oxygen with a purity of 99.6% is obtained at the bottom of the upper tower, and is passed through the main heat exchanger. The device is reheated and then taken out of the cold box and sent out as oxygen product. The dirty nitrogen gas is extracted from the upper part of the upper tower, reheated through the cooler and main

heat exchanger, and then goes to the purification system as regeneration gas. The nitrogen extracted from the top of the upper tower is divided into two parts after being reheated by the cooler and main heat exchanger. One part is incorporated into the pipe network as product nitrogen, and the other part is sent to the water-cooling tower of the pre-cooling system.

A certain amount of argon fraction is extracted from the middle of the upper tower and sent to the crude argon tower. The crude argon tower is structurally divided into two sections. The two sections are connected by a liquid argon pump. The reflux liquid at the bottom of the second crude argon tower passes through the liquid. The argon pump is sent to the top of the first crude argon tower as reflux liquid. After distillation in the crude argon tower, process argon containing oxygen <2PPm is obtained at the top of the tower. Most of it is condensed in the condenser of the crude argon tower and then used as reflux liquid. A part of it is liquefied in the liquefier and sent to the middle of the refined argon tower. Through the distillation of the purified argon column, semen argon containing 99.999% Ar is obtained at the bottom of the purified argon column and sent to the liquid argon storage system.

2.12.3 Air Compressor Station

In order to meet the compressed air needs of the entire plant, consider as much as possible according to the location of gas user points and gas consumption conditions.

As per the Feasibility Study, 2023, one air compressor station will be set up near the steelmaking plant and the steel rolling mill. According to user needs, ordinary compressed air (CA), instrument compressed air (IA), and compressed air for heating furnace atomization are required. Ordinary compressed air should comply with ISO8573-1 Class2.4.2, and instrument compressed air should comply with ISO8573-1 Class1.3.1.

2.12.4 Machine Repair Facilities

There is a mechanical maintenance workshop of 80x33m, equipped with 2 16/3.2t electric bridge cranes. The main scope of work is daily maintenance of steelmaking, continuous casting, steel rolling and other production plants and auxiliary facilities and equipment and production of spare parts.

2.12.5 Warehousing Facilities

Considering the whole factory, a comprehensive warehouse covering an area of about 60x18m will be built in the entire factory area, equipped with 1 10/3.2t crane. Shelves are placed partially in the warehouse, and large goods are placed on the other floor.

2.12.6 Inspection and Testing Facilities

As per the Feasibility Study, 2023, the project requires the construction of a steelmaking laboratory in the steelmaking plant to serve EAF, LF and continuous casting; a testing laboratory near the steel rolling plant to serve the entire plant; and a water quality laboratory in the water treatment area, conduct water quality testing and analysis on various circulating water, raw water and drainage water for water treatment; set up a laboratory in the oxygen generation station to detect and analyze air and product gases.

2.12.7 Ferroalloy Library

A ferroalloy warehouse will be built near the smelting workshop. The central dimensions of the ferroalloy warehouse workshop are 72m long and 29m wide. It is equipped with a 10t electric bridge crane, and the track surface elevation is 6m.

There is a car transportation channel in the middle of the ferroalloy warehouse, with gates at both ends. Concrete partition walls of different sizes are set up on both sides according to the amount of ferroalloy. The partition walls are 2m high and provide 10 compartments. The storage capacity of various ferroalloys is greater than 15 days.

2.12.8 Sanitary Wastewater Disposal System

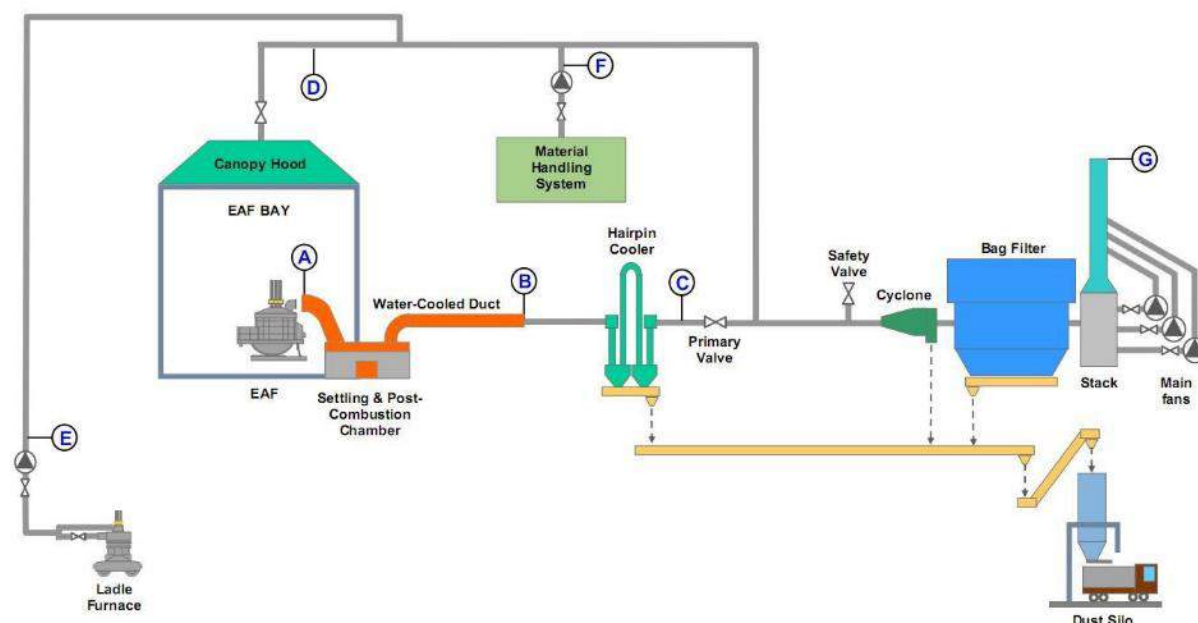
The project authority would be responsible for the treatment of the sewage water. Sanitary wastewater mainly comes from the factory canteen, bathroom, office building, and toilet installed in each building unit. The maximum number of operators working simultaneously in the plant is 1,200, and the per capita sewage volume is 40L per person per day. The maximum daily sewage volume is 48m³ per day. The sources of domestic sewage are canteens, toilets, office buildings and toilets in various buildings. All domestic sewage passes through septic tanks and then is discharged into the sewage treatment plant of CSTP in the economic zone for advanced treatment.

In case of discharge, the standards for sewage discharge in Bangladesh under the Schedule 3 of the Environment Conservation Rules, 2023 will be complied.

2.12.9 Fume Treatment Plant

The fume plant is designed for the treatment of fumes produced during the operation of the Electric Arc Furnace (EAF). The plant is provided with a dust conveying system, which conveys the dust from the bag filter, the axial cyclone, and the cooler to the dust collecting system. Detailed description of the Fume Treatment Plant obtained from Danieli and the regulatory EIA Report, September 2022 has been incorporated in **Appendix K**. The flue gas treatment system flow is shown in Figure 2-7.

Figure 2-7: Flue Gas Treatment System



Source: Technical Feasibility Study Report, September 2023

The flue gas from the electric furnace is extracted from the exhaust hole on the top of the electric furnace. After passing through the top water-cooled elbow, water-cooled sliding sleeve, combustion chamber and water-cooled pipe, the flue gas is cooled to 550°C, and then undergoes natural cooling. It is then cooled to 300°C.

The smoke from the electrode hole and feeding hole on the top of the electric furnace is captured by the roof cover. The smoke is extracted through the exhaust pipe on the cover, mixed with the smoke from the furnace, and then the smoke enters through the spark trap. The pulse bag dust collector can be purified and discharged into the atmosphere through the fan. After purification, the dust concentration is less than 10 mg/Nm³.

During the melting period of the electric furnace, in order to achieve the optimal design value for the amount of smoke exhaust in the furnace and the amount of cold air mixed through the gap, the casing will automatically close to a predetermined position.

During the charging period of the electric furnace, when the scrap steel is put into the electric furnace, a large amount of smoke is generated, which is collected by the roof cover. The smoke is connected to the dust removal system through the pipe. At this time, the valve on the exhaust pipe of the roof cover is fully open, and the dust is removed at this time. The system handles the largest amount of flue gas.

The flue gas generated during the tapping period of the electric furnace is collected by the roof cover, and the flue gas is connected to the dust removal system through the pipe. At this time, the valve on the roof cover smoke exhaust pipe is fully open.

During the period of adding ferroalloy, slag-making materials and nitrogen blowing, the flue gas generated by the ladle furnace is discharged through the exhaust hole on the furnace cover and merged into the electric furnace dust removal system through the pipeline.

The pulse bag dust collector is a negative pressure type. The dust collector is mainly composed of a bracket, an ash hopper, a box, a filter bag, an injection dust cleaning device, a capping machine and a compressed air dust cleaning device.

The flue gas purification system uses three parallel fans to operate, and the inlet of each fan is equipped with a regulating valve.

- Dust conveying and handling facilities: The ash discharged from the dust collector, spark catcher and natural cooler is collected by the chain conveyor under the silo, lifted into the ash storage silo by the chain elevator, and then sent to the transport truck by the screw conveyor.
- Detection and control of dust removal system: This dust removal system is also equipped with a complete set of temperature and pressure detection systems and automatic control systems.

2.12.10 Fire Fighting System

A fire-fighting cell will be formed in the plant which will be responsible for controlling fire incidence, if any from the construction period up to the entire life of the project. The cell will be well trained and mock drilling will be exercised to develop the ability to tackle the situation effectively when the situation demands. The cell would be available to reach anywhere inside the plant within the shortest possible time on receipt of a fire.

2.12.11 Stormwater and Drainage

Storm-water runoff, drainage, and treatment in MRSML involve managing and treating the water that collects and flows over the site, particularly during and after precipitation events. At MRSML the stormwater will be collected through multiple surface and subsurface drains and stored in several reservoirs. The water will be sent to CETP of the CuEZ for the removal of contaminants such as oils, heavy metals etc. As per the Master Plan of CuEZ, the treated water will be reused for non-potable purposes within the economic zone, such as dust suppression, gardening, car wash etc.

15m Wide Road

27.43m Wide Road

25m Wide Road

Drainage Layout Plan

PROJECT NAME:
Mahindra Re-Rolling and Steel Mills Ltd.

PROJECT ADDRESS:
Phase 10, 11, 12, 13, 14, 15, 16, 17,
20, 21, 22, 23, 24, 25, 26, 28 & 29
Goregaon Industrial Estate,
at Lumbini, Mahindra, Gurukul.

ARCHITECT NAME:
MAHINDRA SHARAD DESAI ENGINEERS
A/E (Mechanical & Arch) (PVT)
48, Membership No. 8-213
Mahindra Group of Industries
Mumbai-400 015/0200

ENGINEER NAME:
ENGR. HANISH SANKAR HANU
D/E & Head of Design
S.S. Engr. (Civil)
M.B. No. 13007
Mahindra Group of Industries

ENGINEER NAME:
ENGR. MD. JAKIR HOSSAIN
Dy. AOM, Design
S.S. Engr. (Civil)
FES No. 12015
Mahindra Group of Industries

DRAWING TITLE:
DRAINAGE LAYOUT PLAN

PAGE NO.:
001

2.12.12 Solid Waste Management

- Industrial Solid waste- Steel Slag from the steelmaking process

- Domestic waste: kitchen and wood waste, plastic, paper, floor sweepings, gardening waste, etc.

2.12.13 Hazardous Waste Generation & Management

- Slag- 1 steel slag processing line with a capacity of processing 30 tons of steel slag per hour (From Industrial Process).
- Very limited Fuels and oils.
- Garage waste.
- Sewage.

As per the discussion with MGI, the proposed project will have a "Slag Treatment Plant" in their industry premises to minimize and recycle their slag waste, which is generated from the steel making process. As confirmed by MRSML, the treated slag will be used for road making and brick manufacturing purpose.

All waste produced within the plant will be separated from the source in accordance with internal procedures. They will be classified as either hazardous or non-hazardous, following the best prevailing practices in Hazardous Waste Management and Handling within the industry. Depending on their characteristics, waste will be packaged in drums or jumbo bags and appropriately labeled with details and the date of generation. Following labeling, the waste will be transported to the designated storage location, a covered shed with concrete flooring. Then the waste will be disposed of at a designated dumping site through a DoE authorized vendor. The waste collection and disposal agreement between the authorized vendor and MRSML will be done prior to the construction phase of the project.

2.12.14 Slag Treatment Plant and Management

Effectively managing solid waste is a challenging but critical issue in the steel industry. Slag, a byproduct of the steelmaking process consisting of burnt limestone and dolomite, is one such waste. This slag is crushed and granulated into coarse aggregates for use in road construction. Utilizing this slag not only addresses waste management concerns but also provides an additional profit stream for steel plants. As confirmed by MRSML, the treated slag will then be used for road making and brick manufacturing purpose. In order to process the steel slag and ladle casting residue produced by the electric furnace, a steel slag magnetic separation line with a processing capacity of 30 tons per hour is being constructed.

Table 2-4: Steel Slag Management

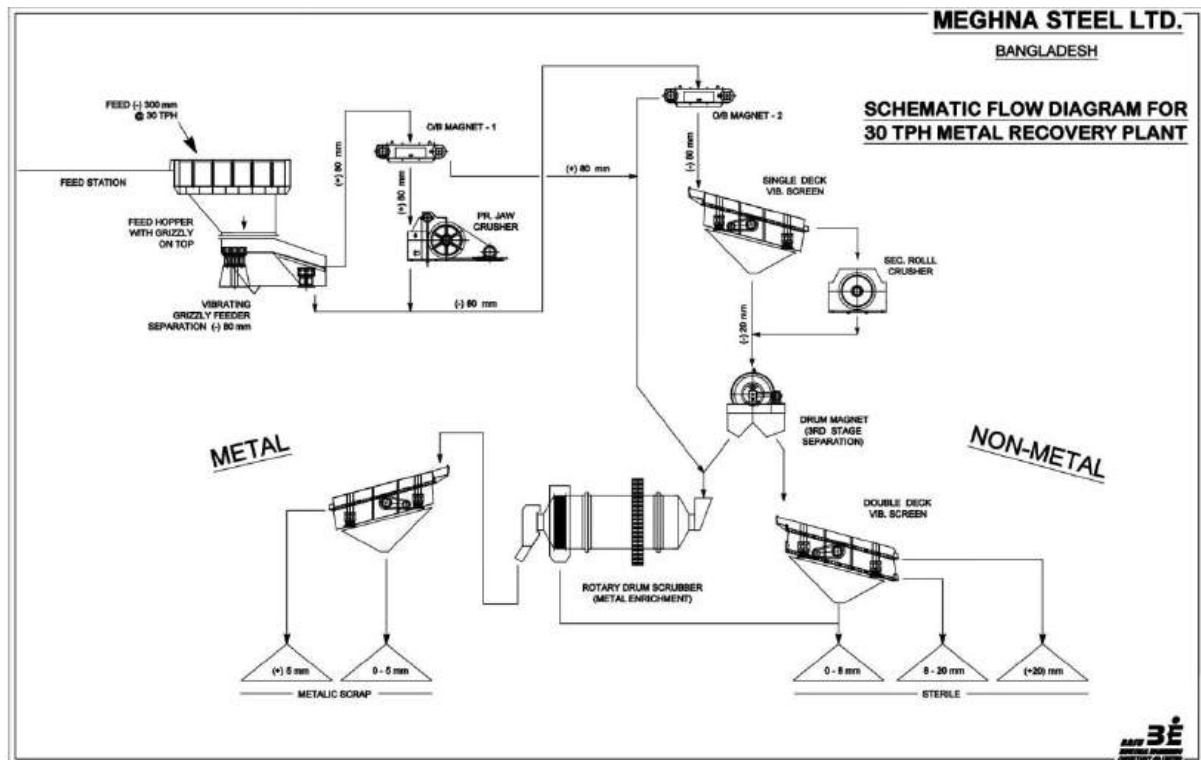
Waste	Approximate Amount Generated / Day	Uses/Importance/ Management
EAF slag	175 ton/day	<ul style="list-style-type: none"> • An ideal aggregate for asphalt surface materials and road surface treatments. • Slag is used as a cement-making material to replace clinker. • Slag fines can be used in developing bricks. • Slags have been successfully used for flooring tiles because of their good abrasive properties.

2.12.14.1 Process Description of Slag Treatment Plant:

The steel slag and ladle casting residue produced by the electric furnace will be transported to the steel slag storage yard by dump trucks for stacking. A steel slag shed will be set up on the entrance side of the magnetic separation line to dehydrate the steel slag.

The steel slag will be transported from the steel slag storage shed using a loader and transferred into the steel slag receiving hopper. A grille will be installed on the hopper to block steel slag pieces larger than 300mm. Slag larger than 80mm will be directed to the 1# belt magnetic separator, where magnetic materials will be sent to the rod mill, and non-magnetic materials will be directed to the jaw crusher. The slag crushed by the jaw crusher, along with slag smaller than 80mm from the vibrating feeder and screening machine, will be sent to the 2# belt magnetic separator. Magnetic materials from this process will go to the rod mill, while non-magnetic materials will be sent to the single-layer vibrator.

Figure 2-9: Steel slag magnetic separation line process flow



Source: Technical Feasibility Study Report, September 2023

Slag larger than 20mm on the sieve will be crushed by the double-roller crusher and then sent to the drum-type permanent magnetic separator, along with the slag that passes through the sieve. Magnetic materials will be sent to the rod mill, while non-magnetic materials will be separated by the double-layer vibrating screen into three sizes of steel tailings: 0-8mm, 8-20mm, and over 20mm. These tailings will be stored in the tailings warehouse, loaded into trucks, and sold. Tailings separated by the rod mill will be sent to the 0-8mm tailings warehouse. The slag steel will be divided into sizes greater than 5mm and less than 5mm by the vibrating screen, stored in the slag steel warehouse, and loaded into trucks. The scrap room will utilize this scrap material as an additive for the electric furnace.

All equipment will be interconnected with chutes, belt conveyors, large-angle belt conveyors, and bucket elevators. To comply with process and environmental protection requirements, the system will incorporate dust removal measures. Dust will be collected from the upper chute of the vibrating screen and the discharge end of the rod mill, and the cleaned dust will be directly reintegrated into the system.

Main process equipment:

- Vibrating feeder and screening integrated machine: 80mm, processing capacity: 80t/h 1 unit · Jaw crusher: processing capacity: 30t/h 1 unit, discharge particle size <180mm
- Belt magnetic separator: B=800mm, process feed capacity: 30t/h, processing capacity: 100t/h 2 units
- Double roller crusher: processing capacity: 30t/h 1 set, discharge particle size <20mm, 1 set
- Drum type permanent magnet magnetic separator:
- Single-layer vibrating screen: processing capacity: 30t/h, screen aperture 20mm, 1 set
- Single-layer vibrating screen: processing capacity: 30t/h, screen aperture 5mm, 1 set
- Double-layer vibrating screen: processing capacity: 30t/h, screen aperture 20mm, 8mm 1 set
- Rod mill: processing capacity: 30t/h, feeding particle size <80mm, 1 set

A steel slag shed with only a roof will be set up for temporary storage and dehydration of steel slag before treatment. The shed will have a length of 36 meters and a width of 18 meters.

The entire slag treatment plant shed will be soundproof or sound-absorbing enclosures system. Vibration will be controlled by using vibration isolation pads or mounts to reduce the transmission of vibrations. Water will be sprayed to suppress dust at various stages of slag processing. Also, high-efficiency air filters will be installed in the shed of the slag treatment plant to capture fine particles.

A closed structure tailings warehouse will be set up with a length of 18 meters, a width of 12 meters, and a height of 8 meters. Inside the warehouse, there will be three 6m x 6m tailings piles, used to stack three different particle sizes of tailings.

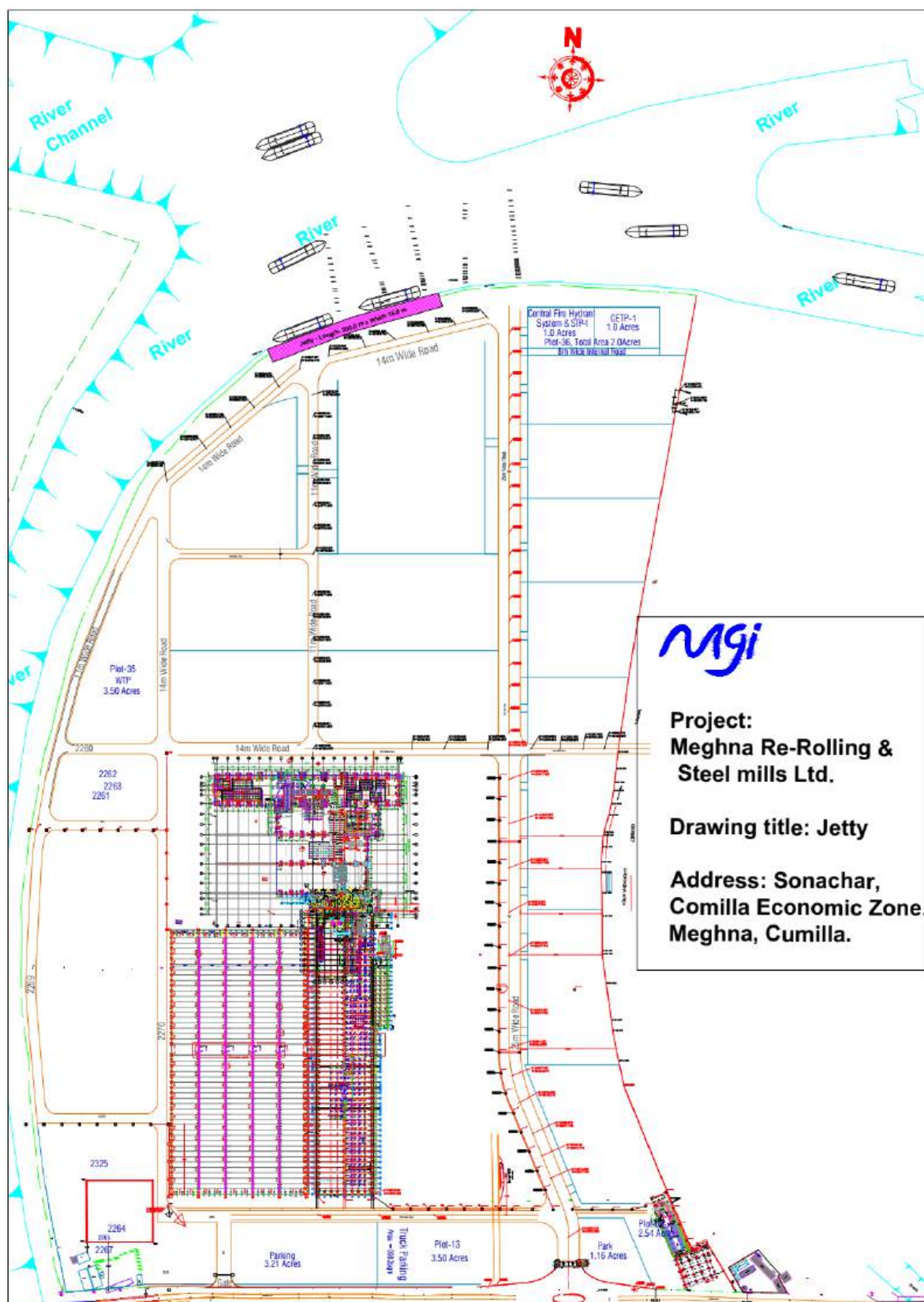
A closed structure magnetic separation powder warehouse will be set up with a length of 12 meters, a width of 12 meters, and a height of 8 meters. Inside the warehouse, there will be two 6m x 6m magnetic separation powder storage yards, which will be used to store tailings of three different particle sizes.

2.13 Associated Facilities

2.13.1 Wharf for Material Transportation

As per MGI, 2024, a wharf will be constructed on the northern side of the proposed steel plant in order to transport the raw material from the vessels. The length of the wharf will be 200m and the width will be 16m. A sheet pile will be installed at shore 18 m deep and RCC pile under deck ϕ 600 mm and 30 m long. D-shape rubber fender will be fastened on wharf frame. Steel Bollard on wharf deck will be 750 mm high and 6 m draught will be maintained. There will be no mooring.

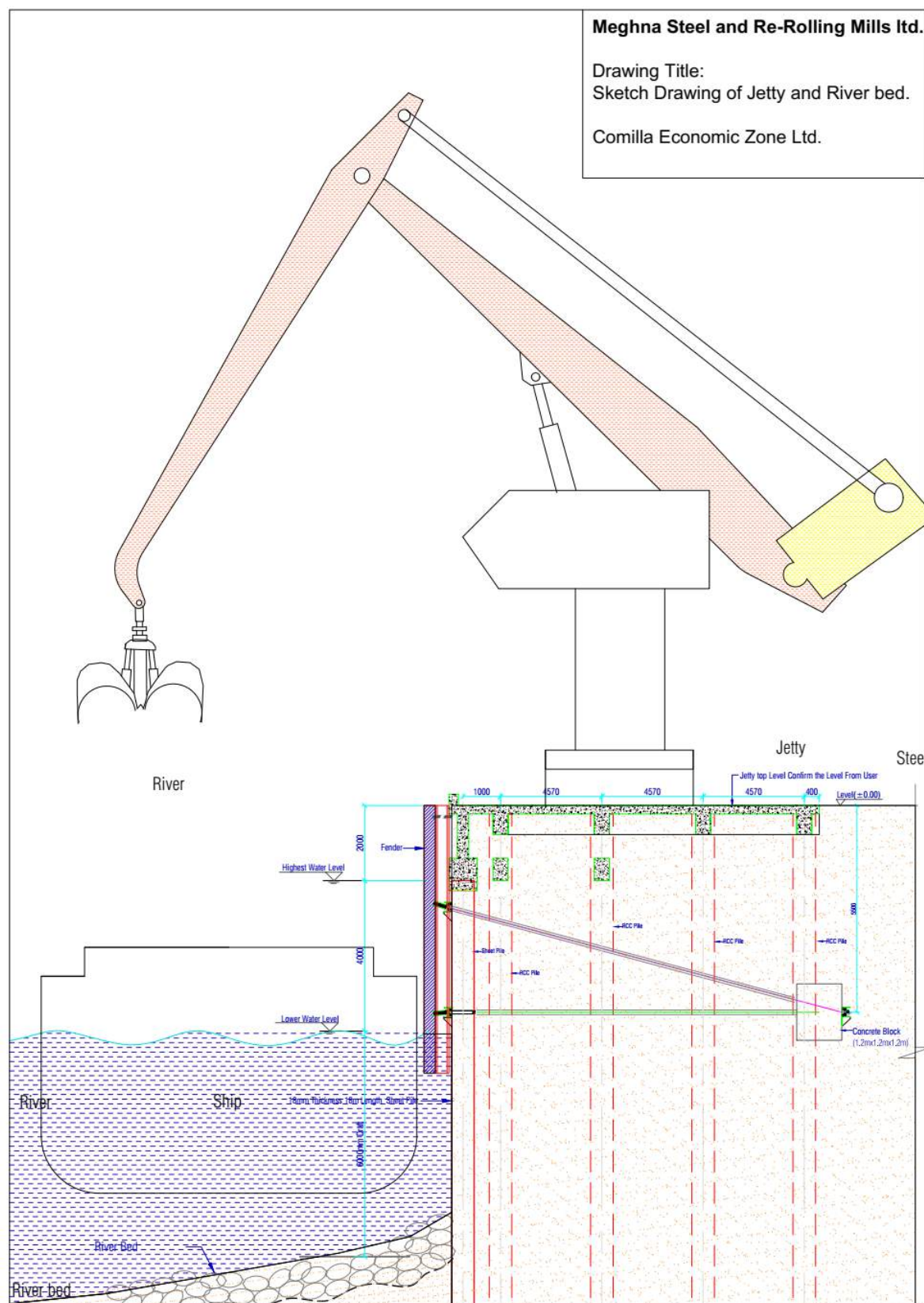
Figure 2-10: Location of the Wharf



Source: MGI, February 2024

A sketch map of the proposed wharf is shown in Figure 2-11.

Figure 2-11: Sketch of the Proposed Wharf



Source: MGI, February 2024

2.14 Capital Dredging

As confirmed by MGI, the capital dredging in the Meghna River branch will be performed by the Bangladesh Inland Water Transport Authority (BIWTA), the authority responsible for managing inland water transport in Bangladesh. BIWTA is also responsible for the development, maintenance, and operations of inland waterways in the country. MGI confirmed that it will not undertake any dredging activities in the Meghna River branch for the proposed steel mills project. Also, MGI confirmed that it did not conduct any dredging activities as part of CuEZ development. Therefore, capital dredging will not be within the scope of this ESIA.

A consultation involving Key Informant Interviews (KIIs) was conducted to understand the general dredging process in river branches, including dredging methods, disposal of dredged materials, impacts on aquatic biodiversity, and relevant mitigation measures. The summary of the consultation is as follows:

- In Bangladesh, the capital dredging is usually performed by BIWTA in collaboration with Bangladesh Water Development Board (BWDB).
- The dredging activities are carried out complying the guidelines of Bangladesh Water Act, 2013 and Bangladesh Water Rules, 2015.
- Dredging activities are generally carried out for three (3) purposes: (1) River training works, (2) Navigation and its maintenance and (3) Land Reclamations.
- For navigation and maintenance purposes, the hydraulic dredging method is used. Usually, cutter suction dredgers are employed for this purpose, along with excavators depending on the type of sediment load. Trailing suction hopper dredgers are also used for large-scale dredging.
- Dredging in the Meghna River branches is generally performed during the dry season, between October and May.
- Dredged materials are generally disposed of on non-cultivated land or in landfills, or they are used in other development activities such as river protection work. When these materials are disposed of on private or cultivated land, compensation is provided to the landowners in accordance with government regulations.
- Parameters for heavy metals and toxic elements are tested periodically prior to the disposal of dredged materials. There are no stipulated standards for dredged materials in Bangladesh, so the Australian standards for sediment quality from 2010 are generally used for comparison. For large-scale dredging projects occurring near ecologically critical areas and dedicated spawning grounds, detailed aquatic biodiversity assessments are conducted, and suggested mitigation measures are adopted by the project authority.

These assessments entail a thorough examination of the local ecosystem, including the diversity of species, habitats, and ecological processes present within the affected area. Highly specialized teams, often comprised of environmental scientists, marine biologists, and ecologists, meticulously survey the targeted regions to identify any potential risks or impacts associated with the proposed dredging activities. Furthermore, the findings of these assessments serve as the foundation for the development of tailored mitigation measures designed to minimize any adverse effects on the surrounding environment. These measures may encompass a range of strategies, including the implementation of sediment control measures, the establishment of buffer zones around sensitive habitats, and the adoption of best practices to minimize disturbance to aquatic life during dredging operations.

According to MGI, dredging activities were scheduled to begin in April 2024, with an anticipated completion by the end of 2025. However, these activities had not commenced during the time of the ESIA study. Initially, capital dredging is necessary. Maintenance dredging will be required based on the accumulation of siltation in the river, which may occur every 2-3 years. MRSML confirmed that the proposed cargo transport route will be through the Aralia channel in the north.

2.15 Shared Facilities

2.15.1 Effluents, Treatment and Management

Meghna Re-Rolling and Steel Mills Ltd. is not expected to generate any industrial wastewater. A closed-circuit cooling system will be implemented for the cooling of billets and MS Rods, ensuring complete recyclability of the water used. Over a certain period, the system may experience some water loss or evaporation, which is addressed by adding makeup water. This replenishment is necessary to compensate for the evaporated or lost water, ensuring the uninterrupted continuation of the process. Consequently, the steel plant's operations and cooling processes will not result in the generation of wastewater.

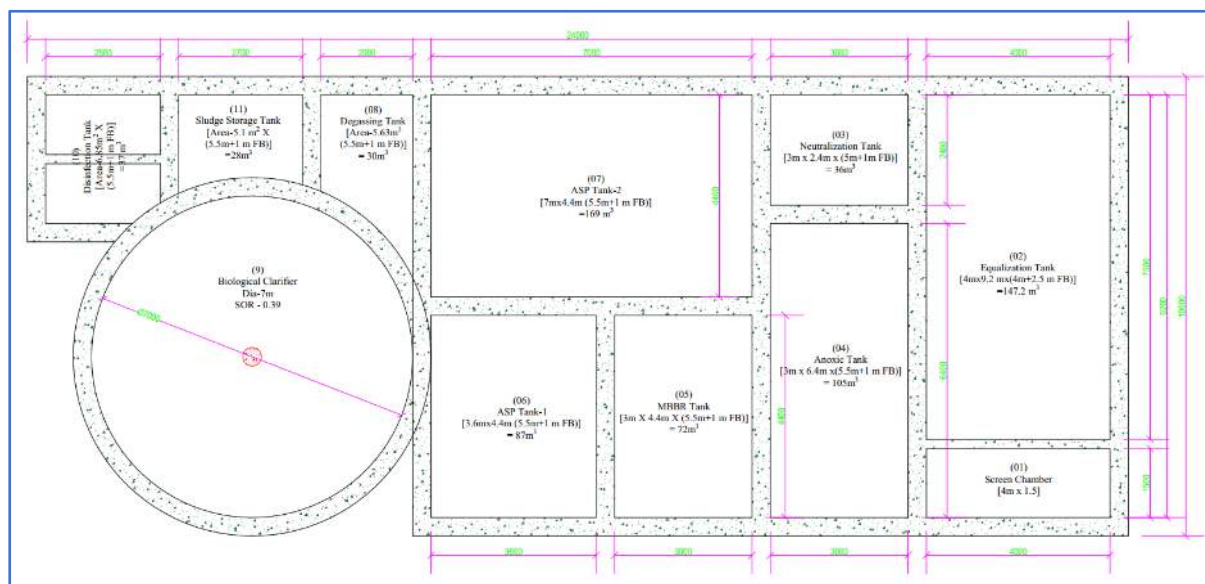
Wastewater primarily originates from sanitary facilities within the plant, as well as from the cleaning of floors, other surfaces, and the maintenance of tools and equipment, including motor vehicles.

Domestic wastewater will undergo treatment through septic tanks and soak pits before being directed to the economic zone Central Sewage Treatment Plant (CSTP) for more advanced treatment. The wastewater from the associated facilities will undergo treatment through the Central Effluent Treatment Plant (CETP) of the economic zone. As per MGI, zero discharge system will be adopted, operated and the treated water will be utilized in toilet flushing, vehicle washing and gardening purposes.

2.15.1.1 Central Sewage Treatment Plant (CSTP)

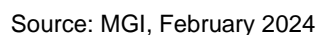
Sewage treatment is the process of removing contaminants from wastewater comprising of domestic sewage. According to MGI, CuEZ will construct a Central Sewage Treatment Plant (CSTP) with a capacity of 720m³/ day. The sources of domestic sewage are canteens, toilets, office buildings and toilets in various buildings. All domestic sewage passes through septic tanks and then is discharged into the CSTP for advanced treatment. The layout of the Central Sewage Treatment Plant (CSTP) is shown in Figure 2-12.

Figure 2-12: Layout of the Central Sewage Treatment Plant (CSTP)



Source: MGI, February 2024

To treat the industrial wastewater, a Central Effluent Treatment Plant (CETP) will be constructed in the Cumilla Economic Zone. According to MGI, the capacity of the CETP is proposed to be 1000 m³/day having the operation period of 24 hours. The process flow of the CETP is shown in Figure 2-13.



2.15.2 Multi Storied Admin Cum Officer's Dormitory Building

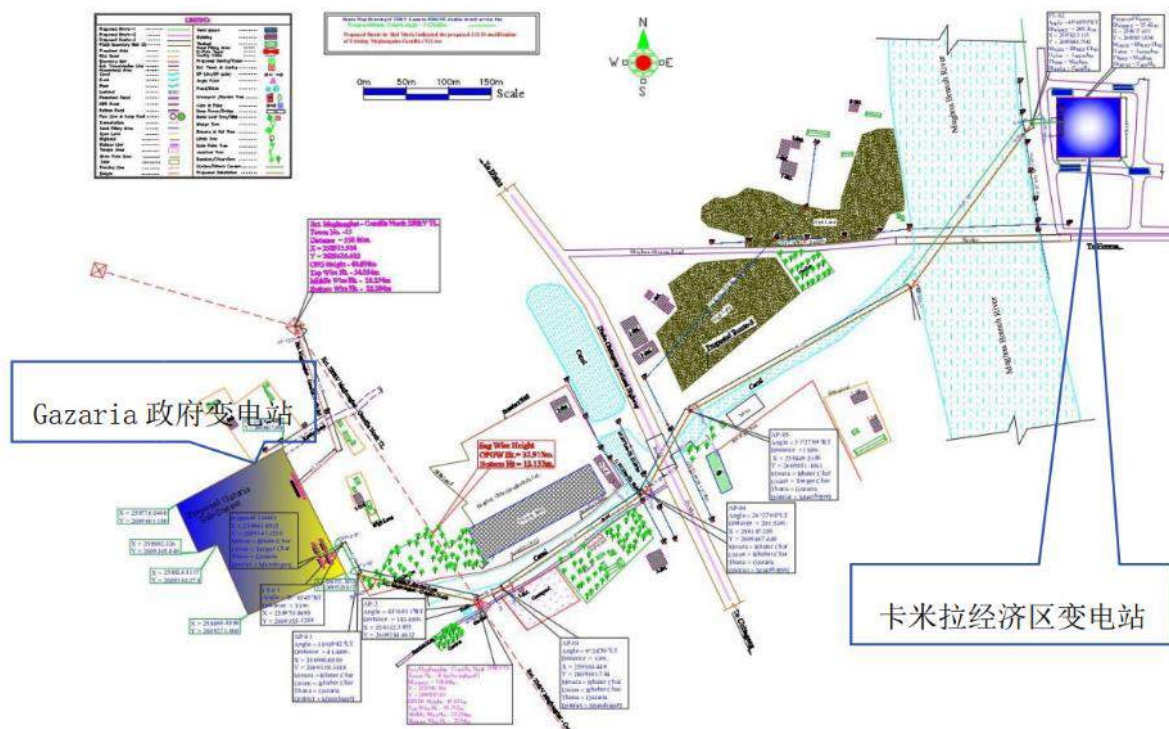
A multi-storied administrative and officer's dormitory building will be constructed on the southeast side of the project. The building will primarily serve as the administrative block. Additionally, the capacity of the G+10-storied staff dormitory building is approximately 1000 employees. This building will house office spaces, a conference room, helipad, gym, medical center, staff dormitory, worker accommodation, and dining facilities. An individual septic tank will be installed and connected to the Central Sewage Treatment Plant (CSTP). The building is estimated to require an area of approximately 26,000 square feet. Water consumption is projected to be around 72,000 liters per day for the admin office and 135,000 liters per day for worker accommodation and dining. The electricity demand in the office area is anticipated to be about 1,190 KW, while it is expected to be 230 KW in the dormitory building. The building will comply with global life and fire safety standards, such as the US NFPA, as well as the requirements of the Bangladesh National Building Code (BNBC).

2.15.3 230kV/33kV Substation

A new Cumilla Economic Zone substation is built in the factory area, and the Gazaria government substation 1.5 kilometers away provides 230kV double-circuit power supply. In addition to providing power for this project, the Cumilla Economic Zone substation also provides 33kV power for other enterprises in the Cumilla Economic Zone. Taking into account the future development of the Cumilla Economic Zone, the substation has reserved the location and conditions for further expansion in the future.

The design of the substation adopts International Electrotechnical Commission (IEC) and Chinese standards. The power supply lines are laid overhead on steel structure towers. The path of the power supply lines is shown in Figure 2-14.

Figure 2-14: The Path of the Power Supply Lines



Source: Technical Feasibility Study Report, September 2023

2.15.3.1 Power Transformation and Distribution Facilities

The Cumilla Economic Zone substation is equipped with a total of five 100/125MVA main transformers with a voltage transformation ratio of 230/33kV.

The 230kV and 230kV systems are all double busbars, and the 33kV system is segmented.

Section 1 33kV busbar is connected to 2 main transformers to provide 7 channels of 33kV power supply for the Cumilla Economic Zone including this project.

The 2 sections of 33kV busbars are connected to 3 main transformers to supply power to 2 electric arc furnace main transformers and 1 LF furnace transformer in this project.

Two sections of 33kV busbars are equipped with contact switches. 230kV equipment and 33kV equipment adopt indoor GIS equipment.

Since the power factor of the DC electric furnace in the smelting workshop of this project is 0.65 and the power factor of the LF furnace is 0.76, a set of SVC dynamic reactive power compensation device needs to be built in the Cumilla Economic Zone substation to compensate the 33kV bus side power factor to above 0.95.

2.15.4 Natural Gas Station and Gas Pipeline

There is a natural gas station, and the natural gas supplied by the government is sent to the natural gas station through pipelines with an inlet pressure of 1MPa. The natural gas station is equipped with 2 sets of pressure regulating valve groups, one for working and one for backup. The pressure is reduced to 0.3MPa for users to use. A 100 PSIG gas pipeline with a 16-inch diameter will connect the steel plant to the off-take/City Gate Station (CGS). The distance from the natural gas station to MRSML is 590m. In the plant, the gas will mainly be used for billet re-heating. There will be no onsite storage for natural gas.

2.16 Key Project Components

Key project components will be as follows:

- Scrap sourcing and transportation system.
- Scrapyard and storage
- Steel Melt Shop
 - Electric Arc Furnace
 - Ladle Furnace
 - Fume Treatment Plant
 - Ladle Fleet and Preparations
- Continuous Casting Machine (CCM) and Rolling Mill
 - Continuous Caster
 - Tunnel Furnace
 - Seven Stand Finishing Mill
 - Cooling System
 - Down-coiler
 - Coil Conveyor
 - Coil Yard
 - Roll Shop
- Wharf
- Water Treatment Plant
- Central Effluent Treatment Plant
- Central Sewage Treatment Plant
- Natural Gas Systems

- Industrial Gases
- Multi Storied Admin Cum Officer's Dormitory Building
- Laboratory Facilities
- Workshop Facilities
- Warehouses / Stores
- Waste Storage, Handling, and Disposal including slag treatment plant

2.17 Project Life Cycle

The life cycle of the Project includes 4 phases:

- Pre-construction Phase (2021-2022)
- Construction Phase (2022-2025)
- Operation and Maintenance (2026 onwards)
- Decommissioning

The anticipated activities that will be carried out during the pre-construction, construction, and operation phase of the proposed steel manufacturing plant project are given in Table 2-5.

Table 2-5: Activities during different phases of the Project

Project Phases	Activities
Pre-construction Phase	<p>The following major activities are to be undertaken during the pre-construction phase of the proposed project:</p> <ul style="list-style-type: none"> • Selection of candidate sites. • Land /purchase/lease; • Land survey, geotechnical investigation; • Feasibility study for the steel manufacturing plant and associated facilities; • Preparation of layout plan, design, and drawings; • Landfilling and leveling; • Land preparation for the proposed project; and • EIA study for environmental clearance from DoE, Bangladesh. • Environmental and Social Impact Assessment study being conducted along with preparation of ESMPs for construction and operation phases along with other plans and procedures.
Construction Phase	<p>The following major activities are to be undertaken during the construction phase of the proposed project:</p> <ul style="list-style-type: none"> • Establishment of labor camp and mobilization of workers for construction activities; • Development of internal road networks; • Transportation of construction materials by road and waterway; • Temporary sites used for storage of construction goods, materials, and machinery for the construction of the steel plant and associated facilities; • Construction of steel plant. • Construction of wharf on the north side of the project. • Heavy equipment and machinery operation in the construction site; • Maintenance and replacement of vehicles and equipment; • Civil construction and technological installation work; • Mechanical and electrical installation; • Use of utilities like land, power, water, fuel, etc.; • Construction waste storage and disposal facility; • Solid, liquid, and hazardous waste generation from the labor camp and construction site and disposal; • Monitoring of mitigation measures for environmental and social impact; and • Overall project construction and management.

Project Phases	Activities
Operation and Maintenance Phase	<p>The following major activities are to be undertaken during the operation phase of the proposed project:</p> <ul style="list-style-type: none"> • Manpower recruitment for the plant operation; • Transportation of raw materials (metal scraps, etc.); • Commercial operation of the steel manufacturing plant; • Utilization of wharf and transportation of material • Utilization of surface and groundwater for plant operation • Generation, treatment, and disposal of effluent • Domestic, solid, and other non-hazardous waste handling, storage, and disposal • Hazardous material and waste storage • Maintenance and replacement of equipment • Implementation of CSR activity; and • Monitoring of ESMP, DMP, and HSE.
Decommissioning Phase	<ul style="list-style-type: none"> • Dismantling of infrastructure and replacement of dysfunctional equipment and installations. • Waste disposal. • Monitoring of ESMP, DMP, and HSE.

2.18 Estimated Project Cost and Project Schedule

According to MGI, the total cost of the Project is estimated to be US\$ 396,693,606 after financing, including contingency. The breakdown of estimated project investment is shown in Table 2-6.

Table 2-6: Investment Estimate for A Steel Project with an Annual Output Of 1.4 million Tons

SN	Name	Investment in USD
1.	Construction project fee	102,807,692
2.	Equipment costs	225,000,000
3.	Installation engineering fee	30,461,538
4.	Other construction costs (7.5%)	26,870,192
5.	Reserve fee (3%)	11,554,183
6.	Total project investment	396,693,606

Source: Feasibility Study, 2023

According to the MGI, it has been assumed that the completion of the proposed project will be finished within 3 years. The possible completion time of the construction is the end of 2025. The Table 2-7 shows the tentative project schedule.

Table 2-7: Tentative Project Schedule

SN	Components	Tentative Schedule
1.	Meghna Re-rolling Mills Limited	
	Pre-construction Phase	2021-2022
	Construction Phase	2022-2025
	Operation and Maintenance	June 2026
2.	Associated Facilities	
	Wharf Construction	2024-2025
	Wharf Commercial Operation	June 2026
3.	Shared Facilities	
	G+10 Construction	2022-2026
	G+10 Commercial Operation	June 2026
	CSTP Construction	2024-2026
	CSTP Commercial Operation	May 2026
	CETP Construction	2024-2026
	CETP Commercial Operation	May 2026

Source: MGI, June 2024

CHAPTER 3

Administrative and Legal Framework

3 ADMINISTRATIVE AND LEGAL FRAMEWORK

This chapter provides a legal and regulatory framework, covering national requirements as well as guidelines and standards to address the environmental and social risks of the proposed project and its associated components and to protect and conserve the environment from any adverse impacts. This chapter intends to discuss the regulatory context, which is directly related to environmental compliance, which must be adhered to by all parties involved in the project throughout the planning, construction, operation, and decommissioning.

3.1 Environment and Social Related Legislation in Bangladesh

All legal provisions relevant to environmental protection applicable to the planning, construction, operation, and decommissioning of the proposed project are identified and summarized in Table 3-1 along with their applicability to the proposed project.

Table 3-1: National Legal Provisions Applicable to the Proposed Project

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
Environment Conservation Act, 1995 and its amendments in 2000, 2002, and 2010	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> • Declaration of Ecologically Critical Areas (ECAs). • Obtaining Environmental Clearance Certificate (ECC). • Regulation for vehicles emitting smoke which is harmful to the environment. • Regulation of development activities from an environmental perspective. • Promulgation of standards for quality of air, water, noise, and soil for different areas and different purposes. • Promulgation of acceptable limits for discharging and emitting waste. • Formulation of environmental guidelines relating to the control and mitigation of environmental pollution, conservation, & improvement of the environment. 	Applicable - according to the Act <i>"no industrial unit or project shall be established or undertaken without obtaining an ECC from the DG"</i> . Therefore, the provisions of the act apply to all the project life cycles.
Environment Conservation Rules, 2023	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> • National Environment Quality Standards for surface water (inland and marine/coastal), drinking water, sewage effluent, industrial effluents, liquid waste discharge standards industry-wise, etc. • Categorization of industries, development projects, and other activities based on actual and anticipated pollution load. • Procedure for obtaining Environment Clearance Certificate (ECC). • Requirements for undertaking IEE and EIA's as well as formulating EMP according to categories of industries/ development projects/activities. • Procedure for damage claim by persons affected or likely to be affected due to polluting activities or activities causing hindrance to normal civic life. 	Applicable - as the project falls under the "Red" category and requires ECC from DOE. Besides, it is stipulated that environmental quality standards and other relevant requirements shall comply during the project life cycle.
Environment Court Act, 2010 and its amendment in 2019	Ministry of Environment, Forest and Climate Change Judiciary	<ul style="list-style-type: none"> • Establishment of one or more environmental courts in each district and one or more special magistrate courts in each district. • Also provides the jurisdictions of the environment court, the penalty for violating the court's order, trial procedure in special magistrate court, power of entry and search, procedure for investigation, procedure, and power of environment court, authority of environment court to inspect, appeal procedure and formation of the environment appeal court. 	Applicable - the court has jurisdiction, under the act's provisions, over trial for an offense or compensation under environmental law, imposing penalties for violation, etc.

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
Noise Pollution (Control) Rules, 2006	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> The Rules have been established to manage noise-generating activities, which have the potential to impact the health & wellbeing of workers and the surrounding communities. An area up to a radius of 100 meters around hospitals, educational institutions, offices, or similar types of institutions is designated as a silent area. The acceptable sound limit in the silent areas is 50 dB(A) for daytime and 40 dB(A) for nighttime. The residential areas are primarily occupied by dwellings. The acceptable sound limit in residential areas is 55 dB(A) for daytime and 45 dB(A) for nighttime. Mixed areas with a mix of residential, commercial & industrial land use. The acceptable sound limit in the mixed areas is 60 dB(A) for daytime and 50 dB(A) for nighttime. Commercial areas are primarily occupied by businesses and officers. The acceptable sound limit in commercial areas is 70 dB(A) for daytime and 60 dB(A) for nighttime. Industrial areas are used for industry or manufacturing. The acceptable sound limit in the industrial areas is 75 dB(A) for daytime and 70 dB(A) for nighttime. An area between 500 meters from the last limit of a residential area for construction-related activity use of brick and stone crusher machine is prohibited and operation of mixture machine and construction-related machinery and equipment are prohibited from 7 PM to 7 AM. The guidelines say exceeding the maximum noise level in certain areas is a punishable offense. 	Applicable - the project construction and operation activities will create noise within the project site and surroundings. Therefore, requires complying with these rules.
Air Pollution (Control) Rules, 2022	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> Stipulate ambient air quality standards, emission standards for vehicles, emission standards for water vessels, gaseous emission standards applicable to industries or projects, odor standards, and standards for construction dust control. 	Applicable - as the project has significant pollution sources, including emissions from construction and operation

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
		<ul style="list-style-type: none"> Local government organizations, construction management authorities, and other relevant organizations shall comply with the standards and control methods specified in the rules. Rules also provide for the prevention of air pollution from hazardous waste, excessive emissions of air pollutants, air quality monitoring and warning, data management, the establishment of a national executive committee for air pollution control, measures to prevent damage to ecosystems caused by air pollution, awards for contributions to air pollution control, and penalties for violations. 	processes, scrap materials transportation and handling, etc. It will be under the obligation of this act.
Ecologically Critical Areas (ECAs) Management Rules, 2016	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> The ECA Management Rule, 2016 has enabled the government to form a "National Committee" headed by the Secretary of MOEFCC. To implement the decision of the Directorate, District, and Upazilla committee may be formed. For the conservation and development of the ecologically critical area, one or more teams may be formed. The responsibility of the team would be to implement the decision and planning of the Government to improve the Environment for Ecology. The Rule also prohibited many activities and processes which are detrimental to the natural condition of habitat, tranquility, biodiversity, etc. 	Not applicable - the proposed project is located far away from any ECA. Therefore, this rule is not applicable to this project.
Biodiversity Act, 2017	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> The Act has enabled the government to form a "National Committee on Biodiversity". The functions of the committee are to conserve biodiversity, genetic biodiversity, identification of biodiversity-related important areas, heritage, etc. The government is empowered to declare, in consultation with local communities and bodies and in coordination with concerned ministries or departments, any place or area significant for its biological heritage as a "Biodiversity Heritage Site". Prohibiting the taking of activities that may have an adverse effect on endangered animals or organisms, etc. No person shall take any such activity, viz (a) adversely affect or may affect endangered species; (b) 	Applicable - the project is going to be established in the Cumilla Economic Zone and a wharf will be constructed in the north side of the project. During the operation phase of the project, the operation of the wharf and plant will impact the surrounding aquatic

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
		adversely affect or may affect the environmental characteristics of the endangered ecological community; or (c) In accordance with the Ramsar Convention, the wetland may adversely affect or affect the environment and environmental characteristics of the declared area.	environment. Therefore, this act is applicable.
Forests Act, 1927 and its amendment in 1982, 1989, 2000 and 2018	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> • The government can prohibit certain activities in the declared Reserved Forest area, causing any damage by negligence in felling any tree or cutting or dragging any timber; etc. • The act makes various provisions for the conservation of forests. • It defines the procedure to be followed for declaring an area to be a Reserved Forest, a Protected Forest, or a Village Forest. • It defines what a forest offense is, what acts are prohibited inside an RF, and penalties leviable on violation of the provisions of the act. • The act gives the government power to make any relevant rules to protect the forest. • Guidelines for social forestry practice. • Control and collection of timber and other forest products, and duties on those. 	Not applicable - the proposed project is going to be established in the Cumilla Economic Zone and no reserve forest and protected areas are found within the project site and surrounding.
Wildlife (Conservation and Security) Act, 2012	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> • Prohibition is related to capturing, killing, shooting, or trapping wildlife. No person shall hunt any wild animal without a license. • Determination of threatened flora and fauna in four (4) schedules. • Prohibitions, entry, and declaration procedure of protected areas (sanctuary, national park, community conservation area, safari park, eco-park, botanical garden, wild animal breeding center, landscape zone or corridor, buffer zone, core zone, special biodiversity conservation area, national heritage, memorial tree, sacred tree, and kunjaban, etc.). • No person, institution, or company shall establish or operate any industrial factory or brickfield within 2 (two) kilometers from the boundary of a sanctuary. 	Not applicable - as no project activities are going to undertake within the buffer zone of the eco-sensitive zone notified in this act.

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
Protected Area Management Rules, 2017	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> • The legal basis for the management and co-management of forest-protected areas. • Structures, functions, and obligations of management of some of the protected areas, but excluding safari-park, zoo, botanical garden, private park, and wildlife fertility center from their application. • The Rules have 33 sections and provide a model for participatory co-management, consisting of forest-dependent communities, forest departments, civil administration, and civil society organizations. • The rules provide for financial benefits and income incentives to shareholders through participatory social forestry programs to be planted in buffer and landscape areas, and eco-tourism. 	Not applicable - no protected areas are found within the project site and its surroundings. Therefore, this act is not applicable.
Bangladesh Water Act, 2013	Ministry of Water Resources	<ul style="list-style-type: none"> • Any infrastructure or landfilling activities over any natural watercourses, stopping the natural flow or creating obstacles, or diverting or attempting to divert the direction is strictly prohibited. • According to the provision of section 43, all the costs may be incurred for the removal of infrastructure or landfilling materials from the person liable for making infrastructure or carrying on landfilling activities. • Any area or any part of any land connected with water resources can be declared as a Water Stress Area. • Ensuring safe abstraction of water from aquifers & executive authority may subject to the lowest safe yield of surface and groundwater. • Any infrastructure shall not be established in the immediate premises of the flood control embankment and ensure the sustainability and protection of the control structure. • No person shall not store, preserve, or divert the water of any water source in any natural or artificial reservoir. 	Applicable - the project installed 3 borewells and proposes to use groundwater for the labor camp and for other purposes during construction and operation.

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
Bangladesh Water Rules, 2018	Ministry of Water Resources	<ul style="list-style-type: none"> Provision of No Objection Certificate for the establishment of projects related to flood control and management project; surface water extraction, supply and use related project and part of the project; irrigation project using surface water; construction of hydraulic structures; water conservation project; flood-affected plain land and wetland development project; groundwater for industrial use; riverbank protection and river control; river excavation and dredging project; canal excavation and re-excavation project; fisheries development in surface water project; groundwater extraction, supply, & use related project & part of the project; and others project. According to Clause-16 of the rules, an NOC should be taken from the DG of WARPO, District Committee/DC, Upazilla Committee/UNO, and Union Committee/Chairman based on the total investment of the specific project. 	Applicable - the project proposes to use surface water for cooling purposes and will be sourced from the branch of the Meghna River. Therefore, a NOC will be required to collect from the relevant committee considering the invested value.
National River Protection Commission Act, 2013	Ministry of Water Resources	<ul style="list-style-type: none"> An act to establish a Commission for preventing illegal occupation of rivers, pollution of water and environment, pollution of rivers caused by industrial factories, illegal constructions, and various irregularities and ensuring multidimensional use of rivers for socio-economic development including restoration of the normal flow of rivers, proper maintenance thereof and making them navigable. 	Applicable - as the proposed project has a likeliness of pollution impact on the environment due to construction and operation activities.
Protection and Conservation of Fish Act, 1950 and its amendment in 1982 and Rules, 1985	Ministry of Fisheries and Livestock	<ul style="list-style-type: none"> The act was enacted to provide for the protection and conservation of fish. Under the Act, the Protection and Conservation of Fish Rules were adopted in 1985. No person shall destroy or make any attempt to destroy any fish by explosives, gun, bow, and arrow in inland waters or within coastal waters. During the Project intervention, it should be noted that if waste effluent is not treated then it may cause significant damage to the local fishery and thus violate the provision of the law. 	Applicable - the project requires compliance with any rules set out to protect fish in inland surface waters. Therefore, this act and rule are applicable.

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
		<ul style="list-style-type: none"> No person shall destroy or make any attempt to destroy any fish by poisoning of water or the depletion of fisheries by pollution, by trade effluents or otherwise in inland waters. Protection and conservation of fish in government-owned water bodies. 	
Bangladesh Economic Zone Act, 2010	Bangladesh Economic Zones Authority, Prime Minister's Office	<ul style="list-style-type: none"> Encourage rapid economic development through the increase and diversification of industry, employment, production, and export including backward and underdeveloped regions. Encourage more efficient management and monitoring programmers for implementing commitments on the environment and other matters. Ensure efficient use of land in the light of clustering principles by dividing the land based on infrastructure and on the availability of local resources to provide a conducive environment and facilities within economic zones. To encourage public-private partnerships in the development and operation of economic zones. The authority, economic zone developers, industrial units established in economic zones, and financial, and business institutions shall be bound to comply with international commitments recognized by the GOB including compliance with all the existing laws on environment and environmental protection. 	Applicable - the proposed project is going to be established in the Cumilla Economic Zone under MGI complying with the operational guidelines of BEZA. Therefore, this act will comply to ensure environmental protection.
Ports Act, 1908	Ministry of Shipping	<ul style="list-style-type: none"> Any person who by himself or another so casts or throws any ballast or rubbish or any such other thing or so discharges any oil or water mixed with oil, and the master of any vessel from which the same is so cast, thrown or discharge, shall be punishable. 	Applicable - as the proposed project has the likeliness of pollutant discharges in the environment.
Bangladesh Merchant Shipping Ordinance, 1983	Ministry of Shipping	<ul style="list-style-type: none"> No ship, other than a Bangladesh ship, shall, except with the previous permission in writing of the Shipping Authority, be engaged or used in the lighterage of food grains and other cargo or transshipment of any cargo other than food grains at any point within the territorial waters of Bangladesh for carriage to any destination within Bangladesh. 	Applicable - as the proposed project has a provision of scrap material transportation and unloading from water vessels in the territorial water

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
		<ul style="list-style-type: none"> No foreign ship shall, except with the previous permission in writing of the Shipping Authority, use, for loading and unloading of bulk cargo within the territorial waters of Bangladesh, any device or equipment which is not permanently attached to the ship. No Bangladesh ship shall, except with prior permission in writing from the DG of shipping, be converted, modified, or altered in such a manner to change the character of the ship. 	of Bangladesh. Therefore, a NOC will be required to take from the Shipping Authority.
Imports and Exports (Control) Act, 1950	Ministry of Finance	<ul style="list-style-type: none"> No goods of the specified description shall be imported or exported except following the conditions of a license to be issued by the Chief Controller or any other officer authorized on this behalf by the Government. 	Applicable - as the machinery and equipment for the project will be imported.
Acquisition and Requisition of Immovable Property Act (ARIPA), 2017	Ministry of Land	<ul style="list-style-type: none"> Current GOB Act, relating to acquisition and requisition of land. According to the law, the affected person will get an additional 200% of the assessed value for land and an additional 100% for structures, trees, crops, and other assets. This law deals with social and economic impacts as a consequence of land acquisition. 	Not applicable - no land acquisition issue in this project as the proposed project going to be established inside of CuEZ under MGI.
Fatal Accidents Act, 1855	Ministry of Law, Justice, and Parliamentary Affairs	<ul style="list-style-type: none"> Provide compensation to families for loss occasioned by the death of a person caused by actionable wrong. It is mentioned in s.1, whenever the death of a person shall be caused by a wrongful act, neglect, or default, and the act, neglect or default is such as would (if death had not ensued) have entitled the party injured to maintain an action and recover damages in respect thereof, the party who would have been liable if death had not ensued shall be liable to an action or suit for damages, notwithstanding the death of the person injured, and although the death shall have been caused under such circumstances as an amount in law to a felony or other crime. 	Applicable - as the proposed project has a provision for an unlikely and accidental event that may cause fatal accidents.

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
Penal Code, 1860	Ministry of Law, Justice, and Parliamentary Affairs	<ul style="list-style-type: none"> Valid provisions related to pollution management, environment protection, and protection of health and safety. Chapter XIV of the Penal Code provides offenses effective public health, safety, convenience, decency, and morals: Section 277: Falling Water or Public Spring or Reservoir. Section 278: Making Atmosphere Noxious to Health. Section 284: Negligent Conduct with respect to Poisonous Substance. Section 285: Negligent Conduct with respect to Fire or Combustible Matter. Section 286: Negligent Conduct with respect to Explosive Substance. 	Applicable - as the proposed project has a provision of pollution impact on the surrounding environment.
Fire Prevention & Extinguish Act, 2003 and Rules, 2014	Ministry of Home Affairs	<ul style="list-style-type: none"> Regulatory enactments in regard to the prevention, the successful extinguishing of fire, and also reduction of damages and consequences of fire. States to obtain a license from the Director General of Fire Service and Civil Defense in case of any warehouse. 	Applicable - the proposed project may cause a fire accident. A NOC from the DG of Fire Service and Civil Defense will be required for the project.
Factories Act, 1965 and the Factories Rules, 1979 Bangladesh Labor Act, 2006 and amendments 2009, 2010, 2013 and 2018	Department of Labor/Department for Inspection of Factories and Establishment/ Ministry of Labor and Employment	<ul style="list-style-type: none"> Pertains to the occupational rights and safety of factory workers and the provision of a comfortable work environment and reasonable working conditions. Provides health, safety, and well-being of the workforce during the project life cycle. Children under 18 years are not allowed to be employed during the project life cycle. Safety precautions regarding explosive or inflammable dust/gas, protection of eyes, protection against fire, work with cranes and other lifting machinery, and lifting of excessive weight. Safety measures like appliances of first aid, maintenance of safety record books, rooms for children, housing facilities, medical care, group insurance, etc. 	Applicable - as provides health, safety, and well-being of the workforce during the project life cycle. Besides, it also stipulated that children under 18 years are not allowed to be employed during the project life cycle and therefore, this law requires to be complied with.

Act/Rules/ Law/Ordinance	Responsible Agency- Ministry/Authority	Key Features/Remarks	Applicability
Bangladesh Labor Rules, 2015		<ul style="list-style-type: none"> No building, wall, chimney, bridge, tunnel, road, gallery, stairway, ramp, floor, platform, staging, or other structure, whether a permanent or temporary character, shall be constructed, situated, or maintained in any factory in such a manner as to cause risk of bodily injury (Rule 38) of factory rules 1979, etc. 	
National 3R Strategy for Waste Management, 2010	Department of Environment	<ul style="list-style-type: none"> The concept of this strategy is minimizing waste impacts in terms of quantity or ill-effects, by reducing the quantity of waste products with simple treatments and recycling the waste by using it as resources to produce the same or modified products. The principle of "3R" is stated as reducing waste, reusing, and recycling resources and products. Reducing means choosing to use items with care to reduce the amount of waste generated. Reusing involves the repeated use of items or parts of items that still have usable aspects. Recycling means the use of waste itself, as resources. It suggests ISO 14001 or any other EMS structure which is significant for the development of strategies relevant to the industry and its social and environmental setting. ISO 14001 is increasingly important in international trade. 	Applicable - this strategy is applicable for the project for the management of waste (i.e., solid wastes) to minimize/reduce environmental, social, and economic problems.
Antiquities Act, 1968 and Antiquities Preservation Rules, 1986	Department of Archaeology, Ministry of Cultural Affairs	<ul style="list-style-type: none"> No person shall deal in antiquities except under and in accordance with a license granted by the Director. No person shall remove any object of the immovable protected antiquity. No person shall damage, alter, deface, or imperil immovable protected antiquity. Any person preserving or storing any kind of movable antiquity without a license shall produce it to the Director on demand for verification of the source of its possession. 	Not applicable - there are no archaeological and cultural sites on the project site.

3.2 Environment and Social Related Policies in Bangladesh

The main policies guiding environmental and social protection and conservation in Bangladesh are outlined in the following Table 3-2.

Table 3-2: Policies and Plans Relevant to the Project

Policy/Plans	Responsible Agency-Ministry/Authority	Key Features	Applicability
National Environment Policy, 2018	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> • Encourage collection and promotion of low carbon emission technology in the country. • Identifying and controlling all types of environmental pollution and degradation activities. • Ensure sustainable, long-term, and environmentally friendly use of all-natural resources. • To take PPP for the development of the environment. • Maintain and streamline the environmental policies and strategies among other policy strategies in the interest of sustainable development. • Ensure the EIA and SEA are in all necessary sectors. • Take action to reduce poverty through environmental protection. • Strengthen observations on proper compliance with environmental laws and regulations. 	Applicable - as the proposed project has a likeliness of having an impact on the surrounding environment
Bangladesh Climate Change Strategy and Action Plan, 2009	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> • Food security, social protection, and health. • Comprehensive disaster management. • Infrastructure. • Research and Knowledge management. • Mitigation and low carbon development. • Capacity building and institutional strengthening. 	Applicable - as the project has the potential to generate pollutants in the air during its construction and operation.
National Forest Policy, 2016	Bangladesh Forest Department/ Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> • Manage all existing forests, wildlife, and other forestry resources, adhering to the principles of sustainable management and climate resilience. • Enrich degraded forest areas and enhance land areas under forest/ tree cover. 	Not applicable - as the project site is in the CuEZ under BEZA. There is no designated

Policy/Plans	Responsible Agency-Ministry/Authority	Key Features	Applicability
		<ul style="list-style-type: none"> Produce a wide array of goods and ecosystem services for the benefit of Bangladesh's present and future generations. 	forest in the project site and its surrounding area.
National Water Policy, 1999	Ministry of Water Resources	<ul style="list-style-type: none"> Protection and prevention of the natural environment for ensuring sustainable development. Minimize disruption to the natural aquatic environment in streams and water channels. Water development plans will not interrupt fish movement and will make adequate provisions in control structures for allowing fish migration and breeding. Water development projects should cause minimal disruption to navigation and, where necessary, adequate mitigation measures should be taken. Full consideration of environmental protection, restoration, and enhancement measures consistent with NEMAP and the NWMP. 	Applicable - for the preservation of water quality in the Meghna River, Branches of Meghna River, and adjacent water bodies.
National Fisheries Policy, 1999	Ministry of Fisheries and Livestock	<ul style="list-style-type: none"> Provide provisions for the protection and conservation of fish in freshwater and brackish water bodies. Preservation, management, and exploitation of fisheries resources in inland open water. Fish cultivation and management in inland closed water. Prawn and fish cultivation in coastal areas. Preservation, management, and exploitation of sea fishery resources. Conserve fish breeding grounds and habitats. promote fisheries development and conservation in all water bodies. 	Applicable - the proposed project will construct and operate a wharf will be constructed in the north side of the project. Therefore, the project will consider this policy to protect the fishery resources around the project area.

Policy/Plans	Responsible Agency-Ministry/Authority	Key Features	Applicability
National Agriculture Policy, 2018	Ministry of Agriculture	<ul style="list-style-type: none"> • Ensure food security and socio-economic development through the productivity of crops, boosting production and raising farmers' income, diversifying crops, producing safe foods and developing a marketing system, profitable agriculture & use of natural resources. • Increasing food availability, rights, and purchasing power by increasing crop productiveness and production. • Discourage the use of agricultural land for non-agricultural work to ensure sustainable food security. • Soil, water, flora, fauna, and overall environmental conservation and effective use initiative adoption. 	Not applicable - as the project is going to be established in the Cumilla Economic Zone under MGI and has no impact on agricultural land and productivity.
National Land Use Policy, 2001	Ministry of Land	<ul style="list-style-type: none"> • To prevent arbitrary use of land. • To formulate guidelines for the maximum use of land according to the natural differences in different parts of the country. • In the case of land acquisition for urbanization and development projects or any other purpose, to ensure its best use by acquiring the least amount of land and to avoid the acquisition of excess land as required. • Arranging for the preservation of such lands, especially government Khas lands, which may be required in the future for various development activities. • To ensure that the use of land is compatible with the natural environment. • Making the best use of land to alleviate poverty and increase employment. • To play a helpful role in preventing the increase in the number of landless. 	Applicable - as the proposed project is going to be established on purchased for industrial purposes.
National Industry Policy, 2016	Ministry of Industries	<ul style="list-style-type: none"> • The policy emphasized green productivity and the use of green technology thereby protecting the environment, setting up ETPs, and CETPs would be encouraged by the government. • Advocates for setting up the Clean Development Mechanism or CDM in the industries. 	Applicable - as the project is a public sector industrial development to maintain a good environment.

Policy/Plans	Responsible Agency-Ministry/Authority	Key Features	Applicability
		<ul style="list-style-type: none"> Adoption of the 3R principle (Reduce, Reuse, Recycle) strategy would be encouraged for all industries. Discourages activities that use agricultural land for industrial purposes. 	
National Tourism Policy, 2010	Ministry of Civil Aviation and Tourism	<ul style="list-style-type: none"> Development of tourism resources of the country and their maintenance. Two special sections of the policy focus on 'archaeological and historical sites' and 'conservation of wildlife'. 	Not Applicable - as the proposed project establishment will not impact any tourist spots, heritage sites, etc.
National Occupational Health and Safety Policy, 2013	Department for Inspection of Factories and Establishment/ Ministry of Labor and Employment	<ul style="list-style-type: none"> Necessary measures to ensure workplace safety and health protection considering international Conventions/ Declarations/ Recommendations/ Instruments. Review and updating of all laws relating to Occupational Health and Safety (OHS). Inclusion of OHS issues in the policies and programs of all related Ministries and agencies. Establish labor courts in the industrial zone as the workers and trade unions can have easy access to the courts for implementing the mandatory provisions of OHS. Impose mandatory terms and conditions upon construction agencies to follow the OHS policies during govt. run construction works. To ensure maximum safety standards during construction and implement all standards and regulations in an internal safety environment. 	Applicable - as the policy pertains to the occupational rights and safety of workers and has the provision of a comfortable work environment and reasonable working conditions for all employees.

3.3 Environmental Standards

The appropriate national environmental standards will be applied under the ECR, 2023. The standards, commonly known as Environmental Quality Standards (EQS), are legally binding. There is a separate schedule for industry-specific standards, other than the general industrial emission and effluent standards. International standards will also be applied. The national and international environmental quality standards are depicted in Appendix E:

3.4 Administrative Setup Related to Environment and Social in Bangladesh

The MOEFCC is the nodal agency in the administrative structure of the GOB, overseeing all environmental matters relating to national environmental policy and regulatory issues in the country. The MOEFCC oversees the activities of the following technical/implementing agencies:

- Department of Environment (DOE)
- Bangladesh Forest Department (BFD)
- Bangladesh Forest Industries Development Corporation (BFIDC)
- Bangladesh Forest Research Institute (BFRI)
- Bangladesh National Herbarium (BNH)
- Water Resources and Planning Organization (WARPO)
- Bangladesh Inland Water Transport Authority (BIWTA)
- Ministry of Fisheries and Livestock (MOFL)
- Ministry of Labor and Employment (MOLE)
- Ministry of Law and Parliamentary Affairs
- Ministry of Land (MOL)
- City Corporation/Purashabha/Union Parishad.

3.4.1 Department of Environment (DOE), Bangladesh

The DOE has been placed under the Ministry of Environment, Forest and Climate Change as its technical wing and is statutorily responsible for the implementation of the ECA, 1995. The department was created in 1989, to ensure sustainable development and to conserve and manage the environment of Bangladesh. The principal activities of the DOE are:

- Defining EIA procedures and issuing environmental clearance permits the latter being the legal requirement before the proposed Project can be implemented.
- Providing advice or taking direct action to prevent degradation of the environment.
- Pollution control, including the monitoring of effluent sources and ensuring mitigation of environmental pollution.
- Setting Quality Standards for environmental parameters.
- Declaring ECAs, where the ecosystem has been degraded to a critical state.
- Review and evaluation of IEEs and EIAs prepared for projects in Bangladesh.

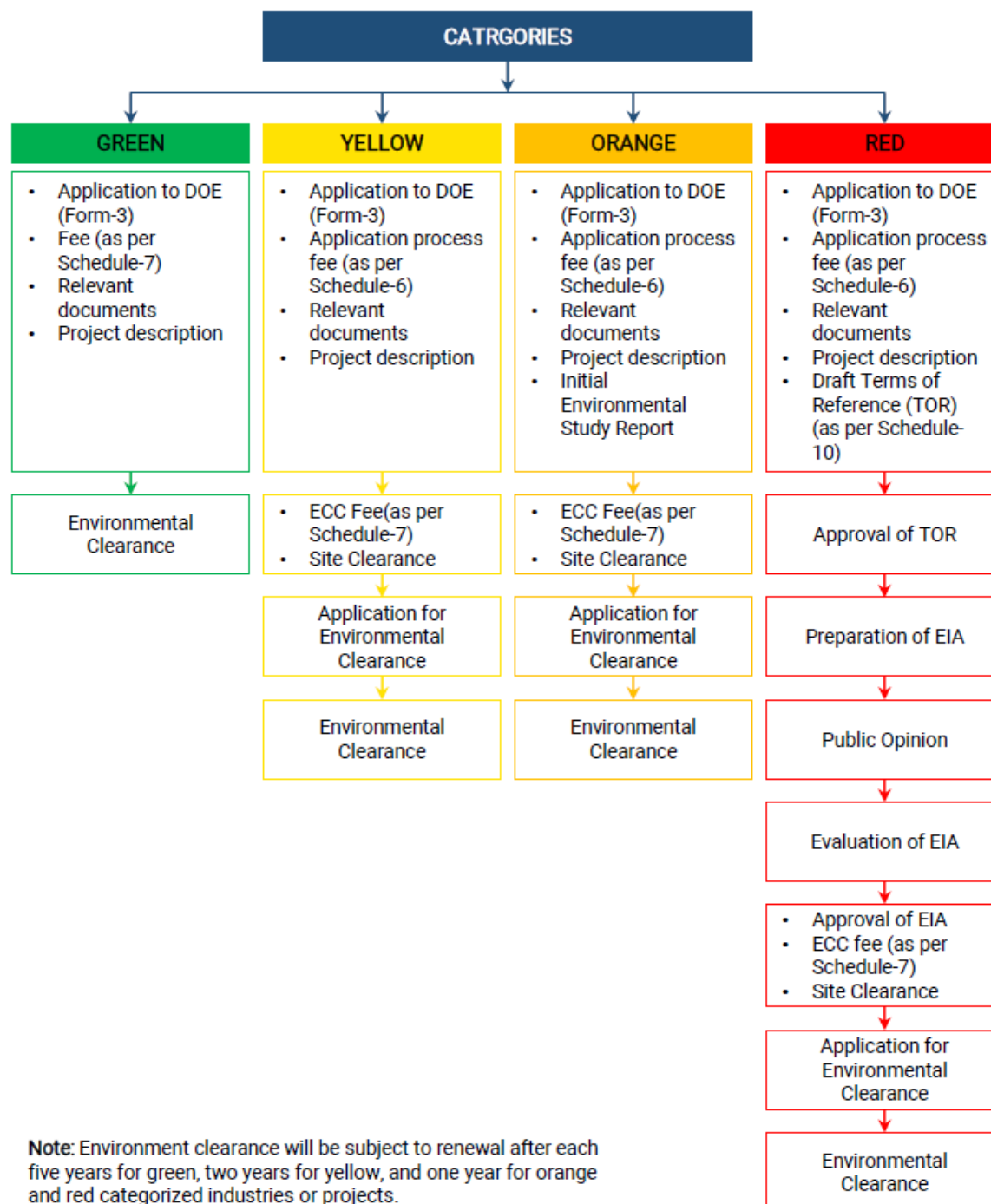
3.4.2 Procedure for obtaining ECC from DOE, Bangladesh

The Environment Conservation Rules 2023 have classified projects to be assessed by the DOE into four categories based on the severity of impacts on important environmental components:

- Green.
- Yellow.
- Orange; and
- Red.

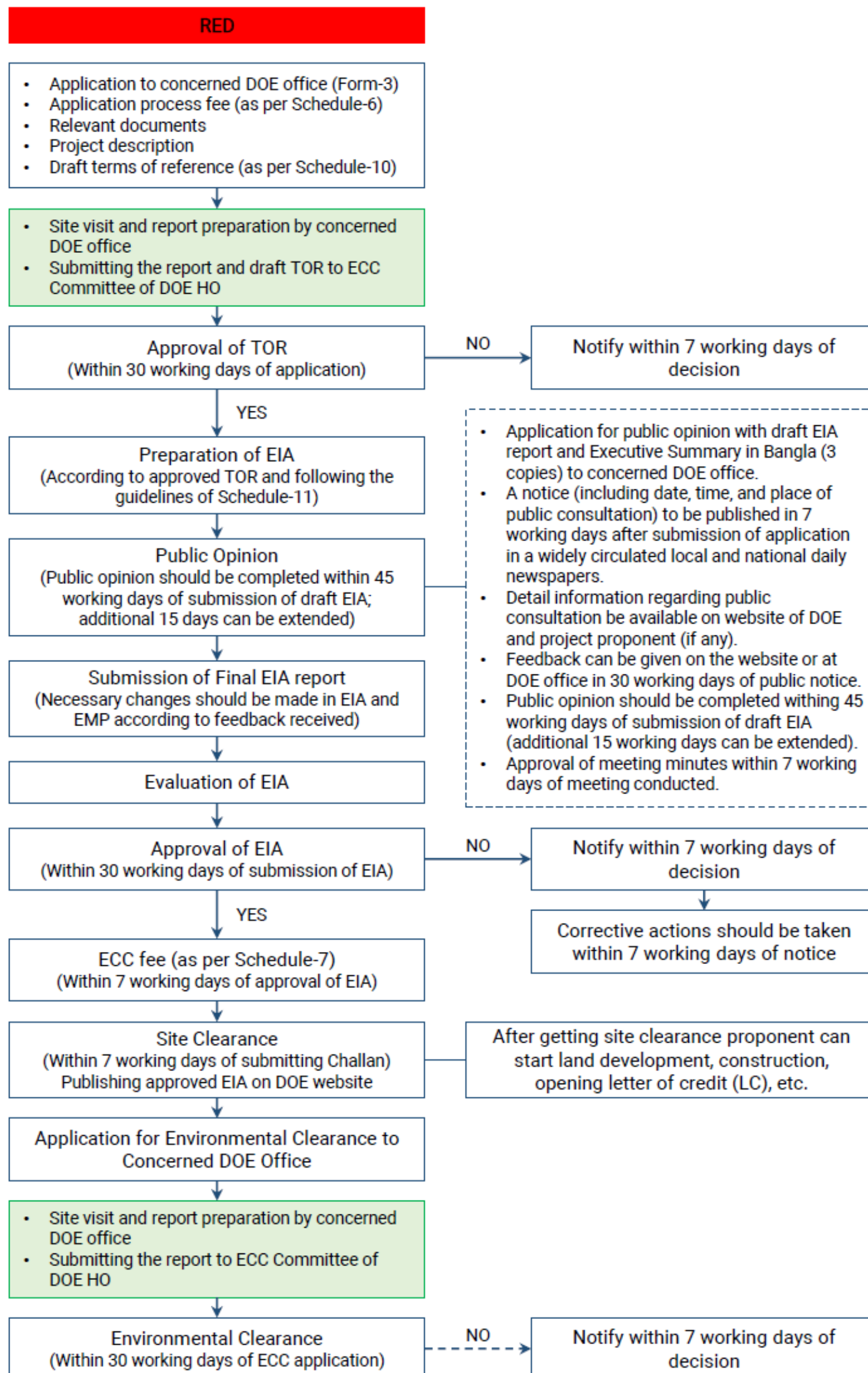
The applicability of environmental clearance and the process in Bangladesh is described in Figure 3-1 and the clearance procedure for “Red” category projects is shown in Figure 3-2.

Figure 3-1: DoE Environmental Clearance Applicability and Procedure



Source: The Environment Conservation Rules 2023

Figure 3-2: Clearance Procedure for RED Category Projects



Source: The Environment Conservation Rules 2023

3.5 International Treaties, Conventions, and Agreements

In addition to compliance with National regulatory requirements, the proposed project will also adhere to the following regional and international conventions signed/acceded/ratified by Bangladesh.

- United Nations Convention on Biological Diversity, 1992
- Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, 1971 (Ramsar Convention)
- United Nations Convention to Combat Desertification, 1994
- United Nations Framework Convention on Climate Change, 1992
- Kyoto Protocol, 1997
- Vienna Convention on the Protection of the Ozone Layer, 1985
- Stockholm Convention on Persistent Organic Pollutants, 2001
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1987
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989
- Convention on International Trade in Endangered Wild Fauna and Flora Species, 1973
- Convention on the Conservation of Migratory Species of Wild Animals, 1979
- Convention on the Protection of World Cultural and Natural Heritage, 1972
- Convention on the Elimination of All Forms of Racial Discrimination, 1978
- Convention on the Elimination of All Forms of Discrimination against Women, 1979
- Optional Protocol to the Convention on the Elimination of Discrimination against Women
- Convention on the Rights of Persons with Disabilities, 2006
- Convention on the Rights of the Child, 1989
- International Covenant on Economic, Social, and Cultural Rights
- International Covenant on Civil and Political Rights
- Convention concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour
- Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families
- International Convention for the Prevention of Pollution of the Sea by Oil, 1954
- International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969
- United Nations Convention on the Law of the Sea, 1982
- International Convention on Oil Pollution Preparedness, Response, and Cooperation, 1990

3.6 IFC Performance Standards

The performance Standards (January 2012) established by the IFC stipulate that the project shall meet certain requirements throughout the life cycle of an investment by the IFC or other relevant financial institutions. The Table 3-3 shows the performance standards along with the specific areas.

Table 3-3: IFC Performance Standards

Performance Standards	Specific Areas
Performance Standard 1	Assessment and Management of Environmental and Social Risks and Impacts
Performance Standard 2	Labour and Working Conditions
Performance Standard 3	Resource Efficiency and Pollution Prevention
Performance Standard 4	Community Health, Safety, and Security
Performance Standard 5	Land Acquisition and Involuntary Resettlement

Performance Standards	Specific Areas
Performance Standard 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources
Performance Standard 7	Indigenous Peoples
Performance Standard 8	Cultural Heritage

Source: IFC Performance Standards, January 2012

These performance Standards and guidelines provide ways and means to identify impacts and affected stakeholders and lay down processes for management and mitigation of adverse impacts. A brief on the requirements as laid down in the performance standards is described in the following subsections.

The following sub-section tries to provide the requirements of the specific PS, to set up the context for matching the requirements of these PS during the various stages of the life cycle of the Project.

Table 3-4: Applicability to IFC Performance Standards

IFC Performance Standards	Applicability	Relevance to the Proposed Project
Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts <ul style="list-style-type: none"> Identify project E&S risks and impacts. Adopt mitigation hierarchy (anticipate/ avoid, minimize, compensate/offset) Improve performance through an Environmental and Social Management System (ESMS) Engagement with Affected Communities, other stakeholders 	Yes	<p>The proposed Meghna Re-Rolling and Steel Mill project is likely to have environmental and social impacts during all phases. These E&S risks and impacts have been preliminarily identified based on field visits, and consultations with stakeholders including communities and Meghna Re-Rolling and Steel Mills Ltd. under Meghna Group of Industries. PS1 is therefore applicable to the project and thus requires an Environmental and Social Impact Assessment (ESIA). Meghna Re-Rolling and Steel Mills Ltd. (MRS MIL) also needs to develop and implement an Environmental and Social Management Plan to manage the risks associated with project operations.</p>
Performance Standard 2: Labour and Working Conditions <ul style="list-style-type: none"> Fair treatment, non-discrimination, equal opportunity Good worker-management relationship Comply with national employment and labor laws. Protect workers, in particular, vulnerable categories. Promote safety and health. Avoid the use of forced labor or child labor 	Yes	<p>The construction phase for the proposed project will involve employing labour for various activities such as clearing of the site, materials collection and transportation, landfilling and levelling, access road construction, construction of steel plant, WTP, electricity substation and transmission line, wharf, gas supply pipeline, etc. During the operation phase, labour will be employed for the operation and maintenance of the steel mill, scrap materials collection and transportation, wharf operation, WTP operation, transportation of finished products, housekeeping, security services, etc. The labour hired including third-party labour</p>

IFC Performance Standards	Applicability	Relevance to the Proposed Project
		during the project life cycle will need to be managed based on the requirements of PS2.
Performance Standard 3: Resource Efficiency and Pollution Prevention <ul style="list-style-type: none"> Avoid, minimize, and reduce project-related pollution. More sustainable use of resources, including energy and water. Reduced project-related Greenhouse Gas (GHG) emissions. 	Yes	Environmental impacts from air and noise emissions due to the site preparation work, and material handling; use of natural resources mainly land and water, energy, etc. may occur on site. The construction works for the development of the project will entail the generation of waste like wastewater and construction debris. The operation will result in the generation of solid and liquid waste. MRSML should monitor emissions appropriate to the nature to ensure that the requirements of PS3 are being met.
Performance Standard 4: Community Health, Safety, and Security <ul style="list-style-type: none"> To anticipate and avoid adverse impacts on the health and safety of the Affected Community To safeguard personnel and property in accordance with relevant human rights principles 	Yes	The major community health and safety risks associated with the project are limited to the construction stage. The risks may include the movement of heavy machinery/vehicles carrying construction equipment on the access road. High dust levels from earthworks, high noise, and emission levels from traffic congestion and idling of vehicles, and an influx of workers could potentially cause local discomfort and potential conflicts with residents. The influx of labour could also expose local communities to public health risks and communicable diseases, such as HIV/AIDS. The project activities can also cause sexual exploitation and abuse. In the operation phase, precautionary measures against hazards and emergency events will be undertaken the Project site will need to be extended to affected communities as recommended in PS4.
Performance Standard 5: Land Acquisition and Involuntary Resettlement <ul style="list-style-type: none"> Avoid, and minimize adverse social and economic impacts from land acquisition or restrictions on land use. 	No	Willing buying and willing selling procedure were applied during the procurement of land. As per the consultation with the landowners and project proponent, it was noted that a satisfactory level of land price was made available as per the types of land. Moreover, no physical displacement was taken place for the proposed project. Though economic displaced took place,

IFC Performance Standards	Applicability	Relevance to the Proposed Project
<ul style="list-style-type: none"> Improve or restore livelihoods and standards of living. Improve living conditions among displaced persons. 		<p>the compensation implemented allowed the affected PAPs the access to new land and the continuity of their economic activity, reducing to the minimum the residual impact on economic displacement.</p> <p>Thus, the provision of PS 5 will not be applicable for the proposed project.</p>
<p>Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources</p> <ul style="list-style-type: none"> Protection and conservation of biodiversity Maintenance of benefits from ecosystem services Promotion of sustainable management of living natural resources 	No	<p>The project does not interfere with the natural or critical ecosystem and there are no notified ecologically sensitive areas i.e., national parks, wildlife sanctuaries, mangrove forests, reserve forests, IBAs, RAMSAR sites, wetlands, coral reefs, marine reserves, marine protected areas, etc. within the project site and a 5 km radius of the project boundary. The proposed project site is located inside of CuEZ.</p> <p>The applicability of this PS shall be detailed out in the ESIA, while implementation of the actions necessary to meet the requirements of this PS shall be managed through the suggested mitigation measures. The operation phase of the proposed project shall ensure the protection of fauna and flora of the site and surroundings.</p>
<p>Performance Standard 7: Indigenous Peoples</p> <ul style="list-style-type: none"> Ensure full respect for IPs (human rights, dignity, aspirations, livelihoods, culture, knowledge, practices) Avoid and minimize adverse impacts. Sustainable and culturally appropriate development benefits and opportunities Free, Prior, and Informed Consent (FPIC) in certain circumstances 	No	<p>There are no indigenous peoples in the project site as well as surrounding areas. Consequently, the project is not expected to have any impact on indigenous peoples and the applicability of PS7 can be scoped out.</p>
<p>Performance Standard 8: Cultural Heritage</p> <ul style="list-style-type: none"> Protection and preservation of cultural heritage 	No	<p>Discussions with the local communities, government departments, and site representatives of the project proponent did not point toward the presence of any</p>

IFC Performance Standards	Applicability	Relevance to the Proposed Project
<ul style="list-style-type: none"> Promotion of equitable sharing of cultural heritage benefits 		cultural, historical, archaeological, and heritage sites within the project footprint. The same was confirmed through a review of existing literature. Consequently, no impacts are envisaged on cultural heritage and PS8 can be scoped out. However, this PS will only be triggered if any unexpected cultural or archaeological goods are found during construction.

3.6.1 IFC Project Categorizations

As part of its review of a project's expected social and environmental impacts, IFC uses a system of social and environmental categorization. This categorization is used to reflect the size of impacts understood as a result of the client's social and environmental assessment and to specify IFC's institutional requirements. The IFC categories are:

- a) **Category-A Projects:** Projects with potentially significant adverse social or environmental impacts that are diverse, irreversible, or unprecedented.
- b) **Category-B Projects:** Projects with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
- c) **Category-C Projects:** Projects with minimal or no adverse social or environmental impacts, including certain financial intermediary (FI) projects with minimal or no adverse risks.
- d) **Category FI Projects:** All FI projects excluding those that are Category-C projects.
 - FI-1: when an FI's existing or proposed portfolio includes or is expected to include substantial financial exposure to business activities with potential significant adverse environmental or social risks or impacts that are diverse, irreversible, or unprecedented.
 - FI-2: when an FI's existing or proposed portfolio is comprised of, or is expected to be comprised of, business activities that have potential limited adverse environmental or social risks or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures; or includes a very limited number of business activities with potential significant adverse environmental or social risks or impacts that are diverse, irreversible, or unprecedented.
 - FI-3: when an FI's existing or proposed portfolio includes financial exposure to business activities that predominantly have minimal or no adverse environmental or social impacts.

IFC, therefore, categorizes projects primarily according to the significance and nature of impacts.

3.7 IFC Environmental, Health and Safety Guidelines

The project will adhere to the following guidelines:

3.7.1 IFC Environmental, Health and Safety General Guidelines, 2007

3.7.1.1 IFC General EHS Guidelines

IFC has EHS Guidelines that are technical reference documents with general and industry-specific examples of good international industry practice. The guidelines are developed to be used together with the relevant industry sector EHS guidelines that provide guidance to users on EHS issues in specific industries. The guidelines include performance levels and measures that are generally considered achievable in new facilities by existing technology at reasonable costs. When host country regulations

and limits differ from the levels and measures presented in the IFC EHS Guidelines, projects should aim at achieving stricter ones.

The organization of the IFC General EHS Guidelines is organized as presented in Table 3-5.

Table 3-5: Organization of the WBG General EHS Guidelines

Main Subject	Topic
Environmental	<ul style="list-style-type: none"> • Air Emissions and Ambient Air Quality • Energy Conservation • Wastewater and Ambient Water Quality • Water Conservation • Hazardous Materials Management • Waste Management • Noise • Contaminated Land
Occupational Health and Safety	<ul style="list-style-type: none"> • General Facility Design and Operation • Communication and Training • Physical Hazards • Chemical Hazards • Biological Hazards • Radiological Hazards • Personal Protective Equipment (PPE) • Special Hazard Environments • Monitoring
Community Health and Safety	<ul style="list-style-type: none"> • Water Quality and Availability • Structural Safety of Project Infrastructure • Life and Fire Safety • Traffic Safety • Transport of Hazardous Materials • Disease Prevention • Emergency Preparedness and Response
Construction and Decommissioning	<ul style="list-style-type: none"> • Environment • Occupational Health & Safety • Community Health & Safety

3.7.2 WBG Environmental, Health, and Safety Guidelines for Integrated Steel Mills, 2007

The EHS Guidelines for Integrated Steel Mills include information relevant to the manufacture of pig iron and raw or low-alloy steel from iron ore and iron-based alloys. It is applicable to the manufacture of metallurgical coke, primary iron, and steel production in the blast and basic oxygen furnaces, scrap metal recycling in the electric arc furnace process, the production of semi-finished products, and hot and cold rolling activities. It does not include the extraction of raw materials and further processing of semi-finished products into finished products.

The following are the discussion topics of this guideline issues associated with steel manufacturing, which occur during the operational phase, it broadly provides recommendations for their management. Recommendations for the management of EHS issues common to most large industrial facilities during the construction and decommissioning phases are provided in the General EHS Guidelines.

Environment

Environmental issues associated with steel manufacturing primarily include the following:

- Air emissions
- Solid waste
- Wastewater
- Noise.

Occupational Health and Safety

Occupational health and safety issues during the construction, operation, maintenance, and decommissioning of integrated steel manufacturing facilities are common to those of large industrial facilities, and their prevention and control are discussed in the General EHS Guidelines.

In addition, the following occupational health and safety issues are specific to steel manufacturing activities:

- Physical hazards
- Heat and hot liquids
- Radiation
- Respiratory hazards
- Chemical hazards
- Electrical hazards
- Noise
- Entrapment hazards
- Fire and explosions.

Environmental Monitoring

Environmental monitoring programs for this sector should be implemented to address all activities that have been identified to have potentially significant impacts on the environment, during normal operations and upset conditions. Environmental monitoring activities should be based on direct or indirect indicators of emissions, effluents, and resource use applicable to the particular project.

Monitoring frequency should be sufficient to provide representative data for the parameter being monitored. Monitoring should be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with operating standards so that any necessary corrective actions can be taken. Additional guidance on applicable sampling and analytical methods for emissions and effluents is provided in the General EHS Guidelines.

3.7.3 WBG Environmental, Health, and Safety Guidelines for Ports, Harbors, and Terminals, 2017

The EHS Guidelines for Ports, Harbors, and Terminals are applicable to marine and freshwater ports, harbors, and terminals for cargo and passengers. Shipping (including repair and maintenance of ships), fuel terminals, and railways are addressed in the EHS Guidelines for Shipping; Crude Oil and Petroleum Product Terminals; and Railways, respectively.

The following section provides a summary of EHS issues primarily associated with port and terminal construction and operations, along with recommendations for their management as part of a comprehensive environmental and social management system for a given project. Recommendations for the management of EHS issues common to most large industrial and infrastructure projects, including sitting and cumulative impact considerations, are provided in the General EHS Guidelines.

Environment

Environmental issues in port and terminal construction and operation primarily include the following:

- Terrestrial and aquatic habitat alteration and biodiversity
- Climate change resilience
- Water quality
- Air emissions
- Waste management.
- Hazardous materials and oil management
- Noise and vibration (including underwater)

Occupational Health and Safety

Occupational health and safety issues during the construction and decommissioning of ports are common to those of the largest infrastructure and industrial facilities. These issues include exposure to dust and hazardous materials that may be present in construction materials and demolition waste (e.g., asbestos), hazardous materials in other building components (e.g., PCB and mercury in electrical equipment), and physical hazards associated with the use of heavy equipment, or the use of explosives.

Specific occupational health and safety issues relevant to port operations primarily include the following:

- Physical hazards.
- Chemical hazards.
- Confined spaces.
- Exposure to organic and inorganic dust; and
- Exposure to noise.

Community Health and Safety

Community health and safety issues during the construction of ports are common to those of the largest infrastructure or industrial facilities and are discussed in the General EHS Guidelines. These impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labor. The following operational phase issues are specific to ports and discussed below:

- Port marine safety.
- Port security; and
- Visual impacts.

Environmental Monitoring

Environmental monitoring programs for this sector should be implemented to address all activities that have been identified to have potentially significant impacts on the environment, during construction and normal operations and upset conditions. Environmental monitoring activities should be based on direct or indirect indicators of emissions, effluents, and resource use applicable to a particular project.

Monitoring frequency should be sufficient to provide representative data for the parameter being monitored. Monitoring should be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with operating standards so that any necessary corrective actions can be taken.

Occupational Health and Safety Monitoring

The working environment should be monitored for occupational hazards relevant to the specific project. Monitoring should be designed and implemented by accredited professionals⁸ as part of an occupational health and safety monitoring program. Facilities should also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents.

3.7.4 WBG Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution, 2007

The EHS Guidelines for Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas.

The following section provides a summary of EHS issues associated with electric power transmission and distribution that occur during the construction and operation phases of a facility, along with recommendations for their management. Additional recommendations for the management of environmental issues during the construction and decommissioning phases of power transmission and distribution systems are provided in the General EHS Guidelines.

Environment

Environmental issues during the construction phase of power transmission and distribution projects specific to this industry sector include the following:

- Terrestrial habitat alteration
- Aquatic habitat alteration
- Electric and magnetic fields
- Hazardous materials

Occupational Health and Safety

Occupational health and safety issues during the construction, operation, maintenance, and decommissioning of electric power distribution projects are common to those of large industrial facilities.

These issues include, among others, exposure to physical hazards from use of heavy equipment and cranes; trip and fall hazards; exposure to dust and noise; falling objects; work in confined spaces; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery.

Occupational health and safety hazards specific to electric power transmission and distribution projects primarily include:

- Live power lines
- Working at height
- Electric and magnetic fields
- Exposure to chemicals

Community Health and Safety

Community health and safety impacts during the construction and decommissioning of transmission and distribution power lines are common to those of most large industrial facilities. These impacts

⁸Accredited professionals may include Certified Industrial Hygienists, Registered Occupational Hygienists, or Certified Safety Professionals or their equivalent.

include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labor.

The operation of live power distribution lines and substations may generate the following industry-specific impacts:

- Electrocution
- Electromagnetic interference
- Visual amenity
- Noise and Ozone
- Aircraft Navigation Safety

Environmental Monitoring

Environmental monitoring programs for this sector should be implemented to address all activities that have been identified to have potentially significant impacts on the environment during normal operations and upset conditions. Environmental monitoring activities should be based on direct or indirect indicators of emissions, effluents, and resource use applicable to the project. Monitoring frequency should be sufficient to provide representative data for the parameter being monitored.

Monitoring should be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with operating standards so that any necessary corrective actions can be taken.

Occupational Health and Safety Monitoring

The working environment should be occupational hazards relevant to the specific project. Monitoring should be designed and implemented by accredited professionals⁹ as part of an occupational health and safety monitoring program. Facilities should also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents.

3.7.5 IFC / EBRD Standards for Workers' Accommodation: Processes and Standards

The relevant IFC / EBRD Standards for worker's accommodation addresses the processes and standards that should be applied to establish, maintain and improve the worker-management relationship, to promote fair treatment, non-discrimination and equal opportunity of workers, and to promote safe and healthy working conditions of workers. The planning and assessing requirements for workers' accommodation is carried out in three stages:

- Assessing the need for workers' accommodation:** This includes guidelines to approach the local housing and labour markets and the potential effects the building of new facilities may have on the surrounding communities by considering a comprehensive assessment of the availability of workforce and existing housing. The measures to mitigate adverse impacts should be identified and included in the relevant action plans.
- Assessing impacts of workers' accommodation on communities:** This assessment is relevant to both the construction phase (or other accommodation) and operation phase. The construction of workers' accommodation and its Impacts on communities should be managed in the same way as for construction of the project itself. The impact of the presence of workers with different lifestyles or cultural backgrounds on the host community and also the transmission of disease due to the influx needs to be assessed and managed.

⁹ Accredited professionals may include Certified Industrial Hygienists, Registered Occupational Hygienists, or Certified Safety Professionals or their equivalent.

- (iii) **Types of workers' accommodation:** Depending on the type of project, specific attention should be given to either providing single workers' accommodation or family accommodation. As per the benchmark practices, the family of the workers should be also accommodated, particularly when workers are sourced from outside.

3.8 Comparison of Safeguard Principles

3.8.1 Gap Analysis –Environment Safeguard

S.N.	Criteria	IFC PS	GoB Framework	Measures to Bridge Gaps
1.	Use of screening process to determine the appropriate environmental assessment	<p>IFC categorization is used to reflect the size of impacts understood as a result of the client's social and environmental assessment and to specify IFC's institutional requirements. The IFC categories are:</p> <ul style="list-style-type: none"> ■ Category A Projects: Projects with potential significant adverse social or environmental impacts that are diverse, irreversible or unprecedented. ■ Category B Projects: Projects with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures. ■ Category C Projects: Projects with minimal or no adverse social or environmental impacts, including certain financial intermediary (FI) projects with minimal or no adverse risks. ■ Category FI Projects: All FI projects excluding those that are Category C projects. 	<p>ECA 1995 and ECR 2023 set screening criteria to classify industries/projects based on potential environmental impacts as follows:</p> <ul style="list-style-type: none"> – Green – Yellow – Orange – Red. <p>These screening criteria are based on project or industry type and do not consider the scale and location. The category determines the level of environmental assessment.</p>	Both IFC and GOB screening and classification procedure be applied, and more stringent classification be followed.
2.	Conduct an environmental assessment	ESIA and IEE - Identify potential impacts on physical, biological, physical cultural resources, and socioeconomic aspects in the context of project's area of influence (i.e., primary project site and facilities, and associated facilities)	<p>Industry/project category</p> <ul style="list-style-type: none"> ■ Green - no environmental assessment required. ■ Yellow - no IEE or EIA required but must provide process flow, lay-out 	Conduct an environmental and social assessment to identify potential direct, indirect, cumulative, and induced impacts and risks in the context of the Project 's area of influence.

S.N.	Criteria	IFC PS	GoB Framework	Measures to Bridge Gaps
			<p>showing effluent treatment plant, etc.</p> <ul style="list-style-type: none"> ■ Orange - IEE required. ■ Red - EIA is required 	
3.	Examine alternatives	<ul style="list-style-type: none"> ■ Analyze alternatives to the project's location, design, and technology. ■ Document rationale for selecting the particular project location, design, and technology. ■ Consider "without project" situation 	Regulations (i.e., ECA 1995) do not require specifically the identification and analysis of alternatives whereas ECR 2023 does.	Analysis of alternative will be conducted as a part of impact assessment study to reduce potential environmental and social impacts and document the rationale for selecting the particular alternative.
4.	Prepare an environment and social management plan (ESMP)	The ESMP will define desired outcomes and actions to address the issues raised in the risks and impacts identification process, as measurable events to the extent possible, with elements such as performance indicators, targets, or acceptance criteria that can be tracked over defined time periods, and with estimates of the resources and responsibilities for implementation. As appropriate, the management program will recognize and incorporate the role of relevant actions and events controlled by third parties to address identified risks and impacts. Recognizing the dynamic nature of the project, the management program will be responsive to changes in circumstances, unforeseen events, and the results of monitoring and review.	EMP and procedures included in the IEE and EIA (i.e., yellow, orange, and red category projects)	As per the GOB and IFC requirement ESMP/ ESAP will be provided with required resources, performance indicator, responsibility of appropriate authority etc.
5.	Carry out meaningful consultation	<ul style="list-style-type: none"> ■ Starts early and continues during implementation. 	<ul style="list-style-type: none"> ■ Public consultation and participation are mandatory based on ECR 2023. 	<ul style="list-style-type: none"> ■ Gender inclusive and responsive consultation will be held with all levels

S.N.	Criteria	IFC PS	GoB Framework	Measures to Bridge Gaps
		<ul style="list-style-type: none"> ■ Undertaken in an atmosphere free of intimidation. ■ Gender inclusive and responsive. ■ Tailored to the needs of vulnerable groups. ■ Allows for the incorporation of all relevant views of stakeholders. ■ Establish a grievance redress mechanism. 	<ul style="list-style-type: none"> ■ Grievance redress mechanism is not mentioned in ECA 1995 but mentioned in ECR 2023. ■ EIA format required by DOE includes stakeholders' consultation. 	<p>of stakeholder in deferent phases of the project and include relevant views of the stakeholder during implementation of the project.</p> <ul style="list-style-type: none"> ■ Specific consultation will be held with vulnerable groups for identification of their need and concern related to the project. ■ Appropriate grievance redress mechanism will be developed before initiation of project
6.	Timely disclosure of draft environmental assessment (including the ESMP)	<ul style="list-style-type: none"> ■ The borrower makes the draft ESIA report available at a public place accessible to project-affected groups and local NGOs. 	<ul style="list-style-type: none"> ■ Public disclosure of environmental reports where DOE posts the EIA/IEE reports to its website. 	No Gap
7.	Monitoring and review	<ul style="list-style-type: none"> ■ Monitor and measure the effectiveness of the management program, as well as compliance with any related legal and/or contractual obligations and regulatory requirements. ■ Report findings to senior management 	<ul style="list-style-type: none"> ■ ECC is subject to annual renewal based on compliance of the conditions set by DOE. 	<ul style="list-style-type: none"> ■ Project proponent will monitor compliance to agreed ESMP. ■ ESMP monitoring report to be reviewed by senior management of the MRSML.
8.	Avoid areas of critical habitats (use of precautionary approach to the use, development and	<ul style="list-style-type: none"> ■ Conserve biodiversity. ■ Maintain the benefits from ecosystem services. 	<ul style="list-style-type: none"> ■ ECA 1995 and ECR 2023 identifies ecologically critical areas and the rules to protect them. 	<ul style="list-style-type: none"> ■ Ecologically Critical Areas to be avoided for development of the project.

S.N.	Criteria	IFC PS	GoB Framework	Measures to Bridge Gaps
	management of renewable natural resources)	<ul style="list-style-type: none"> Promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities. 		<ul style="list-style-type: none"> Habitat and species-specific management plans to be developed for ecologically critical areas and protected species if found in proximity to the project footprint.
9.	Use pollution prevention and control technologies and practices consistent with international good practices	<p>Refers to World Bank's Environmental Health, and Safety (EHS) General Guidelines 2007</p> <ul style="list-style-type: none"> If national regulations differ, more stringent will be followed. If less stringent levels are appropriate in view of specific project circumstances, provide full and detailed justification 	<ul style="list-style-type: none"> Ambient and emission standards included in ECR 2023, Air Pollution Control Rules, 2022 and Noise Pollution Control Rules, 2006. 	<ul style="list-style-type: none"> Where applicable to the type of project apply international standards with special reference to World Bank's Pollution, Prevention and Abatement Handbook. Alternative accepted standards and approaches may be allowed to best reflect national or local conditions, if they are justified and recommended in the ESIA report.
10.	Provide workers with safe and healthy working conditions	<ul style="list-style-type: none"> Refers to EHS General Guidelines 2007. 	<ul style="list-style-type: none"> Occupational health and safety standards included in the Factories Act 1965 and the Bangladesh Labour Act 2006 and Bangladesh Labour Rules, 2015. 	<ul style="list-style-type: none"> Both international and GOB standard will be followed for the project and more stringent one will be applied
11.	Protect cultural heritage and promote equitable sharing	<ul style="list-style-type: none"> Consult affected communities on finding of cultural heritage sites. 	<ul style="list-style-type: none"> Preservation and protection of cultural resources are 	<ul style="list-style-type: none"> Extensive field-based survey by the sector expert and consultation

S.N.	Criteria	IFC PS	GoB Framework	Measures to Bridge Gaps
		<ul style="list-style-type: none"> ■ Use chance find procedures for guidance 	within the Antiquities Act 1968.	with local people and concern government department will be carried out for finding cultural heritage item within the project area of influence

3.8.2 Gap Analysis –Social Safeguard

The following table outlines the comparison between the ARIPA, 2018 and the IFC PS 5 with respect to vital issues concerning land acquisition and involuntary resettlement.

SN	Criteria	ARIPA, 2017	IFC PS-5	Measures for addressing the gaps
1.	Eligibility of Affected Persons	The Act recognizes Legal Owners, Sharecroppers, Tenants (with documental evidence)	All affected persons, including non- title holders, wage labors attached with the land parcels	<ul style="list-style-type: none"> • The project will not entail any physical and economic displacement; hence it will have no applicability. However, if any displacement occurs then the titleholders as well as non-titleholders like sharecroppers, land users, wage earners will be considered as eligible for compensation payment.
2.	Compensation	Market value calculated on the last 12 months average value of properties (land parcels) of similar value	Compensation calculated at replacement cost.	<ul style="list-style-type: none"> • If any displacement occurs, then compensation will be paid at replacement cost for loss of land. • For loss of structures and crops due to construction of the plant, compensation to be paid as per the law of the country and additional assistance for compensating devaluation of land. • Compensation for the loss of land, structures and crops would be paid out before start of the construction work.

SN	Criteria	ARIPA, 2017	IFC PS-5	Measures for addressing the gaps
3.	Minimizing impacts	Discourages unnecessary acquisition but no mechanisms to monitor	Alternative analysis required to justify avoidance and/or mitigation of impacts	<ul style="list-style-type: none"> The proposed project will not require any additional land. If there is provision of any additional land requirement, it will be procured through negotiated purchase.
4.	Meaningful consultations	The Act does not specify on consultation.	<p>The policy specifies meaningful consultations with affected persons and communities.</p> <p>Consultation as core issue for addressing any involuntary resettlement concern.</p>	<ul style="list-style-type: none"> A stakeholder engagement plan (as part of Environment and Social Impact Assessment) will be prepared by the project proponent that will help in involving with a continuous communication with different stakeholders.
5.	Cut-off date	Section 4 Notice under ARIPA is considered as the cut-off-date for affected landowners, however the ordinance does not specify any cut-off-date provision for the non-title holders.	The eligibility criteria of the PAP include the non-titleholders too along with titleholders. It mentions that eligibility of a non-titleholder PAP be determined by relevant cut-off dates.	<ul style="list-style-type: none"> The project will not entail any physical and economic displacement; hence it will have no applicability.
6.	Relocation assistance	Does not have any provision for resettlement or relocation assistance.	Provision of relocation assistance and resettlement planning outlined in the policy	<ul style="list-style-type: none"> The project has not resulted in any physical displacement. Consequently, there is no need for provisioning any relocation assistance.
7.	Livelihood loss	The Act does not mention about livelihood loss; however, it pays compensation for loss of crops and trees.	As per the policy support may be offered after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living. Apart from compensation for income loss the PAPs may be provided with credit facilities, trainings or job opportunities.	<ul style="list-style-type: none"> If any displacement occurs, then the preferred livelihood options emerging out of the socio-economic survey of the affected persons need to be implemented to mitigate/ minimize the livelihood loss resulting out of the project.

SN	Criteria	ARIPA, 2017	IFC PS-5	Measures for addressing the gaps
8.	Grievance Redress Mechanism (GRM)	The Act does not specifically mention GRM. However, the Act has provisions under Part IV of ARIPA, 2017, where affected landowners can file arbitration cases.	A robust GRM should be in place.	<ul style="list-style-type: none"> A dedicated GRM with provisions for receipt, processing, redressing and communicating to the aggrieved will be implemented.
9.	Information disclosure	The Act describes about intimating the affected landowners through notices under different sections of ARIPA and finally through a Gazette Notification the Daag Numbers (Plot Number) are mentioned that stands acquired.	The policy outlines a provision of information disclosure – the RPs should be made available at a place accessible to displaced persons and local NGOs, in a form, manner, and language that are understandable to them. Once the document is approved it is published on the website of borrower and Bank.	<ul style="list-style-type: none"> The GRM process will be shared with the affected persons, host community and other relevant stakeholders as outlined in the Stakeholder Engagement Plan. The relevant reports and documents will also be available at the MGI website.

3.9 Project Screening and Categorization

3.9.1 Project Classification as per DOE, MOEFCC, Bangladesh

Depending upon location, size and severity of pollution loads, projects/activities have been classified in the ECR, 2023 into four categories: Green, Yellow, Orange, and Red.

As per the Schedule-1 of the ECR 2023, the corresponding category related to the production of iron and steel falls under Red Category for the following components:

- “Red” Category-Item 21, ECR 2023: Manufacturing of iron and steel

Therefore, a detailed Environmental Impact Assessment (EIA) is required as per the national regulatory framework. The project authority informed that they have already conducted the EIA and obtained environmental permits from the Department of Environment, Bangladesh.

3.9.2 Project Classification as per IFC Standard

Categorization for the proposed project was undertaken by using checklists for Environmental Assessment, Involuntary Resettlement, and Indigenous people during the screening and scoping exercise.

As part of its review of a project's expected social and environmental impacts, IFC uses a system of social and environmental categorization. This categorization is used to reflect the size of impacts understood as a result of the client's social and environmental assessment and to specify IFC's institutional requirements. The IFC categories are:

- **Category A Projects:** Projects with potentially significant adverse social or environmental impacts that are diverse, irreversible, or unprecedented.
- **Category B Projects:** Projects with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
- **Category C Projects:** Projects with minimal or no adverse social or environmental impacts, including certain financial intermediary (FI) projects with minimal or no adverse risks.
- **Category FI Projects:** All FI projects excluding those that are Category C projects.

As part of the review of environmental and social risks, impacts, and magnitude of the proposed project, it is envisaged that the project can be categorized as Category B project for the following reasons:

For Environment, the project can be categorized as B because the project is expected to have potential limited adverse environmental impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.

Key issues related to this project include:

SN	Key Issues	Remarks
Environmental Issues		
1.	Establishment of the project will result in a permanent change in land use and land cover (approximately 71 acres).	The Project will be constructed on readily developed land that has been converted since 2018 and approved for industrial use by Government of Bangladesh. No significant change in land use was identified.
2.	Generation of dust and air pollution from steel plants, wharf, and vehicle movement at the access road during construction and operation.	Based on the air dispersion modelling of the air emissions at stacks, predicted maximum concentrations of pollutants are well within the national ambient air quality standard level. Also, concentration of all pollutants at 5 km distance was found to be negligible.
3.	Generation of noise and vibration from construction and operational activities.	As predicted from preliminary noise modelling, the noise will be site-specific during operation of the plant and will be within the national standards and WHO guidelines. Plant will install acoustic enclosure system in the noise generating areas.
4.	Solid and liquid waste generation and its disposal or management.	The major solid waste from the process will be Steel Slag from the steelmaking process. The proposed project will install a Slag Treatment Plant. As confirmed by MRSML, the treated slag will then be used for road making and brick manufacturing purpose. Biodegradable waste (kitchen waste) will be transferred to the EZ's Central Solid Waste Dumping Station for further processing. As for liquid waste, plant effluent and domestic sewage generated from the project will be treated in common wastewater treatment facilities proposed at CuEZ level.
5.	Hazardous materials handling and disposal.	No hazardous material will be used for production of steel
6.	Scrap material sourcing, transportation, unloading, and storage at the project site.	The project will require a total of 1.6431 million tons of scrap steel, pig iron, and direct reduced iron annually, mainly imported from the United States and Europe. As confirmed by MGI, there will be no domestic scrap used for steel production.
7.	Surface water intake from the river, gas, and power supply.	The water will be sourced from the branch of the Meghna River. However, it's important to note that these volumes are not required on a daily basis. This water will be recirculated and only make up water will be added when required which is minimal. Power will be sourced from the national grid and natural gas will be sourced from national distribution company

SN	Key Issues	Remarks
8.	Terrestrial and Aquatic Ecology	<p>There are no ecologically critical areas, protected areas, national parks, world heritage sites, important bird and biodiversity areas, etc. in the project site and within a 10 km radius of the project site. Therefore, it is expected that the project will not impact ecologically sensitive areas.</p> <p>No Critically Endangered spp. was found during the ecological baseline survey.</p>
9.	Cumulative impacts	<p>Cumulative impacts are expected from the proposed project, e.g., from the laying of the gas supply pipeline, substation and transmission line, strengthening of access roads and internal roads, wharf construction and operation, water intake from the river, discharge of water from WTP, existing other projects in the CuEZ and surrounding area, etc.</p> <p>However, as per the industry mapping most of the heavy industries are situated on the edge of the 5 km radius of MRSML and situated on the other side of the Meghna River.</p> <p>As per preliminary assessment of VESCs, cumulative impacts on physical, biological and socio-economic environmental conditions will be limited and largely reversible and can be minimized by implementing mitigation measures.</p>
Social Issues		
10.	Mode of Acquisition	<p>During the consultations with the landowners, it was observed that the procurement of land (by CuEZ) was based on a “willing buying and willing selling,” process wherein the households had voluntarily sold their property and assets. Subsequently, MRSML leased the land from CuEZ for 10 years (renewable for a further period of 10 (ten) years by mutual agreement).</p> <p>Existing access roads will be used, and no physical relocation will be necessary for the implementation of the Project.</p>
11.	Physical and Economic Displacement	<p>The proposed steel plant project is going to be established inside the Cumilla Economic Zone (CuEZ). Since the mode of land acquisition for the proposed plant was voluntary in nature, therefore, no direct impacts on landowners are anticipated by the project proponent.</p> <p>On the other hand, an associate facility, the construction of the Wharf will cause physical and economic displacement of people (non-titled) involved with Katha (Brush Pile) fishing situated adjacent to the northern side of the proposed Wharf. Details of Katha fishing is described in section 5.8.5. Study identified a total of 15 (fifteen) Kathas within the 1 km upstream and downstream from the wharf area. Out of these, 3 kathas will be permanently impacted due to the construction of Wharf. A compensation package has been proposed to mitigate the impact of permanently displaced katha owners.</p>

SN	Key Issues	Remarks
12.	Livelihoods Impact	<p>As discussed with MRSML, BEZA and available secondary resources, to establish a Private Economic Zone at Sonachar Mouza of Meghna Upazilla under Cumilla District, MGI authorities applied to the Executive Chairman of Bangladesh Economic Zone in June 2015. The required amount of land was 246.37 acres. In response to this application BEZA published a gazette on June 01, 2021 to raise grievance within 21 days for those who are likely to be impacted by the establishment of this private economic zone. As per the consultation with BEZA, no grievances concerning the issues of land procurement and payment were raised by the landowners. After the cut-off date to raise grievance and other verification process, BEZA published another gazette on March 20, 2022, announcing the area as a Private Economic Zone named Cumilla Economic Zone. BEZA provided the Private Economic Zone license to CuEZ on April 10, 2022.</p> <p>The proposed project area is fall under low land. Hence, single crop agricultural sharecropping practices were conducted there. As per socio-economic survey during the study period a very marginal number (3.3% out of 60 of landowners) of sharecroppers (5 person under 2 landowners) were identified. Moreover, during the consultation with the landowners, sharecroppers, local influential people, Upazila Chairman, Union Parishad Chairman and local people, it was identified that the landowners were very much satisfied after getting the higher price of land compared to the market price. There were some landowners, who also worked as sharecroppers in the other lands. As part of the socioeconomic survey some sharecroppers (that developed cultivation in the CuEZ area prior the land acquisition) were identified who were economically displaced. But the compensation implemented allowed these affected PAPs access to new land and the continuity of their economic activity, reducing to the minimum the residual impact on economic displacement. As they got a high amount of land price, they already procured other lands for agricultural practices. So, the impact of land procurement on the sharecroppers is limited.</p> <p>Due to the operation of the Wharf, 3 (three) kathas adjacent to the wharf area will be impacted permanently. These katha owners need BDT 4,29,500 (details in Section 6.4.3.8.3, Table 6-40) to shift and restore their kathas.</p>
13.	Issues relating to community health and safety	<p>There may be some risk of communicable and sexually transmitted diseases due to the possible labor influx during the construction and operation phase of the project. However, awareness and training will be carried out to mitigate the impact.</p> <p>Workers are currently accommodated at the temporary labor shed at the plant premises. The temporary labor camps, construction camps and permanent dormitories will comply the requirement of Workers' Accommodation: Processes and Standards by IFC/EBRD.</p>

CHAPTER 4

Analysis of Alternatives

4 ANALYSIS OF ALTERNATIVES

4.1 Introduction

The project alternative is the course of action in place of another, that would meet the same purpose and need, but which would avoid or minimize negative impacts and enhance project benefits.

Alternative analysis is the process of analyzing the proposed location for suitability for basic necessities to operate the plant safely and for any alternate technology. This analysis also covers the environmental aspect of pollution prevention and improvement in quality of life in the project vicinity. The project alternative is the course of action in place of another, that would meet the same purpose and need, but which would avoid or minimize negative impacts and enhance project benefits. Such projects may result in specific impacts which can be avoided or mitigated by adherence to certain predetermined performance standards, guidelines, or design criteria. Alternative approaches may therefore be more effective in integrating environmental and social concerns into the project planning process.

4.2 Site Selection Alternatives

No alternate sites have been considered as the steel manufacturing unit is being installed inside the economic zone. As per the ESIA of CuEZ 2023 and regulatory EIA, no other potential locations for the economic zone were considered apart from the existing location.

The existing Cumilla Economic Zone (CuEZ) location has been selected based on the availability and suitability of the communication system.

Cumilla Economic Zone (CuEZ) is situated south of the Meghna Bridge, adjacent to the Meghna-Homna Road in Meghna Upazila. It is conveniently located just 600 meters from the Dhaka-Chittagong highway and 4.5 kilometers from Meghna Bridge 1, making it highly accessible for potential investors. The zone's proximity to a branch of the Meghna River enhances its appeal, providing a reliable water source and facilitating transportation. The ongoing development of the economic zone is expected to attract significant interest, as establishing and operating industries here will be relatively straightforward. The zone will feature CETP, STP, and WTP facilities to treat industrial wastewater to national standards before discharge into the Meghna River branch, minimizing any negative impact on terrestrial and aquatic biodiversity. The land for the zone is owned by Cumilla Economic Zone Ltd, was purchased long ago, and has been designated for economic zone development by a BEZA gazette notification, eliminating any land acquisition issues. Located above flood levels, the site is ideal for the project's construction. Therefore, the site selection for CuEZL is highly suitable and offers several advantages over other locations.

The land area for the MRSML project was allocated by CuEZ and location has been finalized based on the following considerations:

- Availability of adequate land for the proposed plant. A total of 71 acres of land is required for the plant area.
- Sources of supply of raw material.
- Existence road connections in the vicinity for transportation of incoming and outgoing materials.

4.3 Selection of Process Technology

The technical concept of the plant has been developed keeping in view the state-of-the-art technology for effective pollution control for the plant. The selection of the most optimum process route for installation of steel and re-rolling plant needs critical analysis and evaluation. The evaluation process is more relevant due to the emergence of a large number of new competitive technologies in various fields of steel making.

Such an evaluation involves an analysis of past achievements, present status and future prospects of each technology under consideration keeping in view the following criteria.

- Adoption of modern technology
- Capacity of the plant
- Selected product mix
- Conservation of scarce and costly energy input
- Suitability of available raw materials
- Cost considerations.

MRSML is adopting the latest modern technology for the proposed steel and re-rolling plant manufacturing unit. All technologies for steel manufacturing have been considered keeping in mind the environmental aspects. Proper care has been taken to minimize the pollution load due to the operation of the proposed project.

The alternative plant furnace technologies considered include:

- The basic oxygen furnace (BOF).
- The electric arc furnace (EAF).
- The electric induction furnace (EIF).

4.3.1 Basic Oxygen Steel Making (BOS)

A basic oxygen furnace (BOF), also known as Linz–Donawitz-steelmaking is a pear-shaped structure with a closed bottom and an open top that works to process steel. The process relies on steel production from pig iron, which is the intermediate product of smelting iron ore and has high carbon content. The BOF yields high production with minimal labor involved and creates a finished product that is low in nitrogen. Their need for raw materials to create the end product, however, has proven to be inefficient both financially and in terms of its use of time. This alternative was rejected at the project development phase. Further, the BOF has higher atmospheric emissions and waste management issues compared with the other furnaces considered.

4.3.2 Electric Induction Furnace (EIF)

An induction furnace is an electrical furnace, in which the heat is applied by induction heating of metal. The advantage of the induction furnace is a clean, energy-efficient and well-controllable melting process compared to most other means of metal melting. The EIF is able to use 100% scrap feedstock. Most modern foundries use this type of furnace. Since no arc or combustion is used, the temperature of the material is no higher than required to melt it hence making EIF more efficient with minimal loss of valuable alloying elements. A major drawback to EIF is the lack of refining capacity, hence high tensile steel, which requires specific composition of alloying elements, is not easily produced.

The EIF was considered the most suited technology for the plant because it's able to use 100% scrap feedstock considering there is a vibrant scrap market in different countries to readily provide scrap. It has better environmental performance and has an optimized electric consumption. The drawbacks to the EIF were not considered to be significant disadvantages since the objective of the plant is to produce low to medium tensile strength steel products.

4.3.2.1 Advantages

The advantages of the induction furnace are:

- Offers a clean, energy-efficient, and accurately controllable melting process compared to most other means of metal melting. Hence, most modern foundries use this type of furnace, and now also more iron foundries are replacing cupolas with induction furnaces to melt cast iron, as the former emit lots of dust and other pollutants.

- Since no arc or combustion is used, the temperature of the material is no higher than required to melt it. This prevents loss of valuable alloying elements.
- It works on stable load.

4.3.2.1.2 Disadvantages

Induction furnace has its own limitation. One major drawback to induction furnace is the lack of refining capacity. Charged materials must be clean of oxidation products and of a known composition, and some alloying elements may be lost due to oxidation (and must be re-added to the melt). The clean material is also more expensive than the regular ones.

4.3.3 Electrical Arc Furnaces (EAF)

The electric arc furnace (EAF) is more modern and works by heating charged material by means of an electric arc. The EAF has several advantages over BOF in being more efficient, being able to use 100% scrap feedstock and having a better environmental performance. Although this system is highly efficient for recycling scrap, operations can have adverse environmental impacts. These include furnace off-gas with a high dust content; slag production; environmental effects of electricity generation, etc. Electric Arc Furnace has following applications:

- Electric arc furnace produces many grades of steel.
- Concrete reinforcing bars common merchant-quality standard channels, bars, and flats.
- Special bar quality grades used for the automotive and oil industry.
- A typical steel making arc furnace is the source of steel for a mini mill, which may make bars or strip products.

4.3.3.1.1 Advantages

The advantages of electric arc furnace are:

- The key advantage in arc furnace melting is that refining is possible, and one can also produce low carbon steels.
- The electric arc furnace can be used to produce high grade alloy steels like HSS, high tensile steel and silver steel due to control over impurities and thus the steel making.
- Electrodes are normally round in section and come in segments with threaded couplings. This allows replacement of worn-out segments with new ones.
- It can be rapidly started and stopped, allowing the steel mill to vary production according to demand.
- A variety of raw materials can be used. For example, arc furnaces generally use scrap steel as primary raw material. If hot metal from a blast furnace or direct-reduced iron is available economically, these can also be used.

4.3.3.1.2 Disadvantages

The disadvantage of electric arc furnace is that:

- It requires experienced operators who are in short supply.
- Dust generation and collection is a serious problem.
- Consumes large amounts of electricity abruptly that may cause load-shedding.

4.4 No Project Scenario

The no action option means that the proposed project will not be implemented. The benefits to be derived from the proposed project will be lost. The absence of the project will deny the nation significant contributions to the local and national economy.

In the context of the proposed steel plant in CuEZ, the "no project scenario" refers to the situation where the proposed project is not implemented. This scenario is crucial for understanding the potential impacts and consequences of not proceeding with the project. The MRSML project is going to be established in an economic zone under the jurisdiction of Bangladesh Economic Zone Authority (BEZA). Here are the key considerations and potential outcomes of the no project scenario:

4.4.1 Environmental Impact

- **Preservation of Current Ecosystems:**
 - Without the MRSML plant, the existing natural habitats and biodiversity in the designated industrial zone would remain undisturbed.
 - There would be no additional air, water, or soil pollution from the proposed plant operations.
- **Status Quo of Air and Water Quality:**
 - The air and water quality in the area would remain as they are, without the introduction of emissions and effluents from the steel manufacturing process.

4.4.2 Economic Impact

- **Opportunity Cost:**
 - The potential economic benefits from the steel plant, such as job creation, increased local income, and industrial growth, would be foregone.
 - The region might miss out on associated economic activities and investments that typically follow industrial developments.
- **Tax Revenue:**
 - The government would not receive the additional tax revenue that would have been generated from the steel plant operations and associated economic activities.

4.4.3 Social Impact

- **Employment Opportunities:**
 - The creation of direct and indirect employment opportunities that the proposed plant would provide would not materialize.
 - Local communities might continue to face limited job prospects and economic challenges.
- **Community Development:**
 - Potential improvements in local infrastructure, education, and healthcare services driven by corporate social responsibility (CSR) initiatives from the plant would not occur.

4.4.4 Industrial Development

- **Industrial Growth:**
 - The growth of the designated industrial zone might be slower, affecting the overall industrial development plans of the government.
 - The zone might remain underutilized or attract other industries that may have different or lesser economic impacts.

4.4.5 Infrastructure and Utilities

- **Infrastructure Development:**

- Investments in infrastructure and utilities (such as roads, electricity, and water supply) specifically aimed at supporting the steel plant would not be made.
- Existing infrastructure might not see upgrades or expansions.

4.4.6 Land Use and Zoning

- **Land Utilization:**

- The land designated for the steel plant might remain unused or be used for other purposes, potentially leading to inefficient use of the designated industrial area.

4.4.7 Strategic Considerations

- **National Industrial Policy:**

- The goals and objectives of the national industrial policy, which include promoting industrialization and economic growth, might face challenges if key projects like the proposed steel manufacturing plant are not pursued.
- Strategic plans for increasing domestic steel production and reducing dependence on imports might be impacted.

The no project scenario will serve as a baseline for evaluating the impacts of the proposed MRSML project. It helps stakeholders understand the environmental, economic, and social trade-offs involved in not proceeding with the project. This analysis is essential for making informed decisions and ensuring sustainable development aligned with national and local objectives.

CHAPTER 5

Environmental and Social Baseline Conditions

5 ENVIRONMENTAL AND SOCIAL BASELINE

The baseline conditions define the physical, social and biological conditions that prevail in the project study area. It includes information on receptors and resources that were identified during the field visit as having the potential to be affected by the project, as well as have an impact on the sustainability of the project.

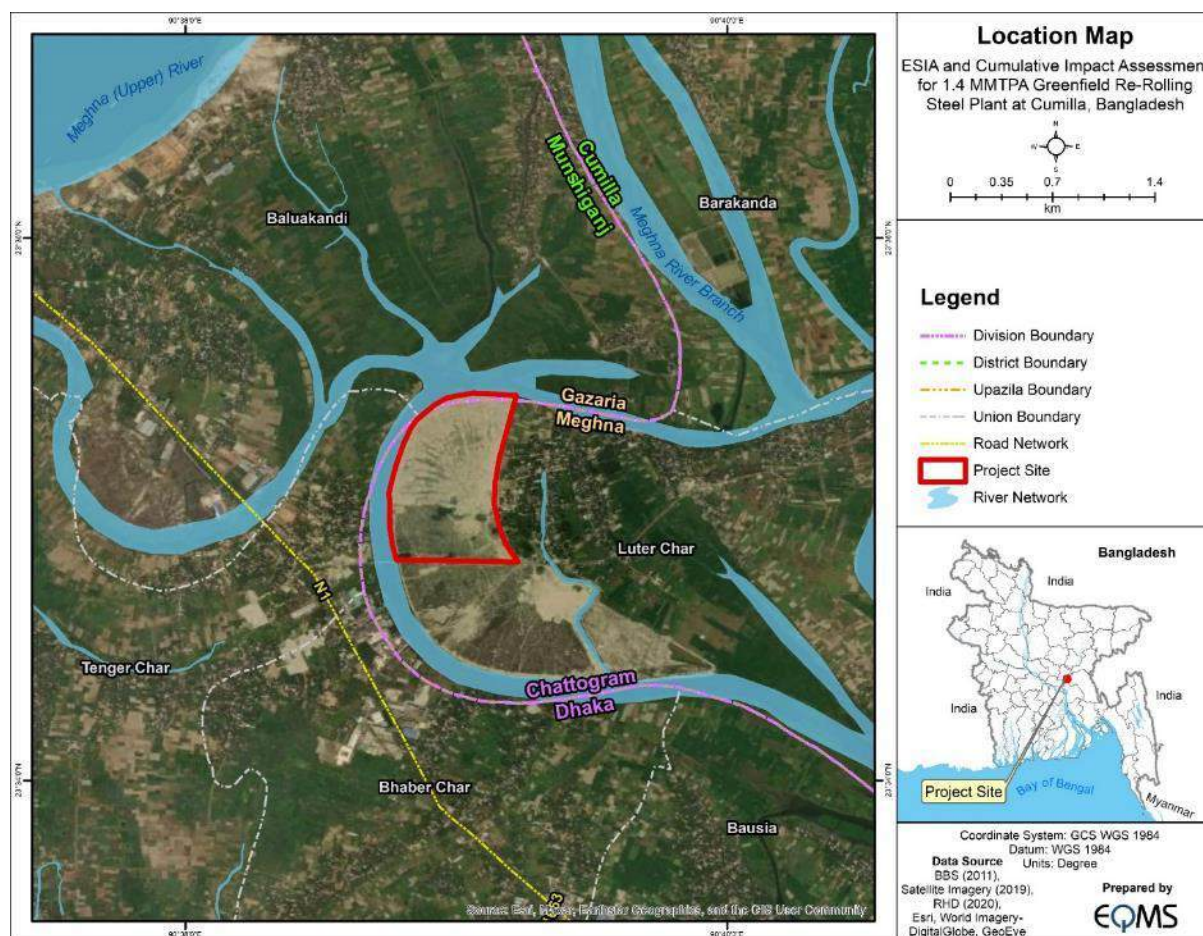
This chapter provides an overview of environmental baseline conditions within the project area and its surroundings, including topography conditions, geological conditions, climate and meteorology, air, noise, water quality, soil condition, sediment quality, land use, and biodiversity. This information is to assess the quality of the existing environment as well as to assess potential impacts caused by the project in both construction and operation phases and to provide mitigation measures and monitoring programs to reduce adverse impacts.

5.1 Site Details

5.1.1 Project Location

The proposed Meghna Re-Rolling & Steel Mills Ltd. is situated within the Cumilla Economic Zone, specifically in Block A, Plot No. # 1 - 7, 12 – 35, which falls under the Luterchar union within Meghna Upazila of Cumilla District under the Chattogram Division. The proposed project site is located between 23°35'25.10"N, 90°39'1.68"E and 23°34'48.55"N, 90°39'1.64"E. The tentative area of the proposed project is about 71.01 acres. The site location is delineated in Figure 5-1.

Figure 5-1: Site location map for the proposed project



Source: EQMS, 2024

5.2 Study Area and Methodology

This section describes the existing environmental and social baseline of the AOI which includes the Site and a 5 km radial area around the boundary of the Site. This includes relevant components of the physical, biological, and socio-economic environment.

The objectives of describing the environmental settings of the AOI are:

- To understand the project needs and environmental characteristics of the area; and
- To assess the quality of the existing environment, as well as the environmental impacts of future developments being studied.

The baseline environment for the Scoping Study was studied through information collected from secondary sources and supplemented with findings from the site reconnaissance study. Primary baseline studies will be conducted during the next phase of the assignment during the ESIA.

5.2.1 Area of Influence (AOI)

A 5 km radial zone around the site has been considered for ESIA to ascertain the presence of sensitive environmental and social receptors in this region.

5.2.1.1 Justification of selecting AOI

- Based on the preliminary air dispersion modelling of the steel plant, predicted maximum concentrations of pollutants are well within the standard level. Also, concentration of all pollutants at 5 km distance was found to be negligible.
- No other direct discharge is expected due to the operation of the proposed project.
- As per the Industry mapping most of the heavy industries are situated on the edge of the 5 km radius of MRSML and situated on the other side of the Meghna River.
- The impacts of the project would be largely contained within the close vicinity of the project site,

The area of influence for the present environmental and social impact assessment (ESIA) study is envisaged to be limited to 5 km buffer from the Project site boundary. It has been selected based on the magnitude of impact that is likely to be contained within this influence area.

The AOI is dominated by industrial areas inside the EZ, industrial units outside the EZ, the Meghna River, branches of the Megha River, the Meghna Bridge, agricultural land, settlements with homestead, plantations, etc. Figure 5-2 shows the 2 km and 5 km buffer of the project area of influence.

Further to this, the AoI with respect to the environmental and social resources was considered based on the following reach¹⁰ of impacts:

Air Quality

- Impact on ambient air quality from vehicle exhaust- within 500 meters of the project site
- Air pollutants disperse from the project site- up to 5 km from the project site.
- Dust falls- typically up to 200 m from construction activities.

Noise Level

- Noise impact area (defined as the area over which an increase in environmental noise levels due to the project can be detected) - typically 500 m from the facilities area- up to 5 km from the project site and 500 m from the access road.

¹⁰ Distance based on the nearest sensitive receptors.

Water Quality

- Surface water bodies within 2-5 km of the project footprint including upstream and downstream channels.
- Groundwater in a 5 km radius of the project footprint

Flora and Fauna (Terrestrial and Aquatic)

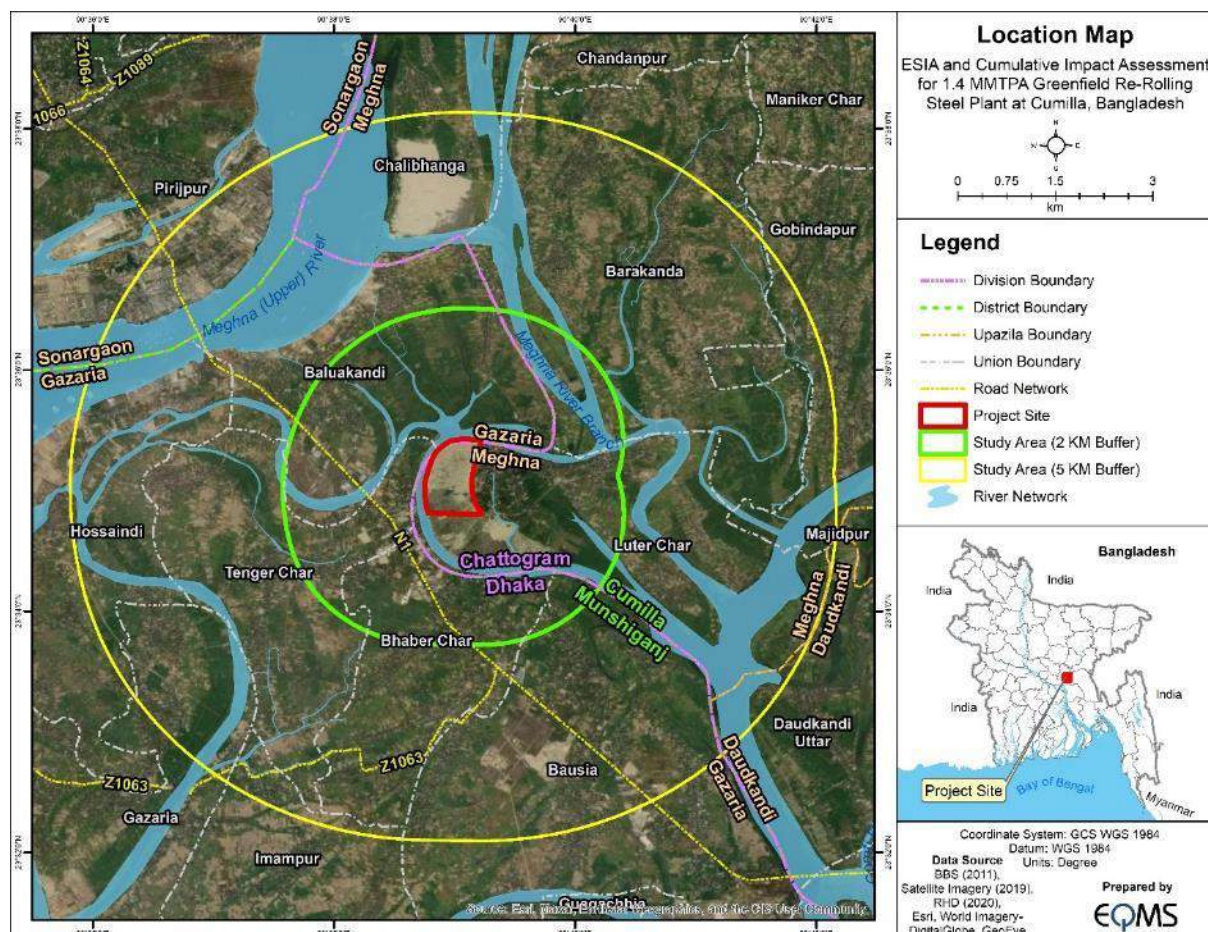
- The areas are immediately adjacent to the project footprint within which a zone of ecological disturbance is created through increased dust, human presence, and project-related activities. This kind of disturbance has been estimated to occur within the project footprint and surrounding areas of about 500 m to 5 km from the activity areas.

Socio-economic/Social

- The AOI for social receptors was fixed to include a 5 km radial zone which has been developed based on the reconnaissance site visits and stakeholder consultations with the local community.

Based on the above, the AOI for the environmental and social baseline was limited to 5 km from the project site.

Figure 5-2: Study area map



Source: EQMS, 2024

5.2.2 Gaps in Previous EIA Study

S.N.	Components	Considered in the Regulatory EIA Study	Gaps	Measures to be taken during ESIA
1.	Air Quality (AQ)	8 AQ monitoring was done during the regulatory EIA study. The monitoring was done twice during baseline. Ambient Air Quality monitoring sample locations were within the EZ.	500m to 5km radius was not considered to measure AQ.	During ESIA, a 4 weeks 24hr monitoring during the baseline survey has been conducted in the sensitive off-site locations which may be impacted by the project.
2.	Noise Level (NL)	A total of 8 NL monitoring was done during regulatory EIA study. The monitoring was done once during baseline. Noise level monitoring sample locations were within the EZ.	500m to 5km radius was not considered to measure NL.	During ESIA, 24 hours sampling at 10 locations for 4 days in the closest off-site sensitive social receptors were carried out. Ambient noise levels (equivalent continuous sound pressure level with "A" frequency weighting – LAeq) were monitored at ten locations to capture the ambient noise close to the proposed project location. A noise data logger was used to monitor ambient noise levels. The readings were taken every 1 minute. The day-time noise levels were monitored from 6 am to 9 pm and night-time levels from 9 pm to 6 am at all the locations covered in a 500m-5 km radius of the study area
3.	Surface Water Quality (SW)	A total of 8 SW monitoring was done during regulatory EIA study. The monitoring was done once during baseline. All the surface water sampling	During the EIA, surface water bodies within 2-5 km of the project footprint including	During ESIA, 2 no of SW monitoring has been done in the around the project area including

S.N.	Components	Considered in the Regulatory EIA Study	Gaps	Measures to be taken during ESIA
		points were located along the branch of the Meghna River.	upstream and downstream channels were not done.	upstream and downstream channels which may be impacted by the project.
4.	Groundwater Quality (GW)	A total of 4 GW monitoring was done during the EIA study. The monitoring was from nearby deep tubewells once during baseline.	In the EIA report, detailed analysis of groundwater monitoring results was not portrayed.	During ESIA, 3 no of GW monitoring has been done and detailed analysis of the monitoring results will be given the report.
5.	Soil Quality (SQ)	Soil Quality monitoring was not considered during EIA study.	Soil Quality was not considered during EIA study.	During ESIA, 3 no of SQ monitoring has been done in the around the study area which may be impacted by the project.
6.	Sediment Quality (SeQ)	Sediment Quality monitoring was not considered during EIA study.	Sediment Quality monitoring was not considered during EIA study.	During ESIA, 5 no of SeQ monitoring w has been done and the samples from the nearest water bodies which may be impacted by the project.
7.	Biodiversity (flora & fauna)	Floral and faunal study was conducted during the baseline mostly based secondary data.	Secondary data was obtained mostly.	During ESIA, a detailed ecological survey has been undertaken to assess the biodiversity aspects
8.	Fisheries Survey	Secondary data was included in the fisheries baseline.	Detailed fisheries survey including primary information was missing in the EIA report.	Detailed fisheries survey including primary information has been conducted.
9.	Phytoplankton and Benthos	Phytoplankton and Benthos sampling and analysis was not conducted during EIA.	Phytoplankton and Benthos sampling and analysis was not conducted during EIA.	During ESIA, Phytoplankton and Benthos sampling and analysis has been done.
10.	Socio Economic Condition	Socio-economic baseline was conducted using available secondary information of the project area.	Detailed primary household survey and analysis was	Detailed primary household survey and analysis will be conducted during ESIA. A sample of

S.N.	Components	Considered in the Regulatory EIA Study	Gaps	Measures to be taken during ESIA
			missing in the EIA report.	305HH survey has been done including FDGs, KIIs and Public Consultation Meetings.

5.2.3 Methodology

The baseline data is collected through primary and secondary sources of information with reference to the scope of work. This data is collected through a concerted effort of:

- Primary monitoring of key environmental parameters like air, noise, water, soil and sediment. The primary monitoring was carried out by the EQMS team.
- Information about geology, geomorphology, topography, physiography, agroecology, soil types, and prevailing natural hazards like floods, earthquakes, cyclones, etc. have been collected from literature reviews and authenticated information made available by government departments.
- Meteorological data such as temperature, rainfall, wind speed and direction, and humidity for a long-term basis (1992 to 2022) of the Dhaka Meteorological Station has been obtained from Bangladesh Meteorological Department (BMD).
- Surveys have been carried out to understand and record the biological environment prevailing in the area and the same has been verified against published information and literature.
- The socio-economic environment has been studied through consultation with various stakeholders in the study area. Additionally, socio-economic data have been obtained from household surveys and the Bangladesh Population and Housing Census.

5.3 Physical Environment

5.3.1 Physiography

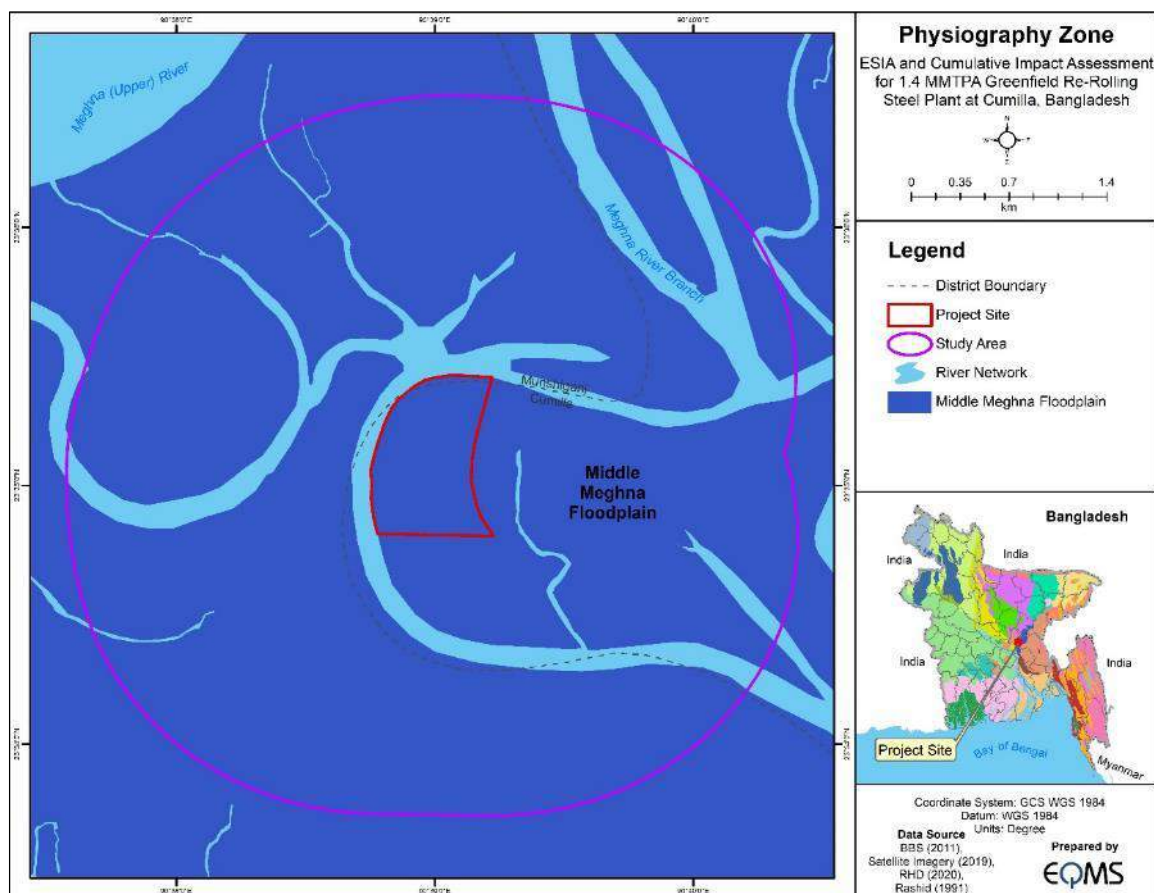
The physiography of Bangladesh is characterized by two distinctive features: a broad deltaic plain subject to frequent flooding, and a small hilly region crossed by swiftly flowing rivers. In the context of physiography, Bangladesh may be classified into three distinct regions (a) floodplains, (b) terraces, and (c) hills each having distinguishing characteristics of its own. The physiography of the country has been divided into 24 sub-regions and 54 units.¹¹

According to the physiography of Bangladesh, the proposed project site and 5 km buffer area of the proposed project boundary falls under the physiographic unit of “Middle Meghna Floodplain”.

Middle Meghna Floodplain: The main channel of the Meghna upstream from its junction with the Dhaleshwari and Ganges as far as Bhairab Bazar is known as the middle Meghna. The floodplain of this river occupies a low-lying landscape of broad islands and many broad meandering channels which formed part of the Brahmaputra before it abandoned this channel when it changed course into the Jamuna two centuries ago. The Meghna sediments are mainly silty and clays and sandy Brahmaputra sediments occur at the surface on some ridges in the north. Seasonal flooding from the Meghna is mainly deep. Basin sites are submerged early and drain late. The physiography of the proposed project area is given in Figure 5-3.

¹¹ Banglapedia. (2022, March 18). *Physiography*. <https://en.banglapedia.org/index.php/physiography>

Figure 5-3: Physiography of the study area



Source: Rashid, 1991

5.3.2 Topography

Topography is a configuration of a land surface including its relief and contours, the distribution of mountains and valleys, the patterns of rivers, and all other features, natural and artificial, that produce the landscape. The overall landscape of Bangladesh can be divided into three broad categories based on topography, physical features, and geological history.¹²

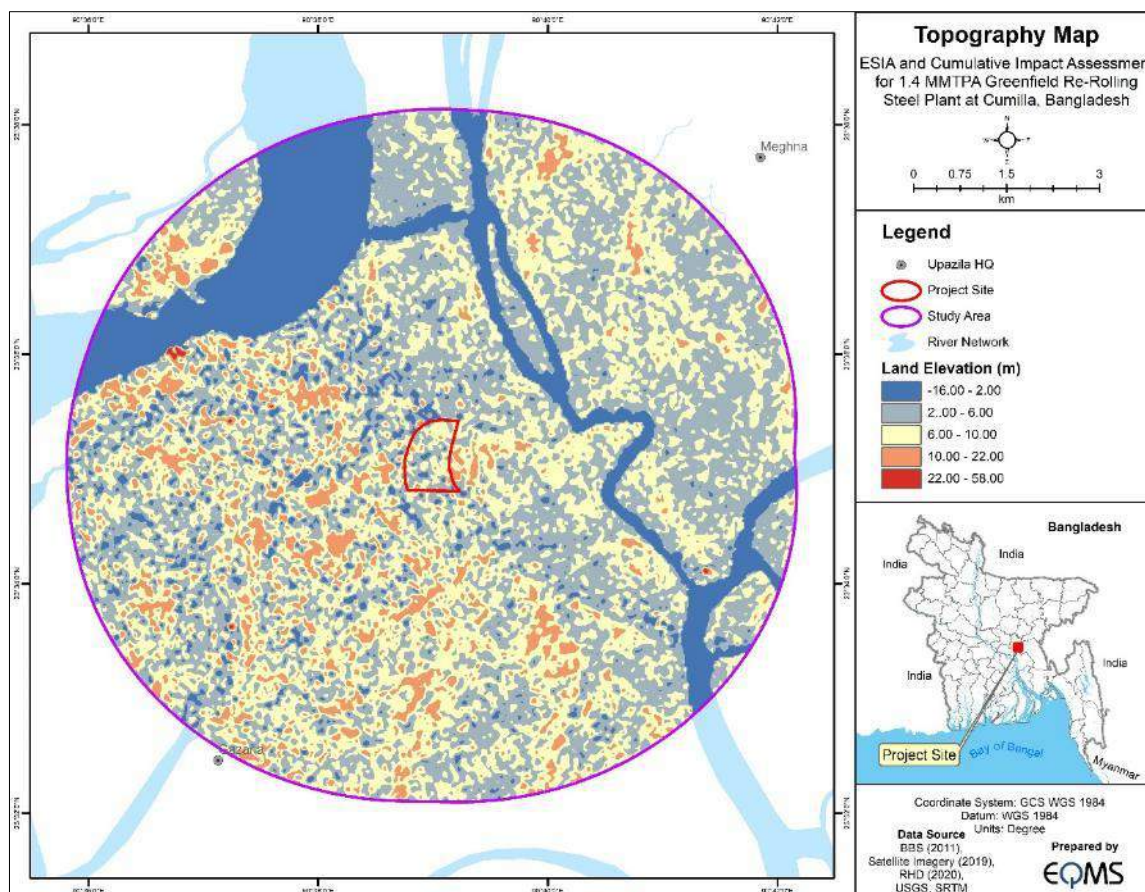
- Hills** – Primarily found along the eastern border of Bangladesh, these areas occupy approximately 18,171 km² or 13% of the land surface. They are generally underlain by sandstones, siltstones, and shales of Tertiary and Quaternary age.
- Terraces** – These are isolated tracts of land, primarily found within central northern and north-western Bangladesh which occupy, in total, about 12,085 km² or 8% of the total land surface. They are generally underlain by unconsolidated clays of Tertiary age, which have been uplifted by seismic activity so that their surfaces are several meters higher than the adjoining floodplain.
- Floodplain** – Most of the land surface of Bangladesh is floodplain, which is 114,580 km² or 79% approximately of the total land surface. These areas generally comprise of Quaternary sediments which have been deposited over subsurface geological formations by the Ganges, Meghna and Brahmaputra rivers.

The proposed project site is reclaimed land, generally flat and low-lying towards the Meghna River. All the relevant information is extracted from the Shuttle Radar Topography Mission (SRTM) DEM only.

¹² Brammer, H. (1996). *The Geography of the Soils of Bangladesh*. University Press Limited, Dhaka, Bangladesh.

The minimum and maximum RL of the project area is found -16 m and 22 m respectively. It is noticed that around 37% of areas have elevations between -16 m and 6 m. However, only about 63% of areas are above 6 m. The topography of the proposed project area is given in Figure 5-4.

Figure 5-4: Topography of the study area



Source: USGS Earth Explorer

5.3.3 Geology

Bangladesh occupies major part of the Bengal Delta, one of the largest in the world. The Ganges-Brahmaputra delta basin or the Bengal Basin includes part of the Indian state of West Bengal in the west and Tripura in the east. Geological evaluation of Bangladesh is basically related to the uplift of the Himalayan Mountains and outbuilding of large deltaic landmass by major river system originated from the uplifted Himalayas. As a mega delta, Bangladesh covers the greater part of the current Bengal Basin with a huge thickness of fluvio-deltaic sediments, being formed by the merging deltas of the rivers Padma (Ganges), Jamuna (Brahmaputra) and Meghna. Major parts of the country, both onshore and offshore, is geologically built up of sediments deposited by these river systems, being active from Oligocene through to Recent. All these rivers are coming from the rising Himalayan Mountains to the north and Burmese hills in the east. The delta building is still continuing into the present Bay of Bengal. Only the eastern part of this country has been uplifted into hilly landform incorporating itself into the frontal belt of the Indo-Burman Range. All of these are the result of the Indian plate colliding with the Asian plate.

The geology of Bangladesh mainly falls under the following:

- The stable Precambrian Platform in the northwest – occupies Rajshahi, Bogura, Rangpur and Dinajpur areas and is characterized by limited to moderate thickness of sedimentary rocks

above a Precambrian igneous and metamorphic basement. This unit is geologically stable in relative terms and has not been affected by fold movement.

- b) Geosynclinal Basin in the southeast – occupies areas of greater Dhaka, Faridpur, Noakhali, Sylhet, Cumilla, Chattogram, and the Bay of Bengal. It is characterized by the huge thickness (maximum of about 20 km near the basin center) of clastic sedimentary rocks, mostly Sandstone and shale of Tertiary age.
- c) The Hinge Zone – a narrow northeast-southwest trending zone, separates the above two units almost through the middle of the country. It is also known as the Eocene hinge zone.

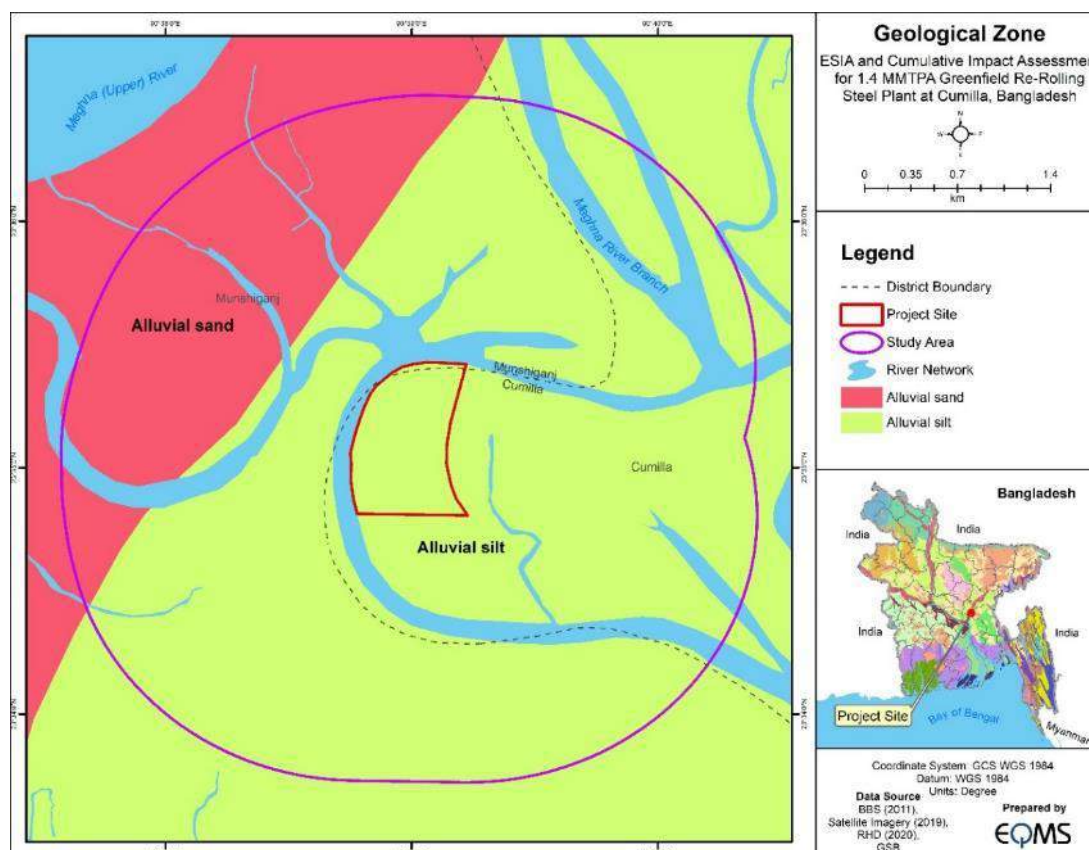
The geology units of the project site are Alluvial sand and Alluvial silt.

Alluvial sand: Light- to brownish-grey, coarse sand to fine silty sand. Sand is generally Surrounded; constitutes channel, bar and levee deposit along rivers and larger tributaries; small• and medium-scale cross beds and laminations are common. Brahmaputra River sand ranges in size from coarse to fine; Padma and Meghna River sand is medium to fine. Grain size decreases generally from north to south and away from channels. Brahmaputra sand contains mostly quartz, feldspar, mica, and significant amounts of heavy minerals, indicating that the sands are first-cycle sediments from the Himalaya Mountains and the Shillong Plateau. Ganges sand contains fewer heavy minerals; its composition reflects source areas in the Himalaya Mountains and the Indian Shield. Meghna sand contains quartz rich, reworked sediments from sandy tertiary rocks in the Fold Belt admixed with sediments drawn from igneous rocks of the Shillong Plateau.

Alluvial silt: Light- to medium-grey, fine sandy to clayey silt. Commonly poorly stratified; average grain size decreases away from main channels. Chiefly deposited in flood basins and interstream areas. The unit includes small back swamp deposits and varying amounts of thin, interstratified sand deposited during episodic or unusually large floods. Most areas are flooded annually. Included in this unit are thin veneers of sand spread by episodic large floods over flood-plain silts. Historic pot, artefacts, and charcoal (radiocarbon dated 500-6,000 years B.p.) found in upper 4 m.

The geological map of the study area is presented in Figure 5-5.

Figure 5-5: Geology of the study area



Source: Geological Survey of Bangladesh, 1991

5.3.4 Land Use

Land use/cover inventories are an essential component of land resource evaluation and environmental studies due to the changing nature of land use patterns. The land use study of the proposed project and its 5 km buffer was undertaken with the following objectives:

- To study the land use in the 5 km radius areas of the proposed project site and provide inputs for environmental planning of the proposed project by analyzing the existing land use scenario.
- To establish the existing baseline scenario using a GIS database for the incorporation of thematic information on the different physical features including water bodies, settlements, transport networks, administrative boundaries, etc.

In the study area, within a 5 km radius covering about 24031.81 acres of land, the major share of the land type is agricultural land which is about 8028.36 acres covering 33.41% of the total land cover. The settlement with homestead vegetation is also present in the study area, which consists of 7736.29 acres and accounts for 32.19% of the total area respectively. The river area covers 18.66% of the total study area. Besides, marsh land, industrial area, and char land cover 5.86 % (1408.27 acres), 4.52% (1085.34 acres), and 2.62% (629.96 acres) respectively. The development land, brick field, and roads cover 1.77% (426.11 acres), 0.03% (7.97 acres), and 0.36% (86.13 acres) respectively. The land use of the study area is presented in Table 5-1 and Figure 5-6.

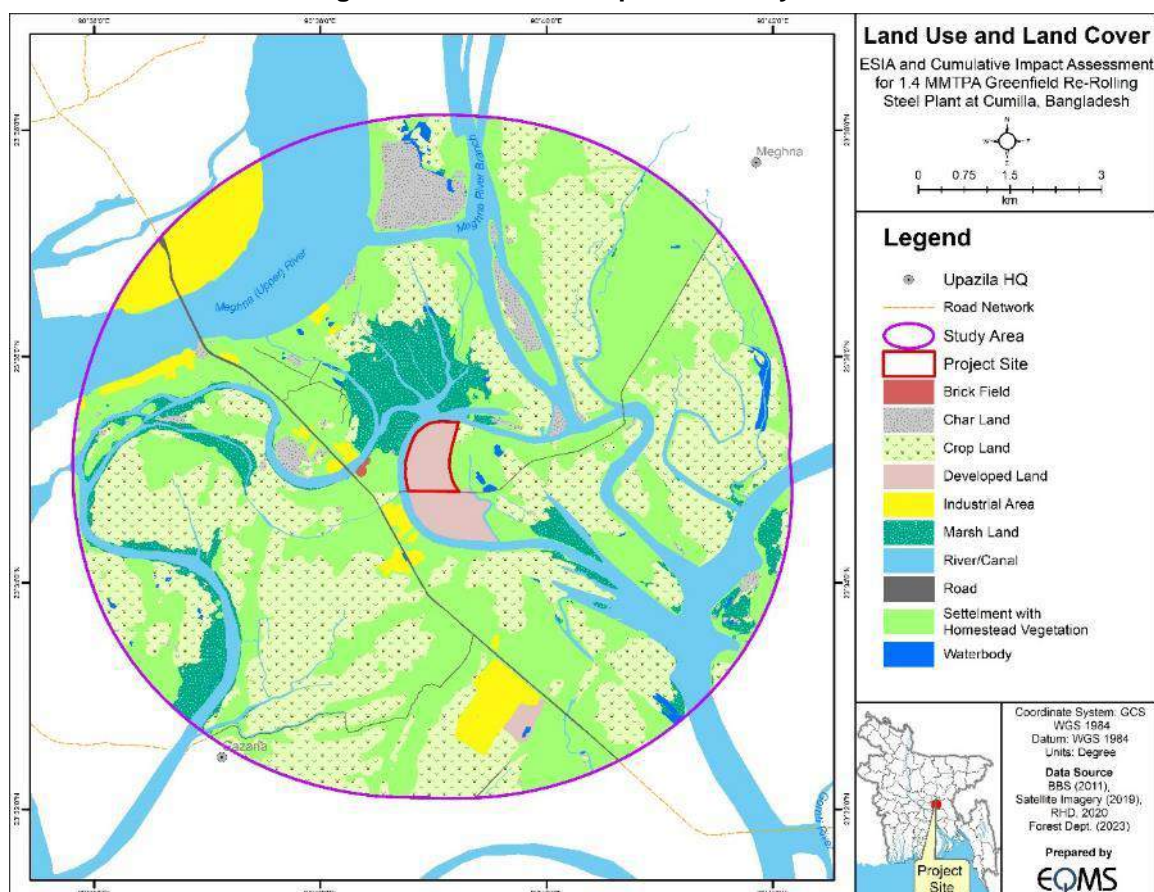
Table 5-1: Land use pattern for the study area

SN	Type	Area (Acres)	Percentage
1.	Brick Field	7.97	0.03

SN	Type	Area (Acres)	Percentage
2.	Char Land	629.96	2.62
3.	Agricultural Land	8028.36	33.41
4.	Developed Land	426.11	1.77
5.	Industrial Area	1085.34	4.52
6.	Marsh Land	1408.27	5.86
7.	River	4483.18	18.66
8.	Road	86.13	0.36
9.	Settlement with Homestead Vegetation	7736.29	32.19
10.	Waterbody	140.19	0.58
		24031.81	100

Source: GIS Mapping and Interpretation of Satellite Imagery by EQMS, 2024

Figure 5-6: Land use map of the study area



Source: GIS Mapping and Interpretation of Satellite Imagery by EQMS, 2024

5.3.5 Geomorphology

There is three geomorphologic division of Bangladesh for its soil formation. These are a) Tertiary Hills, b) Pleistocene Uplands, and c) Holocene Plains (Deltaic Plain). According to the Geological Survey of Bangladesh (GSB), the project area falls under the geomorphic unit of “Deltaic Plain”.

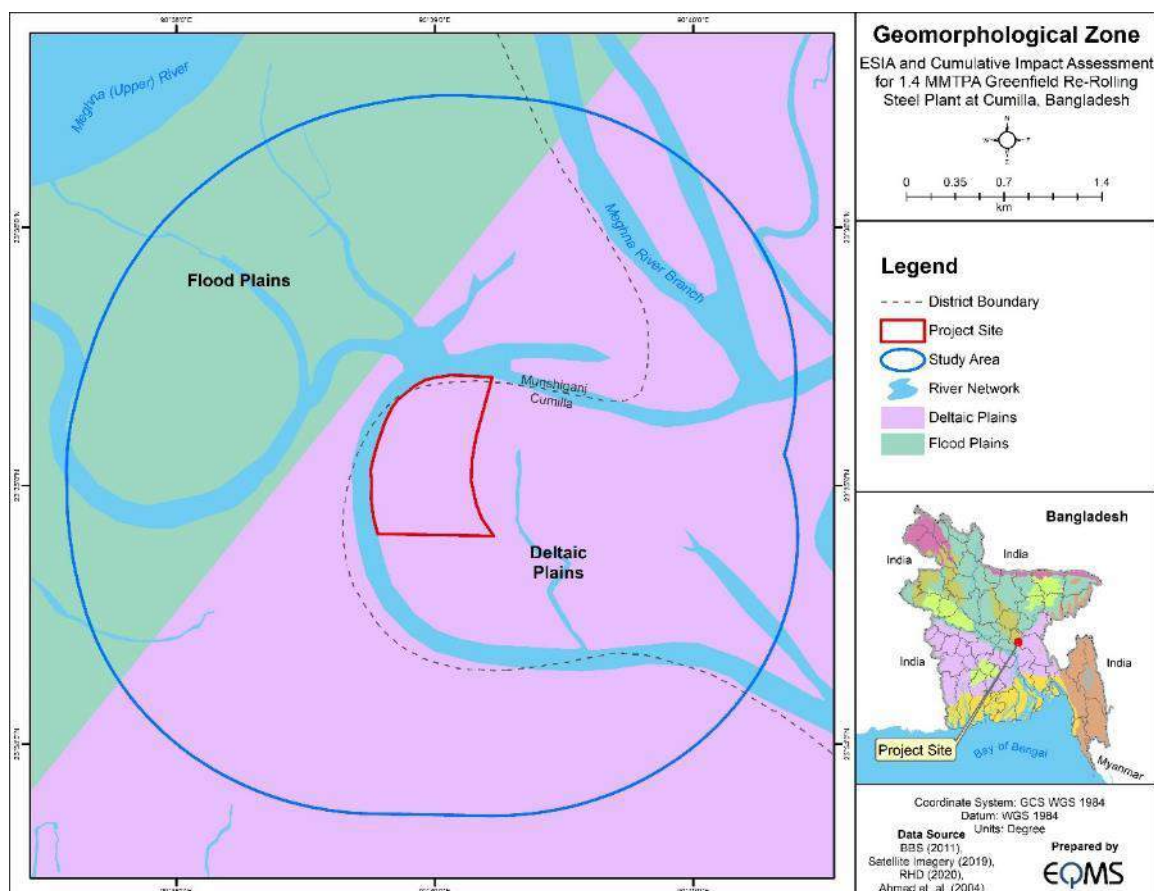
Deltaic Plain: The Delta Complex covers about 32% of Bangladesh. The area south of a line drawn from Ganges-Padma as far as the lower course of the Feni River in the southeast belongs to the delta of the Ganges, Brahmaputra and Meghna River. The Ganges is the greatest builder of the delta (70-80%). The Ganges delta located in the south of the Barind and Madhupur Tract also includes part of West Bengal. The Bangladesh portion of the delta occupies about 46,620 sq. km. In the southwest, a part of the delta has been classified as the inactive delta but the major part in the south and southeast is very active. The elevation of the delta is about 15 to 20 m from the sea level in the northwest and 1 to 2 m in the south. The elevation increases within the upper reaches of the delta. Many swamps (depressions) have developed in the substantial part of the delta. Clay, silty clay and occasionally peat are the major constituents of the delta plain.

The present Delta is a combination of three deltas, namely the Ganges delta, the Old Brahmaputra-Meghna delta and the Ganges-Jamuna (the present Brahmaputra)-Meghna Delta. In some recent literature the name, "Ganges-Brahmaputra-Meghna Delta Complex" has been used. Also, in the summer monsoon season when about 3 million cusecs of water pass through the delta, it behaves as a fluvial delta whereas in the winter when the volume of water passing through the delta drops to 250,000 to 300,000 cusecs it behaves as a tide dominated delta. These unusual features make this delta one of the most complex in the world. Holocene or Recent sediments from a few hundred to thousands of meters cover the Flood plains and the Delta.

Flood Plains: The flood plains of the Ganges, the Atrai, the Brahmaputra-Jamuna, the Old Brahmaputra, and the Meghna rivers cover approximately 40% of Bangladesh. The elevation of the major part of the flood plain ranges from 3 to 5 meters. The flood plain covers the central, north and northeastern part of the country. The Brahmaputra-Jamuna Flood Plain is located between the Barind and Madhupur Tracts. The elevation of this surface is 29 m in the north and about 6 m in the south. In 1887, a remarkable change in the course of the Brahmaputra took place. In that year, the river shifted from a course around the eastern edge to the western side of the Madhupur Tract and changed from a meandering river to a braided river. The Old Brahmaputra degenerated into a small seasonal channel and rarely spills over the previously built-up levees. The Ganges Flood Plain extends from the western border of the country, south of the Barind Tract, as far east where it merges with the Jamuna Flood Plain. The Meghna Flood Plain merges with the southern part of the Old Brahmaputra Flood Plain in the northwest and with the Sylhet Depression in the north. The landform of the flood plain is characterized by natural levees distributed in a mottled pattern which forms shallow depressions and small ridges. The maximum height of the levees is 30 m above sea level. There are numerous small depressions (beels/haors) in the flood plain. The levee of the rivers gently slopes towards these depressions. Silty clay, clay, sandy silt with local peat beds are the major constituents of the flood plain area.

The geomorphology of the proposed project area is given in Figure 5-7.

Figure 5-7: Geomorphology of the study area



Source: Ahmed et al., 2004

5.3.6 Agro-ecology

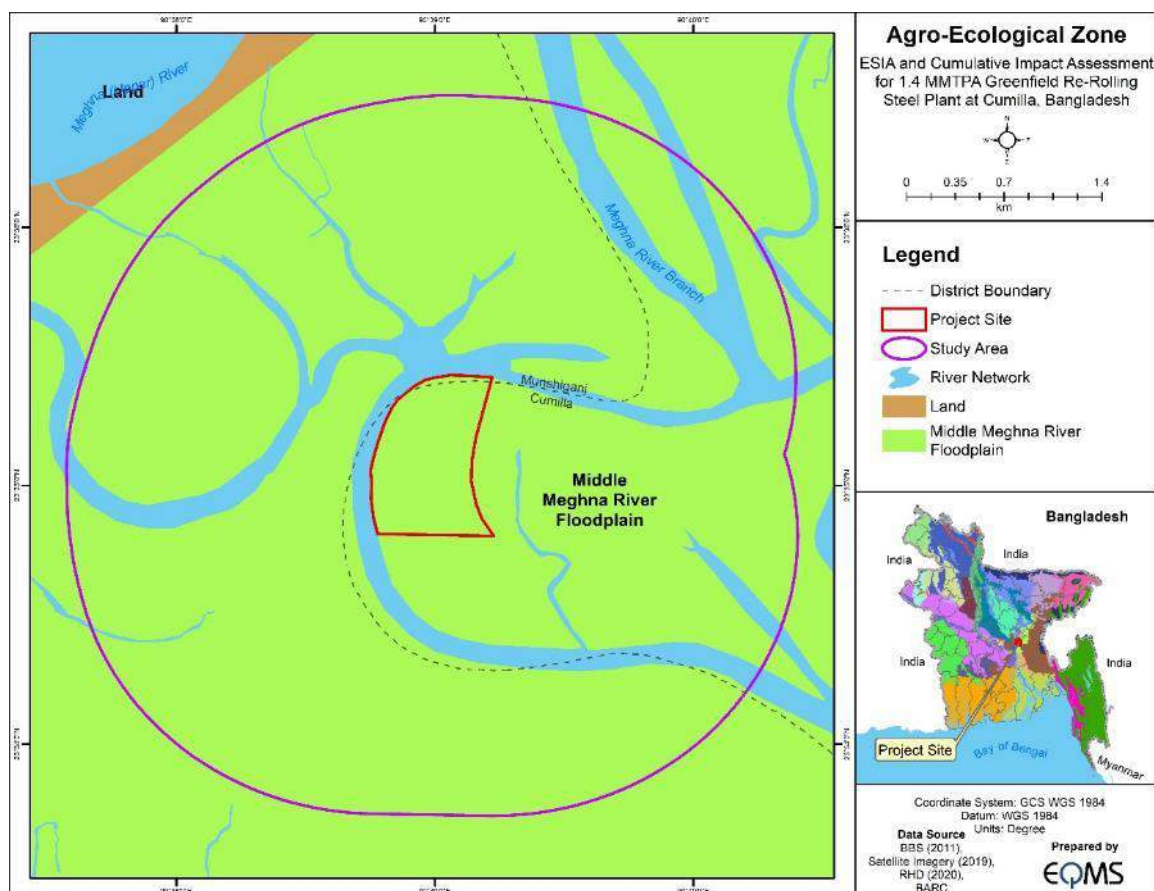
Agroecological Zone land areas are recognized on the basis of hydrology, physiography, soil types, tidal activity, cropping patterns, and seasons. An agroecological zone indicates an area characterized by homogeneous agricultural and ecological characteristics. The agroecological zones of Bangladesh have been identified on the basis of four elements such as physiography, soils, land levels in relation to flooding, and agro climatology. Bangladesh has been tentatively divided into 30 agroecological zones¹³.

The proposed project site belongs to Middle Meghna River Floodplain.

Middle Meghna River Floodplain (1,555 sq km) this region occupies an abandoned channel of the Brahmaputra River on the border between the greater Dhaka and Cumilla Districts. The region includes areas of old Brahmaputra chars within the Meghna River as well as adjoining parts of the mainland. The soil of the area is grey loam on the ridges and grey to dark grey clays in the basins. The dominant general soil type is non-calcareous grey floodplain soil. Topsoil is strongly acidic and subsoils slightly acidic to slightly alkaline. General fertility level is medium with low N and organic matter. The map of the agro-ecological region is given in Figure 5-8.

¹³ FAO-UNDP. (1988). Land Resources Appraisal of Bangladesh for Agricultural Development Report 2: Agroecological Regions of Bangladesh.

Figure 5-8: Agro-ecological Zone of the study area



Source: BARC, 2024

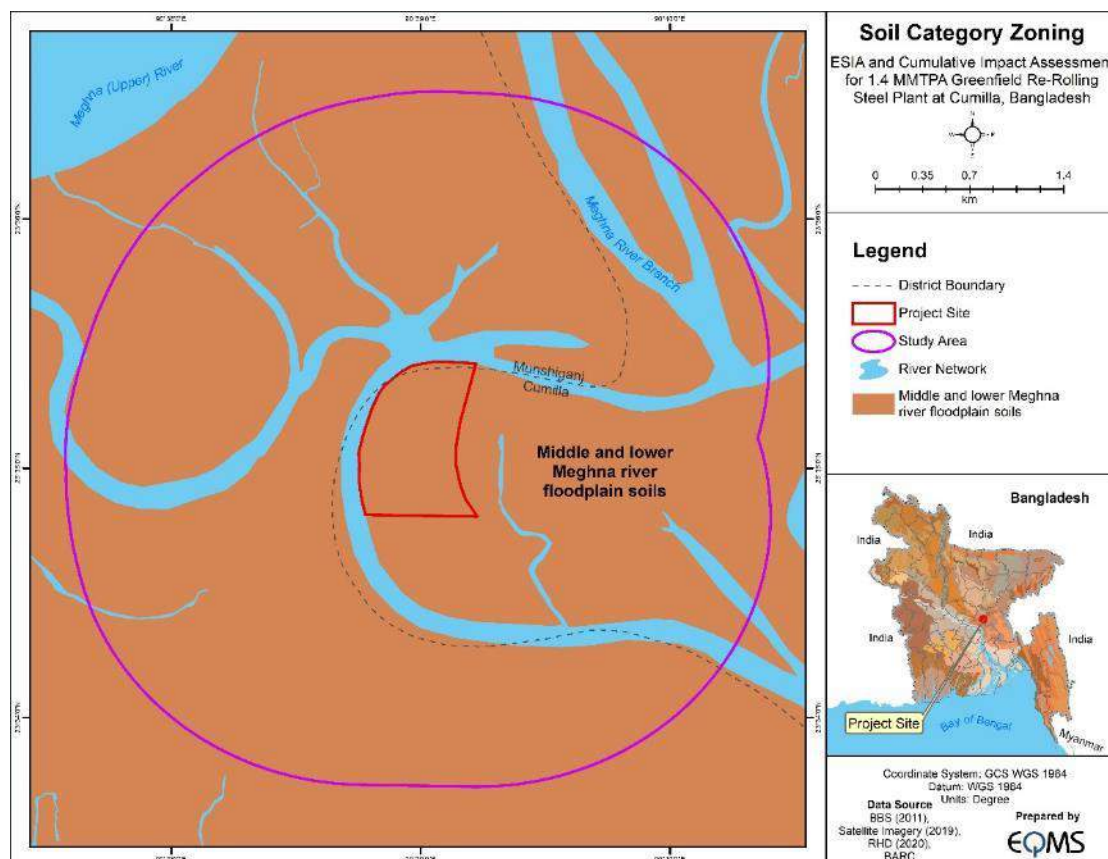
5.3.7 Soil Condition

A major part of Bangladesh is on the delta formed by the three major rivers Brahmaputra, Ganges, and Meghna. Regarding soil formation, two distinct conditions occur in Bangladesh: alternating seasonal wet or inundated and dry conditions, as prevalent on most of the floodplain areas, and intermittently wet or moist or dry conditions, as on the upland areas of hills and terraces. This is due to the variation of agroclimatic parameters in different seasons. The soil formation process differs significantly between floodplain, hill, and uplifted terraces.

A general soil type is a group of soils that are broadly similar in appearance and characteristics because they have developed in response to similar environmental factors such as climate, physiography, and drainage. The project site falls under the general soil types of Middle and Lower Meghna River flood plain. The soils of Middle Meghna Floodplain area are grey, loamy on the ridges and grey to dark grey clayey in the basins. Grey sands to loamy sands with compact silty topsoil, occupying areas of old Brahmaputra char. Dominant general type is Noncalcareous Grey Floodplain soils. Topsoils are strongly acidic, and the subsoil is slightly acidic to slightly alkaline. The general fertility level is medium. In addition, the Soils of Lower Meghna River Floodplain area is relatively uniform. Silty loams occupy relatively higher areas and silty clay loams the depressions. Noncalcareous Dark Grey Floodplain and Calcareous Grey Floodplain soils are major components of general type. Topsoil is moderately acidic and subsoils neutral in reaction. General fertility level is medium to high with low to medium organic matter status.

The soils of the proposed project area are given in Figure 5-9.

Figure 5-9: Soil map of the study area



Source: BARC, 2024

5.3.8 Hydrology and Drainage

The proposed steel manufacturing plant site is located on the shoreline of the branch of the Meghna River. Major waterbodies within the study area (5 km radius) are the Meghna River, channels of Meghna River, Kathalia rivers in the Meghna Upazila. The proposed project site is drained in branch of river Meghna which flows from North to Southwest of the study area and controls the entire drainage of the area. However, the entire area lies in the delta region and is drained by several small and large natural drainage features.

5.3.8.1 Meghna River

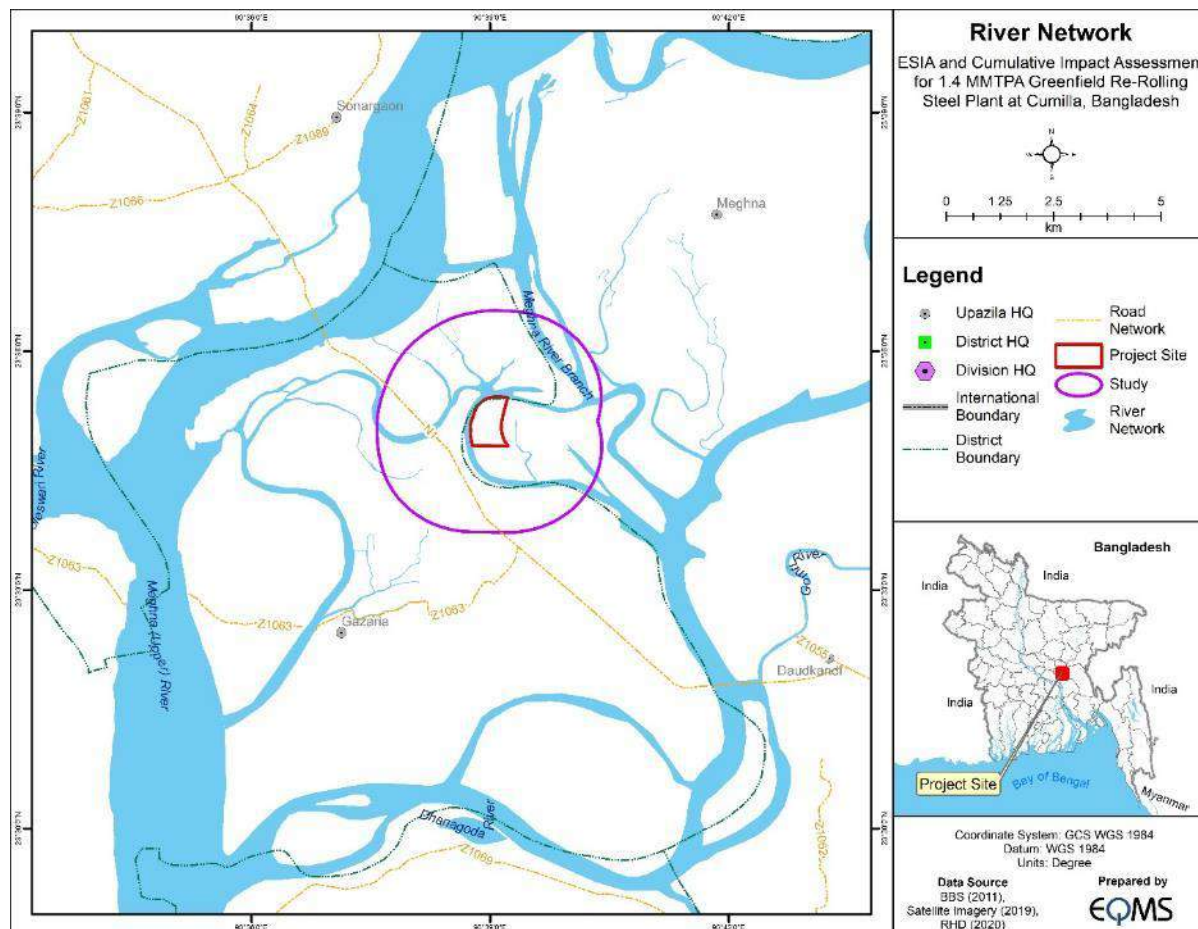
The Meghna is formed due to the confluence of the Surma and Kushiara rivers originating from the hilly regions of eastern India. Down to Chandpur, Meghna is hydrographically referred to as the Upper Meghna. After the Padma joins, it is referred to as the Lower Meghna. Near Muladhuli in Barisal district, the Safipur River is an offshoot of the Surma that creates one of the main rivers in South Bengal. 1.5 km wide, this river is one of the widest in the country as well. At Chatalpar of Brahmanbaria District, the river Titas emerges from Meghna and after circling two large bends by a distance of about 240 kilometers (150 mi), falls into the Meghna again near Nabinagar Upazila. The Titas forms as a single stream but braids into two distinct streams that remain separate before re-joining the Meghna.

In Daudkandi, (Comilla District), the Meghna is joined by the Gumti River, which increases the Meghna water flow considerably. The pair of bridges over the Meghna and Gumti are two of the country's largest bridges.

Meghna is reinforced by the Dhaleshwari before Chandpur. Further down, the Padma River- the largest tributary of the Ganges in Bangladesh, along with the Jamuna River- the largest tributary of the Brahmaputra, join with the Meghna in Chandpur District, resulting in the Lower Meghna.

After Chandpur, the combined flow of the Padma, Jamuna, and Meghna moves down to the Bay of Bengal in an almost straight line, braiding occasionally into a number of riverine including the Pagli, Katalia, Dhonagoda, Matlab, and Udhmodi. All of these rivers rejoin the Meghna at different points downstream.

Figure 5-10: River System map of the study area



Source: RHD, 2024

5.4 Meteorology

5.4.1 Climate

Bangladesh is located in the tropical monsoon region and its climate is characterized by high temperature, heavy rainfall, often excessive humidity, and fairly marked seasonal variations. From the climatic point of view, four distinct seasons¹⁴ can be recognized in Bangladesh.

- 1) **Pre-Monsoon Season (March to May):** Characterized by the highest temperatures of the year – up to 36°C. Some rainfall may occur, with tropical cyclones occasionally affecting inlands and coastal areas.

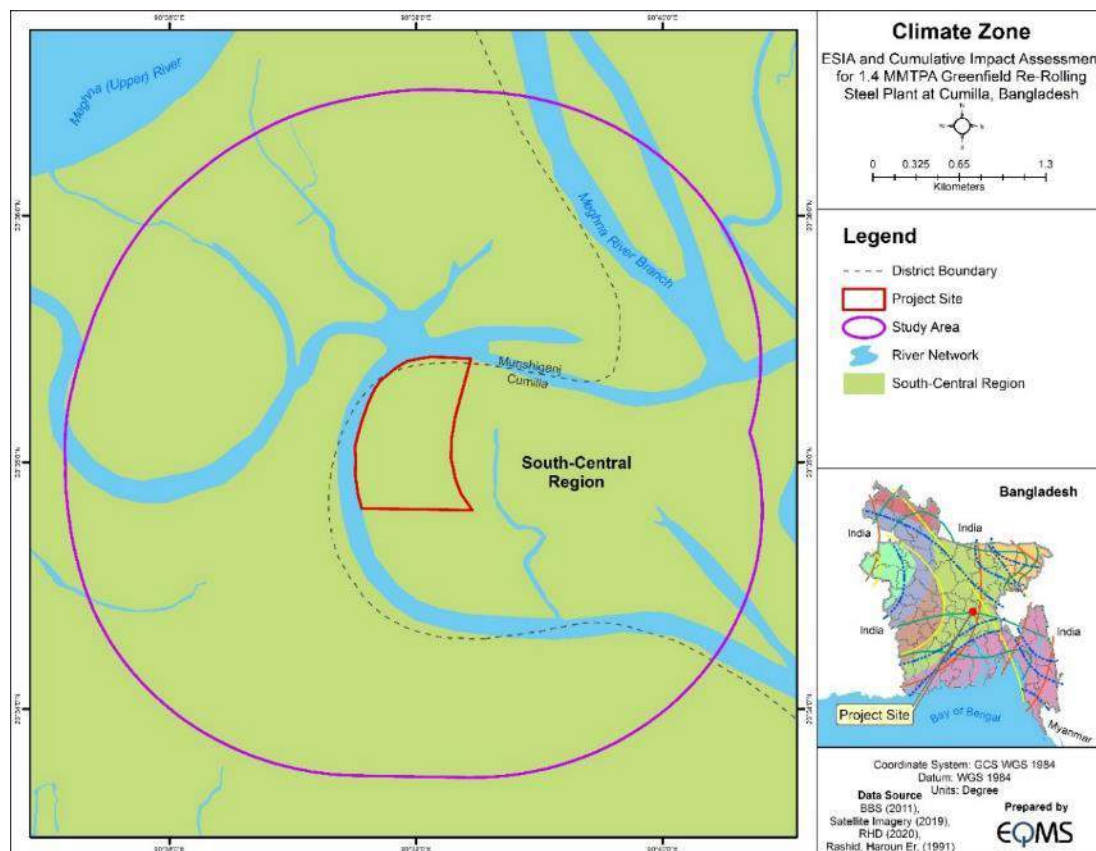
¹⁴ Brammer, H. (1996). The Geography of the Soils of Bangladesh. University Press Limited, Dhaka, Bangladesh.

- 2) **Monsoon Season (June to September):** Period of highest rainfall (up to 80% of the annual rainfall), humidity, and cloud cover. Increased rain and cloud cover generally cause a small reduction in mean daily temperatures.
- 3) **Post-Monsoon Season (October to November):** Temperature remains hot and humid, though cloud cover decreases in this season. Limited tropical thunderstorms may still, particularly in inlands and coastal areas; and
- 4) **Dry Winter Season (December to February):** Coolest time of the year with mean minimum temperatures falling below 10°C in some areas. Reduced humidity and cloud cover. Rainfall is scarce.

Despite the general predictability of the seasons in Bangladesh, local conditions may still vary widely across the country. As such, Bangladesh can be divided into seven climatic sub-zones based on differences in a range of factors including rainfall, temperature, evapotranspiration, and local seasonality (Rashid, 1991). According to the climatic sub-regions of Bangladesh, the proposed project area is located in the South-Central Region. In this zone rainfall is abundant, being above 1,900 mm. The range of temperature is less than to the west zone but in some areas, it is more than the South-eastern zone. This is a transitory zone between the South-eastern, North-western and South-western zones. Most of the severe hailstorms, nor 'westers and tornadoes are recorded in this area. The climatic sub-regions of the study area are shown in Figure 5-11. The climatic data for the study area was obtained from the Bangladesh Meteorological Department (BMD)¹⁵.

¹⁵ Bangladesh Meteorological Department is the authorized Government organization for all meteorological activities in Bangladesh. It maintains a network of surface and upper air observatories, radar and satellite stations, agro-meteorological observatories, geomagnetic and seismological observatories, and meteorological telecommunication system.

Figure 5-11: Climatic sub-regions of the study area

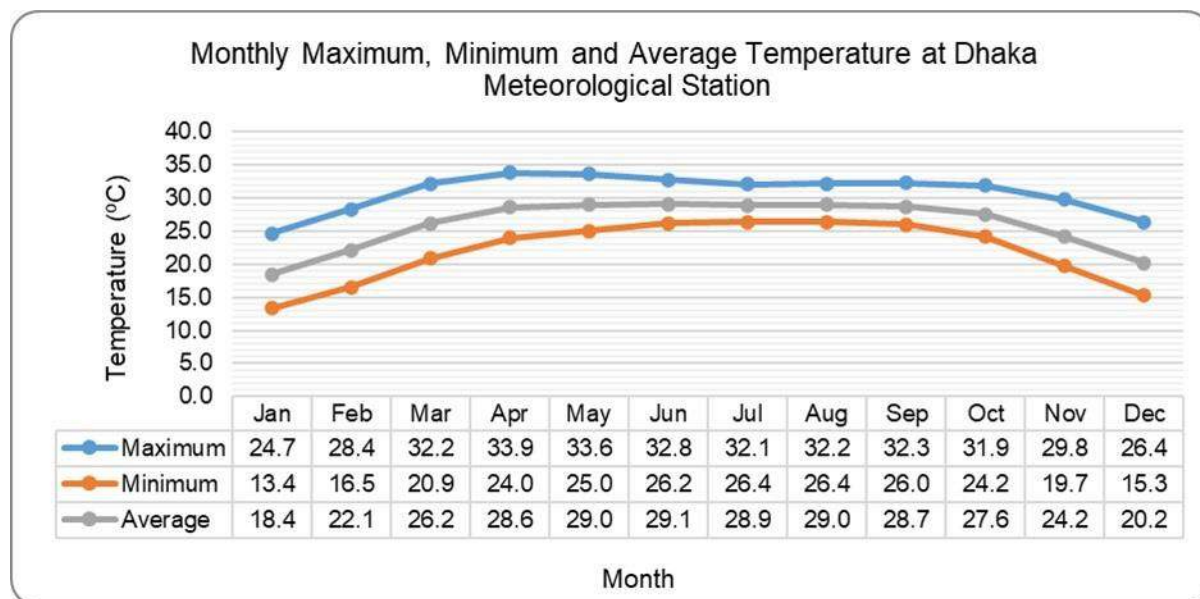
Source: Rashid, H. E. 1991¹⁶

There is no meteorology station in Meghna Upazila. The nearest meteorological station from the proposed project site is at Dhaka Meteorological Station, which is about 35 km from the project site.

5.4.2 Temperature

The variation of maximum, minimum, and average temperature recorded at the Dhaka weather station. The period from February to May is marked by a continuous increase in the temperatures in both years. April and May are the hottest months both years with a mean daily maximum and minimum temperature. December, January, and February are both the coolest months of the year. The maximum Temperature measures in Meghna Upazila is 40°C (April 2021) and the minimum recorded 23°C (January 2022) (Figure 5-12).

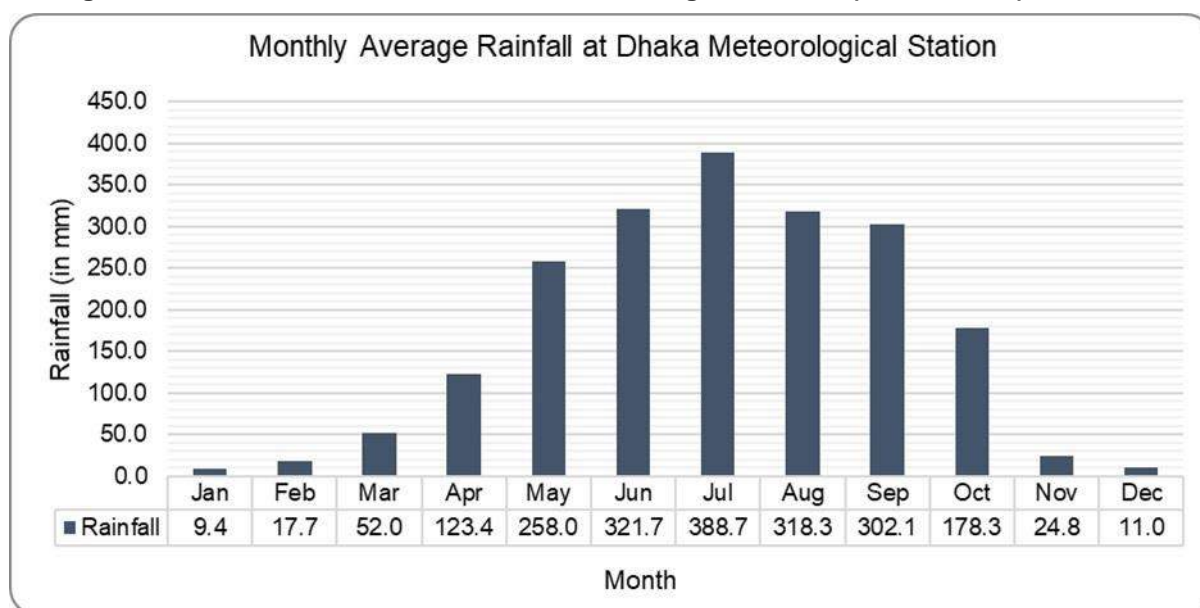
¹⁶ Rashid, H. E. (1991). *Geography of Bangladesh*. The University Press Ltd.

Figure 5-12: Temperature variation at Dhaka Meteorological Station (1992 to 2022)

Source: Bangladesh Meteorological Department (BMD), 2024

5.4.3 Rainfall

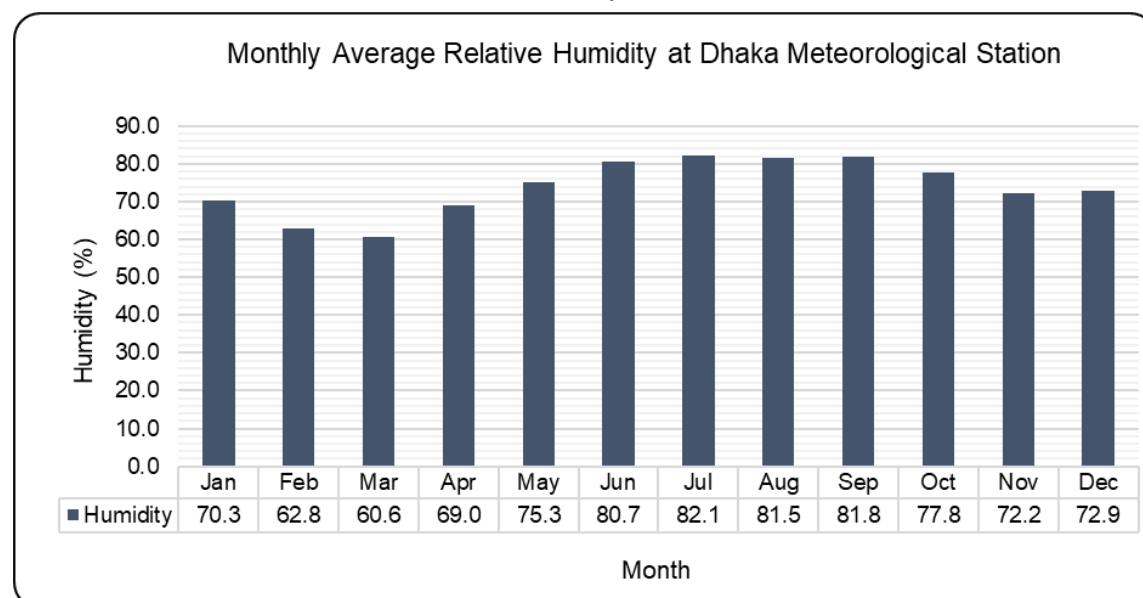
About 80% of the rainfall occurs over six months (May to October) with June to August getting the maximum rainfall. Minimum rainfall is reported from November to February whereas average showering does occur in March, April, and November. The annual rainfall of the study area in 2021 was 1280.9 mm and the total rainy day was 57. The rainfall recorded till June- 2022 was 453.9 mm and total rainy day was 18. The month of November 2021 no rainfall occurred. The variation of monthly maximum, minimum, and average rainfall of the last 31 years of Dhaka Meteorological Station is shown in Figure 5-13.

Figure 5-13: Rainfall variation at Dhaka Meteorological Station (1992 to 2022) in mm

Source: Bangladesh Meteorological Department (BMD)

5.4.4 Relative Humidity

Due to the heavy rainfall and high air temperature, the humidity and cloud levels in Bangladesh remain high. Analyzing the meteorological data, it has been found that during the pre-monsoon period the humidity level remained at its lowest point. Within the study area, February 2021 is the driest month with an average minimum of around 35% humidity and February 2021 has an average minimum of around 4% cloud. However, humidity increases to a maximum in the monsoon period. The average maximum humidity ranges from 60% to 80%, whereas the minimum average ranges from 35% to 60%. The monthly maximum, minimum, and average humidity of the last 31 years of Dhaka Meteorological Station is shown in Figure 5-14.

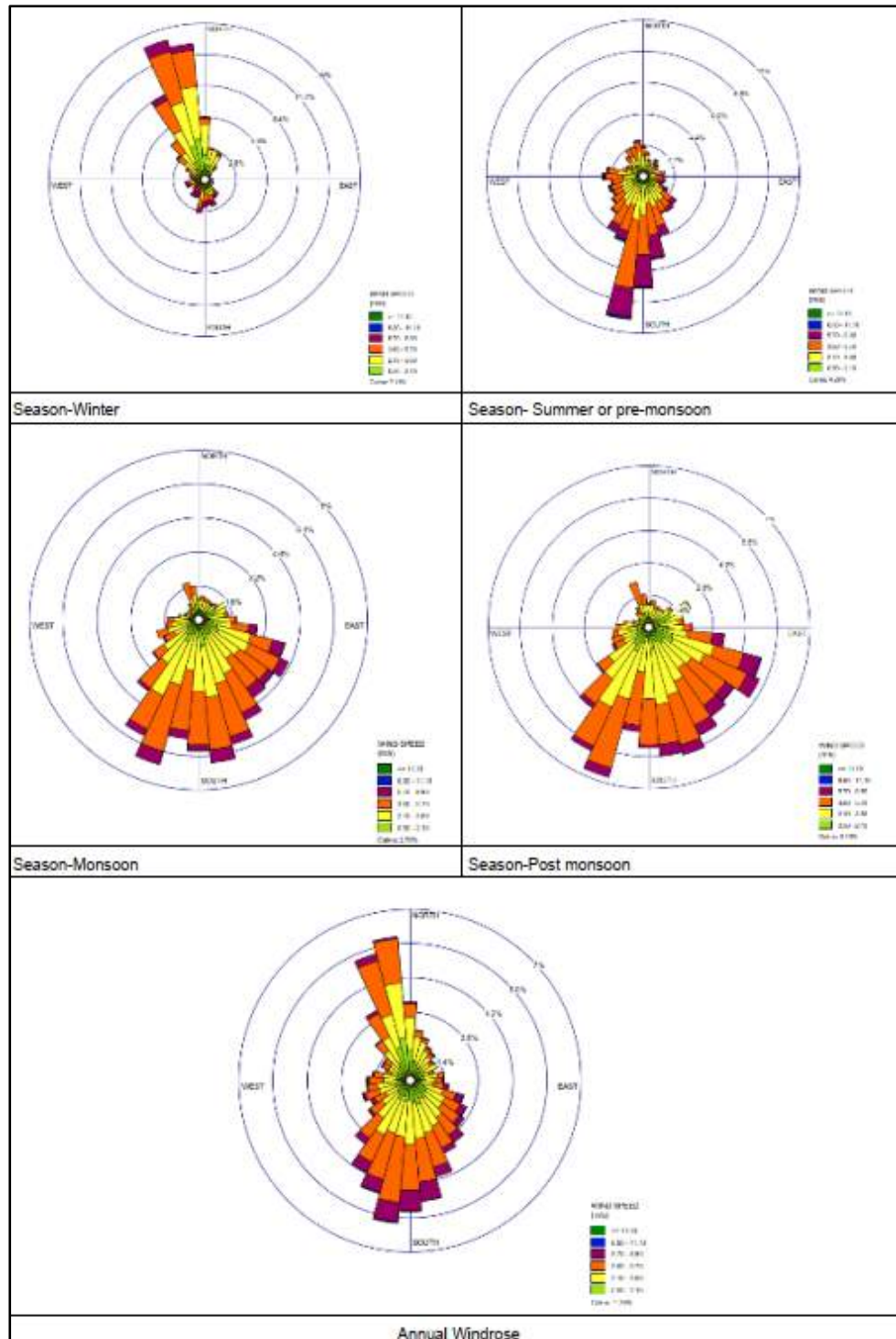
Figure 5-14: Monthly Average Relative Humidity at Dhaka Meteorological Station (1992 to 2022)

Source: Bangladesh Meteorological Department (BMD)

5.4.5 Wind Speed and Direction

The maximum monthly wind speed is available in April, May, June and July. Minimum monthly wind speed found October, November and December. The wind speed in January, February and March is moderately higher than in December and November. The average wind speed in the study area is about 20.4 km/h. The maximum wind speed was recorded at more than 29.5 kmph in April 2022. The seasonal and annual wind rose diagram at the study area is shown in Figure 5-15.

Figure 5-15: Seasonal Wind Rose Diagram at Dhaka Met Station, 2022



The annual windrose shows that the predominant wind directions are from South South-West and North North-West. During pre-monsoon (March-May) the predominant wind direction is from South South-west, and during monsoon season (June-September) it is from South, South South-east and South-west whereas during the post monsoon (October-November) predominant wind direction is also from South-east and south-west and during the winter season (December-February) it is from North-North-west and North-west. The wind roses indicate the prevalent wind direction in an area during the different seasons.

5.5 Environmental Quality

5.5.1 Ambient Air Quality

The objective of the ambient air quality monitoring program was to establish the baseline ambient air quality in the study area. The study area resembles a predominantly rural landscape with villages interspersed between homestead plantations and agricultural lands. The major emission sources in the study area are mainly existing industry, road dust, black smoke from diesel engine vehicles, domestic heating, and cooking, etc.

Monitoring locations were initially selected using aerial photography and imagery, locally available knowledge about villages and settlements, accessibility, and safety to determine the location of nearby sensitive receptors.

EQMS has determined Six (6) air quality monitoring locations around the project site based on prevailing wind direction and locations of the social receptors have been taken into consideration. The monitoring parameters are Particulate Matters (PM₁₀ and PM_{2.5}), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂) and Carbon Monoxide (CO). The ambient air quality monitoring has been conducted for four weeks. The ambient air parameters (except CO- 8hr) were monitored for 24 hours and compared with the Bangladesh Standards.

5.5.1.1 Ambient Air Quality Monitoring Locations

Monitoring locations were chosen to determine the general background concentration in close proximity to human receptors that may be affected by the project activities.

The ambient air quality monitoring locations were based on the following aspects covered in the field survey plan developed prior to the fieldwork:

- Meteorological conditions of the area.
- The topography of the study area.
- Location of sensitive receptors such as major settlements.

Details of the ambient air quality monitoring locations are presented Table 5-2 and Figure 5-16.

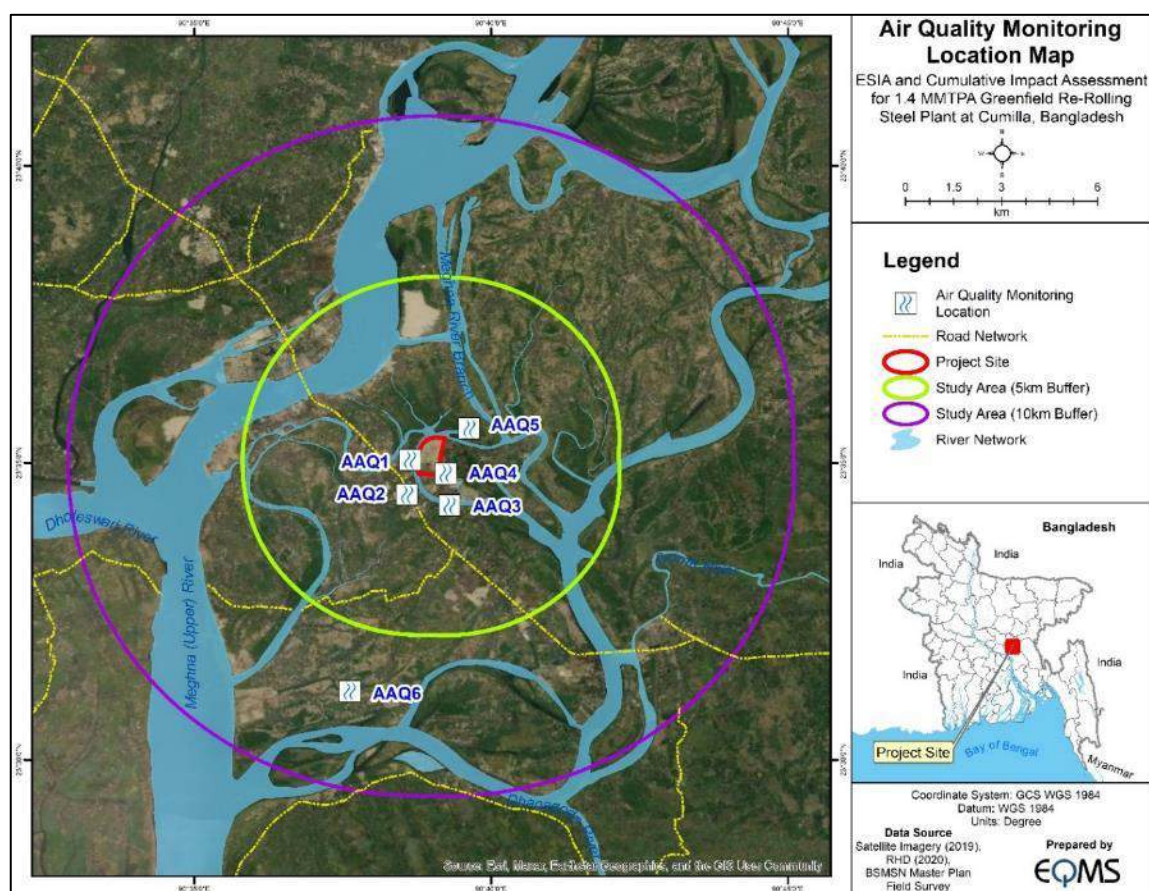
Table 5-2: Ambient air quality monitoring locations

Sampling Locations	Coordinates	Monitoring Date				Location Description
		1 st week	2 nd week	3 rd week	4 th week	
AAQ-1	23°35'3.00"N 90°38'38.00"E	10.02.24	18.02.24	25.02.24	03.03.24	Hazi Umor Faruqe Khondokar's House, Boroikandi, Vaterchar, Gazaria, Munshiganj
AAQ-2	23°34'28.00"N 90°38'35.00"E	10.02.24	21.02.24	29.02.24	07.03.24	Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Mosjid, Anarpura Mahmudbag, Bhabar

Sampling Locations	Coordinates	Monitoring Date				Location Description
		1 st week	2 nd week	3 rd week	4 th week	
						Char, Gazaria, Munshiganj
AAQ-3	23°34'15.00"N 90°39'21.00"E	11.02.24	19.02.24	26.02.24	04.03.24	56 No. Vitikandi Government Primary School, Noyakandi achroykendro, Vitikandi, Gazaria, Munshiganj
AAQ-4	23°34'49.00"N 90°39'14.00"E	11.02.24	20.02.24	28.02.24	06.03.24	Project Site, Luterchar Anwar Camp, CEZ, Meghna-Homna Road, Meghna, Cumilla
AAQ-5	23°35'35.00"N 90°39'38.00"E	12.02.24	22.02.24	27.02.24	05.03.24	Joshim Uddin's House, 9no word Abdullahpur, Meghna, Cumilla
AAQ-6	23°31'9.00"N 90°37'37.00"E	--	--	--	08.03.24	Amin's house, Jastitola, Imampur, Gazaria, Munshiganj

Source: Field Survey by EQMS Team, 2024

Figure 5-16: Ambient air quality monitoring location map



Source: Field Survey by EQMS Team, 2024

Pictures taken during air quality monitoring are shown in Figure 5-17, Figure 5-18, Figure 5-19 and Figure 5-20.

Figure 5-17: Photographs of Ambient Air Quality Monitoring in 1st week

 <p>10 Feb 2024 11:42:19 am 23°35'2"N 90°38'38"E Munshiganj District</p>	 <p>10 Feb 2024 10:35:37 pm 23°35'2"N 90°38'38"E Munshiganj District</p>
<p>AAQ1 (Day)</p>	<p>AAQ1 (Night)</p>
 <p>10 Feb 2024 05:57:34 am 23°34'28"N 90°38'35"E Munshiganj District</p>	 <p>10 Feb 2024 9:18:11 pm 23°34'28"N 90°38'35"E Munshiganj District</p>
<p>AAQ2 (Day)</p>	<p>AAQ2 (Night)</p>
 <p>11 Feb 2024 12:03:29 pm 23°34'15"N 90°39'21"E Nayakandi, Comilla District</p>	 <p>11 Feb 2024 8:23:19 pm 23°34'17"N 90°39'18"E Munshiganj District</p>
<p>AAQ3 (Day)</p>	<p>AAQ3 (Night)</p>
 <p>11 Feb 2024 11:19:37 am 23°34'49"N 90°39'14"E Meghna - Homna Road Luterchar, Comilla District</p>	 <p>11 Feb 2024 10:49:31 pm 23°34'49"N 90°39'14"E</p>

AAQ4 (Day)	AAQ4 (Night)
AAQ5 (Day)	AAQ5 (Night)

Source: Field Survey by EQMS Team, 2024

Figure 5-18: Photographs of Ambient Air Quality Monitoring in 2nd Week

AAQ1 (Day)	AAQ1 (Night)
AAQ2 (Day)	AAQ2 (Night)



AAQ3 (Day)



AAQ3 (Night)



AAQ4 (Day)



AAQ4 (Night)










AAQ5 (Day)



AAQ5 (Night)

Source: Field Survey by EQMS Team,2024

Figure 5-19: Photographs of Ambient Air Quality Monitoring in 3rd Week

 <p>25 Feb 2024 9:39:31 am 23°35'2"N 90°38'38"E Gazaria, Munshiganj District</p>	 <p>25 Feb 2024 8:22:13 pm 23°35'2"N 90°38'38"E Munshiganj District</p>
<p>AAQ1 (Day)</p>	<p>AAQ1 (Night)</p>
 <p>29 Feb 2024 11:26:30 am 23°34'28"N 90°38'36"E Gazaria, Munshiganj District</p>	 <p>29 Feb 2024 8:05:11 pm 23°34'28"N 90°38'35"E Munshiganj District</p>
<p>AAQ2 (Day)</p>	<p>AAQ2 (Night)</p>
 <p>26 Feb 2024 10:46:19 am 23°34'16"N 90°39'13"E Nayakandi, Munshiganj District</p>	 <p>26 Feb 2024 7:58:06 pm 23°34'16"N 90°39'18"E Munshiganj District</p>
<p>AAQ3 (Day)</p>	<p>AAQ3 (Night)</p>
 <p>28 Feb 2024 11:28:50 am 23°34'49"N 90°39'14"E Meghna - Homna Road Luterchar, Comilla District</p>	 <p>28 Feb 2024 8:25:04 pm 23°34'49"N 90°39'14"E Meghna - Homna Road Luterchar, Comilla District</p>

AAQ4 (Day)	AAQ4 (Night)
AAQ5 (Day)	AAQ5 (Night)

Source: Field Survey by EQMS Team, 2024

Figure 5-20: Photographs of Ambient Air Quality Monitoring in 4th Week

AAQ1 (Day)	AAQ1 (Night)
AAQ2 (Day)	AAQ2 (Night)



AAQ3 (Day)



AAQ3 (Night)



AAQ4 (Day)



AAQ4 (Night)



AAQ5 (Day)



AAQ5 (Night)



AAQ6

Source: Field Survey by EQMS Team, 2024

5.5.1.2 Ambient Air Quality Monitoring Results

The summary of the ambient air quality results for four weeks is presented in Table 5-3. Details of four weeks ambient air quality monitoring data are included as lab sheet in the Appendix G:

Table 5-3: Summary of ambient air quality monitoring results for four weeks

Sampling location	Month	Observed	Ambient air pollution concentration in $\mu\text{g}/\text{m}^3$				CO mg/m^3
			PM ₁₀	PM _{2.5}	SO ₂	NO ₂	
AAQ1	February-March 2024	Maximum	26.53	17.26	15.25	16.41	0.5
		Minimum	17.37	12.62	12.21	14.25	0.3
		Average	22.48	15.46	13.52	15.31	0.4
AAQ2	February-March 2024	Maximum	47.53	38.47	16.73	28.64	0.6
		Minimum	32.74	22.82	12.76	23.46	0.4
		Average	39.59	28.85	14.91	26.05	0.53
AAQ3	February-March 2024	Maximum	31.74	22.36	18.46	32.56	0.7
		Minimum	25.56	15.61	16.73	18.67	0.3
		Average	29.06	18.60	17.74	26.02	0.43
AAQ4	February-March 2024	Maximum	53.73	42.35	27.59	42.56	0.6
		Minimum	43.78	31.42	22.68	34.73	0.4
		Average	48.18	35.59	24.76	37.89	0.53
AAQ5	February-March 2024	Maximum	26.74	18.84	12.63	14.89	0.9
		Minimum	21.26	16.34	8.37	7.36	0.4
		Average	23.93	17.39	10.59	10.72	0.63
AAQ6	February-March 2024	Maximum	15.69	10.89	6.68	8.47	0.4
		Minimum	12.34	8.42	5.95	6.23	0.3
		Average	14.02	9.66	6.32	7.35	0.35
Duration (hours)			24	24	24	24	8
Standards							
Bangladesh*			150	65	80	80	5
IFC/WHO**			45	15	40	25	10

Source: Field Measurement and Laboratory Analysis by EQMS, 2024

Note:

* The Bangladesh National Ambient Air Quality Standards have been taken from the Air Pollution Control Rules 2022

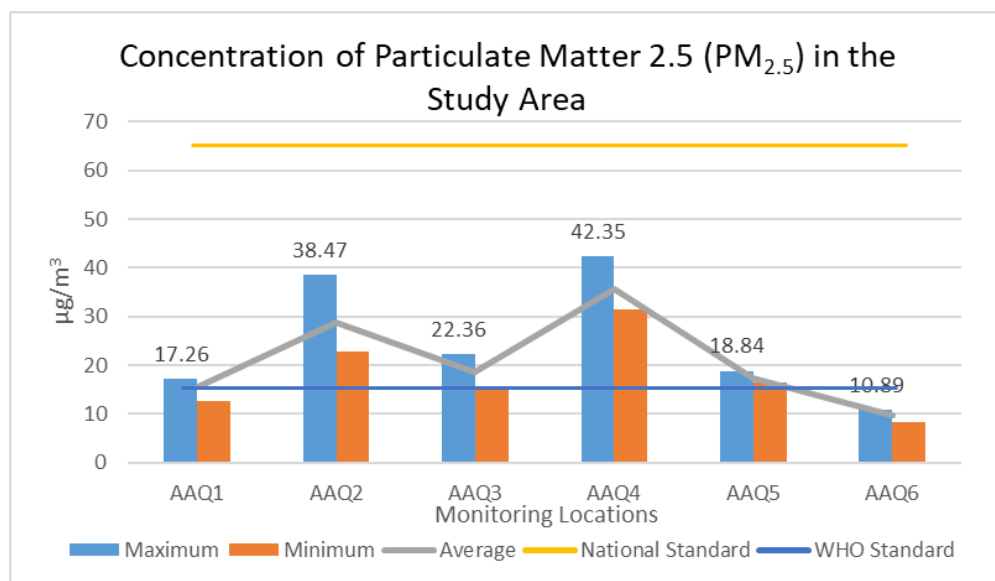
** WHO Ambient Air Quality Guideline Values 2021

5.5.1.2.1 Interpretation of Air Monitoring Results in the four weeks Period

Particulate Matter (PM_{2.5})

The 24hrs minimum and maximum PM_{2.5} concentrations in the monitoring locations were found from 8.42 µg/m³ (AAQ6) to 42.35 µg/m³ (AAQ4). The average PM_{2.5} concentrations were found between 9.66 µg/m³- 35.59 µg/m³. As the location AAQ2 and AAQ4 besides the road area, Exhaust from cars, trucks, buses, and other motor vehicles is a significant source of PM_{2.5}. The PM_{2.5} concentration was within the NAAQS (65 µg/m³-24 hourly average) but exceeded the WHO standards in all locations (except AAQ6). The main reason for the increase in PM_{2.5} in the ambient air are surrounding soil surface abrasion, Construction activities near road sites, Industrial activities. The concentrations of PM_{2.5} in the study area are shown in Figure 5-22.

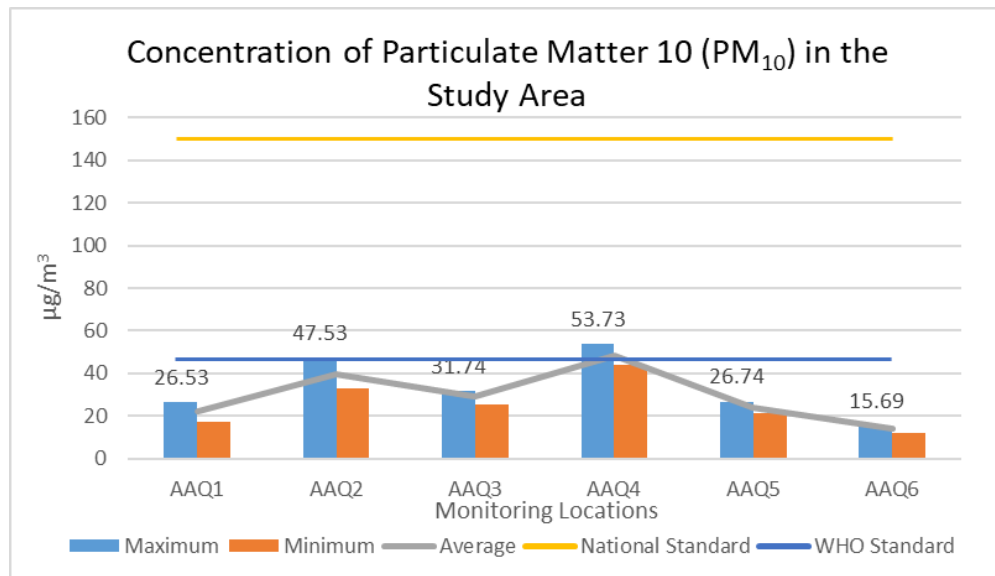
Figure 5-21: Concentrations of PM_{2.5} in study area



Source: Field Measurement and Laboratory Analysis by EQMS, 2024

Particulate Matter (PM₁₀)

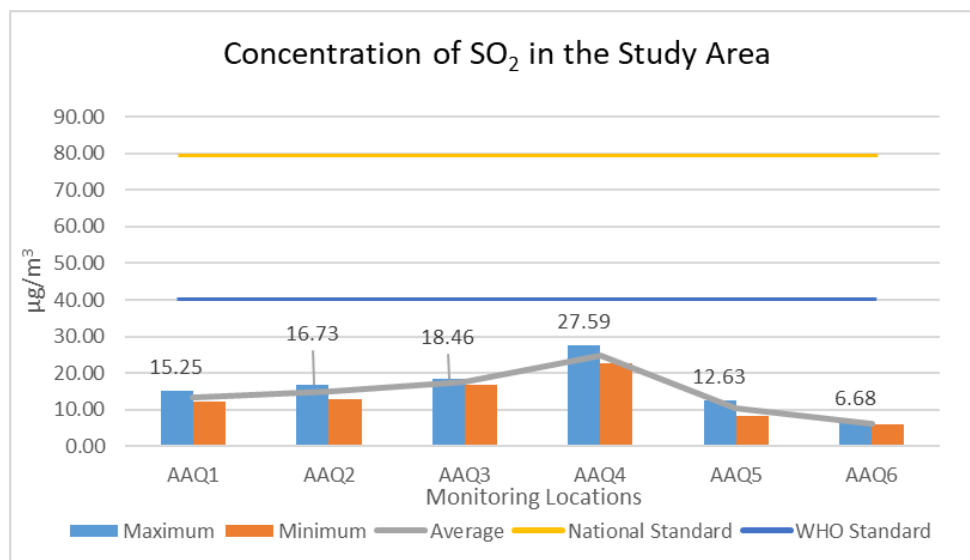
The 24hrs minimum and maximum PM₁₀ concentrations in the monitoring locations were found from 12.34 µg/m³ (AAQ6) to 53.73 µg/m³ (AAQ4). The average PM₁₀ concentration varies between 14.02 µg/m³- 48.18 µg/m³ which are within the national ambient air quality standard-NAAQS (150 µg/m³-24 hourly average) but exceed the WHO standards in AAQ4 only. The main reason for the increase in PM₁₀ in the ambient air are construction activities near project sites and construction vehicles brake wear, tire wear, and road surface abrasion. The concentrations of PM₁₀ in the study area are shown in Figure 5-22.

Figure 5-22: Concentrations of PM₁₀ in study area

Source: Field Measurement and Laboratory Analysis by EQMS, 2024

Sulfur dioxide (SO₂)

The minimum and maximum concentration of SO₂ at the monitoring locations ranged from 5.95 µg/m³ (AAQ6) to 27.59 µg/m³ (AAQ4). The average SO₂ concentrations were found from 6.32 µg/m³ to 24.76 µg/m³ within the range of NAAQS (80 µg/m³-24 hourly average) and also within the WHO standards (40 µg/m³-24 hourly average). The concentrations of SO₂ in the study area are shown in Figure 5-23.

Figure 5-23: Concentrations of SO₂ in study area

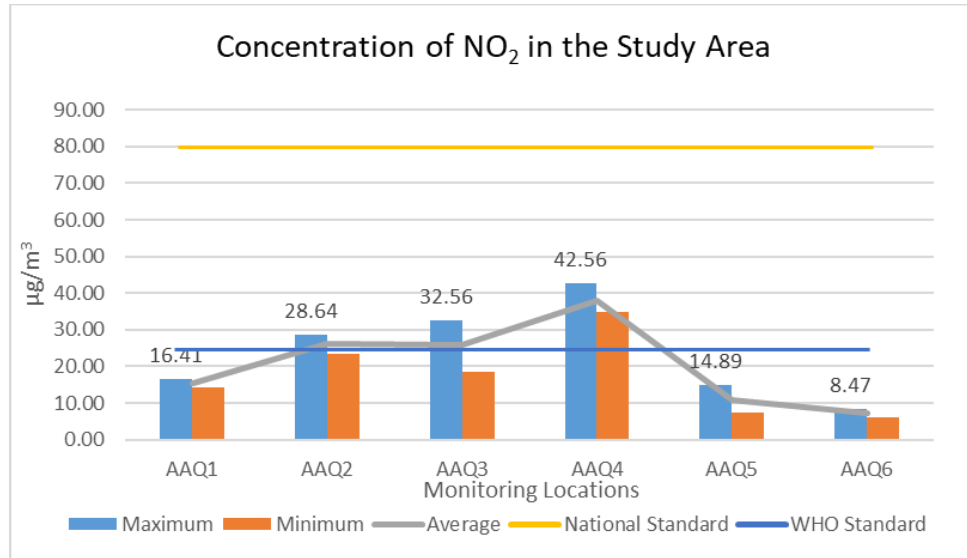
Source: Field Measurement and Laboratory Analysis by EQMS, 2024

Nitrogen Dioxide (NO₂)

The minimum and maximum 24hr concentration of NO₂ in the monitoring locations were found from 6.23 µg/m³ (AAQ6) to 42.56 µg/m³ (AAQ4). During the 4 weeks monitoring period, average NO₂ concentration was found between 7.35 µg/m³- 37.89 µg/m³ which are within the value of NAAQS (80 µg/m³-24-hour average) but exceed the WHO standards in three locations (AAQ2, AAQ3 and AAQ4). Motor vehicle exhaust. Vehicles, especially those powered by diesel engines, High traffic

volumes, location near paper industry are the main reason for NO₂ emission. The concentrations of NO₂ in the study area are shown in Figure 5-24.

Figure 5-24: Concentrations of NO₂ in study area

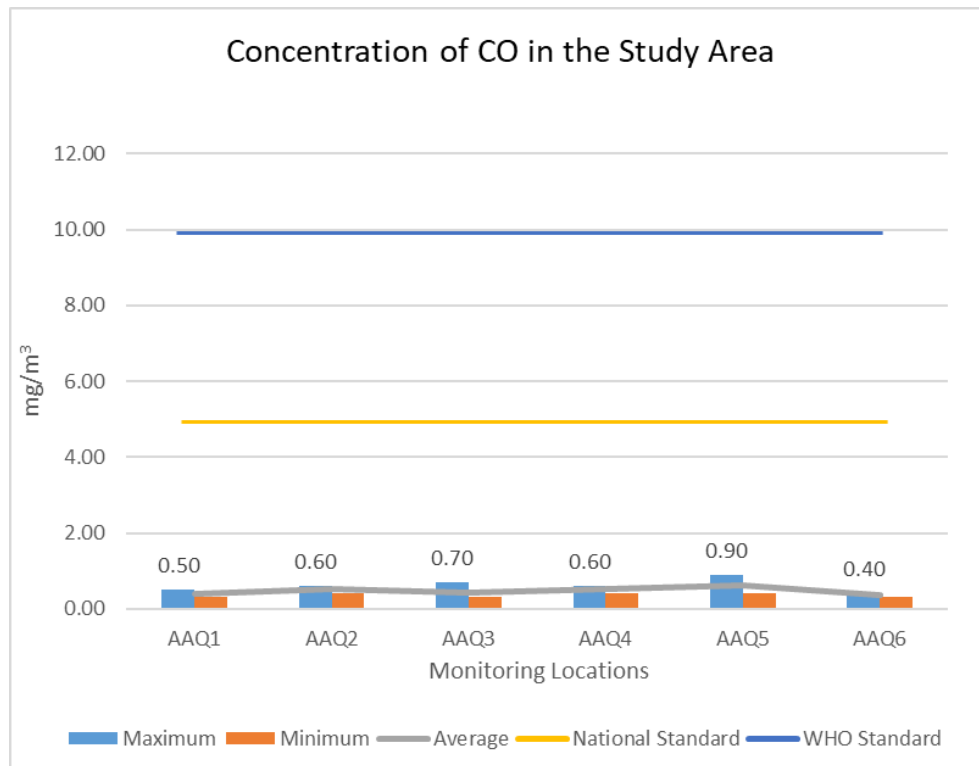


Source: Field Measurement and Laboratory Analysis by EQMS, 2024

Carbon Monoxide (CO)

The 8 hourly minimum and maximum concentration of CO in the monitoring locations was found 0.4 mg/m³ (AAQ6) to 0.9 mg/m³ (AAQ5). During the 4 weeks monitoring period, average CO concentration was found between 0.35 mg/m³- 0.63 mg/m³ which is covered the value of NAAQS (5 mg/m³-8 hourly average) and also within the WHO standards (10 µg/m³-8 hourly average). The concentrations of CO in the study area are shown in Figure 5-25.

Figure 5-25: Concentrations of CO in study area



Source: Field Measurement and Laboratory Analysis by EQMS, 2024

5.5.2 Ambient Noise Quality

The proposed project area is located in the industrial zone (CuEZ). There are internal service roads, local roads, a few industries, settlement areas, local markets, etc. outside of the proposed project boundary. Presently there are few established industries, and many under-construction industries exist near the project site. These industries along with human activities, vehicular movement on the access road, and river traffic (boat, ship, trawler, etc.) are the main sources of noise. Noise measured is assessed against the IFC and DOE criteria.

5.5.2.1 Sampling Methodology

As part baseline, 24 hours sampling at 10 locations for 4 days in the closest off-site sensitive social receptors were carried out. Ambient noise levels (equivalent continuous sound pressure level with "A" frequency weighting – LAeq) were monitored at ten locations to capture the ambient noise close to the proposed project location. A noise data logger was used to monitor ambient noise levels. The readings were taken every 1 minute. The day-time noise levels were monitored from 6 am to 9 pm and night-time levels from 9 pm to 6 am at all the locations covered in a 500m-5 km radius of the study area to comply with the IFC EHS guidelines for ambient noise levels.

5.5.2.2 Ambient Noise Monitoring Locations

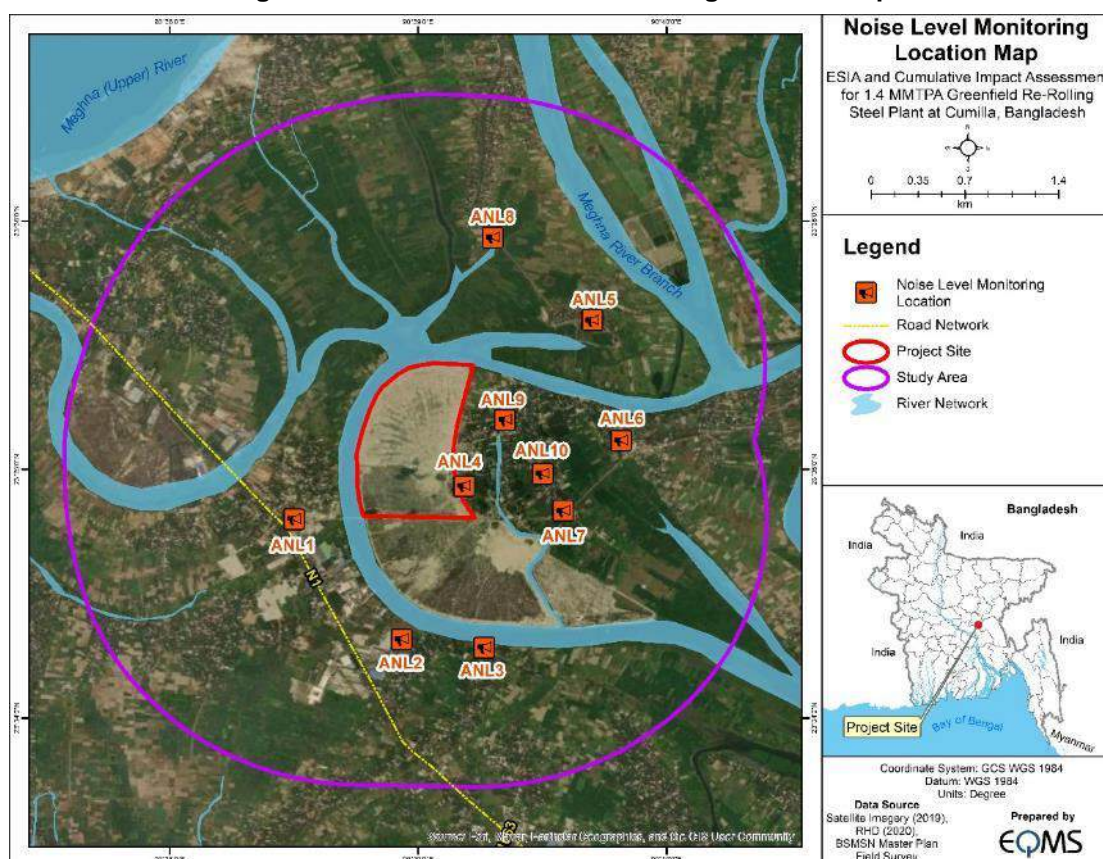
Noise monitoring was conducted at ten locations within the study area during the baseline survey in February 2024. These locations are chosen in such a way that representative data could be recorded all over the study area. Details of the ambient noise monitoring locations are presented in Table 5-4 and Figure 5-26

Table 5-4: Ambient noise monitoring locations

Sampling Locations	Coordinates	Monitoring Date	Location Description	Category of Area/Receptor
ANL-1	23°34'48.00"N 90°38'30.00"E	10.02.2024	In-front of new food village restaurant & sweetmeats, Vaterchar, Notun Rastha, Gazaria, Munshiganj	Commercial
ANL-2	23°34'19.00"N 90°38'56.00"E	10.02.2024	North side of JMI Industrial Park, 2no word vitikandi, Gazaria, Munshiganj	Industrial
ANL-3	23°34'17.00"N 90°39'16.00"E	11.02.2024	56 No. Vitikandi Government Primary School, Noyakandi Achroykendro, Vitikandi, Gazaria, Munshiganj	Silent
ANL-4	23°34'56.00"N 90°39'11.00"E	11.02.2024	In-front of Shafiq member's house, Hariluter Char, Meghna, Cumilla	Residential
ANL-5	23°35'36.00"N 90°39'42.00"E	13.02.2024	71No. Abdullahpur Government Primary School, Gazaria, Munshiganj	Silent
ANL-6	23°35'7.00"N 90°39'49.00"E	11.02.2024	Kandargaon Madrasha Masjid, Luter Char, Meghna, Cumilla	Mixed
ANL-7	23°34'50.00"N 90°39'35.00"E	11.02.2024	In-front of YS Fashion Point, Meghna-Homna Road, Luter Char, Meghna, Cumilla	Mixed

Sampling Locations	Coordinates	Monitoring Date	Location Description	Category of Area/Receptor
ANL-8	23°35'56.00"N 90°39'18.00"E	13.02.2024	In-front of Yasin ali's House, 71No. Abdullahpur, Gazaria, Munshiganj	Residential
ANL-9	23°35'12.00"N 90°39'21.00"E	11.02.2024	Luterchar Mofizur Islam High School, 1no word, Luter Char, Meghna, Cumilla	Silent
ANL-10	23°34'59.00"N 90°39'30.00"E	11.02.2024	Luterchar Pashim Para Baitol Idris Jame Mashjid, Luter Char, Meghna, Cumilla	Residential




Source: Field Survey by EQMS Team, February 2024

Figure 5-26: Ambient noise monitoring location map

Source: Field Survey by EQMS Team, 2024

Pictures taken during noise monitoring in the project area are shown in Figure 5-27

Figure 5-27: Pictures taken during noise monitoring in the project area.

 <p>10 Feb 2024 10:23:39 am 23°34'48"N 90°38'31"E Munshiganj District</p>	 <p>10 Feb 2024 9:44:40 pm 23°34'48"N 90°38'31"E Munshiganj District</p>
<p>ANL-1 (Day)</p>	<p>ANL-1 (Night)</p>
 <p>10 Feb 2024 12:40:32 pm 23°34'19"N 90°38'56"E Munshiganj District</p>	 <p>10 Feb 2024 8:19:04 pm 23°34'19"N 90°38'56"E Munshiganj District</p>
<p>ANL-2 (Day)</p>	<p>ANL-2 (Night)</p>
 <p>11 Feb 2024 12:16:07 pm 23°34'16"N 90°39'17"E Nayakandi, Munshiganj District</p>	 <p>11 Feb 2024 8:23:53 pm 23°34'17"N 90°39'18"E Munshiganj District</p>
<p>ANL-3 (Day)</p>	<p>ANL-3 (Night)</p>
 <p>11 Feb 2024 9:38:02 am 23°34'56"N 90°39'11"E Nayakandi, Cumilla District</p>	 <p>11 Feb 2024 11:19:26 pm 23°34'56"N 90°39'11"E Luterchar, Cumilla District</p>

ANL-4 (Day)	ANL-4 (Night)
ANL-5 (Day)	ANL-5 (Night)
ANL-6 (Day)	ANL-6 (Night)
ANL-7 (Day)	ANL-7 (Night)

ANL-8 (Day)	ANL-8 (Night)
ANL-9 (Day)	ANL-9 (Night)
ANL-10 (Day)	ANL-10 (Night)

5.5.2.3 Interpretation of Noise Monitoring Results

The equivalent daytime and night-time noise levels in comparison to the respective national and international standards are tabulated in Table 5-5.

Table 5-5: Ambient noise level in the study area

Sampling Locations	Location Setting (IFC/DOE)	Time	Noise Level in dB(A) ¹⁷			Bangladesh Standard ¹⁸	IFC Guidelines
			Leq	L _{max}	L _{min}		
ANL-1	Commercial	Day	65.0	81.4	45.7	70	70
		Night	67.2	80.2	48.5	60	70
ANL-2	Industrial	Day	50.2	55.9	38.4	75	70
		Night	35.4	37.8	30.4	70	70
ANL-3	Silent	Day	53.2	58.5	43.2	50	55
		Night	45.4	50.6	37.1	40	45
ANL-4	Residential	Day	61.7	80.9	30.9	55	55
		Night	49.0	61.5	30.8	45	45

¹⁷ A-weighted decibel, abbreviated dB(A), is an expression of the relative loudness of sounds in air as perceived by the human ear. In the A-weighted system, the decibel values of sounds at low frequencies are reduced, as the ear is less sensitive to low audio frequencies, especially below 1000 Hz, than to high audio frequencies.

¹⁸ Ministry of Environment, Forest, and Climate Change. (2006). *Noise Pollution (Control) Rules, 2006* (S.R.O. No. 212-Law/2006). The People's Republic of Bangladesh.

Sampling Locations	Location Setting (IFC/DOE)	Time	Noise Level in dB(A) ¹⁷			Bangladesh Standard ¹⁸	IFC Guidelines
			Leq	L _{max}	L _{min}		
ANL-5	Silent	Day	50.3	55.9	38.4	50	55
		Night	45.5	50.8	37.2	40	45
ANL-6	Mixed	Day	51.7	55.8	40.7	60	55
		Night	48.5	61.5	30.6	50	45
ANL-7	Mixed	Day	51.5	55.8	39.2	60	55
		Night	45.5	50.6	37.1	50	45
ANL-8	Residential	Day	45.5	50.7	37.1	55	55
		Night	35.6	41.9	30.8	45	45
ANL-9	Mixed	Day	53.4	58.7	43.3	60	55
		Night	47.8	58.9	30.8	50	45
ANL-10	Silent	Day	52.5	58.5	40.5	50	55
		Night	45.5	50.8	36.5	40	45

Source: Field Survey by EQMS Team, February 2024

Ambient daytime noise level (Leq_{day}) was recorded in the range of 45.5 to 65.0 dB (A). In contrast, the study area's ambient nighttime noise levels (Leq_{night}) varied from 35.4 to 67.2 dB (A). Maximum noise levels (L_{max}) at the monitoring locations were recorded in the range of 37.8 to 81.4 dB (A), and the minimum noise levels (L_{min}) at the monitoring locations were recorded in the range of 30.4 to 48.5 dB (A). The highest and lowest noise level was recorded at 81.4 dBA and 30.4 dBA at ANL1 and ANL2 respectively. Noise levels of all locations have been found below the Noise Pollution Control Rules, 2006 Standards except ANL-1, ANL-3 and ANL-10. Based on the noise monitoring locations, ANL-1 emerges as the closest point to the Dhaka-Chittagong Highway. The primary contributor to elevated noise levels there is the substantial traffic flow. The ANL-4 categories are designated for residential use but are positioned nearest to the Meghna-Homna Road. The main factor leading to increased noise levels in this location is the significant volume of traffic passing through. Although ANL-3 and ANL-10 are categorized as silent zones, their proximity to residential areas results in slightly elevated noise levels being considerable at these locations.

5.5.3 Water Quality

5.5.3.1 Surface Water Quality

The main water body in and around the project area is the Meghna River. The water may be polluted due to industrial effluents, human activities, unplanned disposal of domestic waste, accidental oil spillage, etc. Two (2) surface water samples have been collected during the baseline survey from the proposed project area. The sampling locations are selected considering the flow, upstream, downstream, proposed jetty area, etc. The monitoring parameters are Alkalinity, BOD₅, COD, Calcium, Chloride, Dissolved Oxygen, EC, Magnesium, Nitrate, Nitrite, Oil and Grease, pH, Potassium, Salinity, Sulphate, Temperature, TDS, TSS, Turbidity.

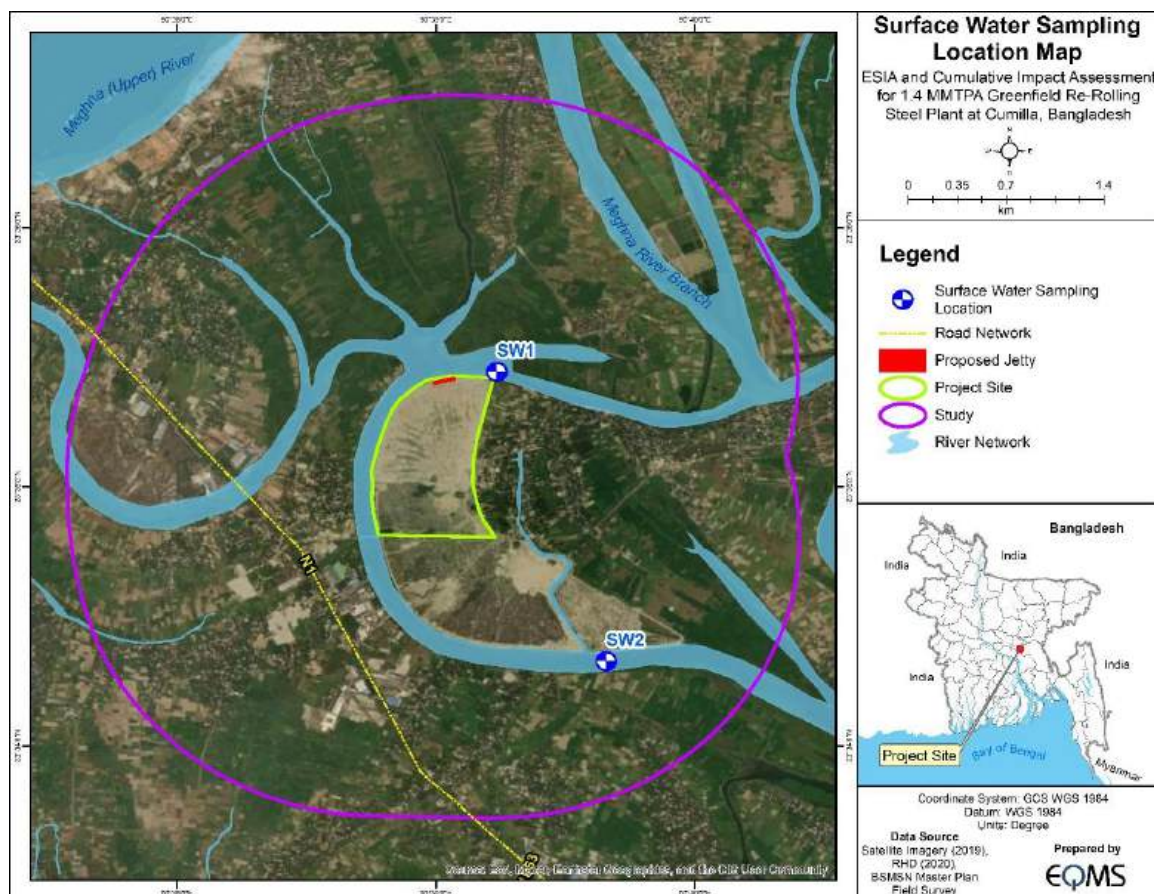
The detail of the surface water sampling locations is presented in Table 5-6 and Figure 5-28

Table 5-6: Surface water sampling location

Sampling Locations	Coordinates	Monitoring Date	Location Description
SW-1	23°35'26.00"N 90°39'16.00"E	28.02.2024	Upstream of Meghna River Branch

Sampling Locations	Coordinates	Monitoring Date	Location Description
SW-2	23°34'20.00"N 90°39'40.00"E	28.02.2024	Downstream of Meghna River Branch

Source: Field Survey by EQMS Team, February 2024

Figure 5-28: Surface Water Sampling Locations

Source: Field Survey by EQMS Team, 2024

Pictures taken during sampling are shown in Figure 5-29.

Figure 5-29: Photographs taken during surface water sampling**SW1- Upstream of Meghna River Branch**



SW2- Downstream of Meghna River Branch

5.5.3.1.1 Surface Water Monitoring Results

The analyzed results for surface water were compared to Bangladesh Standards (ECR,2023). Results of inland surface water analysis are presented in Table 5-7.

Table 5-7: Surface water analysis result

Parameters	Unit	Surface Water Samples		Bangladesh Standard ¹⁹					
		SW-1	SW-2	Source of Drinking Water for Supply Only after Disinfecting	Water Usable for Recreational Activity	Source of Drinking Water for Supply After Conventional Treatment	Water Usable by Fisheries	Water Usable by Various Process and Cooling Industries	Water Usable for Irrigation
Temperature	°C	23.0	23.1	-	-	-	-	-	-
pH	-	6.88	6.43	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6 - 9	6.5 - 8.5	6.5 - 8.5
DO	mg/L	5.8	6.7	6 or more	5 or more	6 or more	5 or more	1 or more	-
BOD	mg/L	2.8	2.1	2 or less	3 or less	3 or less	6 or less	12 or less	12 or less
COD	mg/L	21	27	10	10	25	50	100	100
EC	µS/cm	280	240	-	-	-	-	-	2250
TDS	mg/L	140	120	1000	1000	1000	1000	1000	1000
TSS	mg/L	17	13	-	-	-	-	-	-
Turbidity	NTU	1.8	1.4	-	-	-	-	-	-
Salinity	ppt	0.12	0.10	-	-	-	-	-	-
Alkalinity	mg/L	94	80	-	-	-	-	-	-
Chloride	mg/L	3	1.8	-	-	-	-	-	-
Sulfate	mg/L	5	8	-	-	-	-	-	-
Nitrate	mg/L	1.4	10.5	-	-	-	-	-	-
Nitrite	mg/L	<0.01	1.0						
Potassium, K	mg/L	21	26	-	-	-	-	-	-
Calcium, Ca	mg/L	47	52	-	-	-	-	-	-
Magnesium, Mg	mg/L	24	28	-	-	-	-	-	-

¹⁹ According to Schedule-2 (KA) of Environmental Conservation Rules, 2023, the Government of Bangladesh

Parameters	Unit	Surface Water Samples		Bangladesh Standard ¹⁹					
		SW-1	SW-2	Source of Drinking Water for Supply Only after Disinfecting	Water Usable for Recreational Activity	Source of Drinking Water for Supply After Conventional Treatment	Water Usable by Fisheries	Water Usable by Various Process and Cooling Industries	Water Usable for Irrigation
Oil and Grease	mg/L	1.71	1.41	-	-	-	-	-	-

Source: Laboratory Analysis by EQMS Laboratory, 2024

5.5.3.1.2 Interpretation of Surface Water Monitoring Results

Temperature (°C): The temperature of the sampled surface water (SW-1 and SW-2) is around 23.0°C to 23.1°C.

pH: The pH values of SW-1 and SW-2 are 6.88 and 6.43 respectively. Both values fall within the acceptable range of 6.5 to 8.5 for various water uses including drinking water supply (after disinfecting), recreational activities, conventional treatment, fisheries, industries, and irrigation.

Dissolved Oxygen (DO) (mg/L): Both samples (SW-1 and SW-2) have DO levels of 5.8 mg/L and 6.7 mg/L respectively, which meet the standard of 6 mg/L or more for drinking water supply and various other uses.

Biochemical Oxygen Demand (BOD) (mg/L): BOD levels in SW-1 and SW-2 are 2.8 mg/L and 2.1 mg/L respectively. These values are below the maximum permissible limit of 2 mg/L for drinking water supply and other designated uses.

Chemical Oxygen Demand (COD) (mg/L): SW-1 has a COD value of 21 mg/L, while SW-2 has a value of 27 mg/L. These values meet the standard for various uses including drinking water supply, fisheries, industries, and irrigation.

Electrical Conductivity (EC) (µS/cm) and Total Dissolved Solids (TDS) (mg/L): Both EC and TDS values are within acceptable limits for various uses including drinking water supply and other industrial and agricultural purposes.

Salinity: Salinity measures the concentration of dissolved salts in the water. SW-1 has a salinity of 0.12 parts per thousand (ppt), and SW-2 has 0.10 ppt.

Total Suspended Solids (TSS): This measures the concentration of suspended particles in the water. SW-1 has a TSS concentration of 17 mg/L, while SW-2 has 13 mg/L.

Turbidity: Turbidity measures the clarity of the water, indicating the presence of suspended particles. SW-1 has a turbidity of 1.8 NTU while SW-2 has 1.4 NTU.

Alkalinity: Alkalinity measures the ability of water to neutralize acids. SW-1 has an alkalinity of 94 mg/L, and SW-2 has 80 mg/L.

Chloride: Chloride concentration is an indicator of saltwater intrusion and pollution. SW-1 has a chloride concentration of 3 mg/L, while SW-2 has 1.8 mg/L.

Sulfate: Sulfate concentration is important for water quality and can affect taste and odor. SW-1 has a sulfate concentration of 5 mg/L, while SW-2 has 8 mg/L.

Nitrate and Nitrite: These are forms of nitrogen that can indicate contamination from agricultural runoff or wastewater. SW-1 has 1.4 mg/L of nitrate and less than 0.01 mg/L of nitrite, while SW-2 has 10.5 mg/L of nitrate and 1.0 mg/L of nitrite.

Potassium, Calcium, and Magnesium: the concentration is SW-1 has potassium (K) at 21 mg/L, calcium (Ca) at 47 mg/L, and magnesium (Mg) at 24 mg/L. SW-2 has potassium at 26 mg/L, calcium at 52 mg/L, and magnesium at 28 mg/L. These are essential nutrients for plant growth.

Oil and Grease: This measures the concentration of oil and grease in the water, which can indicate pollution. SW-1 has 1.71 mg/L, while SW-2 has 1.41 mg/L.

Overall, the analysis suggests that the sampled surface water meets the regulatory standards set by DoE for drinking water supply, recreational activities, fisheries, industrial processes, and irrigation after conventional treatment or disinfection.

5.5.3.2 Groundwater Quality

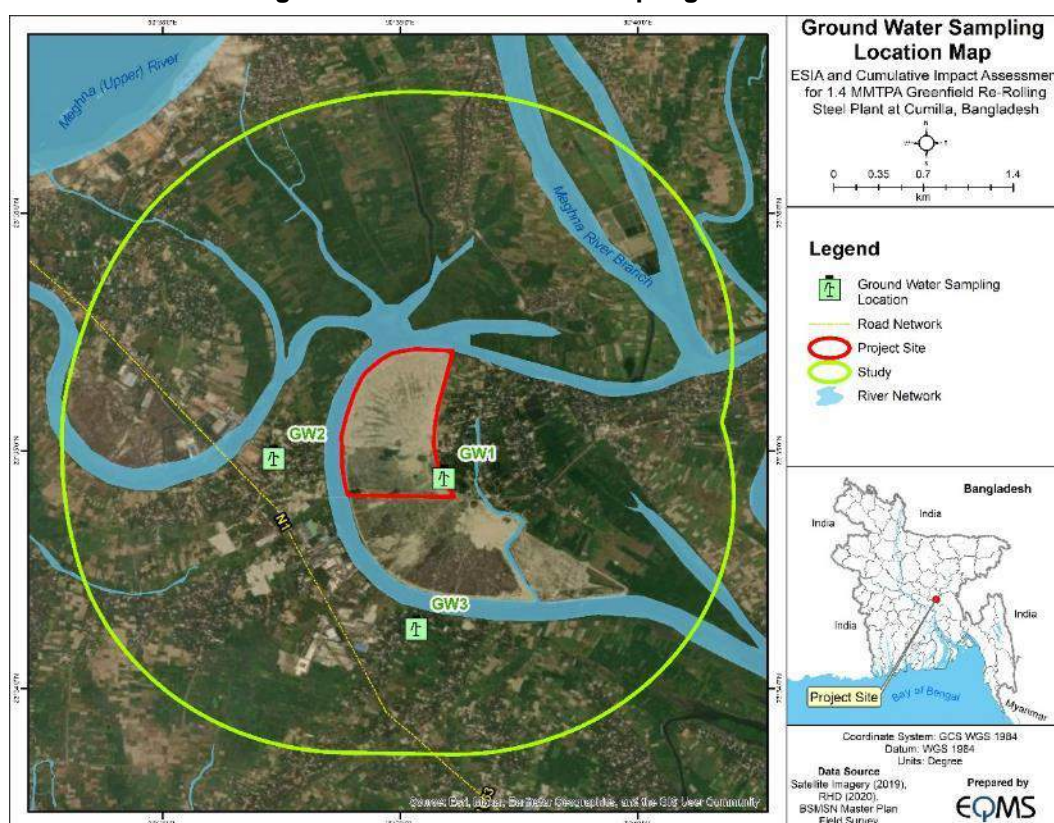
Groundwater is most important for drinking, household uses, commercial activities, and irrigation purposes. Groundwater is available in the study area. Three (3) groundwater (deep wells) samples have been collected during the baseline survey from the proposed project area. The monitoring parameters are Arsenic, COD, Calcium, Magnesium, Chloride, Chromium, Conductivity, Fluoride, Fecal Coliform, Total Coliform, Iron, Lead, Hardness, Odor, pH, Potassium, Temperature, TDS, etc. The detail of the surface water sampling locations is presented in Table 5-8 and Figure 5-30.

Table 5-8: Ground water sampling location

Sampling Locations	Coordinates	Monitoring Date	Location Description
GW-1	23°34'53.00"N 90°39'11.00"E	20.02.2024	Near Labour Shade, Project site, Meghna-Homna Road, Luter Char, Meghna, Cumilla
GW-2	23°34'58.00"N 90°38'28.00"E	20.02.2024	Hasan Basri Madrasha, Boroikandi, Vaterchar, Gazaria, Munshiganj
GW-3	23°34'15.00"N 90°39'4.00"E	20.02.2024	Vitikandi Uttar Para Mosjid, Vitikandi, Gazaria, Munshiganj

Source: Field Survey by EQMS Team, 2024

Figure 5-30: Ground water sampling locations



Source: Field Survey by EQMS Team, 2024

Pictures taken during sampling are shown in Figure 5-31.

Figure 5-31: Photographs taken during ground water sampling



GW1- Near Labour Shade, Project site, Meghna-Homna Road, Luter Char, Meghna, Cumilla



GW2- Hasan Basri Madrasha, Boroikandi, Vaterchar, Gazaria, Munshiganj



GW3- Vitikandi Uttor Para Masjid, Vitikandi, Gazaria, Munshiganj

5.5.3.2.1 Ground Water Monitoring Results

The analyzed results for groundwater were compared to Bangladesh Standards (ECR,2023). Results of groundwater analysis are presented in Table 5-9

Table 5-9: Groundwater analysis results

Parameters	Unit	Groundwater Quality				
		GW-1	GW-2	GW-3	Bangladesh Standard ²⁰	IFC Standard ²¹
Electric Conductivity (EC)	μS/cm	457	628	520	-	-
Temperature	°C	24.5	23.4	23.8	20-30	-
Odor		Odorless	Odorless	Odorless	Odorless	-
pH		6.82	6.50	6.64	6.5 – 8.5	6.5 - 8.5
TDS	mg/L	350	342	420	1000	-
Hardness	mg/L	162	160	125	500	-
Chloride	mg/L	2.3	3.1	2.6	250	-
Iron	mg/L	0.02	0.05	0.03	0.3 – 1.0	-
Magnesium	mg/L	23.5	17.2	18.4	30 – 35	-
Arsenic	mg/L	<0.01	<0.01	<0.01	0.05	0.01
Chromium	mg/L	<0.01	<0.01	<0.01	0.05	0.05
Calcium	mg/L	35	56	43	75	-
Fluoride	mg/L	<0.01	<0.01	<0.01	1.0	1.5
Potassium	mg/L	4.7	5.2	6.4	12	-
Total Coliform	C.F.U/100	0	0	0	0	-
Fecal Coliform	C.F.U/100	0	0	0	0	-

The key parameters in groundwater are discussed below, compared with the Bangladesh ECR,23 Standards for drinking water.

5.5.3.2.2 Interpretation of Groundwater Monitoring Results

Electric Conductivity (EC): The values of EC for GW-1, GW-2, and GW-3 are 457, 628, and 520 μS/cm respectively. These values indicate the water's ability to conduct electrical current, which is generally influenced by the dissolved ions present.

Temperature: The temperatures for GW-1, GW-2, and GW-3 are 24.5°C, 23.4°C, and 23.8°C respectively. These temperatures fall within the recommended range of 20-30°C, indicating normal conditions.

Odor: All samples are reported as "odorless," indicating there are no noticeable odors present in the water.

pH: The pH levels for GW-1, GW-2, and GW-3 are 6.82, 6.50, and 6.64 respectively. These values are slightly acidic but fall within the acceptable range of 6.5 to 8.5.

Total Dissolved Solids (TDS): The TDS levels for GW-1, GW-2, and GW-3 are 350, 342, and 420 mg/L respectively. These values are within the National Standard (ECR,23), indicating the concentration of dissolved solids in the water is relatively low.

Hardness: The hardness levels for GW-1, GW-2, and GW-3 are 162, 160, and 125 mg/L respectively. These values are within the National Standard (ECR,23).

²⁰ According to Schedule-2 (KHA) of Environmental Conservation Rules, 2023, the Government of Bangladesh

²¹ IFC: International Finance Corporation, WB: World Bank,

Chloride: The chloride levels for GW-1, GW-2, and GW-3 are 2.3, 3.1, and 2.6 mg/L respectively. These values are well below 250 mg/L (National Standard (ECR,23)).

Iron: The iron levels for GW-1, GW-2, and GW-3 are 0.02, 0.05, and 0.03 mg/L respectively. These values are within the range of 0.3 – 1.0 mg/L mentioned in ECR,23.

Magnesium: The magnesium levels for GW-1, GW-2, and GW-3 are 23.5, 17.2, and 18.4 mg/L respectively. These values fall within the recommended range of 30 – 35 mg/L as per the National Standard (ECR,23).

Arsenic and Chromium: The concentrations of arsenic and chromium are below the detection limit (<0.01 mg/L), which is well below the maximum permissible limits (0.05 mg/L for arsenic and chromium) as per the National Standard (ECR,23).

Calcium: The calcium levels for GW-1, GW-2, and GW-3 are 35, 56, and 43 mg/L respectively. These values are below the standard limit of 75 mg/L mentioned in ECR,23.

Fluoride: The fluoride levels for GW-1, GW-2, and GW-3 are below the detection limit (<0.01 mg/L), which is well below the maximum permissible limit of 1.0 mg/L mentioned in ECR,23.

Potassium: The potassium levels for GW-1, GW-2, and GW-3 are 4.7, 5.2, and 6.4 mg/L respectively. These values are below the National Standard (ECR,23).

Total Coliform and Fecal Coliform: Both total coliform and fecal coliform are reported as 0 CFU/100 mL, indicating the absence of bacterial contamination.

Overall, all parameters' value were found within the standard stipulated in ECR 2023 (Schedule-2). It can be concluded that the ground water of the project area is good in quality.

5.5.4 Soil Quality

The soil quality of the study area is assessed through primary monitoring. As part of this study, soil quality was monitored in three locations - at nearby open fields. During the baseline survey, the project site was already developed, raised by sandfill and landfilling had been completed, preventing the survey team from accessing the soil for sampling. Given the similarity in soil conditions between the plant area and its surroundings, the team chose to collect soil samples from the surrounding areas to assess the overall soil quality.

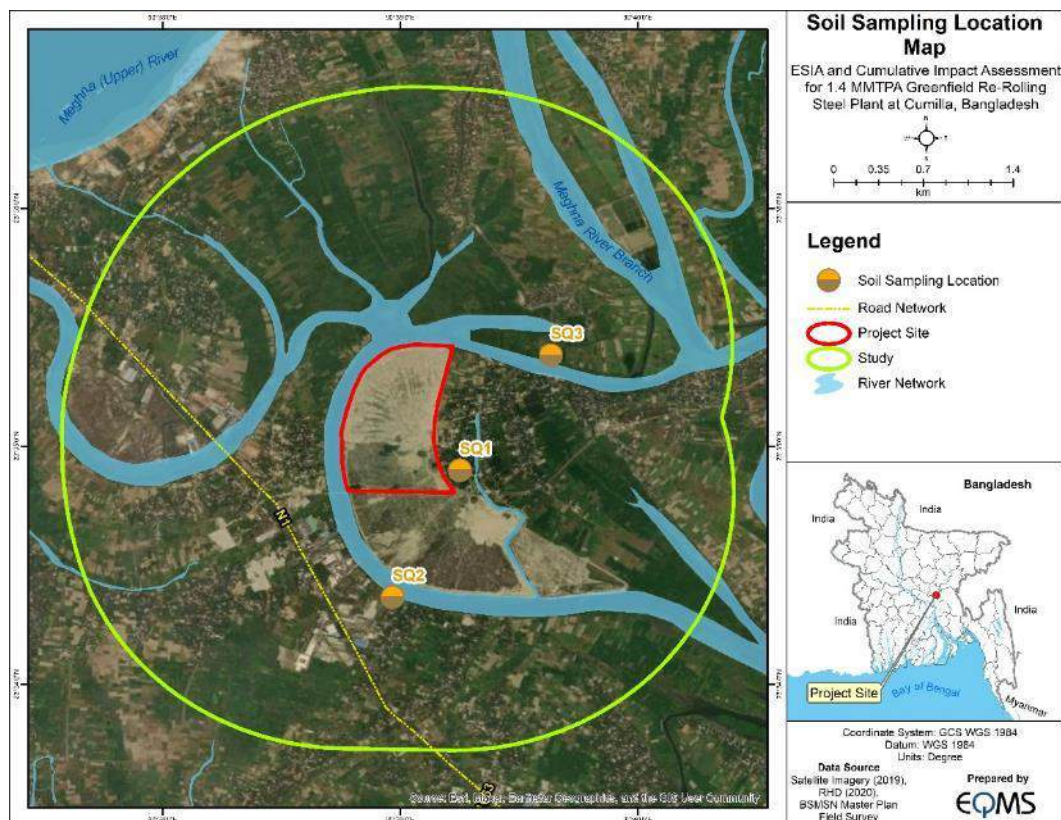
A soil sampling procedure was followed by the EQMS to ensure the quality of soil sample collection. The sample was stored in a plastic jar, sealed, and sent to the laboratory for pollution analysis. The detail of the soil sampling location is presented in Table 5-10 and Figure 5-32. Primary soil monitoring also includes analysis of heavy metals with the objective of establishing baseline values for such contaminants (if present in the soil).

Table 5-10: Soil sampling locations

Sampling Locations	Coordinates	Monitoring Date	Location Description
SQ-1	23°34'54.00"N 90°39'15.00"E	20.02.2024	Agricultural land, 71No. Abdullahpur, Gazaria, Munshiganj
SQ-2	23°34'22.00"N 90°38'58.00"E	20.02.2024	Hariluter Char, Meghna-Homna Road, Luter Char, Meghna, Cumilla
SQ-3	23°35'23.00"N 90°39'38.00"E	20.02.2024	North side of JMI Industrial Park, 2no word vitikandi, Gazaria, Munshiganj

Source: Field Survey by EQMS Team, February 2024

Figure 5-32: Soil sampling location map



Source: Field Survey by EQMS Team, 2024

Picture captured during soil sampling is shown in Figure 5-33

Figure 5-33: Photographs taken during Soil Sampling

<p>20 Feb 2024 11:34:55 am 23°35'23"N 90°39'38"E Luterchar, Comilla District</p>	<p>20 Feb 2024 12:01:04 pm 23°34'54"N 90°39'15"E Luterchar, Comilla District</p>
<p>SQ1: Agricultural land, 71No. Abdullahpur, Gazaria, Munshiganj</p>	<p>SQ2: Hariluter Char, Meghna-Homna Road, Luter Char, Meghna, Cumilla</p>



SQ3: North side of JMI Industrial Park, 2no word Vitikandi, Gazaria, Munshiganj

Source: Field Survey by EQMS Team 2024

The soil of the study area is mostly clay silt. In general, soil in the study area was found to be moderately to slightly acidic in nature. The analysis result of the soil sample is given in Table 5-11.

Table 5-11: Analysis result of soil sample

Parameter	Unit	SQ1	SQ2	SQ3	Methods of Analysis	**Dutch Intervention Values 2013
Soil Texture	--	Clay silt	Clay silt	Clay silt	Hydrometer method	-
pH	--	5.60	6.45	6.15	pH meter	-
Electric conductivity	dSm-1	2.65	3.50	3.65	EC meter	-
Nitrogen (Total)	%	0.07	0.02	0.05	Micro Kjeldahl method	-
Organic Matter	%	0.56	0.84	0.62	ASTM D 2974	-
Moisture	%	12.0	16.0	17.0	Gravimetric method	-
Potassium	me/100 g	30.1	90.7	85.5	Ammonium acetate Extraction	-
Calcium	me/100 g	12.85	13.64	14.15	AAS	-
Magnesium	me/100 g	3.32	3.55	3.35	AAS	-
Sodium	me/100 g	0.12	0.16	0.15	AAS	-
Phosphorus	µg/g	2.10	3.20	3.20	Ascorbic acid Blue Color method	-
Sulphur	µg/g	33.8	27.54	30.41	Jackson Turbidimetric method	-
Boron	µg/g	1.90	1.35	1.10	AAS	-
Copper	µg/g	1.30	2.90	2.50	AAS	-
Iron	µg/g	85	100	104	AAS	-
Zinc	µg/g	0.66	0.35	0.72	AAS	5
Manganese	µg/g	5.00	5.32	5.80	AAS	-
Mercury	ppm	BDL	BDL	BDL	AAS	0.036
Cadmium	ppm	0.9	BDL	0.3	AAS	0.013

Source: Laboratory Analysis by EQMS Laboratory, 2024

In the Environmental Conservation Rules (ECR), 1997 has no soil quality standard.

**Dutch Intervention Values 2013 (Soil Remediation Circular)

5.5.4.1 Interpretation of Soil Quality Results

Soil Texture: Indicates the texture of the soil, which is predominantly clay silt for all three samples.

pH: pH level of the soil, which indicates its acidity or alkalinity. SQ2 has the highest pH (6.45), indicating it's slightly alkaline compared to SQ1 (5.60) and SQ3 (6.15), which are slightly acidic.

Electric Conductivity: Represents the soil's ability to conduct electricity, which is related to the concentration of ions. SQ3 has the highest conductivity (3.65 dSm-1), followed by SQ2 (3.50 dSm-1) and SQ1 (2.65 dSm-1).

Nitrogen (Total): Total nitrogen content in the soil, expressed as a percentage. SQ1 has the highest nitrogen content (0.07%), followed by SQ3 (0.05%) and SQ2 (0.02%).

Organic Matter: Percentage of organic matter present in the soil. SQ2 has the highest organic matter content (0.84%), followed by SQ3 (0.62%) and SQ1 (0.56%).

Moisture: Percentage of moisture content in the soil. SQ3 has the highest moisture content (17.0%), followed by SQ2 (16.0%) and SQ1 (12.0%).

Potassium, Calcium, Magnesium, Sodium: Concentrations of these elements in the soil, measured in milliequivalents per 100 grams (me/100 g).

Phosphorus, Sulphur, Boron, Copper, Iron, Zinc, Manganese, Mercury, Cadmium: Concentrations of these elements in the soil, measured in micrograms per gram (µg/g) or parts per million (ppm). BDL stands for 'Below Detection Limit,' indicating the element was present at a concentration lower than the detection limit of the analysis method.

5.5.5 Sediment Quality

Five sediment samples were collected from different locations for sediment quality analysis following the USEPA technical manual.²² The samples were collected from the riverbed of Meghna River Branch. The proposed project is going to be constructed at the side of the Meghna River Branch. A sediment sampling procedure was followed by the EQMS to ensure the quality of the sediment sample collection. The samples were stored in a plastic jar, sealed, and sent to the laboratory for pollution analysis. There is no stipulated standard value for sediment in Bangladesh, as well as in IFC EHS general guideline. Therefore, the analyzed results had been compared with the Australian standard.²³ To compare with the sediment assessment levels (Interim Sediment Quality Guidelines or ISQGs) adopted by DEC,²⁴ which are sourced from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality.²² The guidelines contain two concentrations, the ISQG-Low concentration (or trigger value) and the ISQG-High concentration. The trigger value is a threshold concentration and below this concentration, the frequency of adverse effects is expected to be very low. The ISQG-High concentration is intended to represent a concentration above which adverse biological effects are expected to occur more frequently. The detail of the sediment sampling location is presented in Table 5-12 and the sampling location map is shown in Figure 5-34. The photograph of the sediment sample collection is shown in Figure 5-35.

²² *Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analysis*, USEPA, 2001.

²³ *Assessment levels for Soil, Sediment and Water*, Department of Environment and Conservation, Western Australia, 2010

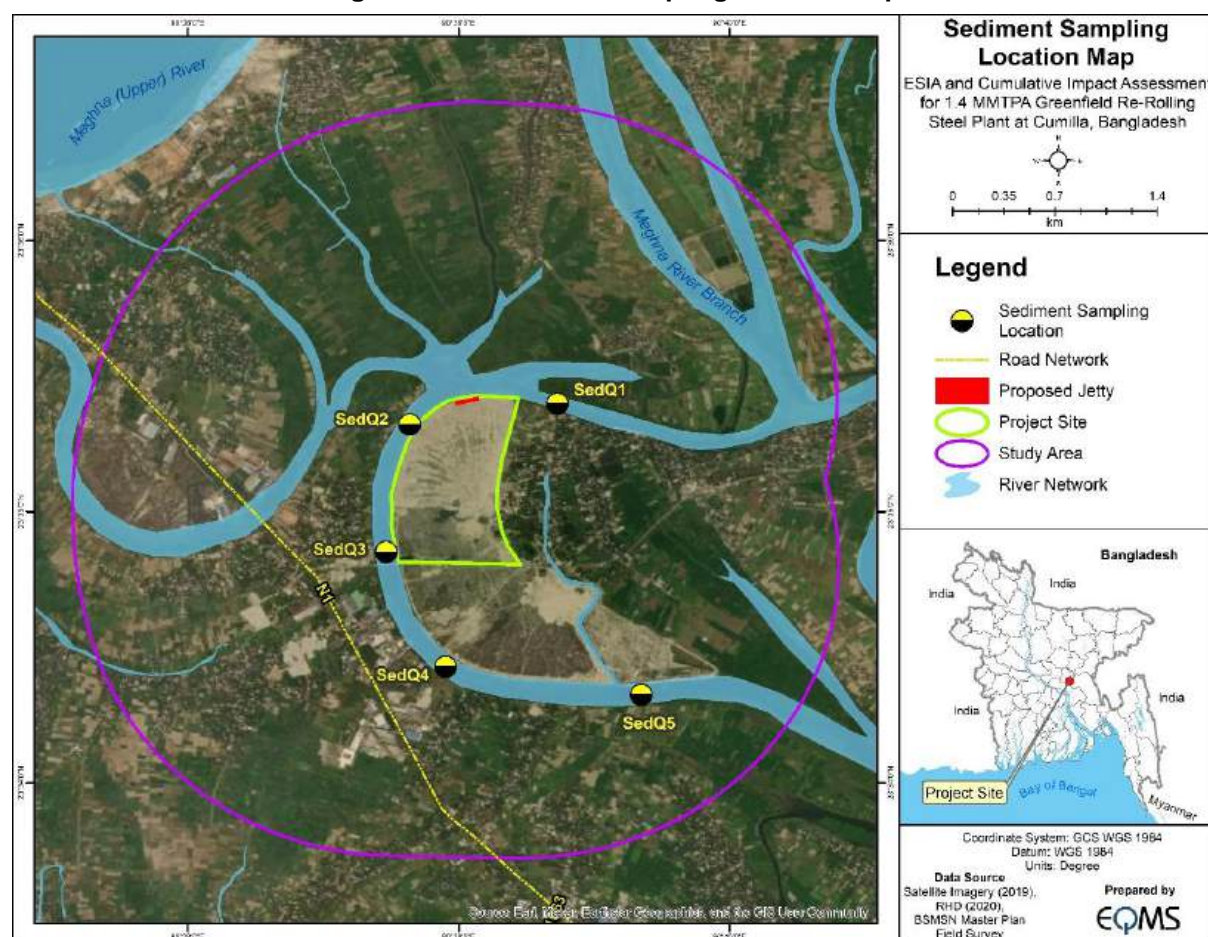
²⁴ *Department of Environment and Conservation, previously Department of Environment (DoE), and before that, Department of Environmental Protection (DEP), Western Australia.*

Table 5-12: Sediment Sampling Location

S/N	Location	Code	Date	Geographical Location
1	Upstream, Meghna River Branch	SedQ-1	28.02.2024	23°35'22.00"N 90°39'26.00"E
2	Upstream near Proposed project outlet, Meghna River Branch	SedQ-2	28.02.2024	23°35'20.00"N 90°38'48.00"E
3	Downstream near Vater Char-Luterchar Bridge, Meghna River Branch	SedQ-3	28.02.2024	23°34'55.00"N 90°38'44.00"E
4	Downstream near JMI outlet, Meghna River Branch	SedQ-4	28.02.2024	23°34'25.00"N 90°38'57.00"E
5	Downstream, Meghna River Branch	SedQ-5	28.02.2024	23°34'19.00"N 90°39'40.00"E

Source: Field Survey by EQMS Team, February 2024

Figure 5-34: Sediment sampling location map



Source: Field Survey by EQMS Team, 2024

Picture captured during sediment sampling is shown in Figure 5-33

Figure 5-35: Photographs taken during Sediment Sampling

SedQ1: Upstream, Meghna River Branch	SedQ2: Upstream near Proposed project outlet, Meghna River Branch
SedQ3: Downstream near Vater Char-Luterchar Bridge, Meghna River Branch	SedQ4: Downstream near JMI outlet, Meghna River Branch
SedQ5: Downstream, Meghna River Branch	

Source: Field Survey by EQMS Team 2024

The analysis result of the sediment sample is given in Table 5-13.

Table 5-13: Analysis Result of Sediment Sample

Parameter	Unit	Sediment Quality					Australian standard ²⁵	
		SedQ-1	SedQ-2	SedQ-3	SedQ-4	SedQ-5	ISQG-Low (Trigger Value) ²⁶	ISQG-High ²⁷
Sediment Type	-	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	-	-
pH	-	7.6	6.75	6.82	6.95	6.78	-	-
Organic Carbon	%	0.3	0.6	1.1	1.6	0.7	-	-
Copper (Cu)	ppm	4.67	5.34	12.32	15.35	6.25	65	270
Iron (Fe)	ppm	3.2	4.5	8.3	9.1	3.5	-	-
Manganese (Mn)	ppm	5.6	6.3	14.6	17.2	6.4	-	-
Zinc (Zn)	ppm	0.81	0.23	2.15	3.63	0.42	200	410
Lead (Pb)	ppm	5.5	8.3	14.2	26.6	6.2	50	220
Cadmium (Cd)	ppm	BDL	BDL	BDL	BDL	BDL	1.5	10
Nickel (Ni)	ppm	3.67	5.32	12.23	15.52	6.27	21	52
Chromium (Cr)	ppm	6.73	4.63	17.42	21.58	8.31	80	370

Source: Laboratory Analysis by EQMS Laboratory, 2024

5.5.5.1 Interpretation of Sediment Quality Results

Table 5-13 presents the analysis results of sediment samples collected from five different locations (SedQ-1 to SedQ-5). Each sediment sample is characterized by various parameters including sediment type, pH, organic carbon content, and concentrations of several heavy metals such as copper, iron, manganese, zinc, lead, nickel, and chromium.

Sediment Type: All samples belong to the clay loam category.

pH: pH values range from 6.75 to 7.6 across the samples. Higher pH values indicate alkalinity, while lower values indicate acidity. There is no stipulated standard value of pH for sediment in Bangladesh, as well as in IFC EHS general guideline and Australian standard.

Organic Carbon: Organic carbon content varies from 0.3% to 1.6% across the samples.

Copper, Iron, Manganese, Zinc, Lead, Nickel, Chromium: These heavy metal concentrations are measured in parts per million (ppm). The concentrations of these metals vary significantly among the sediment samples. For example, copper concentrations range from 4.67 ppm to 15.35 ppm, iron concentrations range from 3.2 ppm to 9.1 ppm, manganese concentrations range from 5.6 ppm to 17.2 ppm, zinc concentrations range from 0.23 ppm to 3.63 ppm, lead concentrations range from 5.5 ppm

²⁵ Department of Environment and Conservation, previously Department of Environment (DoE), and before that, Department of Environmental Protection (DEP), Western Australia

²⁶ Interim sediment quality guidelines – low: Probable effects concentrations below which biological effects would rarely occur.

²⁷ Interim sediment quality guidelines – high: Probable effects concentrations below which biological effects would possibly occur. Concentrations above these values represent a probable-effects range within which effects would be expected to frequently occur.

to 26.6 ppm, nickel concentrations range from 3.67 ppm to 15.52 ppm, and chromium concentrations range from 4.63 ppm to 21.58 ppm. There is no sediment quality standard in the Environmental Conservation Rules (ECR), 2023. Therefore, the analyzed results had been compared with the Australian standard and Cu, Zn, Pb, Cd, Ni and Cr were found within the standard.

5.5.6 Traffic Volume

Assessment of the existing traffic characteristics within the study area was undertaken to evaluate the traffic movement and to identify the best suitable solution for vehicle movement required for material and personnel movement during the project's construction.

5.5.6.1 Road Traffic

The current traffic (road) assessment was identified for one (1) location in the project AOI, which is connected to the project site. The traffic assessment location was selected based on discussions with the client and a survey of the main access roads which will provide connectivity to the project for the transportation of manpower and materials. The location details are provided in Table 5-14. The traffic volume was monitored continuously for 24 hours, one time, during the study period.

Table 5-14: Locations of traffic survey

S/N	Sampling Locations	Date	Coordinates	Location Details
1	RoT-1	20.02.2024	23°34'47.95"N 90°38'35.90"E	Assess the traffic load in the Meghna-Homna Road, Luter Char, Meghna, Cumilla.

Source: Field Survey by EQMS Team, February 2024

The project site can be accessed from Dhaka-Chittagong Highway. At this location, the road traffic survey was conducted continuously for 24 hours, one time, during the study period. The road traffic survey was done for both-way movement of vehicles and categorized as heavy motor vehicles (truck, bus, dumper, tanker, and trailer), light motor vehicles (car, jeep, van, tractor, and minibuses), two/three-wheelers (CNG scooter, motorcycle, auto-rickshaw, etc.), non-motorized vehicles (bicycle, rickshaw, etc.). A summary of the traffic observed in the study area is given in Table 5-15.

Table 5-15: Road traffic observed in the study area

S/N	Description	Traffic Volume
1	Two/three-wheelers	2413
2	Non-motorized vehicles	1397
3	Heavy motor vehicles	1108
4	Light motor vehicles	202
Total		5120
Average flow/hour		140

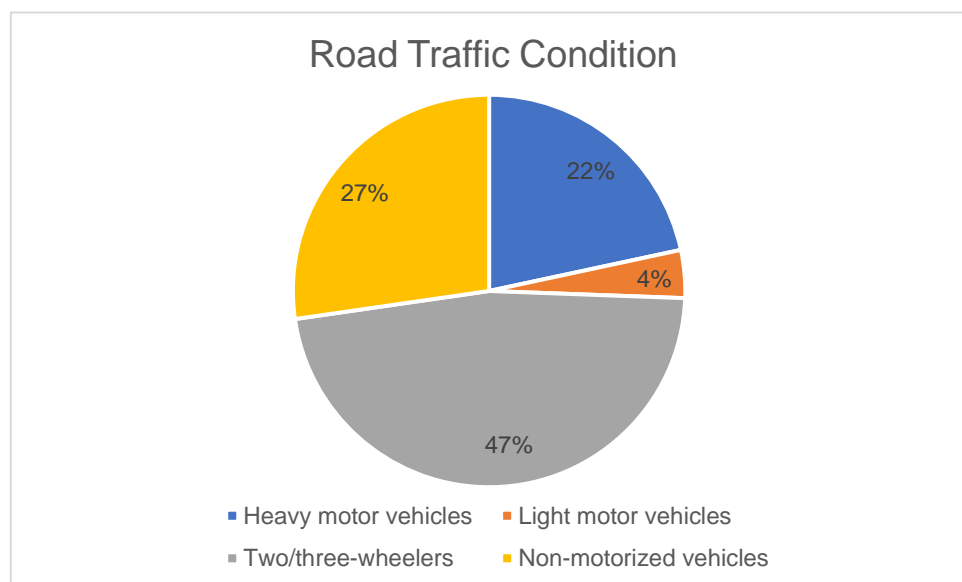
Source: Field Survey by EQMS Team, February 2024

5.5.6.1.1 Interpretation of Road Traffic Results

A total of 5120 vehicles were recorded at the traffic monitoring station. As per observation made for traffic volume, an average of 140 vehicles/hour was recorded at this location. It was also noticed that a major contributor (47%) of the vehicular traffic was two/three wheelers followed by non-motorized vehicles (27%). Heavy vehicles (trucks, buses, dumpers, tankers, and trailers) contributed 22% of the total volume while the contribution of light vehicles like cars, jeeps, vans, tractors, minibuses, etc.

towards total vehicular traffic was fewer. Figure 5-36 illustrates the contribution of different types of vehicles toward total vehicular traffic at the monitored station.

Figure 5-36: Road Traffic Condition



Source: Field Survey by EQMS Team, February 2024

5.5.6.2 River Traffic

5.5.6.2.1 River Traffic on the Meghna Branch River

The current river traffic assessment was identified for one (two days) location in the project AOI, which is connected to the project site. The traffic assessment location was selected based on discussions with the client and a survey of the Meghna branch river which will provide connectivity to the project for the transportation of materials. The location details are provided in Table 5-16. The traffic volume was monitored continuously for 24 hours, two days, during the study period.

Table 5-16: Locations of river traffic survey

S/N	Sampling Locations	Date	Coordinates	Location Details
2	RiT-1 ²⁸	24.05.2024	23°34'48.66"N 90°38'46.77"E	Meghna Branch River adjacent to the project
3	RiT-2 ²⁹	28.05.2024	23°34'48.66"N 90°38'46.77"E	Meghna Branch River adjacent to the project

Source: Field Survey, May 2024

The Meghna branch river is adjacent to the project site. An expert survey team selected a survey point to assess the river traffic conditions on this branch. At this point, a 24-hour continuous river traffic survey was conducted for two days during the study period. The survey monitored both directions of Meghna branch river transport, categorizing the traffic into motorized boats, trawlers (for people and goods), barges, large cargo vessels, speed boats, non-motorized boats, and others. A summary of the river traffic observed in the study area is given in Table 5-17.

²⁸ River traffic survey conducted by EQMS Team.

²⁹ River traffic survey conducted by MGI.

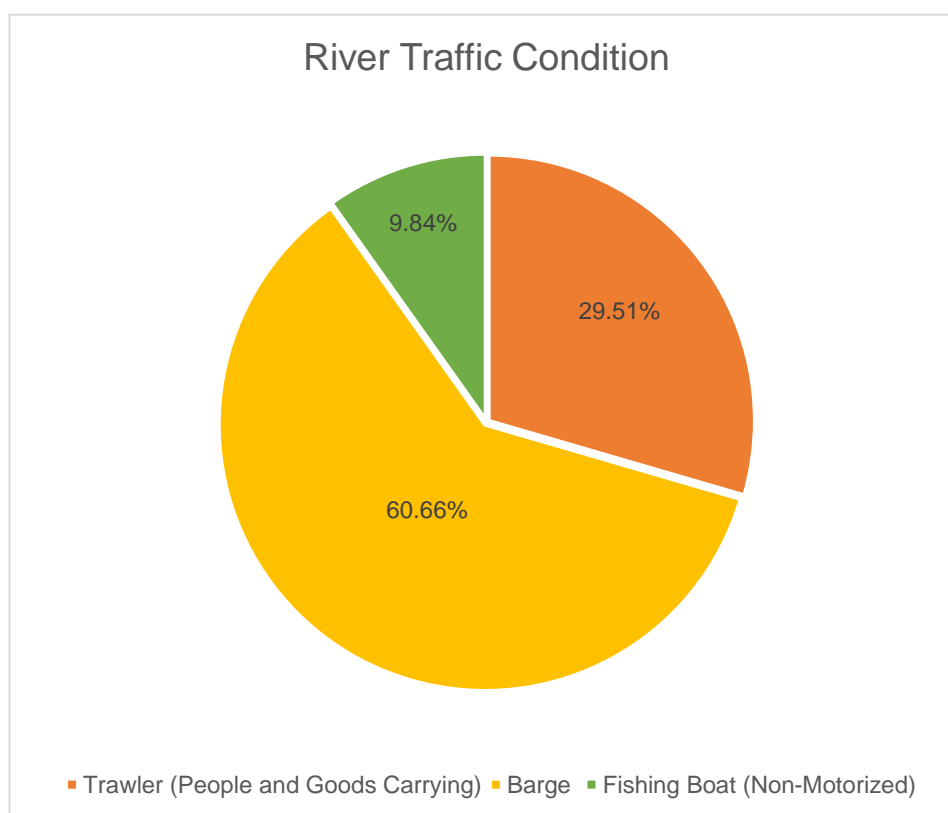
Table 5-17: River traffic observed in the study area

S/N	Description	Traffic Volume		Average Volume
		RiT1	RiT2	
1	Trawler (People and Goods Carrying)	8	10	9
2	Barge	12	25	18.5
3	Personal Boat (Non-Motorized)	4	2	3
Total		24	37	30.5
Average flow/hour		1.27		

Source: Field Survey, May 2024

5.5.6.2.1.1 Interpretation of River Traffic Results

According to river traffic data collected on May 24, 2024, and May 28, 2024, the average movement included 18 barges, 9 motorized trawlers, and 3 non-motorized boats. Based on observations of traffic volume, an average of 1.27 river transports per hour was noted at this location, with peak traffic occurring during the daytime (6 AM to 6 PM). Barges were the major contributors, accounting for 60.66% of the river traffic. Trawlers, used for carrying people and goods comprised 29.51% of the total volume, while personal boats (non-motorized) made up 9.84%. Additionally, it was confirmed that no movement of fishing boats was found during the survey. Figure 5-37 illustrates the contribution of different types of river transports to the overall river traffic at the monitored station.

Figure 5-37: River Traffic Condition

Source: Field Survey by EQMS Team, May 2024

5.5.6.2.2 River Traffic on the main Meghna River

Meghna rivers are important waterways in Bangladesh. It is reported that a large number of commercial vessels and passenger ferries are operating on these waterways. Most of the river traffic is utilizing mechanical vessels operated on fuel oils. The spillage and leakage from vessels possibly add to the pollution level in the rivers. Based on the secondary information³⁰, the total number of water vessel movements in both directions during the weekend at the Meghna Bridge point was counted as 1,141. During the weekdays, the number of vessels count was 1,156. The vessels included manual passenger boat, fishing boat, country cargo boat, trawlers, large and medium container/ cargo vessel/ ship, and passenger launch. Traffic monitoring was carried out daily on the main Meghna River.

According to MGI, daily only one (1) medium-sized scrap-carrying vessel will deliver scrap materials from Chittagong port through the main Meghna River to the proposed MRSML project site.

5.6 Biological Environment

The biological environment encompasses both ecosystem and biodiversity of an area. It includes all living things like plants, animals, and small micro-organisms like bacteria, algae, and fungi. Industrialization is one of the main drivers of ecological, environmental, and socio-economical change worldwide³¹. It is a central component of land transformation processes and fundamental changes in land use and landscape pattern around the globe, especially in developing countries. This provision is fully applicable to the project area of Proposed Meghna Re-Rolling & Steel Mills Ltd. is a steel mill manufacturing factory. Steel, a fundamental resource for industrial operations, is a key indicator of industrial prosperity. Presently, there is a substantial demand for the steel industry in Bangladesh. Taking these factors into consideration, The Meghna Group of Industries has formulated a plan to venture into the Bangladesh steel market by establishing Meghna Re-Rolling & Steel Mills Ltd. This proposed steel mill manufacturing facility aims to produce an initial capacity of 1,000,000 tons of MS Rod in various grades. The factory is strategically located in the Cumilla Economic Zone, Luterchar, Meghna, Cumilla, and falls under the regulatory framework of the Bangladesh Economic Zones Authority (BEZA). However, the adjacent project areas have a high value in terms of their rich biodiversity in its diverse ecological habitats.

5.6.1 Bio-ecological Zone

Flora and fauna in a particular bio-geographic region or zone tend to have shared characteristics in terms of broader climatic & geographical feature preferences/requirements. Therefore, IUCN has classified Bangladesh into 25 Bio-ecological Zones³² in the context of physiographic and biological diversity. The study area, which encompasses both terrestrial and aquatic ecosystems. The study area falls under one bio-ecological zones, namely, 11: Major Rivers (IUCN, 2002)

5.6.1.1 11: Major Rivers

The Major Rivers are situated in Rajshahi, Kushtia, Faridpur, Shariatpur, Chandpur, Narayanganj, Manikganj, Tangail, Sirajganj, Kurigram, and Rangpur (22°55'-26°15' N and 88°10' - 90°37' E). The Soil characteristics are Calcareous alluvium (non-saline) and Noncalcareous alluvium. The average rainfall is 1270-2290 mm. The temperature range is 9°C to 37° C. Bangladesh is a country of rivers; it has about 24,000 kms of rivers, streams and canals. It lies across the delta of four major rivers: the Ganges

³⁰ ESIA Report for Proposed 600MW Combined Cycle Power Plant at Sonargaon, Narayanganj, Bangladesh

³¹ Freitas, E.V.D., M.D.M. Veloso, and W.S. Araújo. 2020. Urbanization alters the composition, but not the diversity and structure of Neotropical savanna woody plant communities. *Folia Geobotanica* 55: 95–108

³² Nishat, A., S.M.I. Huq, S.P. Barua, A.H.M.A. Reza, and A.S.M. Khan. 2002. Bio-ecological Zones of Bangladesh. The World Conservation Union (IUCN), Dhaka, Bangladesh. 141 pp

Padma, Brahmaputra-Jamuna, Meghna and Teesta. Together, they cover about 7% of the country's total surface and are noticeably rich in Biodiversity.

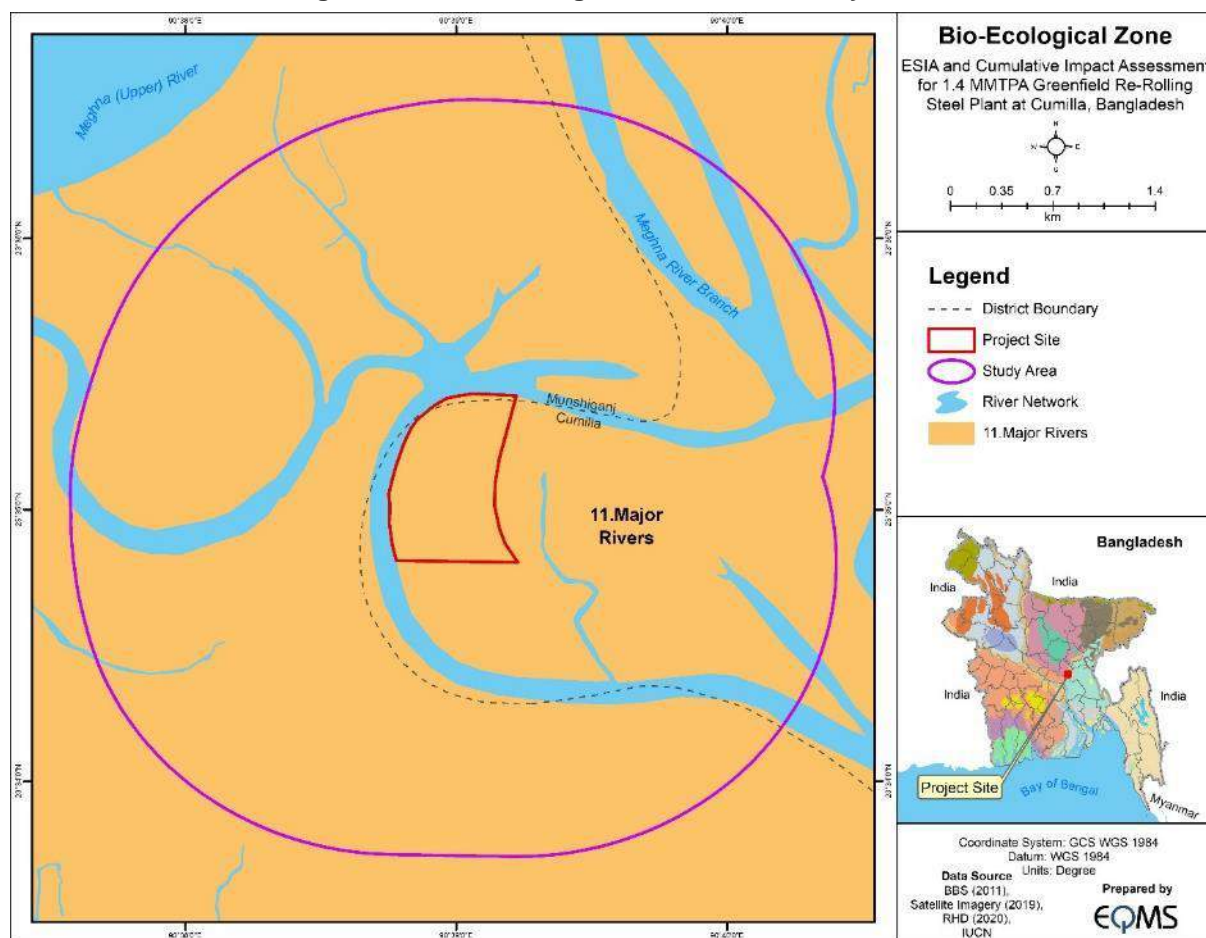
A summary of each of the bio-ecological zones is presented below and typical Characteristics of these bio-ecological zone within the AOI is provided in Table 5-18. The Map of the Bio-ecological zone has been presented in Figure 5-38.

Table 5-18: Typical Characteristics of Bio-ecological Zones of AOI

11: Major Rivers		
Floral diversity	Plants	Binna ghash (<i>Vetiveria zizanoides</i>) (NE), Kash (<i>Saccharum spontaneum</i>) (LC), Ghagra (<i>Xanthium indicum</i>) (NE), Ban Palang (<i>Rumex maritimus</i>) (NE)
Faunal Diversity	Mammals	Ganges River dolphin (<i>Platanista gangetica</i>) (EN); Bengal Fox (<i>Vulpes bengalensis</i>) (LC); Greater bandicoot rat (<i>Bandicota indica</i>) (LC)
	Birds	River lapwing (<i>Vanellus duvaucelii</i>) (NT); Black-bellied tern (<i>Sterna acuticauda</i>) (EN); Sand lark (<i>Calandrella rayta</i>) (LC); Spot-billed duck (<i>Anas poecilorhyncha</i>) (LC); Small pranticole (<i>Glareola lactea</i>) (LC)
	Reptiles	Birbron's softshell turtle (<i>Pelochelys bibroni</i>) (VU); Gangetic gharial (<i>Gavialis gangeticus</i>) (CR); Ganges softshell turtle (<i>Aspideretes gangeticus</i>) (EN), Median roofed turtle (<i>Kachuga tentoria</i>) (LC)
	Amphibians	Jeredon's bull frog (<i>Hoplobatrachus crassus</i>) (LC); Skipper frog (<i>Euphlyctis cyanophlyctis</i>) (LC)

Source: Atlas of Bio-ecological Zones of Bangladesh, IUCN, 2002

Figure 5-38: Bio-ecological Zone of the Study Area



Source: Atlas of Bio-ecological Zones of Bangladesh, IUCN, 2002

5.6.2 Terrestrial Ecosystem

5.6.2.1 Habitats

As per the IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, the project area is classified as a modified habitat, as human activity has substantially altered the area's primary ecological functions and species composition. Analysis of the land use change map reveals a historically heterogeneous land cover composition at the project site, encompassing agricultural land, vegetated settlements, marshland, and bare ground. Prior to the establishment of the Economic Zone, the land use pattern exhibited minimal temporal variation. The establishment of the Comilla Economic Zone constitutes the primary driver of historical land use pattern alteration at the project site. The historical land use pattern of the project site is shown in Figure 5-40. The modified habitat of the project Area of Influence (AoI) encompasses the following habitat types:

Homestead Vegetation: The areas of the surrounding village sites are classified as homestead habitats. Homestead vegetation was recorded near villages and settlements. Common species include Coconut (*Cocos nucifera*) (NE), Jackfruit (*Artocarpus heterophyllus*) (NE), Mango (*Mangifera indica*) (DD), Guava (*Psidium guajava*) (LC), Lychee (*Litchi chinensis*) (VU), Papaya (*Carica papaya*) (DD), Mahogany (*Swietenia mahagoni*) (NT), Banana (*Musa sapientum*) (LC), Koroï (*Samanea saman*) (LC), etc. This vegetation provides support to many urban wildlife species such as birds, herpetofauna and mammals around the project AOI.

Agricultural lands: Agricultural land dominates the project AOI. Different types of agricultural practices were observed within the AOI. The predominant agricultural method is mono-cropping of paddies. Other crops that are cultivated are Potato (*Solanum tuberosum*) (NE), Chilli (*Capsicum annuum*) (LC), Onion (*Allium cepa*) (LC), Pumpkin (*Cucurbita pepo*) (LC), and Tomatoes (*Solanum lycopersicum*) (NE). Tree species observed near the agricultural lands are Mahogany (*Swietenia mahagoni*) (NT), Mango (*Mangifera indica*) (DD) and Date palm (*Phoenix sylvestris*) (NE), etc.

Roadside Vegetation: The major roadside vegetation consists of Acacia (*Acacia spp.*) (LC), Raintree (*Samanea saman*) (LC), Bot (*Ficus benghalensis*) (NE), Mahogany (*Swietenia mahagoni*) (NT), Eucalyptus (*Eucalyptus camaldulensis*) (NT), etc. This vegetation is an additional habitat for many birds and small mammal species.

Grassland and Fallow Land: Uncultivated upland near the village, generally used for plantation is categorised as fallow land. The grassland and fallow land are provided with the habitat for many grass birds. The shrubs, herbs, weeds and grasses germinate during the monsoon and form the ground cover. The major plant species of these sites are Akshmoni (*Acacia spp.*) (LC), Eucalyptus (*Eucalyptus camaldulensis*) (NT), Raintree (*Samanea saman*) (LC), Narikel (*Cocos nucifera*) (NE) and Mahogany (*Swietenia mahagoni*) (NT). Besides, Jungle Rice (*Echinochloa colona*) (LC), Cogon Grass (*Imperata cylindrica*) (LC), Wire Grass (*Cynodon dactylon*) (NE) are dominant herb species at the grassland habitat.

Figure 5-39 Map Showing the Historic Land Use Pattern of the Project Site

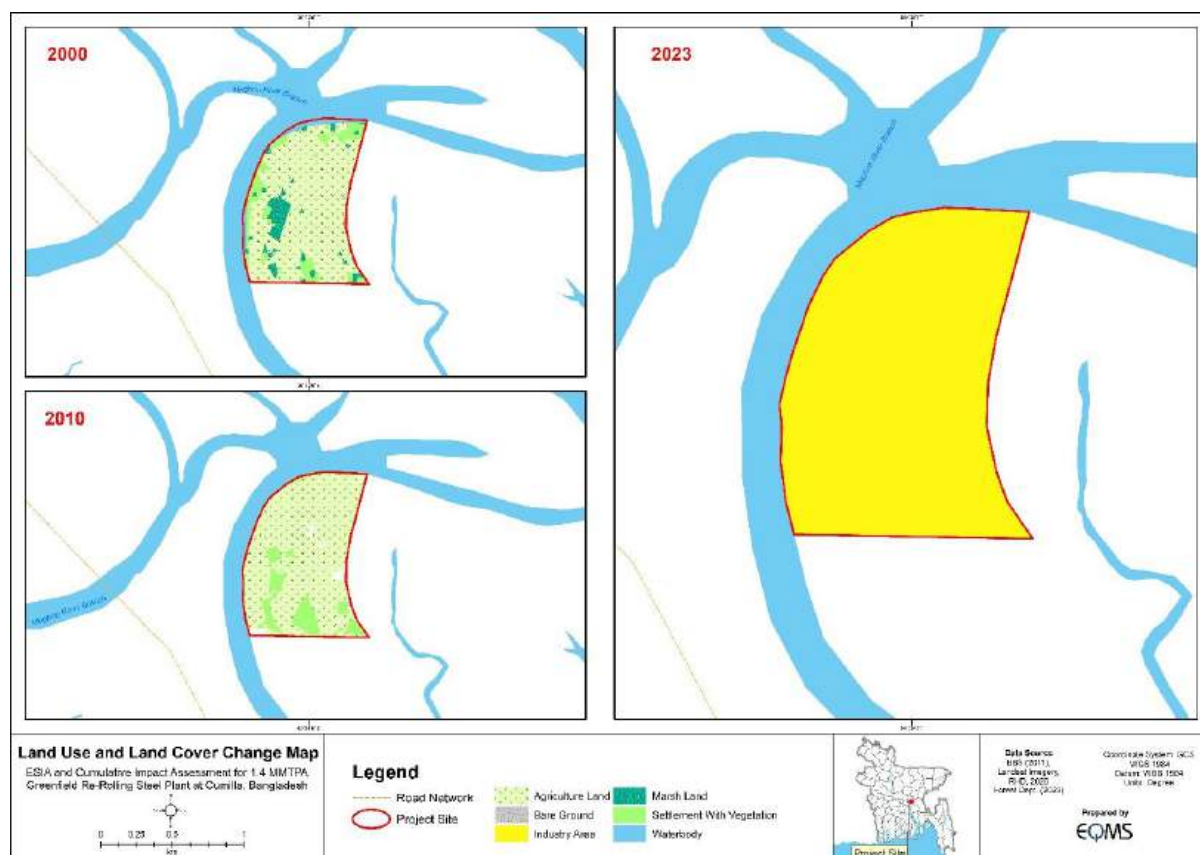


Figure 5-40: Photographs of Different Types of Terrestrial Habitats

Source: EQMS Field Survey, February 2024

5.6.2.2 Terrestrial Flora

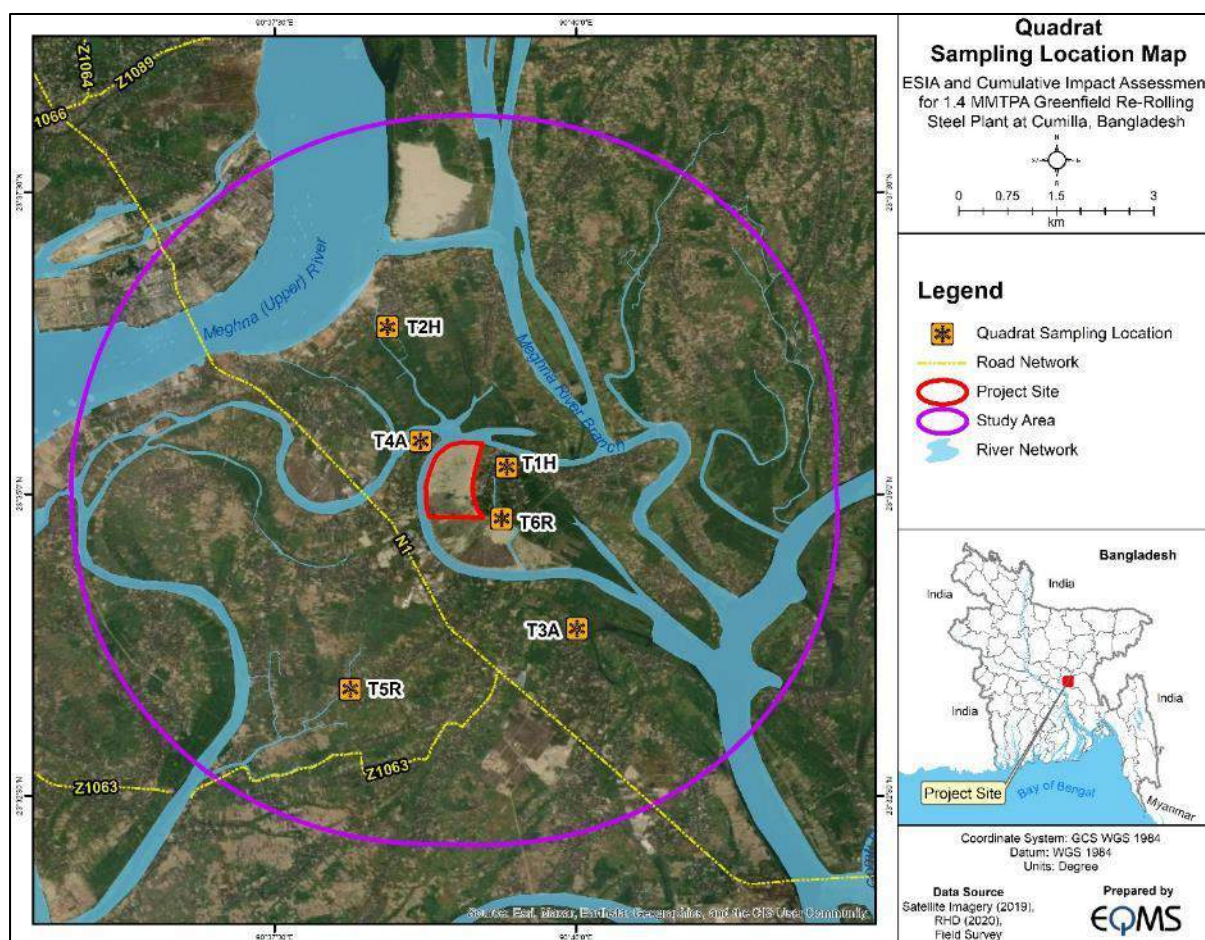
The quadrat sampling method was used for assessing the vegetation structure in and around the project area. A total of six quadrates were taken for phytosociological assessment where the sampling plot size was considered 10 m x 10 m for trees, 5 m x 5 m for shrubs and 1 m x 1 m for herbs. All the trees, herbs and shrubs within the study plots were counted and their taxonomic identification were recorded. The location and GPS of the Quadrat sites have been provided in Table 5-19 and shown in Figure 5-41.

Table 5-19: Details of Quadrates for Floral Species

SL#	Quadrat No.	Latitude	Longitude	Habitat
1.	Q1	23°35'13.36"N, 90°39'25.27"E	23°35'1.39"N,90°39'29.02"E	Homestead Habitat
2.	Q2	23°36'22.96"N, 90°38'26.02"E	23°36'50.04"N,90°38'28.12"E	Homestead Habitat
3.	Q3	23°34'6.87"N, 90°39'51.87"E	23°34'3.62"N, 90°39'25.30"E	Agricultural Habitat
4.	Q4	23°35'26.34"N,90°38'42.48"E	23°35'5.59"N, 90°38'37.71"E	Agricultural Habitat
5.	Q5	23°33'23.07"N, 90°38'7.47"E	23°33'40.22"N,90°38'34.65"E	Roadside Habitat
6.	Q6	23°34'47.83"N, 90°39'22.88"E	23°34'54.02"N,90°39'40.81"E	Roadside Habitat

Source: EQMS Field Survey, February 2024

Figure 5-41: Map of Quadrates for Floral Assessment



Source: EQMS Field Survey, February 2024

5.6.2.2.1 Species Composition

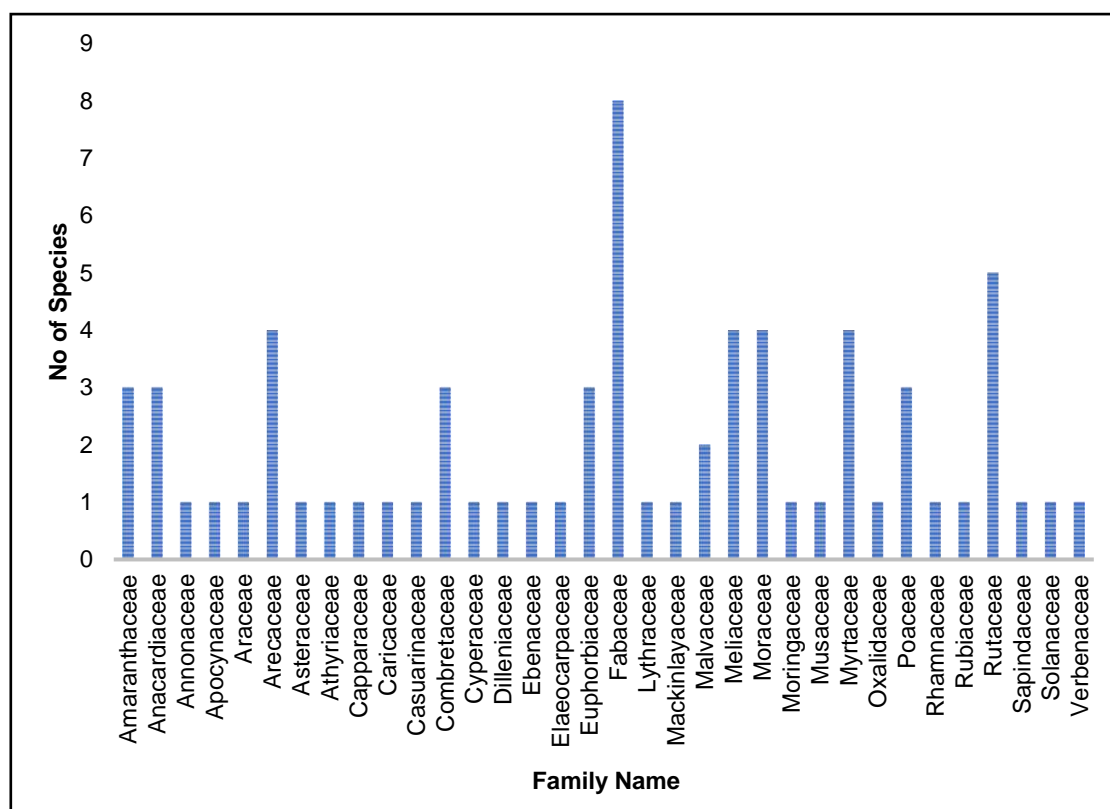
A total of forty-six (46) species under twenty-three (23) families of trees were enumerated during the field survey from six quadrat plots. Major tree species observed in and around the project AOI area are Aam (*Mangifera indica*), Mahagoni (*Swietenia mahagoni*), *Acacia* spp., Jam (*Syzygium cumini*), Supari (*Areca catechu*), Narikel (*Cocos nucifera*), Khejur (*Phoenix dactylifera*), etc. A total of twenty-one (21) species of herbs and shrubs under fourteen (14) families.

Diversified macrophytes are also found in the study area due to the enriched presence of different aquatic habitats. Major species observed in the study area are Common water hyacinth (*Eichhornia crassipes*), Water spinach (*Ipomea aquatic*), Water Lily (*Nymphaea nouchali*), Helencha (*Enhydra fluctuans*), Alligator weed (*Alternanthera phyloxeroides*), Water lettuce (*Pistia stratiotes*), Taro (*Colocasia esculenta*), etc. Among these species Common water hyacinth (*Eichhornia crassipes*) is an invasive species found in the aquatic ecosystems of the project AOI.

In the project site and the surrounding area, common climbers observed during this study included Asam lota or Bitter vine (*Mikania micrantha*), Amal lota (*Cayratia trifolia*), Pipul or Long piper (*Piper longum*), and Common lantana (*Lantana camara*). Among the recorded species, Asam lota or Bitter vine (*Mikania micrantha*) and Common lantana (*Lantana camara*) are invasive floral species. Jungle Rice (*Echinochloa colona*), Cogon Grass (*Imperata cylindrica*), Wire Grass (*Cynodon dactylon*) are dominant herb species in the grassland habitat.

The most abundant family is Fabaceae which includes Eight (8) plant species. A checklist of Terrestrial Flora has been presented in Appendix B:. A photo plate of observed floral species has been shown in Appendix C:. In addition, a comparison of terrestrial flora species based on their family (taxonomic classification) has been shown in Figure 5-42.

Figure 5-42 Comparison of Number of Floral Species by Family



Source: EQMS Field Survey, February 2024

5.6.2.2.2 Species Diversity

Shannon Diversity index (H) is used to characterize species diversity for different quadrats. The biodiversity indices of different quadrates are presented in Table 5-20. The highest value of Shannon diversity index (H) was found for Quadrat Q1 (1.866) followed by Quadrat Q6 (1.841) and the lowest value was found for Quadrat Q2 (1.150). If we compare these six quadrats, we can see that Q1 has a higher species diversity than the other quadrats, while Q2 exhibits lower diversity. However, the diversity index value, which ranges from 1 to 2, indicates a moderately diverse community where a variety of species are present, and they are relatively evenly distributed in terms of abundance. The value of Evenness (E) is highest in Quadrat Q4 followed by Quadrat Q3 and Q6. An evenness value of 0.8 to 0.9 suggests that the distribution of individuals among species is relatively balanced, with few species dominating the community and most species having comparable abundance levels. The highest species richness (8) was recorded in Quadrat Q1, and the greatest number of individuals (20) was recorded in Quadrat Q4. As Quadrat Q2 and Quadrat Q3 were found to be woodlot plantations which were dominated by Mahogany (*Swietenia mahagoni*) trees, the least values of Shannon diversity index (H) were observed for these quadrats. However, species richness value of 4-8 suggests a moderate level of diversity within the community or sample, reflecting the presence of several distinct species but not necessarily indicating exceptionally high biodiversity.

Mahogany (*Swietenia mahagoni*) is Near Threatened as per the global IUCN Red List of Threatened Species (Version 2022-2), but it is a non-native species (native to Caribbean) commonly planted in homestead plantations of Bangladesh primarily for its timber value.

Table 5-20: Biodiversity Indices of Different Quadrats

Parameter	Quadrat 1 (Q1)	Quadrat 2 (Q2)	Quadrat 3 (Q3)	Quadrat 4 (Q4)	Quadrat 5 (Q5)	Quadrat 6 (Q6)
Shannon-Wiener Diversity Index (H)	1.866	1.150	1.523	1.752	1.672	1.841
Evenness (E)	0.898	0.830	0.946	0.978	0.933	0.946
Species Richness (S)	8	4	5	6	6	7
Total Abundance	14	17	9	20	13	15

Source: EQMS Field Survey, February 2024

5.6.2.3 Terrestrial Fauna

5.6.2.3.1 Avifauna

The avifauna survey was conducted in February 2024 during the dry or winter season. Surveys were conducted during active bird periods, specifically in the early morning (0630h to 0830h) and late afternoon (1600h to 1800h) over 11 consecutive days, with one transect per day. The transect method was applied to survey the bird species present in the project AOI. The avifauna was also counted visually or by hearing their calls and then recorded in the datasheet. Transect method is a good way to survey birds because by using this method we can cover a lot of ground by walking along a route and identifying all the birds; it has been seen or heard while standing at a series of points along with a transect.

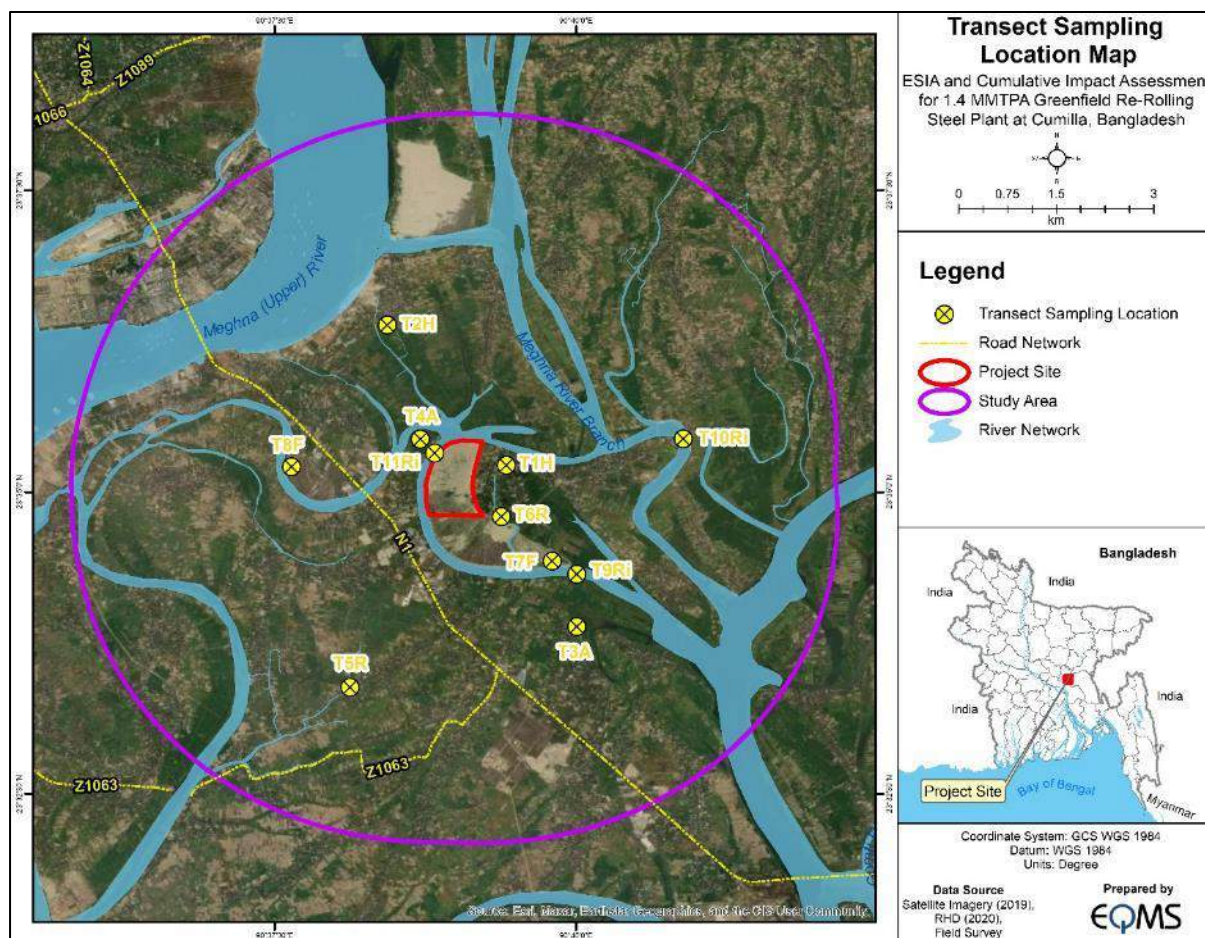
Data on avian fauna was collected from eleven (11) transects (1 km long) laid within different habitat types of the study area. Three transects (T9Ri, T10Ri, and T11Ri) were employed as boat based transect for the survey of waterbird species. Details of these transects are provided in Table 5-21 and Figure 5-43.

Table 5-21: Details of Transects for Avian Species

Sl. No.	Transect Code	Habitat Type	Start Point	End Point	Transect Length
1.	T1H	Homestead Habitat	23°35'13.36"N, 90°39'25.27"E	23°35'1.39"N, 90°39'29.02"E	1 km
2.	T2H	Homestead Habitat	23°36'22.96"N, 90°38'26.02"E	23°36'50.04"N, 90°38'28.12"E	1 km
3.	T3A	Agricultural Habitat	23°34'6.87"N, 90°39'51.87"E	23°34'3.62"N, 90°39'25.30"E	1 km
4.	T4A	Agricultural Habitat	23°35'26.34"N, 90°38'42.48"E	23°35'5.59"N, 90°38'37.71"E	1 km
5.	T5R	Roadside Habitat	23°33'23.07"N, 90°38'7.47"E	23°33'40.22"N, 90°38'34.65"E	1 km
6.	T6R	Roadside Habitat	23°34'47.83"N, 90°39'22.88"E	23°34'54.02"N, 90°39'40.81"E	1 km
7.	T7F	Grass land and Fallow land	23°34'25.75"N, 90°39'49.40"E	23°34'28.45"N, 90°39'36.61"E	1 km
8.	T8F	Grass land and Fallow land	23°35'12.62"N, 90°37'38.36"E	23°34'58.28"N, 90°37'55.35"E	1 km
9.	T9Ri	Riverine Habitat (Boat based)	23°34'19.26"N, 90°40'0.38"E	23°33'55.26"N, 90°40'43.22"E	1 km
10.	T10Ri	Riverine Habitat (Boat based)	23°35'26.50"N, 90°40'53.34"E	23°35'14.38"N, 90°39'58.87"E	1 km
11.	T11Ri	Riverine Habitat (Boat based)	23°35'19.48"N, 90°38'49.59"E	23°34'58.71"N, 90°38'43.65"E	1 km

Source: EQMS Field Survey, February 2024

Figure 5-43: Transect Sampling Locations Map for Avifauna Survey



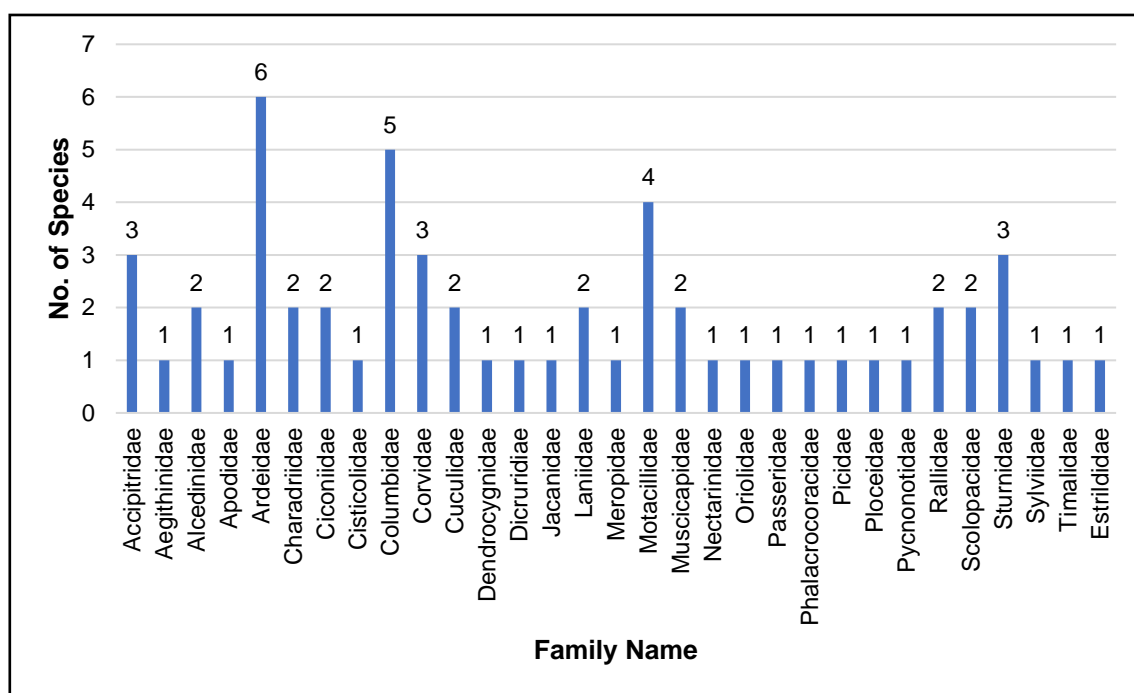
Source: EQMS Field Survey, February 2024

A total of Fifty-seven (57) species of birds under Thirty-one (31) families were recorded (primary survey and secondary information) from the study area in February 2023. The highest number of birds belong to the family Ardeidae (6 species) followed by Corvidae (5 species) and Sturnidae (3 species). All most all bird species recorded in the study area are Least Concern (LC), according to the IUCN Red List of Threatened Species of Bangladesh, 2015 and Global IUCN Red List Status (Version 2023-1).

Common migratory birds observed in the Aol are Lesser Whistling Duck (*Dendrocygna javanica*), Grey-headed Lapwing (*Vanellus cinereus*), Common Sandpiper (*Actitis hypoleucos*), White Wagtail (*Motacilla alba*), Barn Swallow (*Hirundo rustica*), etc. All the migratory species found in the AOI are also least concern (LC) according to IUCN Red List of Bangladesh (2015) and Global IUCN Red List of Threatened Species (Version 2023-1). Among these avifauna species, the Lesser Whistling Duck (*Dendrocygna javanica*), Grey-headed Lapwing (*Vanellus cinereus*), and Barn Swallow (*Hirundo rustica*) are congregatory in nature, often found in large flocks.

A Comparison of Avian species based on family is presented in Figure 5-44 . Some observed bird species are shown in Appendix C-2:Appendix C-2: and a checklist of all recorded avian species has been provided in Appendix B-3:.

Figure 5-44: Number of Avian species Based on Family



Source: EQMS Field Survey, February 2024

5.6.2.3.1.1 Migratory Avian Species

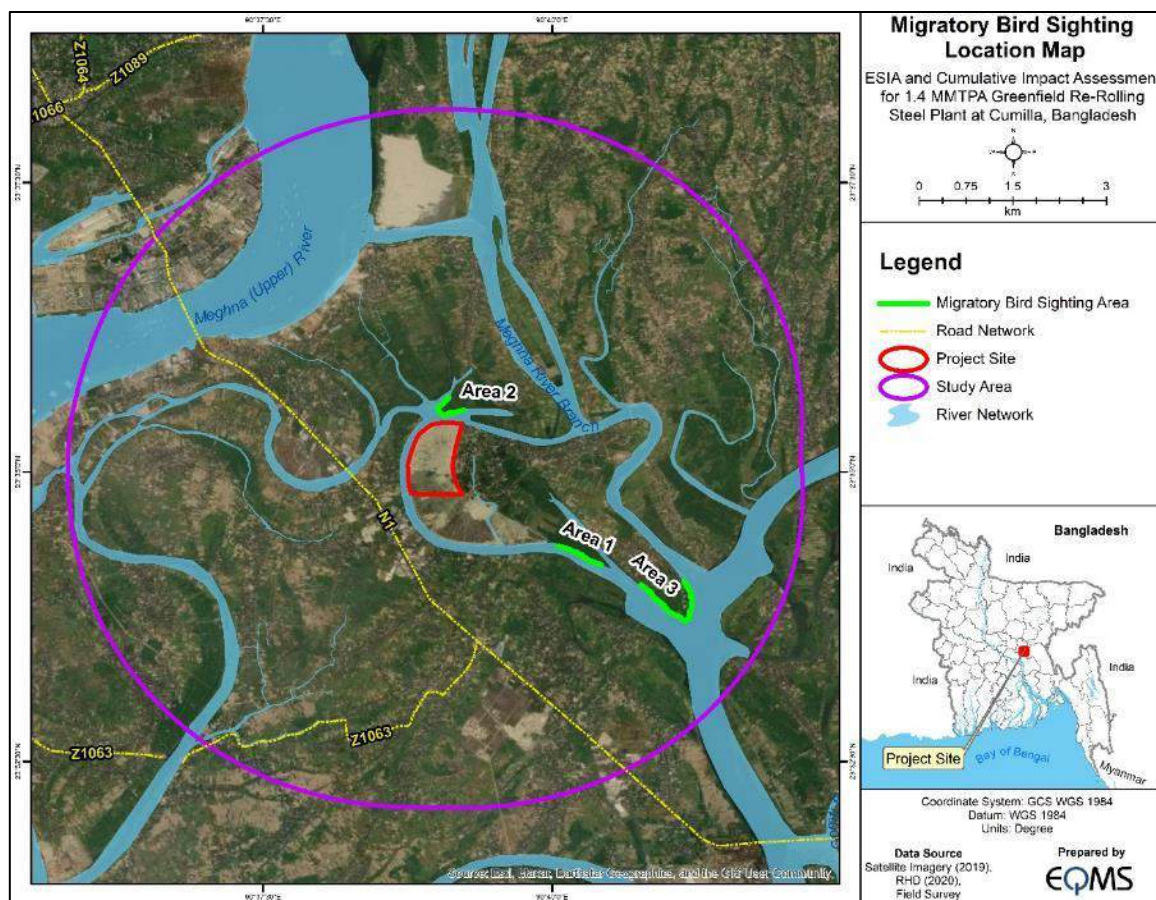
A total Eight (08) Migratory bird were observed during the field visit of February 2024, within the Project AOI. All the migratory avian species recorded in the study area are Least Concern (LC) according to both IUCN Red List of Threatened Species of Bangladesh, 2015 and Global IUCN Red List Status (Version 2023-1).

Seven (07) species of terrestrial and aquatic associated migratory birds which were observed in the AOI are, Common Stonechat (*Saxicola maurus*), Brown shrike (*Lanius cristatus*), White Wagtail (*Motacilla alba*), Citrine Wagtail (*Motacilla citreola*), Wood Sandpiper (*Tringa glareola*), Long-legged Buzzard (*Buteo rufinus*) and Grey-headed Lawping (*Vanellus cinereus*). Among eight species, one species viz. Common Sandpiper (*Actitis hypoleucos*) is generally an aquatic associated species but also found in the moist agricultural fields, rivers, ponds, canals, and grassy lawns.

A huge flock of Grey-headed Lawping (*Vanellus cinereus*) is observed in the bank line area of Meghna River branch area approximately 400m north-east (23°35'38.44"N and 90°39'6.32"E), approximately 1.6km south-east (23°34'20.32"N and 90°40'6.06"E) and approximately 3.8km south-east (23°33'50.23"N and 90°41'12.48"E) from the project site.

According to the primary survey and secondary information from local people, migratory species observed in the AOI are commonly found in the riverbank line area of Meghna branch river adjacent to the project site. A map of migratory bird sighting area (based on Primary survey and secondary information) has been presented in Figure 5-45. A checklist of observed migratory birds have been provided in Appendix B-4:.

Figure 5-45: Migratory Bird Sighting Area Present in the AOI

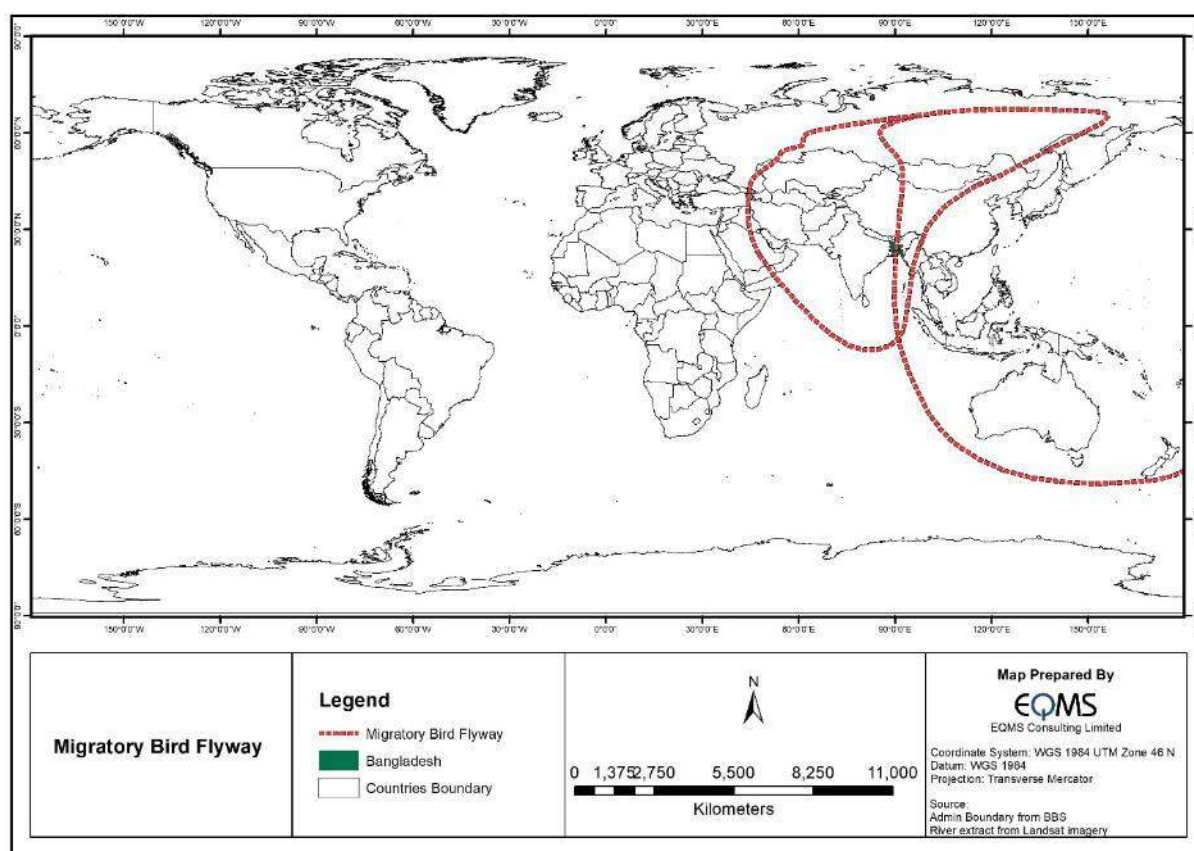


Source: EQMS Field Survey, February 2024

5.6.2.3.1.2 Migratory Bird Flyways

Large areas of the eastern and southeastern portion of Bangladesh where the site is located, is within the East Asian-Australian Flyway. Approximately 492 migratory bird species are known to fly along this flyway, arriving in October and November and returning to their resident countries between February and April. Due to the presence of this flyway, some migratory bird species, such as the Ruddy shelduck (*Tadorna ferruginea*) (LC), Indian spot-billed duck (*Anas poecilorhyncha*) (LC), and lesser whistling duck (*Dendrocygna javanica*) (LC), are likely to visit the AOI during the winter and post-winter season. However, they do not use this habitat as their regular foraging ground. The map of the East Asian-Australasian Flyway and Flyway site in Bangladesh has been presented in Figure 5-46.

Figure 5-46: Map of East Asia-Australasia Flyway



Source: BirdLife International

5.6.2.3.2 Herpetofauna







Amphibians and reptilian groups are known as herpetofauna. Visual Encounter Surveys (VES) were conducted mainly for reptile fauna over a wider area. These surveys generally comprised walking through various habitats, such as bushy areas, along the riverside, agricultural areas, looking for active reptiles, disturbing logs, and other ground debris to check for sheltering animals. In addition, Informal consultation with local people and published literature review help us to get information about the local species available in the study area.

During the field visit of February 2024, a total of six (06) species of amphibians belonging to four (04) families and ten (10) species of reptiles belonging to seven (07) families were listed from the project AOI based on primary and secondary data (Appendix B-5:).

All the amphibian species are included in the Bangladesh Wildlife (Conservation and Security) Act, 2012, under Schedule-II, which protects them from hunting, killing, and capturing. Amphibians recorded or reported to be present in the AOI are found to be Least Concerned species.

According to the IUCN Bangladesh Red-list (2015) and Global IUCN Red List Status (Version 2023-1), One (01) Near Threatened (NT) reptile species, Bengal Monitor Lizard (*Varanus bengalensis*) was found in the study area. Bengal Monitor was observed near the Omrakanda Bridge (23°35'25.44"N, and 90°40'33.82"E) beside the Meghna-Homna Road. The picture of Bengal monitor has not been clicked due to the rapid movement of the species. Photographs of observed herpetofauna species are given in Figure 5-47.

Figure 5-47: Observed Herpetofauna in the Project AOI

		
Indian skipper frog (<i>Euphlyctis cyanophlyctis</i>)	Common Asian toad (<i>Duttaphrynus melanostictus</i>)	Indian Bull frog (<i>Hoplobatrachus tigerinus</i>)
		
Bronze Grass Skink (<i>Eutropis macularia</i>)	Common Garden lizard (<i>Calotes versicolor</i>)	Common smooth water snake (<i>Enhydria enhydria</i>)

Source: EQMS Field Survey, February 2024

5.6.2.3.3 Mammals

Visual Encounter Survey was followed for observing and counting the wild mammalian species. These surveys generally comprised walking through a vegetation trail or specific transect line to check for sheltering animals. A review of published literature, informal consultation and discussion with local people were also carried out to collect information regarding the mammalian species found in the proposed project AOI.

During the study, nine (09) terrestrial mammal species belonging to six (06) families were reported to be observed in the AOI: Common Indian Field Mouse (*Mus booduga*), Common House Rat (*Rattus rattus*), House Mouse (*Mus musculus*), Lesser Mole Rat (*Bandicota bengalensis*), Small Indian Mongoose (*Urva auropunctata*), Indian Flying Fox (*Pteropus giganteus*), Irrawaddy Squirrel (*Callosciurus pygerythrus*), House shrew (*Suncus murinus*), and Golden Jackal (*Canis aureus*). The Indian Flying Fox (*Pteropus giganteus*) found in the AOI was an individual species using the site solely as a foraging ground; however, their roosting locations were not found within the project AOI. All mammalian species found are Least Concern (LC) both locally and globally according to IUCN Red List of Bangladesh (2015) and IUCN Red List of Threatened Species (Version:2023-1). A detailed checklist of reported terrestrial mammals has been provided in Appendix B-6:Appendix B-6:. A Photo plate of Observed Terrestrial mammal species has been presented in the Figure 5-48 .

Figure 5-48: Photoplate of Observed Terrestrial Mammals in the AOI



Source: EQMS Field Survey, February 2024

5.6.3 Aquatic Ecosystem

The Aquatic ecosystem within the AOI comprises mainly the Riverine habitat of Meghna, branch of Meghna River, small Canals and lentic waterbodies (Ponds). Different types of aquatic habitats within the AOI have been presented in Figure 5-49.

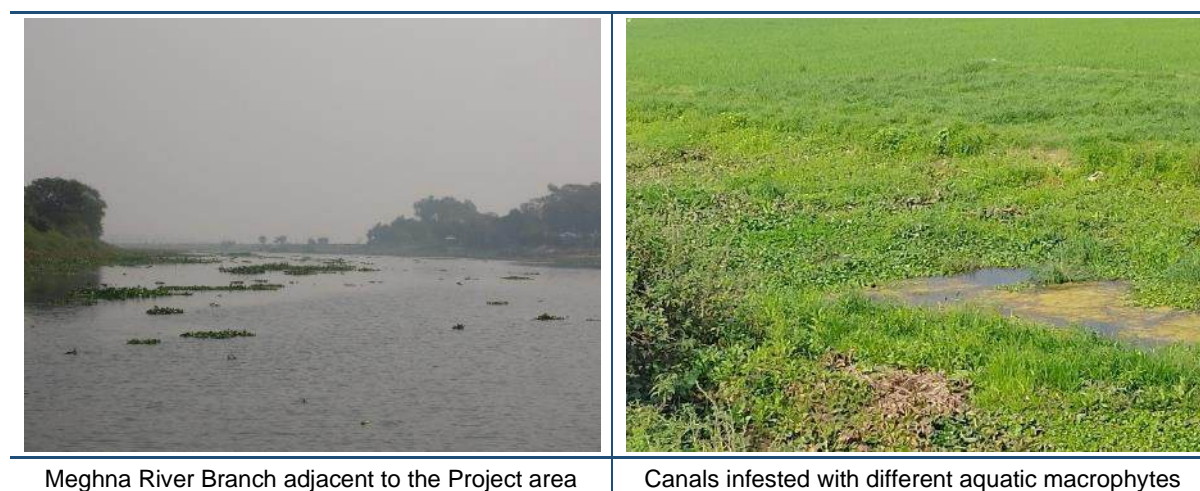
5.6.3.1 Habitat

As per the IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, the project associated aquatic area is classified as a modified habitat, as human activity has substantially altered the area's primary ecological functions and species composition. The modified aquatic habitat of the project Area of Influence (Aol) encompasses the following habitat types.

Riverine Habitat of River Branch of Meghna: The project AOI falls under Meghna River and its adjacent floodplain area. However, the core AOI falls on a branch river of Meghna River. This branch river loops the total project area and falls in the main Meghna River near Rampur Bazar of Meghna Ghat. Fisheries activity was observed in this branch river.

Ponds: Ponds are largely located at roadside areas and human settlements. Ponds are maintained often to fulfill the requirement of water for household use and fish culture purposes. In the study area, some ponds are available for extensive aquaculture. Major species culture in the ponds are Rui (*Labeo rohita*), Koi (*Anabas testudineus*), Catla (*Catla catla*), Silver carp (*Hypophthalmichthys molitrix*), Bighead carp (*Hypophthalmichthys nobilis*), Grass carp (*Ctenopharyngodon idella*), Pangus (*Pangasius hypophthalmus*) and Nilotica (*Oreochromis niloticus*)

Canals: Natural drainage canals in the study area ultimately drain into subchannel/branch of Meghna and then Meghna River. Canals of the study area provide a home for aquatic macrophytes, insects, birds, fishes etc. in the study period, the canals were observed in clogged condition due to the infestation of different aquatic macrophytes viz. Common water hyacinth, Alligator weed, Water lettuce, Taro etc.

Figure 5-49: Different Aquatic Habitat in the AOI

Source: EQMS Field Survey, February 2024

5.6.3.2 Aquatic Flora

Aquatic vegetation (macrophytes) is mainly recorded in the riverbanks, canals and ponds within the AOI. It provides cover for fish, substrate for aquatic invertebrates, produces oxygen, and acts as food for some fish and wildlife. Diversified macrophytes were found in the study area due to the enriched presence of different water habitats.

Major species observed in these habitats are Common Water hyacinth (*Eichhornia crassipes*), Helencha (*Alternanthera philoxeroides*), Water fern (*Azolla filiculoides*), Kasura (*Actinoscirpus grossus*), Alligator weed (*Alternanthera philoxeroides*), Water lettuce (*Pistia stratiotes*), Taro (*Colocasia esculenta*), Asian watergrass (*Hygroryza aristata*), Water Primrose (*Jussiaea repens*), Water clover (*Marsilea* sp.), Greater duckweed (*Spirodela polyrhiza*), sedge (*Cyperus laxus*), Water chestnut (*Eleocharis* sp.), Pink morning glory (*Ipomoea carnea*), Buffalo spinach (*Enhydra fluctuans*), Water spinach (*Ipomea aquatica*), Common duck weed (*Lemna perpusilla*), Hastate-leaved pondweed (*Monochoria hastata*), Najas (*Najas gracillima*), Taro (*Colocasia esculenta*), Water Lily (*Nymphaea rubra*) and Blue Water Lily (*Nymphaea nouchali*). Among these species Common water hyacinth (*Eichhornia crassipes*) is an invasive species which adversely affects the aquatic ecosystems of the project AOI.

5.6.3.3 Aquatic Fauna

5.6.3.3.1 Fisheries Resources and Management in Project AOI

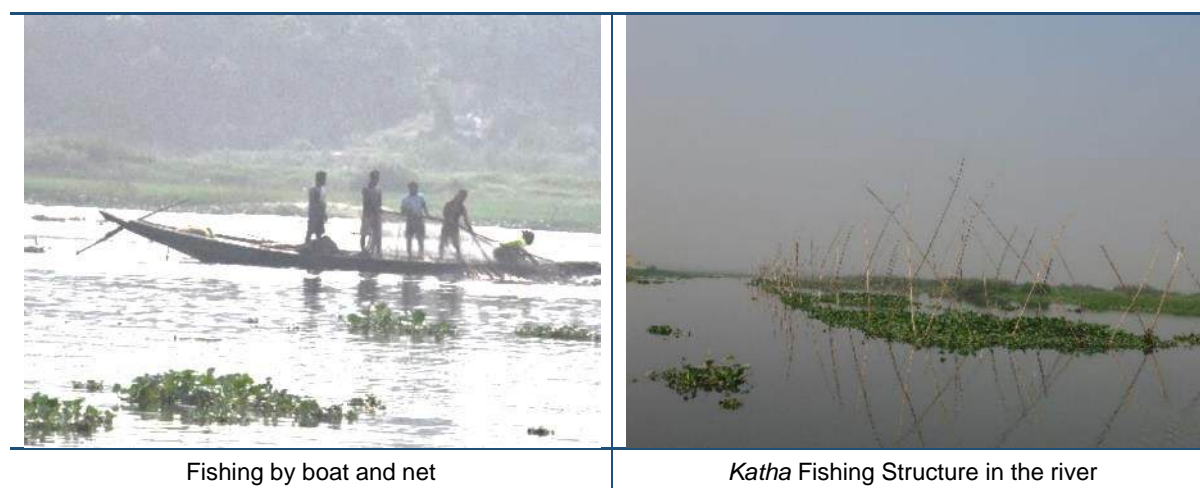
A branch of Meghna River surrounds the project area. During the study period, river-based fishing activity was observed in AOI. Two kinds of fishing activities were observed in the study area- (i) Typical fishing by boat and nets, (ii) *Katha* (Brush pile) Fishing in the river. They used different types of net, mainly Gill net, cast net, Seine net (very small amount), Lift net etc. Almost all the captured fish species from this River were sold in the local fish Market.

Katha (Brush pile) is a manmade artificial structure where different species and ages of fish take shelter. *Katha* acts like a short-time shelter for fish and works as a nursing and feeding ground for them. Moreover, fish also use *Katha* as a hiding place and protection from predators. Therefore, schools of various fish species accumulate in *katha*, which makes it a fish aggregating device in freshwater environments.

According to the consultation with Upazila Fisheries Officer of Meghna Upazila and local people indicate that, most of the fishermen are in the seasonal group, who relied on fishing only during a certain period (pre monsoon and monsoon) of the year.

Freshwater aquaculture practice is not very common practice in project AOI and its adjacent areas. Some seasonal waterbodies and ponds are observed in AOI. Common fish species cultured in the ponds are Nile Tilapia (*Oreochromis niloticus*), Rui (*Labeo rohita*), Catla (*Catla catla*), Mrigal (*Cirrhinus cirrhosus*), Kalbaus (*Labeo calbasu*), Silver Carp (*Hypophthalmichthys molitrix*), Big head (*Hypophthalmichthys nobilis*), etc. The average production of pond culture is 15-25 kg/acre.

Figure 5-50: Fishing method in project adjacent river area



Fishing by boat and net

Katha Fishing Structure in the river

Source: EQMS Field Survey, February 2024

5.6.3.3.2 Fishing Craft and Gears

Different types of fishing gear are used to catch fish in Meghna River branch, narrow canals and seasonal waterbodies adjacent area to the AOI. According to the consultation with Upazila Fisheries Officer of Meghna Upazila and local people lived around the project site confirmed that, there is fishing activity near the project site area. A total of six types of gears were used classified into three categories: fishing net, fish traps, and Hooks- line. Generally, non-mechanized boat is used for fishing in this area, However, some fishermen use mechanized small boat. According to the consultation, foldable fishing trap (China Duyari jal) is heavily used by the local fishermen which is completely illegal and create threat to fish and other wildlife biodiversity. Types of fishing gear used during monsoon period in the study area has been presented in Table 5-22.

Table 5-22: Fishing gear used in Meghna River branch and seasonal waterbodies

Category	Types of Gear	Local Name of gear	Locations
Fishing Net	Gill Net	Current jal	Used in the Meghna River branch and Meghna River
	Seine net	Ber jal	Used in Meghna River
	Cast net	Jhaki Jal	Used in Meghna River branch, ponds, canals and seasonal waterbodies
	Dragged Net	Thela jal	Used in Meghna River branch, ponds, canals and seasonal waterbodies
Trap	Fish Trap	Chai	Used in Meghna River branch, canals and seasonal waterbodies
	Foldable fish trap	China Duyari jal	Heavily used in Meghna River branch
Hooks-Line	Borshi	Chip Borshi	Used in Meghna River branch, ponds, canals and seasonal waterbodies

Source: EQMS Field Study, February 2024

5.6.3.3.3 Fish and Crustacean Inventory

The prime objective of the fisheries study was to examine and evaluate the overall fisheries status (capture and cultured fish species) in the study area. Boat-to-boat survey, Fish Market survey,

consultation with local people, KII with Upazila Fisheries Officer of Meghna Upazila was employed to know the fish species composition (Figure 5-51).

During the field visit one (1) fish market was surveyed to find out the fish species composition of the study area. The names of the surveyed fish market are presented in Table 5-23.

Table 5-23: Details of Fish market surveyed adjacent to the Project site

SI No	Name of Fish Market	Address	GPS Coordination
1.	Noya Kandargaon Fish Market	Kandargaon, Meghna Upazila	23°35'4.137"N 90°39'51.47"E

Source: EQMS Field Survey, February 2024

Figure 5-51: Consultation and Fisheries Survey Activities in the Study Area

		
Checking Fishing net in a Fishing boat	Consultation with local Fishermen in the Meghna River branch	Fishing by hook and line inside the Katha
		
Fishing by Seine net at project adjacent area	Foldable Fishing trap (China Duyari jal)	Illegal China Duyari net is Placed in the riverbank side area
		
Fish market survey activity and consultation with retailer		KII with Upazila Fisheries Officer of Meghna Upazila, Cumilla

Source: EQMS Field Survey, February 2024

5.6.3.3.1 Capture Fish Species in the Meghna River Branch

A total of 19 species of captured fish under 14 families have been recorded in the project AOI (Meghna branch river) during the boat-to-boat survey and consultation with the Upazila Fisheries Officer (Meghna Upazila, Cumilla), and the local fishermen. Generally local fishermen in this area used gill net, seine

net, drag net, cast and foldable fishing trap (illegal) for fishing purposes. A checklist of captured fish species in the Meghna River branch has been presented in Table 5-24.

Table 5-24: Checklist of Recorded Fish Species in Meghna River Branch from the Fisheries Survey

Sl. No.	Family	Local Name	English Name	Scientific Name	IUCN Red List of Bangladesh, 2015*	Global IUCN Red List Version 2023-1**
1.	Bagridae	Bajari Tengra	Tengra Catfish	<i>Mystus tengara</i>	LC	LC
2.	Gobiidae	Bele	Tank Goby	<i>Glossogobius giuris</i>	LC	LC
3.	Notopteridae	Foli	Bronge Feather-back	<i>Notopterus notopterus</i>	VU	LC
4.	Mastacembelidae	Guchi Baim	Barred Spiny Eel	<i>Macrognathus pancalus</i>	LC	LC
5.		Gutum	Guntea loach	<i>Lepidocephalichthys guntea</i>	LC	LC
6.	Belonidae	Kakila	Freshwater Garfish	<i>Xenentodon cancila</i>	LC	LC
7.	Siluridae	Kani Pabda	Butter Catfish	<i>Ompok bimaculatus</i>	EN	NT
8.	Adrianichthyidae	Kanpona	Estuarine Ricefish	<i>Oryzias melastigma</i>	LC	LC
9.	Anabantidae	Koi	Climbing Perch	<i>Anabas testudineus</i>	LC	LC
10.	Ambassidae	Lal Chanda	Highfin Glassy Perchlet	<i>Parambassis lala</i>	LC	NT
11.		Nama Chanda	Elongate Glass-perchlet	<i>Chanda nama</i>	LC	LC
12.	Pristolepidae	Napit Koi	Badis	<i>Badis badis</i>	NT	LC
13.	Cyprinidae	Phutani punti	Dwarf barb	<i>Pethia phutunio</i>	LC	LC
14.		Rui	Rohu Carp	<i>Labeo rohita</i>	LC	LC
15.		Sar Punti	Olive Barb	<i>Systemus sarana</i>	NT	LC
16.	Nandidae	Meni	Mottled Nandus	<i>Nandus nandus</i>	NT	LC
17.	Heteropneustidae	Shing	Stinging Catfish	<i>Heteropneustes fossilis</i>	LC	LC
18.	Channidae	Shol	Snakehead Murrel	<i>Channa striatus</i>	LC	LC
19.		Taki	Spotted Snakehead	<i>Channa punctata</i>	LC	LC

Source: EQMS Field Survey, February 2024

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 5: Freshwater Fishes; LC=Least Concern, NT=Near Threatened; VU=Vulnerable, EN= Endangered; NE=Not Evaluated, DD=Data Deficient

**IUCN 2024. The IUCN Red List of Threatened Species. Version 2023-1. (<https://www.iucnredlist.org/>)

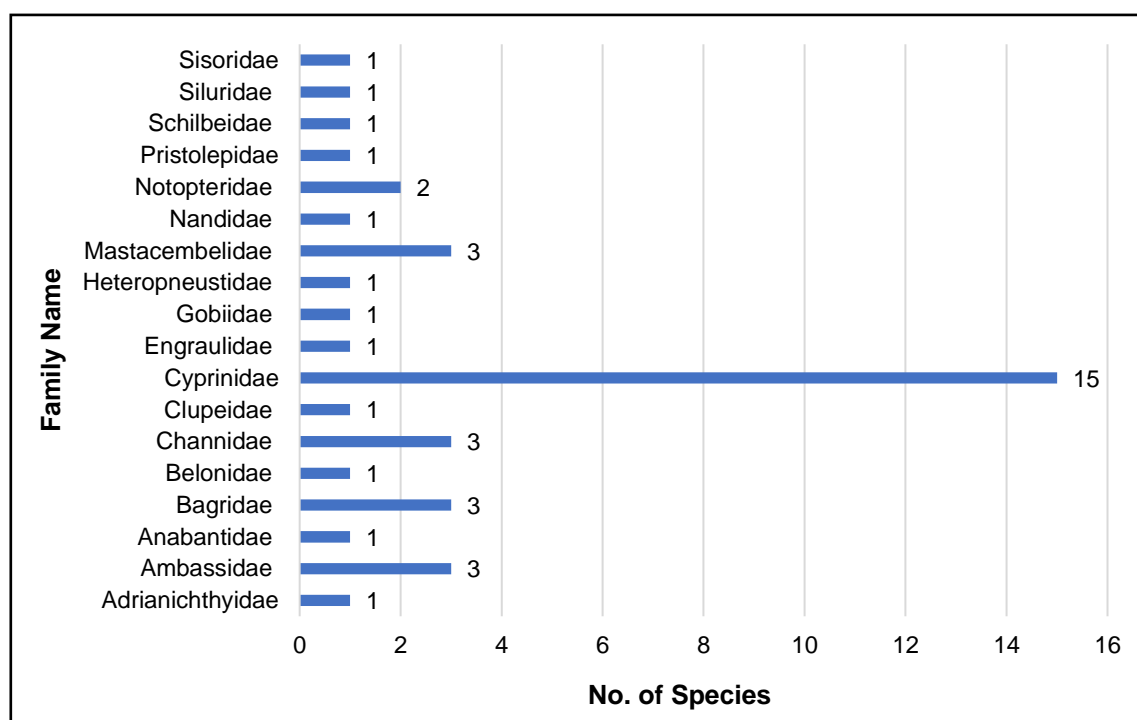
5.6.3.3.2 Fish and Crustacean Inventory (Fish Market Survey)

During the field visit, a total of forty-one (41) species of fish and three (03) species of crustaceans were recorded from the Market survey and consultations from AOI. The recorded 41 fish species are covered under 18 families. The highest number of fish species belong to the family Cyprinidae (15 species).

According to the IUCN Red List of Bangladesh, four 'Vulnerable' (*Wallago attu*, *Gudusia chapra*, *Notopterus notopterus* & *Pethia ticto*), six 'Near Threatened' (*Cirrhinus reba*, *Labeo gonius*, *Nandus nandus*, *Badis badis*, *Systemus sarana*, and *Macrognathus aculeatus*), and three 'Endangered' (*Chitala*

chitala, *Channa marulius*, and *Ompok bimaculatus*) species was recorded. According to Global IUCN Red List status (Version 2023-1), two Vulnerable (*Cirrhinus cirrhosus*, and *Wallago attu*), four Near Threatened (*Chitala chitala*, *Ailia coila*, *Parambassis lala* and *Ompok bimaculatus*) fish species were reordered. However, all conservation significant fish species are recorded from the fish market survey. According to the consultation with the retailers of the fish markets indicates that, almost all fish species found in the market are sourced from the main Meghna River. Family-based fish species diversity has been presented in Figure 5-52.

Figure 5-52: Family-Based Fish Species Diversity in the AOI



Source: EQMS Field Survey, February 2024

During the field visit, three (03) species crustaceans under one family were recorded from the fish market survey in the AOI. A detailed checklist of different fish, and crustacean species observed from the study area have been presented in Appendix B-7: and Appendix B-8:. Also, a Photo plate of observed fish and crustacean species have been provided in Appendix C-3:.

5.6.3.4 Plankton and Benthos Profile in the AOI

For the qualitative study, plankton was collected by plankton net (No. 20 silk bottling cloth, mesh size: 45 µm) at predefined six (6) sample collection points (Table 5-25 and Figure 5-53). After collection, they were preserved in 3% formalin and a few drops of Glycerin and Lugol's solution. After adding preservatives, they were brought to the laboratory for species identification and numerical abundance. Pictorial views of the plankton sample collection are shown in Appendix C-4:.

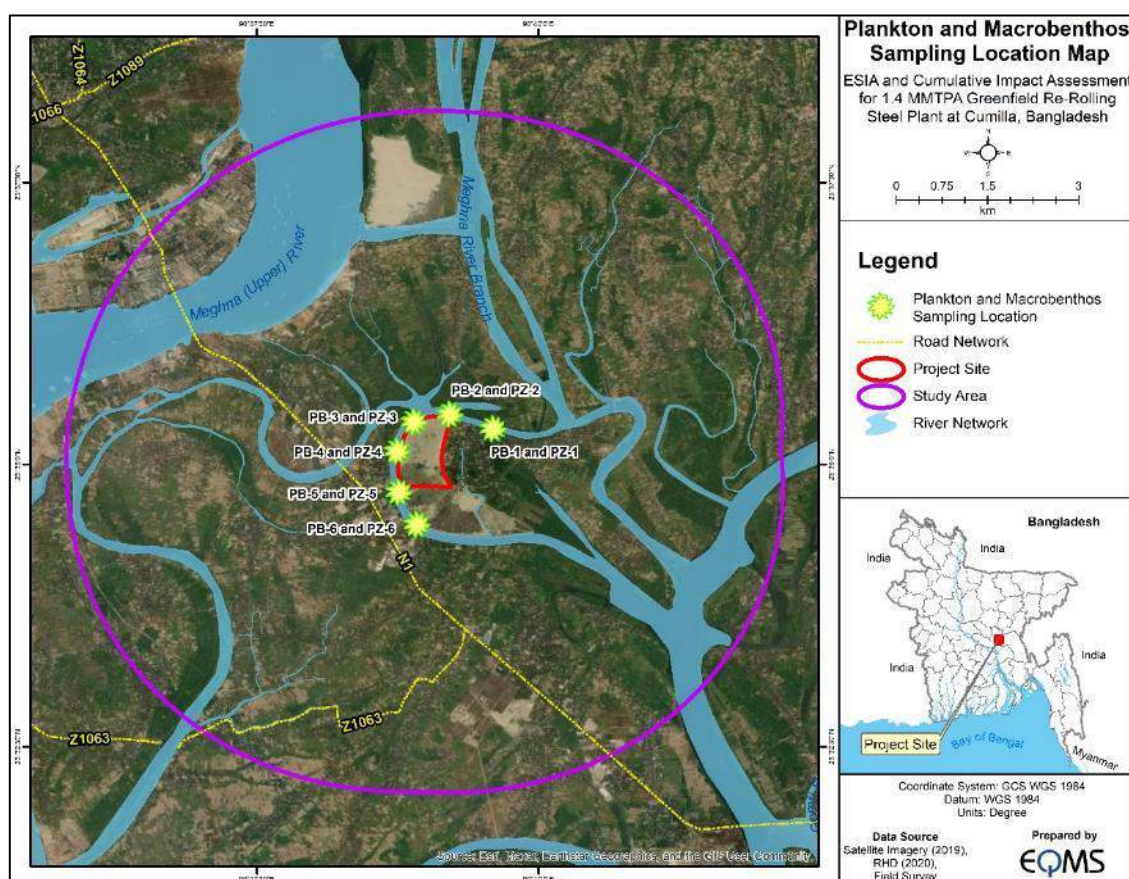
Benthos samples were collected by Ekman's bottom grab sampler from predefined Six (6) selected points of proposed project AOI (Table 5-25 and Figure 5-53), and sediment from the sampler was taken into a plastic bucket and mixed with water. Then the mixed water passed through a 0.5 mm mesh-sized hand-sieve to remove the waste particles, and the separated macro-benthos with other residue were preserved in labeled plastic containers with 10% buffered formalin and transferred to the laboratory for further analysis. Organisms were sorted and enumerated under major taxa. An electric microscope was also used to identify benthos. A pictorial Presentation of benthos sampling is given in Appendix C-5:.

Table 5-25: Sampling points for plankton and benthos survey

Sl. No.	Sampling Location	Plankton Sample Code	Benthos Sample Code	GPS Coordination
1.	Adjacent to Luterchar Kheya Ghat	PZ-1	PB-1	23°35'18.95"N,90°39'35.92"E
2.	600m upstream from Luterchar Kheya Ghat	PZ-2	PB-2	23°35'26.66"N,90°39'12.99"E
3.	1200m upstream from Luterchar Kheya Ghat	PZ-3	PB-3	23°35'22.59"N,90°38'53.83"E
4.	1800m upstream from Luterchar Kheya Ghat	PZ-4	PB-4	23°35'7.05"N, 90°38'44.87"E
5.	2500m upstream from Luterchar Kheya Ghat	PZ-5	PB-5	23°34'45.32"N,90°38'45.81"E
6.	3000m upstream from Luterchar Kheya Ghat	PZ-6	PB-6	23°34'28.08"N,90°38'55.39"E

Source: EQMS Field Survey, February 2024

Figure 5-53: Map showing plankton and macrobenthos sampling locations



Source: EQMS Field Survey, March 2024

5.6.3.4.1 Phytoplankton

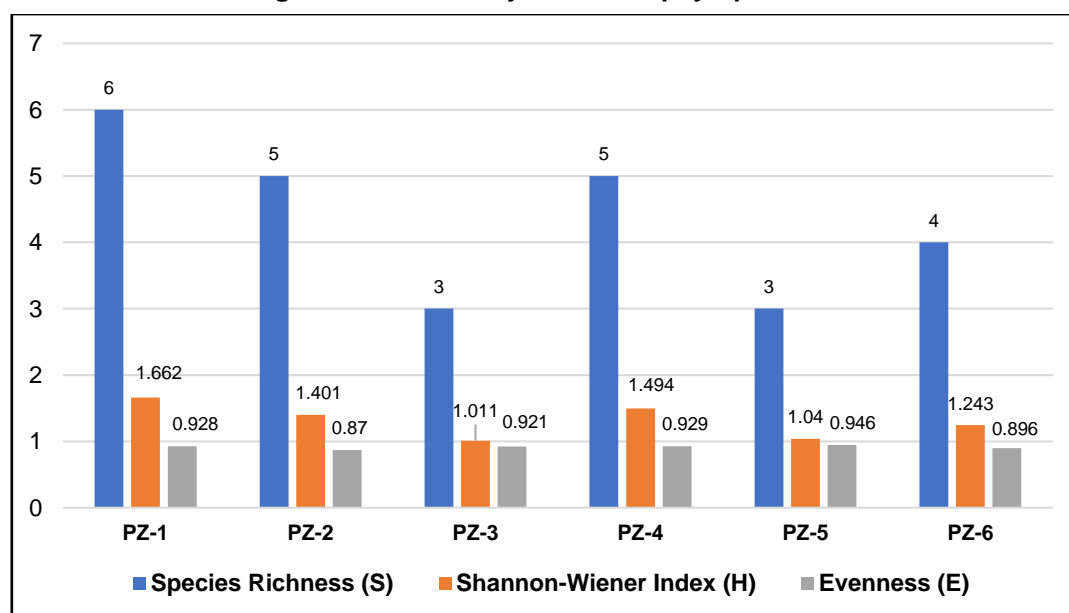
A total of seven (07) species of phytoplankton were identified by sample analysis from six predefined sample collection locations. The dominant phytoplankton class was the Bacillariophyceae. *Chlorella* sp. was dominant under Bacillariophyceae. Species composition and numbers of phytoplankton per liter have been presented in Table 5-26.

Table 5-26: A checklist of phytoplankton found in the study area

S/N	Class	Genus	Number (individuals/ L)					
			PZ1	PZ2	PZ3	PZ4	PZ5	PZ6
1.	Bacillariophyceae	<i>Nitzschia</i> sp.	3	0	0	2	2	0
2.		<i>Melosira</i> sp.	4	2	0	0	0	1
3.		<i>Navicula</i> sp.	9	4	6	2	1	0
4.	Euglenophyceae	<i>Euglena</i> sp.	0	3	0	6	0	3
5.	Chlorellaceae	<i>Chlorella</i> sp.	14	11	4	0	1	0
6.		<i>Pediastrum</i> sp.	2	0	0	3	0	1
7.	Conjugatophyceae	<i>Spirogyra</i> sp.	9	3	2	2	0	1

Source: EQMS Laboratory Analysis, March 2024

The Shannon-Wiener diversity indices by sampling location have been presented in Figure 5-54. The graph indicates that the diversity of Phytoplankton is higher in the Adjacent to Luterchar Kheya Ghat (PZ-1) and lower in the sampling point PZ-3. Evenness is higher in the sampling point PZ-5 and Lower in PZ-2. The higher Evenness value of PZ-5 indicates that the number of phytoplankton classes is more evenly distributed followed by PZ-4, PZ-1, PZ-3, PZ-6, and PZ-2, respectively.

Figure 5-54: Diversity indices of phytoplankton

Source: EQMS Field Survey, March 2024

5.6.3.4.2 Zooplankton

A total of six (06) species of zooplankton were identified by sample analysis from six predefined sample collection locations. *Daphnia* sp. was the highest abundant zooplankton species. The location of species composition and the number of zooplankton per liter has been presented in Table 5-27.

Table 5-27: A checklist of zooplankton found in the study area

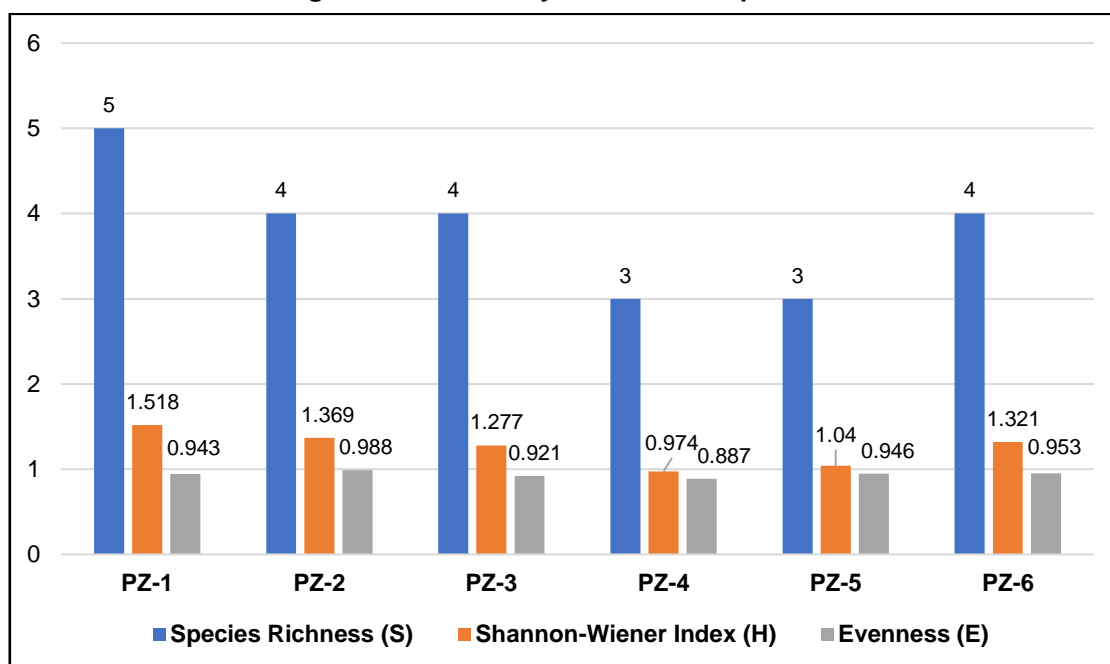
S/N	Group/Order	Genus	Number (individuals/ L)					
			PZ1	PZ2	PZ3	PZ4	PZ5	PZ6
1.	Copepoda	<i>Diaptomus</i> sp.	5	2	0	3	0	2

S/N	Group/Order	Genus	Number (individuals/ L)					
			PZ1	PZ2	PZ3	PZ4	PZ5	PZ6
2.		<i>Cyclops</i> sp.	4	0	1	0	0	1
3.	Rotifera	<i>Brachionus</i> sp.	3	3	0	1	1	0
4.	Anomopoda	<i>Daphnia</i> sp.	8	2	3	0	0	2
5.		<i>Bosmina</i> sp.	3	2	1	4	2	3
6.	Crustacean Larvae	<i>Nauplius</i>	0	0	2	0	1	0

Source: EQMS Laboratory Analysis, March 2024

The Shannon-Wiener diversity indices by sampling location have been presented in Figure 5-55. The graph indicates diversity is higher in the adjacent to the Luterchar Kheya Ghat area (PZ-1) and lower in the sampling point PZ-4. The evenness value is higher in the sampling points PZ-2 and Lower in PZ-4. A higher Evenness value of PZ-2 indicates that the number of Zooplankton classes is more evenly distributed among the other sampling points.

Figure 5-55: Diversity indices of zooplankton



Source: EQMS Field Survey, March 2024

5.6.3.4.3 Macrobenthos

Seven (07) genera were identified from six sampling locations. These genera belong to Polychaetas, Gastropoda, Insecta, Bivalvia, etc. In the present study, Macrobenthos abundance varied between 844 and 44 individuals per square meter (indv. /m²). The location of species composition and the number of individuals per square meter have been presented in Table 5-28.

Table 5-28: A checklist of benthos organisms identified in the study area

S/N	Groups	Taxa/Species	PB1		PB2		PB3		PB4		PB5		PB6	
			n	N	n	N	n	N	n	N	n	N	n	N
1.	Gastropoda	<i>Bellamya</i> sp.	11	488	5	222	0	0	1	44	18	800	4	177

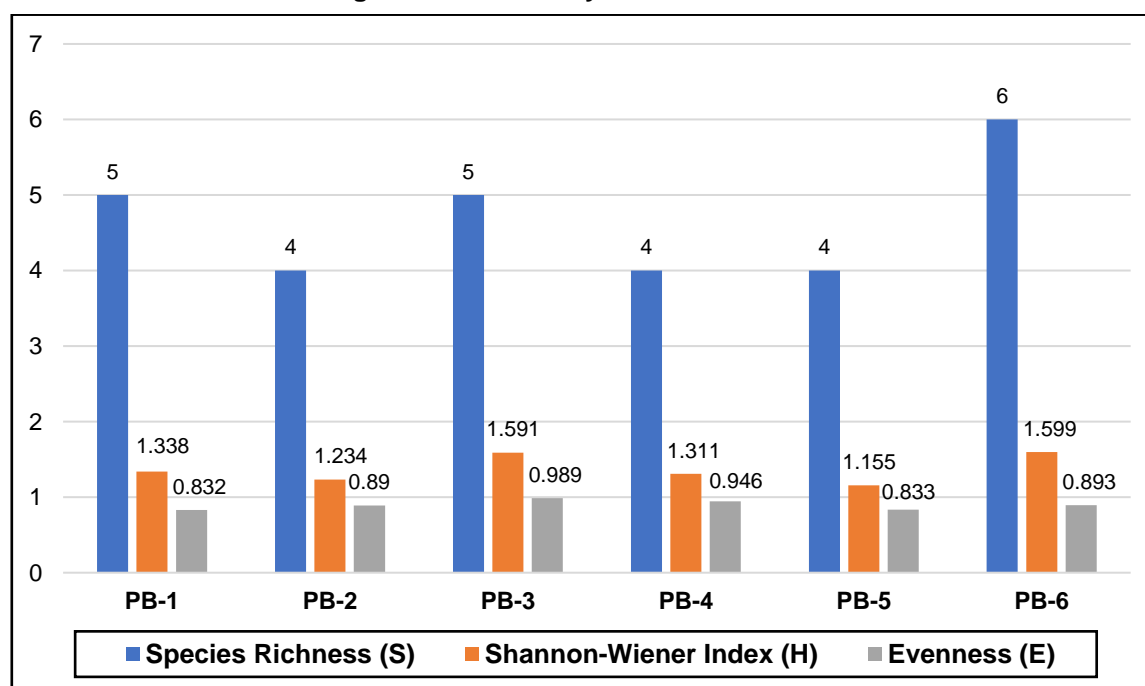
S/N	Groups	Taxa/ Species	PB1		PB2		PB3		PB4		PB5		PB6	
			n	N	n	N	n	N	n	N	n	N	n	N
2.		<i>Brotia costula</i>	2	89	2	89	3	133	2	89	2	89	0	0
3.		<i>Indoplanorbis exustus</i>	2	89	0	0	2	89	3	133	0	0	2	89
4.	Polychaeta	<i>Lmbrineris</i> sp.	0	0	3	133	0	0	0	0	7	311	1	44
5.		<i>Nereis</i> sp.	7	311	9	400	3	133	0	0	19	844	6	266
6.	Insecta	<i>Chironomus</i> sp.	2	89	0	0	2	89	3	133	0	0	3	133
7.	Bivalvia	<i>Lamellidens</i> sp.	0	0	0	0	3	133	0	0	0	0	1	44

Source: EQMS Laboratory Analysis, March 2023

*n= Number of individuals per sample (Grab area= 0.0225 m²); N= Number of individuals/m²

The Shannon-Wiener diversity indices by sampling location have been presented in Figure 5-56. The graph indicates macrobenthos diversity is higher in the (PB-6) and lower in the sampling point PB-5. The evenness value is higher in the sampling point PB-3 and lower in PB-1 and PB-5. A higher Evenness value of PB-3 indicates that the number of Benthos classes is more evenly distributed among the other sampling points.

Figure 5-56: Diversity indices of benthos



Source: EQMS Field Survey, March 2024

5.6.3.5 Aquatic Mammals

The Ganges River Dolphin ("Shushuk" in Bangla), *Platanista gangetica* is a freshwater dolphin species distributed throughout the Ganges-Brahmaputra-Meghna River systems in Bangladesh.

According to the IUCN Red List of Bangladesh 2015, The Ganges River Dolphin is listed as Vulnerable (VU) but the Global IUCN Red List of Threatened Species (version: 2022-2) listed it as Endangered

(EN). This species is placed on the First Schedule of the Bangladesh Wildlife (Conservation and Security) Act, 2012.

During the study period, no individuals were seen at the project site adjacent to the river area or AOI. Consultation of local people and fishermen revealed that they did not observe Ganges River Dolphin (*Platanista gangetica*) in the project adjacent branch of Meghna River. Also, consultation with the Upazila Fisheries Officer of Meghna Upazila confirms the absence of the Ganges River Dolphin in the project adjacent river (Meghna River branch) area.

Besides this primary survey, Key Informant Interviews (KIIs) were conducted with forest department officials, NGOs, and university professors to assess the likelihood of the AOI being suitable dolphin habitat (Figure 5-57). Each of them also confirmed that due to the lack of suitable habitat in the AOI, the likelihood of the presence of this species seems to be very low.

Figure 5-57 Stakeholder Consultation Regarding the Dolphin Issue in the Project AOI



KII with Dr. M. Monirul H. Khan, Professor & Chairman, Department of Zoology, Jahangirnagar University



KII with Dr. Sheikh Muhammad Abdur Rashid, CEO, CARINAM

Source: EQMS Site Visit and stakeholder consultation, February 2024

5.6.4 Areas of Higher Biodiversity and Conservation Significance

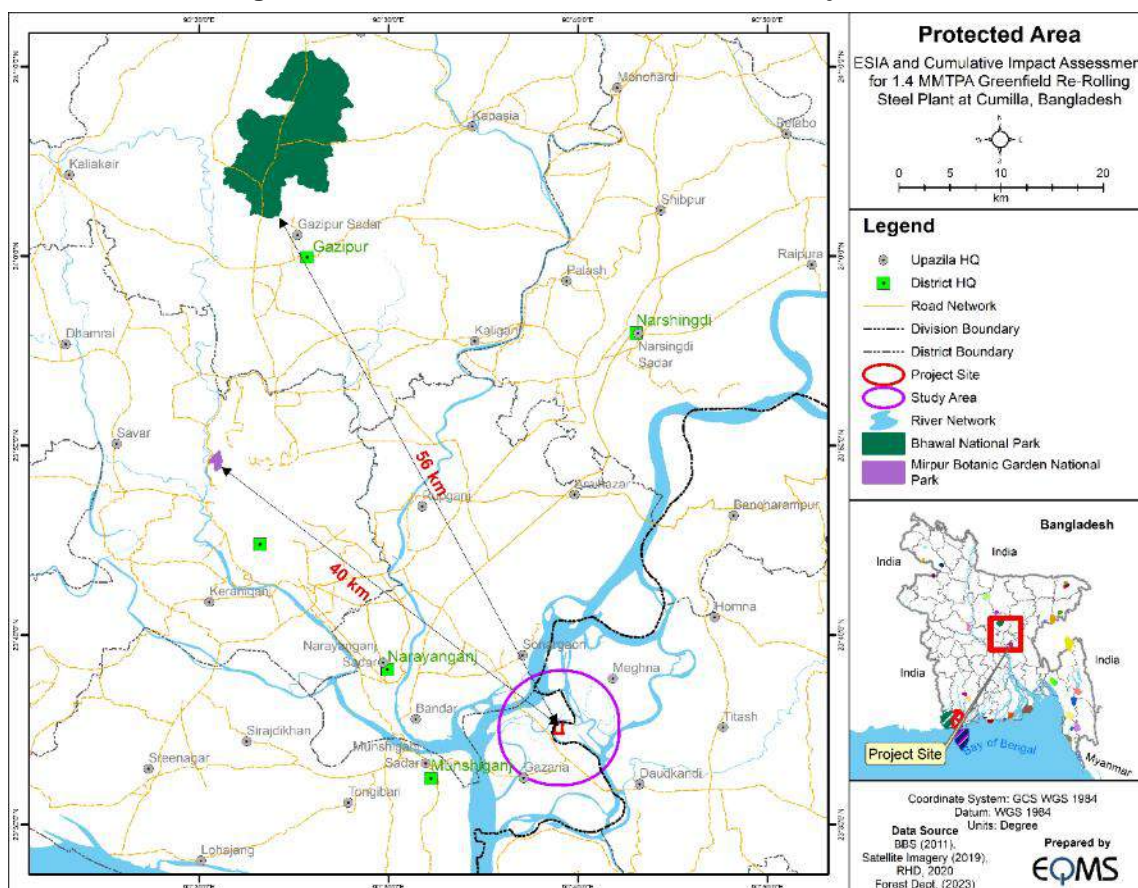
5.6.4.1 Protected Areas (PAs)

A protected area is a clearly defined geographical space, recognized, dedicated, and managed to achieve the long-term conservation of nature, associated ecosystem services, and cultural values. Protected areas (PA) or conservation areas are locations which receive protection because of their recognized natural, ecological, or cultural values. There are several kinds of protected areas, which vary by level of protection, depending on the enabling laws of each country or the regulations of the international organizations involved.

In Bangladesh, the Forest Department defines and designates the number of “Protected Areas” viz. Wildlife Sanctuary, National Park, Safari Park, Eco-Park, Botanical Garden, Special Biodiversity Conservation Area, Marine Protected Area, Aviary Park, etc. There are 53 (Fifty-three) Protected Areas in Bangladesh according to the Forest Department Website (February 2024).

There are two (2) PAs nearer to the project site. No Protected Area is present within the project AOI. The nearest PA from the project site is Mirpur Botanical Garden National Park (Approximately 40 km North-west from the project site).

Figure 5-58: Protected Areas Nearest to the Project Site



Source: Bangladesh Forest Department (February 2024)

5.6.4.2 Ecologically Critical Areas (ECAs)

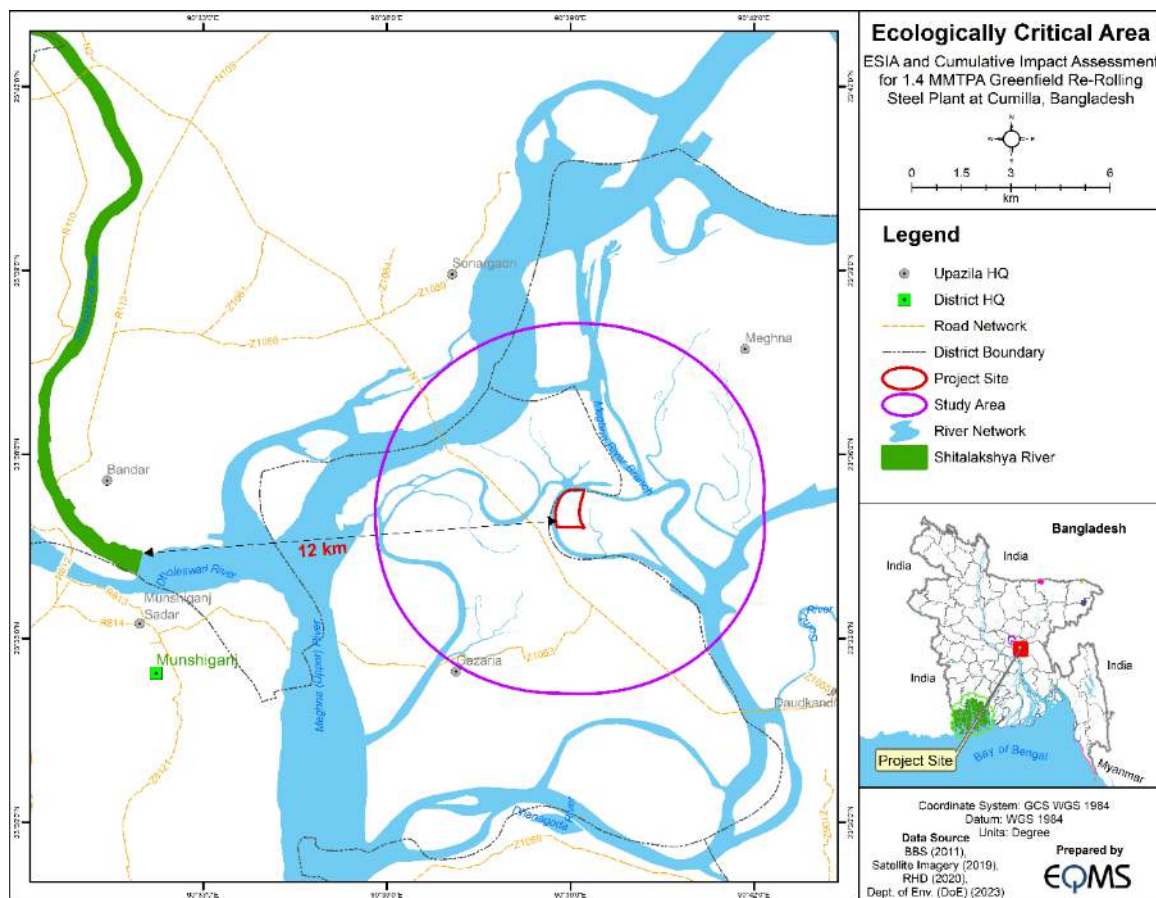
As per Bangladesh law, the Ecologically Critical Areas (ECAs) are ecologically defined areas or ecosystems affected adversely by the changes brought through human activities. An area which is enriched with unique biodiversity and environmentally significant and shall need protection or conservation from destructive activities can be declared as ECA. To improve the condition of ecosystems, the government declared thirteen ECAs till now with varying levels of degradation, comprising coastal areas, islands, wetlands, and rivers in different parts of the country. The Ministry of Environment, Forest and Climate Change (MoEFCC) has declared 13 areas as ECAs.

Ecologically Critical Area has restriction on-

- Natural forest and trees cutting
- Any type of wild animal killing
- Oysters, corals, turtles, and other wildlife hunting
- Any type of activities which may destroy the flora and faunal residence.
- Any type of activity which may destroy/change the quality of land and water.
- Construction of industry/plant which produces soil, water, and noise pollution.
- Any functions which is bad for fish and aquatic species
- Any functions which can produce solid and liquid waste.
- Stone or Mineral resource extraction using Auto or Manual or other methods

There is no Ecologically Critical Area present within the project AOI. The nearest ecologically critical area is Shitalakshya River, which is approximately 12 km away (Western direction) from the project boundary (Figure 5-59).

Figure 5-59: Ecologically Critical Areas Nearest to the Project Site



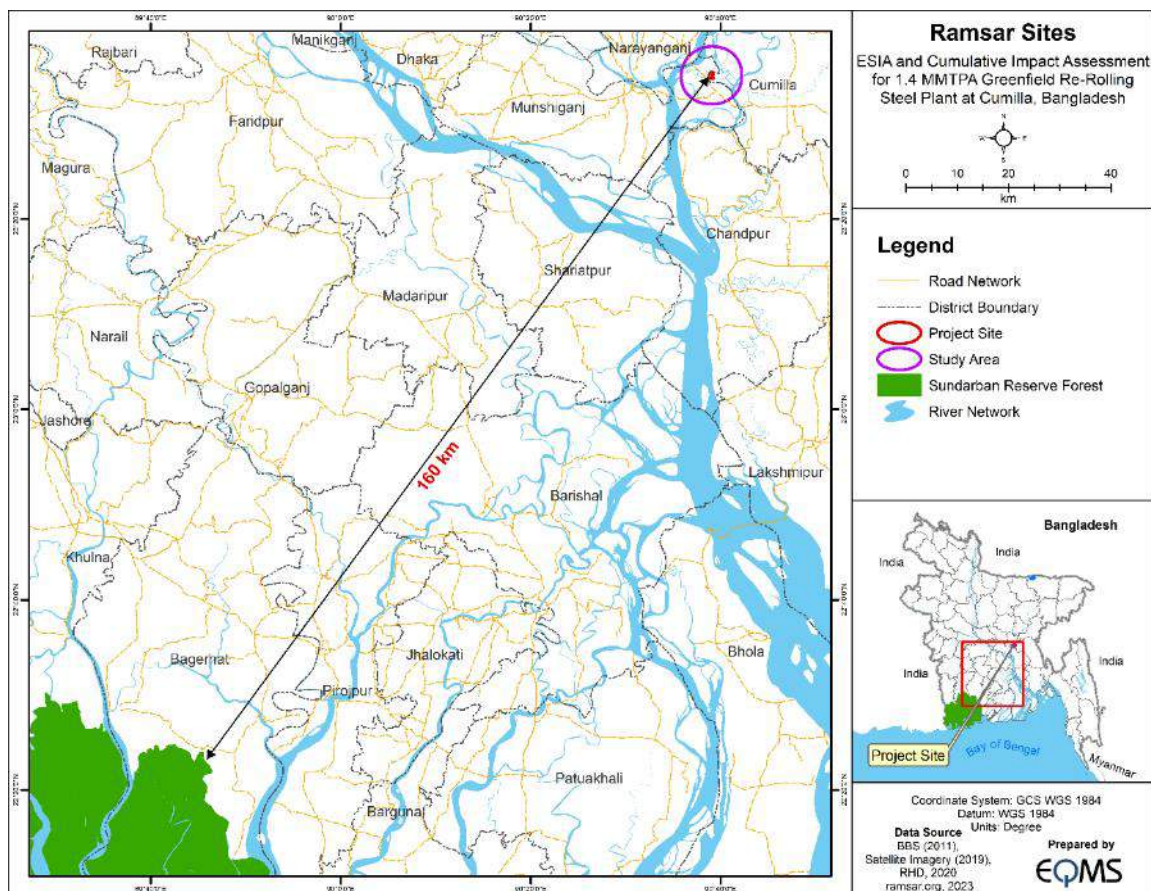
Source: Department of Environment, Bangladesh (February 2024)

5.6.4.3 Ramsar Sites

Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention. The Convention on Wetlands, known as the Ramsar Convention, is an intergovernmental environmental treaty established in 1971 by UNESCO, which came into force in 1975. It provides support for national action and international cooperation regarding the conservation of wetlands, and wise sustainable use of their resources.

Bangladesh currently has two (2) sites designated as Wetlands of International Importance (Ramsar Sites) with a surface area of 611,200 hectares which are Sundarbans Reserved Forest (160 km from the project site) and Tanguar Haor. However, there are no Ramsar Sites within the project AOI. The Map of Ramsar site presented in the Figure 5-60.

Figure 5-60: Ramsar sites map



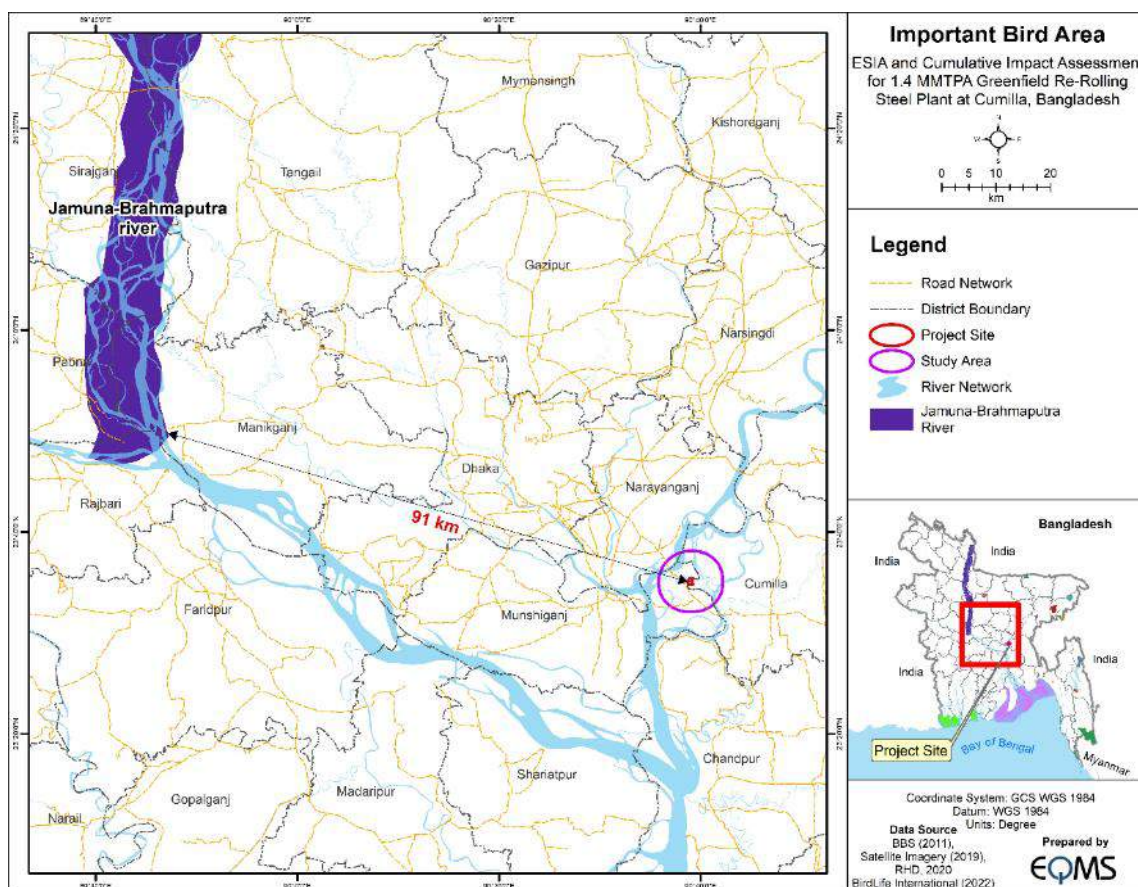
Source: Ramsar Convention

5.6.4.4 Important Bird and Biodiversity Areas (IBAs)

According to BirdLife International (2023), there are 20 (twenty) Important Bird & Biodiversity Areas (IBAs) in Bangladesh with a total area of 544,438 ha³³. The nearest IBA is Jamuna-Brahmaputra River IBA (Figure 5-61) Which is 91 km North-western side from the project AOI. The Jamuna-Brahmaputra River IBA extends along the course of the Jamuna/Brahmaputra River, which originates in the Tibetan Plateau and flows through the Indian states of Arunachal Pradesh and Assam before entering Bangladesh. The area of Jamuna-Brahmaputra River IBA is 200,000 ha and declared in 2004. It forms a vast floodplain before joining the Ganges River in Bangladesh.

³³ BirdLife International. (2023, July 23). *Country Profile: Bangladesh*. <http://www.birdlife.org/datazone/country/Bangladesh>

Figure 5-61: Nearest IBAs from the Project site



Source: BirdLife International (2024)

5.6.5 Critical Habitat Assessment

5.6.5.1 Introduction

'Critical Habitat' is a concept applicable to several international financial lending institutions, like IFC, designed to enable the identification of areas of high biodiversity value in which development would be particularly sensitive and require special attention. The concept has been developed in consultation with numerous international conservation organizations, and thus considers many pre-existing conservation approaches, such as Key Biodiversity Areas, Important Bird Areas, and Alliance for Zero Extinction Sites. This comprehensive approach has meant that it has seen high levels of interest and uptake.

The concept of Critical Habitat is further defined in the following document:

- International Finance Corporation (IFC): IFC Performance Standard 6 (PS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources.

The objective of undertaking Critical Habitat Assessment (CHA) for 1.4 MMTA Greenfield Re-Rolling Steel Plant (the Project) is to arrive at definitive conclusions regarding whether the area where a development has been proposed meets the definitions of a Critical Habitat, per the classifications set out in IFC PS6 following the criteria and processes for CHA described therein.

A Critical Habitat Assessment was undertaken utilizing a three-stage approach:

- Stage 1 – Desktop Assessment and Stakeholder Engagement

- Following the definition of the study area, initial desktop reviews and consultations with the local community and qualified specialists were conducted using interviews and letters. This aimed to understand the possible biodiversity features and use of natural resources within the project landscape from the perspective of all relevant stakeholders.
- Stage 2 – Field Surveys and Data Collection
 - At this stage, field surveys were conducted to confirm distribution of biodiversity features and ecological functions within the project area.
- Stage 3 – Assessment of Findings against Critical Habitat Criteria
 - Determination of critical habitat and priority biodiversity feature status was made against prescribed thresholds as per IFC PS6 (v. January 01, 2012) and its Guidance Note 6 (June 27, 2019). The findings of the CHA process fed into the overall project ESIA and subsequent environmental management and monitoring programs.

5.6.5.2 Constraints and Limitations of CHA

This Critical Habitat Assessment (CHA) leverages data available to EQMS Consulting Limited as of May 2024. Our data sources encompass:

- Publicly available information obtained through online searches and similar studies carried out in the Meghna ghat area.
- Global biodiversity data retrieved from the Integrated Biodiversity Assessment Tool (IBAT).
- On-site biodiversity field surveys.

It's important to note that field surveys were not conducted throughout the year. Consequently, it was necessary to make some assumptions regarding species' presence and abundance during unsurveyed periods. Detailed field data on the presence and distribution of different ecosystems within the EAAA was limited. To address this, the mapping and calculations of occupied areas for threatened species primarily relied on publicly available data sources.

5.6.5.3 IFC Performance Standard 6

The project aims to align with the requirements of IFC PS6. The objectives of this standard are to protect and conserve biodiversity, maintain benefits from ecosystem services, and promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities. IFC PS6 provides guidance on how to identify three classes of areas based on their condition and significance for biodiversity. These three classes are:

- Modified Habitat (MH)
- Natural Habitat (NH)
- Critical Habitat (CH)

5.6.5.3.1 Natural and Modified Habitat

Under PS6, habitat is classified as either Natural or Modified based on the extent of human modification of the ecosystem. For example, agricultural areas, plantations and urban areas show “substantial modification” and would be classed as Modified, whereas woodlands exploited for non-timber forest products or grasslands that retain most of the original species and ecological processes and would in most cases be considered Natural Habitat (NH).

PS6-compliant projects must implement mitigation strategies that are designed to achieve No Net Loss (NNL) for NH, and this requirement for NNL can also extend to individual populations of threatened species supported by a specific habitat.

5.6.5.3.2 Critical Habitat

Areas of “high biodiversity value” are termed as Critical Habitat (CH) by the IFC. Such a designation is based on the presence and/or quantity of significant types of biodiversity (e.g., threatened species, highly threatened ecosystems, etc.). PS6-compliant projects must achieve a Net Gain (NG) for CH values. IFC PS6 has four criteria with defined quantitative thresholds to identify CH:

- **Criterion 1: Critically Endangered (CR) and Endangered (EN) species:**
 - 1a: Areas that support globally important concentrations of an IUCN Red-listed EN or CR species ($\geq 0.5\%$ of the global population and ≥ 5 reproductive units of a CR or EN species).
 - 1b: Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a).
 - 1c: As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.
- **Criterion 2: Restricted-range species:**
 - 2a: Areas that regularly hold $\geq 10\%$ of the global population size and ≥ 10 reproductive units of a species.
- **Criterion 3: Migratory/congregatory species:**
 - 3a: Areas known to sustain, on a cyclical or otherwise regular basis, $\geq 1\%$ of the global population of a migratory or congregatory species at any point of the species' lifecycle.
 - 3b: Areas that predictably support $\geq 10\%$ of the global population of a species during periods of environmental stress.
- **Criterion 4: Highly threatened and/or unique ecosystems:**
 - 4a: Areas known to sustain a significant percentage of the global extent.

For Critical Habitat Assessment there is one qualitative criterion:

- **Criterion 5 – Key evolutionary processes:**
 - Areas with certain features of a landscape including high spatial heterogeneity, environmental gradients, connectivity between habitats and sites of demonstrated importance for climate change adaptation. No quantitative thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgement.

5.6.5.4 Methodology

5.6.5.4.1 Determination of Ecological Appropriate Area of Analysis (EAAA)

In line with IFC PS6 Guidance Note (GN) 6 (IFC 2019), particularly GN59, a Critical Habitat Assessment (CHA) should be conducted for each regularly occurring species within the project's area of influence or ecosystem. This applies to species meeting Criteria 1-4 as outlined in the IFC GN. These assessments should be conducted within an Ecologically Appropriate Area of Analysis (EAAA). The boundaries of an EAAA are determined by considering the distribution of species or ecosystems (within and sometimes extending beyond the project's area of influence) and the ecological patterns, processes, features, and functions that are necessary for maintaining them. This approach ensures that all important biodiversity within the project footprint and linked surrounding habitats are taken into consideration.

This Critical Habitat Assessment (CHA) evaluates the range of species with the potential to occur within the project's area of influence. This includes various wildlife and fish species with significant mobility differences. Due to this variation, the assessment has employed various species specific EAAAs. These are described below in Table 5-29.

Table 5-29 Description of the Ecologically Appropriate Areas of Analysis (EAAA) used to determine the presence of Critical Habitat for different Species

Biodiversity Features	EAAA	Rationale	EAAA area (km ²)
Grey-headed Lawping (<i>Vanellus cinereus</i>)	11.5 km buffer radius around the Steel Plant	The proposed EAAA corresponds to a buffer distance equal to the diameter of an average winter home range, as recorded for this species in Yuanjiang, China (18.56 km ² : Lei et al. 2021) and represents the maximum distance from the project at which a migratory/ congregatory Grey-headed Lawping could interact with the Project area.	5,692
Black-bellied Tern (<i>Sterna acuticauda</i>)	8.5 km buffer radius around the Steel Plant	Definition of the EAAA follows the same approach as for Grey-headed Lawping but uses a home range of 793 km ² based on information from IUCN Red List of Threatened Species of Bangladesh 2015 (Vol. 03 Birds).	850
Pallas's Fish Eagle (<i>Haliaeetus leucoryphus</i>)	19 km buffer radius around the Steel Plant	The proposed EAAA corresponds to a buffer distance equal to the diameter of an average home range, as recorded for this species in Mongolia, India, And Myanmar (50 km ² : Steele, 2017) and represents the maximum distance from the project at which a breeding migrant eagle could interact with the Project area.	5,699
Steppe Eagle (<i>Aquila nipalensis</i>)	25 km buffer radius around the Steel Plant	Definition of the EAAA follows the same approach as for Pallas's Fish Eagle but uses a home range size of 41 km ² from Ustyurt Plateau in Uzbekistan (CHA – Kungrad 1.5 GW Wind Farm Project, 2023).	1,39,772
Ganges River Dolphin	10 km buffer radius around the Steel Plant	Little is known about home range sizes in <i>Platanista gangetica</i> (Gomez and Swinton, 2009). However, expert consultation suggest that their home range average home range is 15 km ² which also represents the maximum distance from the project at which Ganges River Dolphin could interact with the project area	7,338
Spotted Pond Turtle (<i>Geoclemys hamiltonii</i>)	6.5 km buffer radius around the Steel Plant	Definition of the EAAA used an approach analogous to that for Grey-headed Lawping, although using dispersal rather than home range information. The 6.5 km value was taken from studies on dispersal distance by the Reeves' Turtle (<i>Mauremys reevesii</i>) (maximum distance of 6570 m; Shi et al., 2023) and very likely represents a precautionary estimate for other species.	7,453
Yellow Monitor (<i>Varanus faveszens</i>)	1.5 km buffer radius around the Steel Plant	Definition of the EAAA used an approach analogous to that for Grey-headed Lawping, although using dispersal rather than home range information. The 1.5 km value was taken from studies on	16,459

Biodiversity Features	EAAA	Rationale	EAAA area (km ²)
		the mean straight-line travelled on active days by the Lace monitor (<i>Varanus varius</i>) (maximum distance of 335 m; Guarino, 2002) and very likely represents a precautionary estimate for other reptile species.	
Indian Softshell Turtle (<i>Nilssononia gangetica</i>)	6.5 km buffer radius around the Steel Plant	Definition of the EAAA used an approach analogous to that for Grey-headed Lapwing, although using dispersal rather than home range information. The 6.5 km value was taken from studies on dispersal distance by the Reeves' Turtle (<i>Mauremys reevesii</i>) (maximum distance of 6570 m; Shi et al., 2023) and very likely represents a precautionary estimate for other species.	45,348
Humped Featherback (<i>Chitala chitala</i>)	10 km buffer radius around the Steel Plant	Little is known about home range sizes Humped Featherback (<i>Chitala chitala</i>). However, expert consultation suggest that their home range average home range is around 15 km ² which also represents the maximum distance from the project at which Bengala Barb could interact with the project area	7,302

5.6.5.4.2 Analysis

A list of relevant biodiversity values overlapping with each defined EAAA was obtained via the Integrated Biodiversity Assessment Tool (IBAT)³⁴. These lists were further refined using publicly available databases (e.g., GBIF³⁵, eBird³⁶), information from biodiversity field surveys conducted for the Project, and the consultation of a regional expert on flora, habitats, and ecosystems. Species were then informally screened to discount those that would clearly not meet relevant thresholds (e.g., due to low level of range overlap, habitat unsuitability, or being known to be extinct in the EAAA). Fish and plant species were also screened out at this phase because: i) impacts on freshwater fishes from the Project are very unlikely, provided that adequate standard mitigation measures (e.g., avoiding spillages or runoff of pollutants or waste) are implemented; and ii) none of the plant species with a threatened status or range-restricted distribution that could possibly trigger CH qualification has been identified at the Project area during the vegetation surveys conducted to date.

The shortlist of species was then assessed against the applicable CH criteria and thresholds following IFC 2019, noting that species may be screened against multiple criteria. Five categories of certainty were used based on the evidence that a species qualifies as triggering Critical Habitat.

- Certain – if data demonstrate exceedance (e.g., numbers based on field surveys).
- Likely – if the range overlap, or other evidence, suggests the EAAA is likely to exceed the threshold, and the species' presence has been confirmed in the Project area.

³⁴ IBAT is a global biodiversity dataset setup by a partnership between BirdLife International, Conservation International, the International Union for Conservation of Nature (IUCN) and United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC), which enables the access to key biodiversity datasets, such as the IUCN Red List, IUCN/UNEP-WCMC Protected Planet, IUCN-BirdLife Key Biodiversity Areas, etc. Note that an IBAT subscription is mandatory to use any of the above-mentioned dataset for commercial purposes <https://www.ibat-alliance.org/>

³⁵ <https://www.gbif.org/>

³⁶ <https://ebird.org/home>

- Possible – if the range overlap is close to the threshold, or there is the potential for the EAAA to have a higher proportion of the population than average, and the species' presence has been confirmed in the Project area.
- Non-conclusive – if the outcome of the assessment would have otherwise been likely/possible CH, but the species' presence has not been confirmed in the Project area; and
- Does not qualify – if available evidence indicates that the threshold is not exceeded.

5.6.5.5 Potential Critical Habitat-qualifying species

The 49 threatened species are potentially found within 50 km of the area of interest using the Integrated Biodiversity Assessment Tool (IBAT). Beside these species, a total of 13 'restricted range' species were also found through IBAT screening. The identification of Critical Habitat-qualifying Species through IBAT is enhanced by a subsequent screening process. This process involves Key Informant Interviews (KIIs) with local experts, Focus Group Discussions (FGDs) with locals, and secondary literature search. Additionally, the IUCN Red List of Threatened Species of Bangladesh is used to examine the distribution of these CH-qualifying species. Through this comprehensive approach, only the following species, out of the initially identified 62, are assessed to confirm their occurrence in the study area of the Re-rolling Steel Plant project.

Table 5-30 Species screening shortlist considered against IFC PS6 Critical Habitat criteria, and assessment conclusions

1. Black-bellied Tern (<i>Sterna acuticauda</i>)		
Status	Global IUCN: Endangered (EN)	IUCN Bangladesh: Critically Endangered (CR)
Notes	<p>The Black-bellied Tern occurs along the main rivers of the central and northern regions of Bangladesh. Beyond Bangladesh, this species is also found in Cambodia, India, the Lao People's Democratic Republic, Myanmar, Nepal, Pakistan, Thailand, and Vietnam. In Bangladesh, the Black-bellied Tern is gregarious and inhabits freshwater environments such as large rivers, lakes, and other inland waters, and it rarely occurs in coastal zones.</p> <p>The population of the Black-bellied Tern has declined by more than 90% over the past 20 years (from 98 individuals in 1995 to 2 in 2012). It is now feared to be extirpated, as recent surveys in its traditional habitats have failed to record any individuals of this species. Although a countrywide survey has not been conducted, it can be assumed with certainty that the population is less than 50 (IUCN Bangladesh, 2015).</p> <p>No specimens were recorded during the baseline survey of Re-rolling Steel Plant project, and it is considered absent in the study area.</p>	
Criteria 1	<p>The current range, according to the IUCN, indicates that its Area of Occurrence (AOO) overlaps with the defined EAAA; however, the habitat requirements of this species suggest that the chance of its occurrence in the EAAA is very low. In addition, the species was not recorded in field surveys conducted in the Project area, and its potential occurrence was not assessed. The global population of this species is now estimated to number only 800-1,600 mature individuals. Therefore, it is unlikely that the freshwater and terrestrial habitats within the EAAA would support $\geq 0.5\%$ of the global population, and as such, the thresholds for the determination of Critical Habitat under Criteria 1 are not met.</p>	
Criteria 2	<p>Black-bellied Tern is not endemic, or a range-restricted species and this Criteria is not relevant to this species.</p>	
Criteria 3	<p>This criterion is not relevant to a resident, Black-bellied Tern species</p>	
2. Pallas's Fish Eagle (<i>Haliaeetus leucoryphus</i>)		

Status	Global IUCN: Endangered (EN)	IUCN Bangladesh: Endangered (EN)
Notes	Its global range extends through Central, South and Southeast Asia. It occurs mainly in the haors and open water central, southwest and northeast regions of Bangladesh as well as in other larger wetlands and the Sundarbans Mangrove Forest. This species is an uncommon breeding migrant to Bangladesh and its population is estimated very low (< 250).	
Criteria 1	Though the AOO overlaps with the EAAA for this species as per the IUCN Red List of Threatened Species of Bangladesh, the study area does not support habitats suitable for this species. In addition, the species was not recorded in field surveys conducted in the Project area, and its potential occurrence was not assessed. Based on surveys and available data from across the species' extant distribution, the global population is estimated to fall well below 2,500 mature individuals. Therefore, it is unlikely that the habitats within the EAAA would support $\geq 0.5\%$ of the global population, and as such, the thresholds for the determination of Critical Habitat under Criteria 1 are not met.	
Criteria 2	This species is not endemic or range-restricted and as such Criteria 2 is not relevant to this species.	
Criteria 3	Pallas's Fish Eagles are breeding migrants; however, they are not known to migrate through the Project study area. This species has not been recently recorded within the Project study area and the Re-rolling Steel Plant project baseline study also did not confirm their occurrence in the study area. Therefore, the EAAA is not important for this species, and the thresholds for determining Critical Habitat under Criteria 3 are not met.	

3. Steppe Eagle (*Aquila nipalensis*)

Status	Global IUCN: Endangered (EN)	IUCN Bangladesh: Least Concern (LC)
Notes	The Steppe Eagle lives in Africa, Arabia, the Middle East, South and East Asia including Bangladesh, Bhutan, China, India, Mongolia, Myanmar, Nepal, Pakistan and Russia (Siberia). This uncommon winter migrant is widely distributed in Bangladesh. It is not a habitat specialist and occurs in a wide variety of habitats. The total global population is 50,000 to 75,000 individuals.	
Criteria 1	The area of influence of Re-rolling Steel Plant project does not hold any Steppe Eagle as per baseline biodiversity survey for the project, and its potential occurrence was not assessed. The threshold for triggering Criteria 1 would be between 250 and 375 birds within the EAAA for the populations to be in excess of 0.5% of the global population. Therefore, Criteria 1 is not relevant to this species.	
Criteria 2	This species is not an endemic or range-restricted and as such Criteria 2 is not relevant to this species	
Criteria 3	The Steppe Eagle is a migratory bird in Bangladesh; however, no birds were recorded in the Re-rolling Steel Plant project study area during the baseline survey. Therefore, this bird species is not utilizing any habitat in the study area. As such, it is not determined that the Ecologically Appropriate Area of Assessment (EAAA) supports this species, and thus, a Critical Habitat determination under Criteria 3 cannot be made.	

4. Ganges River Dolphin (*Platanista gangetica*)

Status	Global IUCN: Endangered (EN)	IUCN Bangladesh: Vulnerable (VU)
Notes	Ganges River Dolphin occurs in Bangladesh, India, Nepal, Pakistan. Its subspecies (<i>P. g. gangetica</i>) occurs in the Ganges Brahmaputra-Meghna, and Karnaphuli-Sangu River systems of the South Asian subcontinent, from the deltas upstream to where they are blocked by rocky barriers, shallow water, fast currents, dams, or barrages. All major rivers of Bangladesh support this species.	

	It should also be noted that the results of recent studies, field trips at of Re-rolling Steel Plant project study area, Focus Group Discussions (FGDs) with locals, and relevant Key Informant Interviews (KIIs) suggested their absence in the area of influence of Re-rolling Steel Plant project.
Criteria 1	Though the AOO overlaps with the EAAA for this species as per the IUCN Red List of Threatened Species of Bangladesh, the study area does not support habitats suitable for this species. It was not recorded in field surveys conducted in the Project area, and its presence is classified as unlikely in the Project Aol. The aggregate range-wide abundance of Ganges River Dolphins is suggested to be 4,000–5,000 individuals. The threshold for triggering Criteria 1 would be between 20 and 25 dolphins within the EAAA for the populations to be in excess of 0.5% of the global population. Therefore, Criteria 1 is not relevant to this species.
Criteria 2	Since it's not a restricted-range or endemic species and suitable habitats are not present within the study area, Criteria 2 is not triggered, and no further assessment is required.
Criteria 3	This is not a congregatory or migratory species and as such these criteria is not relevant.

5. Spotted Pond Turtle (*Geoclemys hamiltonii*)

Status	Global IUCN: Endangered (EN)	IUCN Bangladesh: Endangered (EN)
Notes	Spotted Pond Turtle is found in Bangladesh, India, Nepal and Pakistan (Ganges, Indus and Mahanadi River systems). In Bangladesh this species is mostly seen in freshwater wetlands, in the Ganges and Brahmaputra River systems and their adjacent water bodies, including ponds and lakes in the countryside in Bagerhat, Barisal, Comilla, Dhaka, Faridpur, Manikganj, Noakhali, Panchagarh and Patuakhali Districts as well as in the haor basin of eastern parts i.e., greater Mymensingh and Sylhet Districts.	
Criteria 1	Though the AOO overlaps with the EAAA for this species as per the IUCN Red List of Threatened Species of Bangladesh, the study area does not support habitats suitable for this species. The species is considered rare after an abrupt population decline over the past 20 years and its total disappearance from extensive parts of its range in Bangladesh. The species was also not recorded within the EAAA, and its presence is classified as unlikely in the EAAA. Therefore, Criteria 1 is not relevant to this species.	
Criteria 2	This species is not an endemic or range-restricted and as such Criteria 2 is not relevant to this species.	
Criteria 3	Criteria is not relevant to a resident species.	

6. Yellow Monitor (*Varanus flavescens*)

Status	Global IUCN: Endangered (EN)	IUCN Bangladesh: Near Threatened (NT)
Notes	Yellow monitor is known to occur in Bangladesh, Bhutan, India, Nepal and Pakistan. In Bangladesh the yellow Monitor occurs almost in every part of the country barring the deep forests, although not uncommon in the periphery. There are no current data on population size and certain threats are affecting the species and this has led to eradication in some parts of its range in the country.	
Criteria 1	Though the Area of Occupancy (AOO) overlaps with the EAAA for this species according to the IUCN Red List of Threatened Species of Bangladesh, the study area appears unsuitable for this species based on our primary baseline study. Its presence is classified as unlikely within the project Area of Occupancy (AOO). There are no current data on population size and trends for this species. It is uncommon compared with the other monitor lizards in its range. Therefore, it is unlikely that freshwater and terrestrial habitats found within the EAAA would support $\geq 0.5\%$ of the global population	

	and as such the thresholds for determination of Critical Habitat under Criteria 1 are not met	
Criteria 2	This species is not an endemic or range-restricted and as such Criteria 2 is not relevant to this species.	
Criteria 3	Criteria is not relevant to a resident species.	
7. Indian Softshell Turtle (<i>Nilssonia gangetica</i>)		
Status	Global IUCN: Endangered (EN)	IUCN Bangladesh: Endangered (EN)
Notes	Indian Softshell Turtle is found in Bangladesh, India, Nepal and Pakistan (Ganges, Indus and Mahanadi River systems). In Bangladesh this species lives in the major river systems (Ganga-Padma, Jamuna-Brahmaputra, Surma-Kushiyara-Megna, and so on) and floodplains.	
Criteria 1	Though the AOO overlaps with EAAA for this species as per the IUCN Red List of Threatened Species of Bangladesh, the study area does not support habitats suitable for this species. Therefore, it is unlikely that freshwater habitat within Project AoI would support $\geq 0.5\%$ of the global population and as such the thresholds for determination of Critical Habitat under Criteria 1 are not met.	
Criteria 2	This species is not an endemic or range-restricted and as such Criteria 2 is not relevant to this species.	
Criteria 3	Criteria is not relevant to a resident species.	
8. Humped Featherback (<i>Chitala chitala</i>)		
Status	Global IUCN: Near Threatened (NT)	IUCN Bangladesh: Endangered (EN)
Notes	Humped Featherback is recorded from Bangladesh, India, Malaysia, Myanmar, Nepal, Pakistan, the Philippines and also from Thailand. This species is described as a widely distributed species in rivers, beels, haors, reservoirs, canals and ponds (Rahman 2005). However, the species is specifically reported from the river Brahmaputra, Jamuna, Padma, Meghna, Someshwari and Kongsho River of Netrokona, Korotoa and Atrai River of Dinajpur, the Surma River of Sylhet, the Kirtonkhola and Shugandha River of Barishal Division.	
Criteria 1	This species is now extensively cultivated in the fishponds within the project's area of influence. The specimens that were recorded from the local fish market during baseline study were from culture fisheries. Although the AOO overlaps with the EAAA for this species as per the IUCN Red List of Threatened Species of Bangladesh, the study area does not support habitats suitable for the natural population of this species. Therefore, it is unlikely that the freshwater habitat within the EAAA would support a significant number of natural populations, and as such, the thresholds for the determination of Critical Habitat under Criteria 1 are not met.	
Criteria 2	This species is not an endemic or range-restricted and as such Criteria 2 is not relevant to this species.	
Criteria 3	Criteria is not relevant to a resident species.	
9. Grey-headed Lapwing (<i>Vanellus cinereus</i>)		
Status	Global IUCN: Least Concern (LC)	IUCN Bangladesh: Least Concern (LC)
Notes	Grey-headed Lapwing's global range extends over Asia including Bangladesh, Cambodia, China, India, Indonesia, Japan, Korea, Myanmar, Mongolia, Nepal, Russia, Singapore, Taiwan, Thailand, the Philippines and Vietnam. In Bangladesh it occurs mainly in the freshwater wetlands all over the country although it also passes through	

	the coastal areas as well as the Saint Martin's Island in the southeasternmost part of the country. This species is a migratory, diurnal wader and seen in small flocks, sometimes mixed with other lapwings and migratory waders.
Criteria 1	The Grey-headed Lapwing is listed as Least Concern by the IUCN Red List of Threatened Species, indicating it's not Critically Endangered (CR) or Endangered (EN). While the Ecological Appropriate Area of Analysis (EAAA) may contain a large number of these birds, the species itself is considered of low conservation concern. Therefore, Criteria 1 for critical habitat designation is not relevant for the Grey-headed Lapwing.
Criteria 2	This species is not endemic or range-restricted and as such Criteria 2 is not relevant to this species.
Criteria 3	The Grey-headed Lapwing is a migratory bird with a global population estimated between 25,000 and 100,000 individuals (source: IUCN Red List). This species prefers certain habitat types, e.g., wetlands and grasslands. Given the habitat within the EAAA, it's unlikely to support a significant portion of the global population. Specifically, the EAAA is unlikely to sustain $\geq 1\%$ of the global population, which represents roughly 250 to 1000 individuals. Therefore, the thresholds for Critical Habitat designation under Criteria 3 are not likely to be met.

5.6.5.6 Criterion 4: Highly Threatened or Unique Ecosystems

Guidance Note 6 (IFC 2012) defines highly threatened or unique ecosystems as

- at risk of significantly decreasing in area or quality
- with a small spatial extent and/or
- containing unique assemblages of species including assemblages or concentrations of biome-restricted species.

A comprehensive IUCN assessment of ecosystems within the project's area of influence (AOI) is absent, and no equivalent Bangladeshi evaluation exists. Consequently, a formal assessment against Criterion 4 is excluded. However, preliminary evaluation of primary habitats within the Re-rolling Steel Plant project site and its AOI indicates an absence of habitats qualifying under Criterion 4 (Table 5-31).

Table 5-31 Summary of Assessment of Habitats in the Project Site Against Criterion IFC 4

Definition	Assessment
Risk of significantly decreasing in area or quality	The proposed Re-rolling Steel Plant and its associated access roads, wharf and other infrastructure might decrease both the extent and quality of the habitat. However, given the wide distribution of this vegetation type, it is not currently considered to pose a significant risk.
Small spatial extent	The habitat is widespread
Containing unique assemblages of species including assemblages or concentrations of biome-restricted species	The vegetation type does not support unique assemblages or a concentration of biome-restricted species

Based on this assessment, it can be concluded that the project area does not trigger Critical Habitat (CH) concerns under IFC Performance Standard 6, Criterion 4.

5.6.5.7 Criterion 5: Key Evolutionary Processes

This criterion is defined by the physical features of a landscape that might be associated with evolutionary processes, and/or subpopulations of species that are phylogenetically or morpho genetically distinct and may be of special conservation concern given their distinct evolutionary history (IFC 2012b, paragraph GN95).

Although key evolutionary processes may operate at various spatial scales, in the sense of PS6, these are usually considered at a relatively fine scale rather than broad biogeographic regions (e.g., an individual mountain that may have acted as a glacial refugium and thus hosted the evolution of a suite of endemic species). No quantitative significance thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgment. Areas associated with key evolutionary processes were screened using expert advice. Given the very sparse vegetation, composed mainly of widespread homestead plant species with no evidence of local endemism, and the low density of animal species, it is very unlikely that any key evolutionary processes could occur in the Project area. Therefore, the Project area does not qualify for Criterion 5.

5.6.5.8 Summary and Suggestions

For determining whether the project site and the study region comprises a critical habitat, the following guidelines must be applied as per the applicable reference frameworks:

To determine the critical habitat of an area, only the criteria and thresholds provided for defining a CH are indicative for decision-making, as there is not any universally accepted or automatic formula.

- To identify critical habitat in the study area or project area, the project type, scale, anticipated impacts or mitigation strategy is irrelevant. Critical habitat identification is based only on the presence of high biodiversity values in the Study Area or project area.
- The assessment of critical habitat must not focus solely on the Project Site but the whole landscape.
- The CHA must consider the distribution and connectivity of features important to the CH trigger species concerned, as well as the ecological processes that support these features.

Although eight (08) species were reported from the project area of influence as potential trigger species for Critical Habitat (CH), comprising seven (07) Endangered (EN), one (01) Near Threatened (NT), and one (01) Least Concern (LC) species according to the global IUCN status, only five (05) trigger the CH criterion based on their national IUCN status. The remaining four (04) species do not meet the CH criterion as their national IUCN status is Vulnerable, Near Threatened, or Least Concern. According to the assessment conducted following the International Finance Corporation's (IFC) Performance Standard 6 (PS6) and its Guidance Note (2019), none of the species in the study area meet the threshold limit for Criterion 1. Moreover, the study area does not qualify for CH Criteria 2 to 5 and does not overlap fully or partially with any internationally and/or nationally designated area.

Thus, it has been concluded that the proposed 1.4 MMTPA Greenfield Re-Rolling Steel Plant site and its area of influence is not a Critical Habitat for any of the identified species, because the study area does not meet any of the IFC(PS6), 2012 and its Guidance Note (2019) criteria during the critical habitat screening study. Hence, the Project area does not qualify for critical habitat areas.

5.7 Natural Hazards, Vulnerability for the Project

5.7.1 Earthquake

The location of Bangladesh is adjacent to the plate margins of India and Eurasia where earthquake has occurred in the past. The project site is situated at the southern tip of a Pleistocene terrace of the Madhupur Tract. Significant damaging historical earthquakes have occurred in and around Bangladesh and damaging moderate-magnitude earthquake occur every few years. The position of Bangladesh is adjacent to the very active Himalayan subduction plate in the north, moving east, and the westward movement of the Burma deformation produce the potential for earthquakes. Over the past 200 years, at every 30 years intervals, Bangladesh has experienced several large earthquakes. Since 1860, more than 20 light and intermediate major earthquakes, with epicenters in Bangladesh, have been experienced. The flow of the river was diverted because of catastrophic earthquakes in 1762 and 1782. Also, these earthquakes have been partially responsible for the diversion of the Old Brahmaputra River

to the Jamuna Channel. Thus, the design of land buildings and land-based structures for this project should be as per of the Bangladesh National Building Code (2021). According to the Bangladesh National Building Code (BNBC) 2021, the country has been divided into four seismic zones with different levels of ground motion. Table 5-32 includes a description of the four seismic zones.

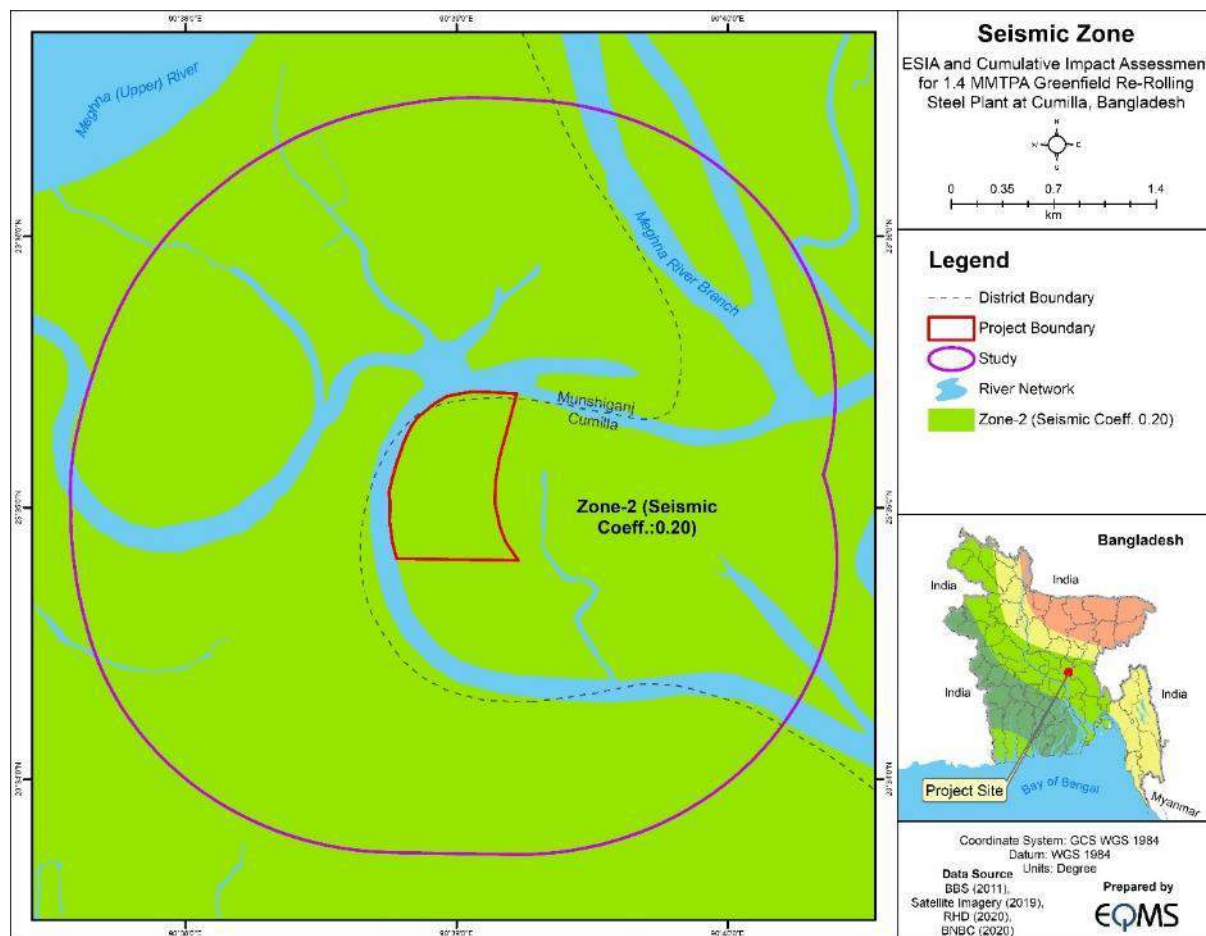
Table 5-32: Description of Seismic Zones

Seismic Zone	Location	Seismic Intensity	Seismic Zone Coefficient, Z
1	Southwestern part including Barisal, Khulna, Jessore, Rajshahi	Low	0.12
2	Lower Central and Northwestern part including Noakhali, Dhaka, Pabna, Dinajpur, as well as Southwestern corner including Sundarbans	Moderate	0.20
3	Upper Central and Northwestern part including Brahmanbaria, Sirajganj, Rangpur	Severe	0.28
4	Northeastern part including Sylhet, Mymensingh, Kurigram	Very Severe	0.36

Source: Bangladesh National Building Code (BNBC), 2021

There are four seismic zones in Bangladesh. Each zone has a seismic zone coefficient (Z) which represents the maximum considered peak ground acceleration (PGA) on very stiff soil/rock (site class SA) in units of g (acceleration due to gravity). The zone coefficients (Z) of the four zones are Z=0.12 (Zone 1), Z=0.20 (Zone 2), Z=0.28 (Zone 3), and Z=0.36 (Zone 4). According to this seismic zoning, the proposed project is located in Zone-2 (moderate seismic intensity), with a seismic coefficient Z=0.20g. The seismic zone map of the study area is given in Figure 5-62 .

Figure 5-62: Map showing seismic zoning map of Bangladesh with project area



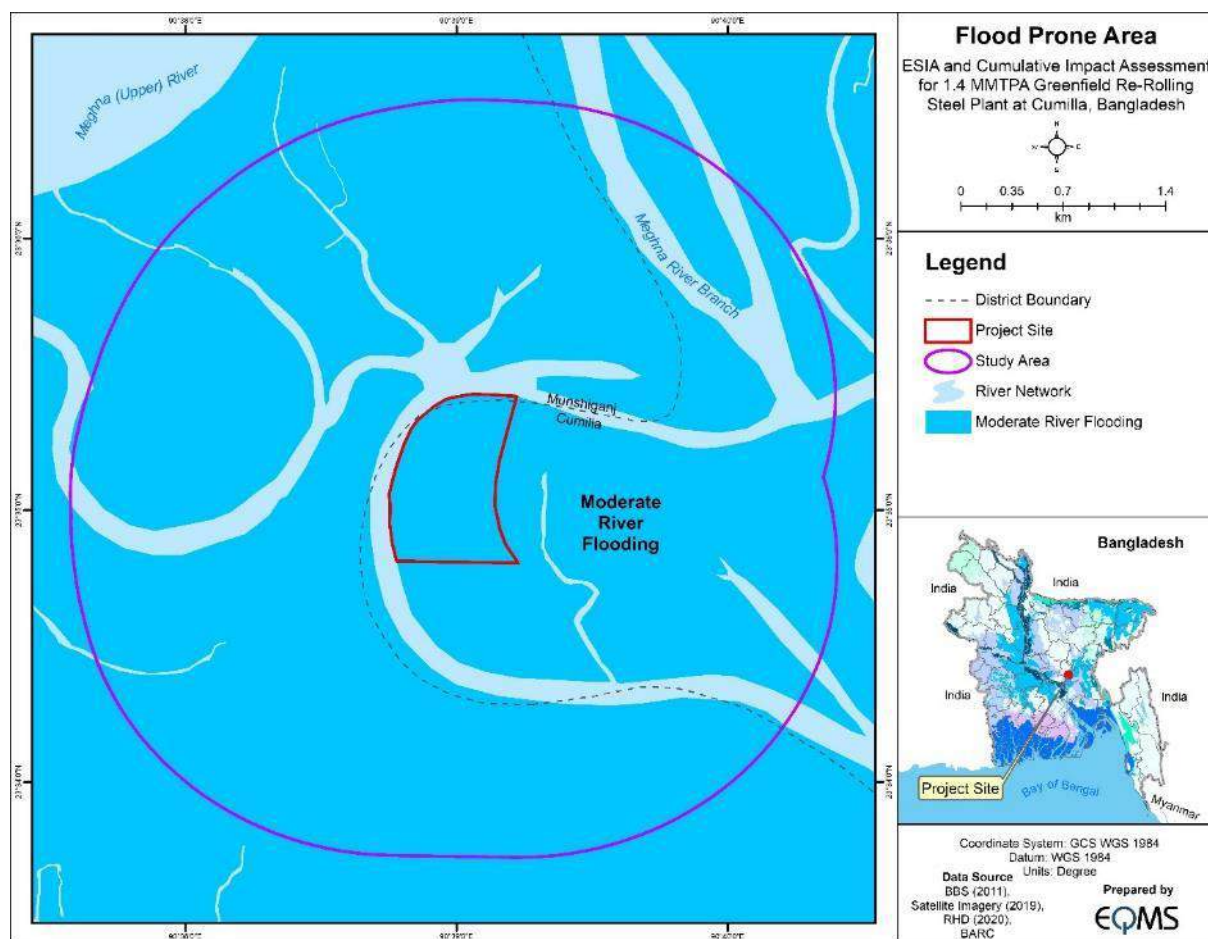
Source: Bangladesh National Building Code (BNBC), 2024

5.7.2 Flood

Bangladesh is situated on the Brahmaputra River Delta and is prone to flooding. Being less than 5 meters above mean sea level, Bangladesh faces the cumulative effects of floods during the monsoon season from June to September. Ganga-Brahmaputra-Meghna (GBM) Basin is one of the largest river basins (1.7 million sq. Km) in South-East Asia passing through various countries such as India (64%), China (18%), Bangladesh (7%), Bhutan (9%) and Nepal (3%) (BWDB, 2006). Bangladesh is at the confluence of three rivers-Ganga, Brahmaputra and Meghna. Meghna River is one of the most important rivers in Bangladesh and the area of Meghna River basin is more than half of the country's area. Meghna River is divided into two parts-Upper Meghna River and Lower Meghna River. Upper Meghna River is from Bhairab Bazar (24.0555° N, 90.9802° E) up to Chandpur (23.2321° N, 90.6631° E) and Lower Meghna River is from Chandpur to the end point in the sea.

There are four different types of floods encountered in the Bangladesh-Flash floods, river floods, tidal floods and storm surges. The Meghna River basin is subjected only to flash floods and river floods. Flash floods are restricted to the far eastern and far northern portion of the basin and therefore the study area is mainly subjected to river floods. The proposed project site is located in the Moderate River Flooding area. The flood prone area map of the study area is given in Figure 5-63.

Figure 5-63: Flood Prone Area map of the study area



Source: BARC, 2024

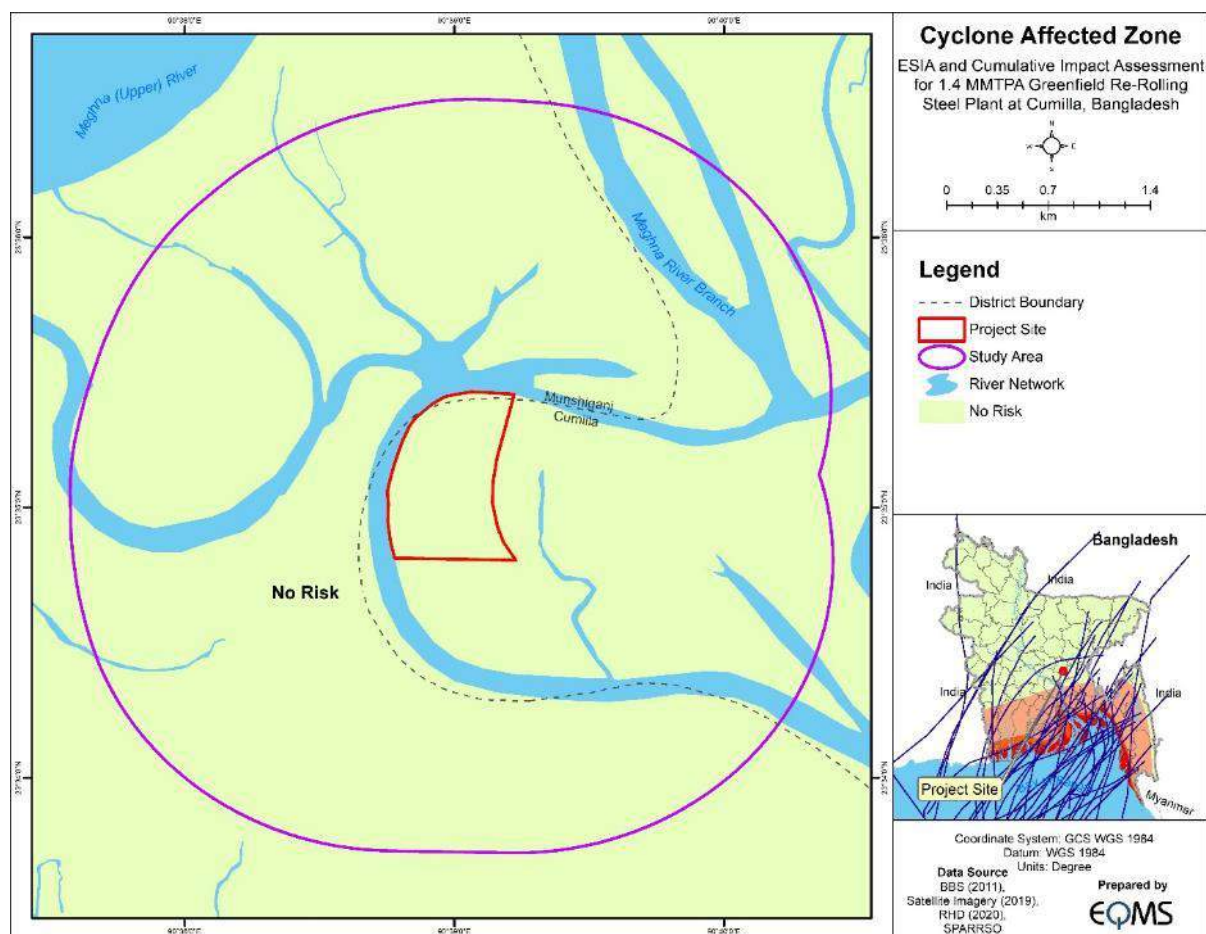
A detailed Flood Risk Assessment has been undertaken and incorporated in Section 9.3.

5.7.3 Cyclone

Natural Hazard is the naturally occurring events like cyclone, earthquake and flood etc. which can become hazardous due to the intervention of human infrastructure. It is not that these events are hazardous but it's the vulnerability of human infrastructure to destruction (risk) that makes such events hazardous. In view of the past natural hazard events in Bangladesh, atmospheric and exogenic hazards risk are high and endogenic hazards risk are relatively low. In Bangladesh Cyclone and flood are major natural hazards. Almost every year overwhelming cyclones hit Bangladesh. At the time of Cyclone, the winds speed sometimes reach 250 km/hr or more and 3- 10 m high waves. For these types of Cyclones every year extensive damages have happened to life, property and livestock. These cyclones occur in two seasons, April-May and October-November. However, the proposed project Site is in the 'no cyclone risk zone'. In fact, the Site has a no cyclone risk within 5 km of its radius.

The cyclone map of the study area is given in Figure 5-64

Figure 5-64: Cyclone affected zone map of the study area



Source: SPARSO, 2024

5.8 Socio-economic Environment

Examining the existing socio-economic conditions of the residents in the project area will serve as a valuable benchmark for evaluating the potential socio-economic effects of proposed interventions. This analysis will facilitate a comparison of future changes and impacts resulting from the project interventions. Socio-economic characteristics encompass various aspects such as administrative structure, demographics, household size, education, occupation, housing, employment opportunities, and access to water and sanitation.

5.8.1 Approach and Methodology

For the purposes of establishing the socio-economic baseline for the project and undertaking the social impact assessment of the project, a phased participatory approach was adopted. Through this approach, an attempt was made to integrate the local understanding and perspective into the impact assessment process and identification of the mitigation measures. The purpose of such an approach was to allow for:

- The triangulation of the information available from secondary sources through the information made available by the local community, both qualitative and quantitative.
- Formulation of the socio-economic baseline based on a combination of primary and secondary qualitative and quantitative data.

An understanding to be developed of the local community's perception of the project and its activities and the possible impacts from the same and the desirable mitigation measures.

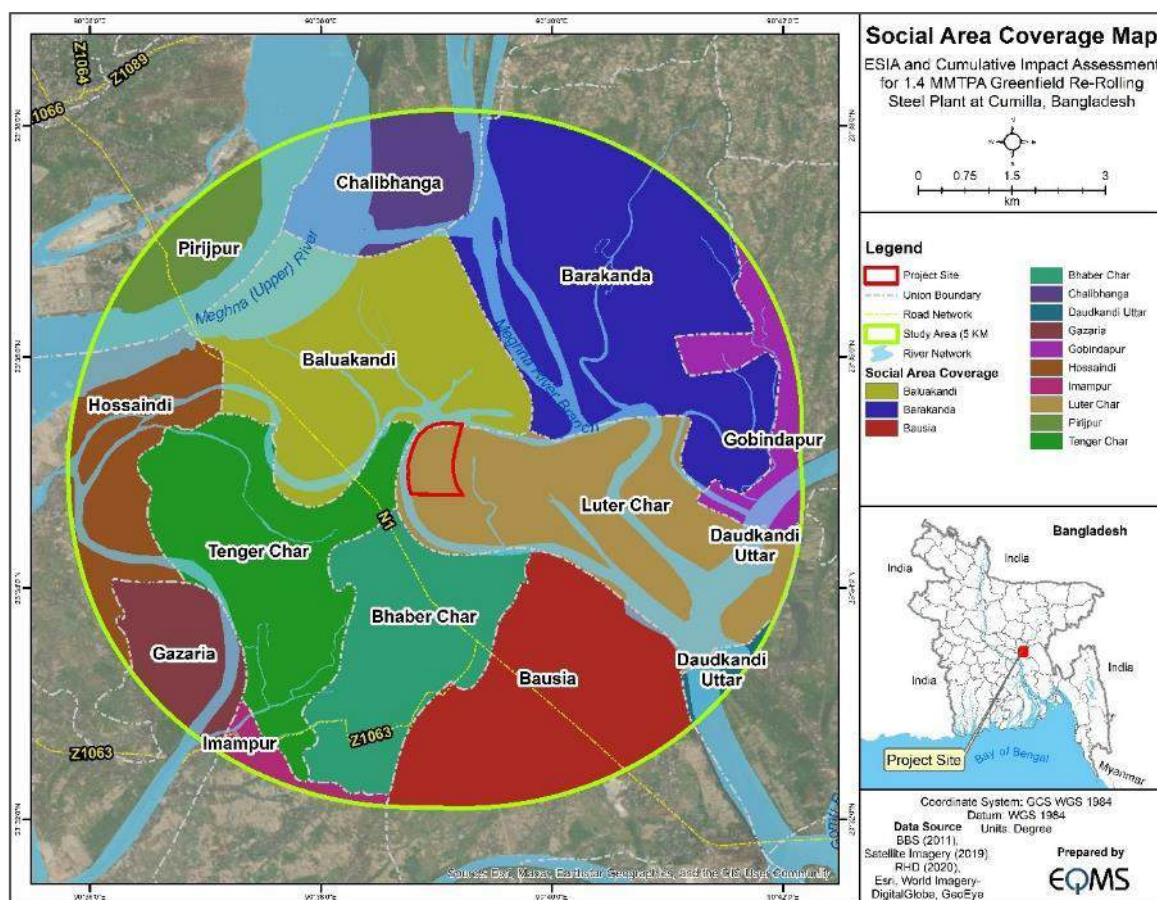
5.8.1.1 Socio-economic Survey Methodology

This section outlines the methodology developed for conducting a survey in the 13 union of Meghna Upazila under Cumilla district of Chittagong division. The survey aimed to gather data on various socio-economic aspects within the community to better understand the socioeconomic profile of residents. A simple random sampling technique was utilized to ensure a representative sample. With 20,603 households in the 5 km Area of Influence (AOI), a sample size of 305 was determined, achieving a 95% confidence level with a 5% margin of error. Households were randomly selected using a systematic approach. Furthermore, as the majority of the landowners belonged to Luterchar Union, where the project site is located, 60 households were specifically surveyed as part of the Landowners Survey. Structured questionnaires were developed in both Bengali and English to facilitate understanding for participants. The questionnaire covered various relevant topics, including demographics, income and expenditure, healthcare, education, public utilities and facilities and so on, with attention given to cultural sensitivity and language clarity. The survey was conducted using KOBO Toolbox, a digital data collection platform. Surveyors were trained extensively in questionnaire administration, informed consent, confidentiality, and accurate data recording. Door-to-door surveys were conducted within the surveyed area based on predetermined sampling.

5.8.2 Study Area

The social baseline was initially evaluated at a range up to 5 km from the project area designated as the study area. The 5 km study area (Buffer area) has been selected to grab the holistic insights of diverse social aspects in the study area. Secondary data from different sources has been used for Buffer area analysis. The data analysis and findings of both primary survey data analysis and findings of secondary source from Population and Housing Census, 2011, Bangladesh Bureau of Statistics (BBS) has been portrayed hereunder. Figure 5-65 presents the study area.

Figure 5-65: Buffer Map for Socio-economic Study



Source: GIS Unit, EQMS

A 5 km buffer area has been selected to identify and assess the impact of the proposed project on the community's people. As per the secondary data from the Bangladesh Bureau of Statistics (2011), a total of 13 unions have been identified at the 5 km buffer area of the project footprint. Details about the demographic information and study area has been depicted in the below Table 5-33.

Table 5-33: Study Area

SL#	Division	District	Upazila	Union
1.	Chattogram	Cumilla	Daudkandi	Daudkandi Uttar
2.			Meghna	Barakanda
3.				Chalibhanga
4.				Gobindapur
5.				Luter Char
6.	Dhaka	Munshiganj	Gazaria	Baluakandi
7.				Bausia
8.				Bhabar Char
9.				Gazaria
10.				Hossaindi

SL#	Division	District	Upazila	Union
11.				Imampur
12.				Tenger Char
13.		Narayanganj	Sonargaon	Pirojpur

Households were selected through simple random sampling along with specific intervals. Accordingly, 305 households were surveyed. From the selected total sample 60 land sellers/owners were found in the Luterchar union. The following sections have presented socio-economic condition in two categories-

1. Landowners/sellers from Luterchar Union
2. Respondents from other Unions from the project influence zone.

A wide range of data, for example demography, age/sex distribution, education, occupation, income/poverty data, types of structures and other assets including project perception was collected through this survey.

5.8.3 Socioeconomic Profile of Project Area of Influence

5.8.3.1 Demographic Profile

As per the Population and Housing Census (2011), there are about 20,603 households (HHs) with a total population of 93,030 living in the surrounding of the project area. The average sex ratio is 98.8 and the average household size is 4.5.

The surveyed population comprises of 245 households, with 241 male-headed households and 4 female-headed households. In terms of individual population distribution, there are a total of 523 males, constituting 53% of the population, and 467 females, representing 47%. The overall population amounts to 990 individuals, resulting in an average household size of approximately 4.02. These figures highlight the gender distribution within households. The data provides a snapshot of the demographic structure, showcasing the male-female ratio and the average household size within the surveyed population.

Table 5-34: Demographic Information of the Project Area of Influence

HH	Male HH	Female HH	Male		Female		Total pop.	HH size
			Pop.	%	Pop.	%		
245	241	4	523	53	467	47	990	4.02

Source: EQMS Socio Economic Survey, March 2024

The data represents a demographic distribution based on age groups within a given population. The majority of the population falls within the age range below 14, comprising 24.4% of the total. The subsequent age group, spanning from 15 to 18 years, constitutes 6.5% of the population, while those between 19 to 20 years old account for 3.4%. A significant portion of the population, 18.2%, falls within the age range of 21 to 30 years, indicating a sizable segment of young adults. The subsequent age groups, ranging from 31 to 65 years, demonstrate a fairly uniform distribution, collectively representing 63.8% of the population. Notably, individuals above 65 years old make up 3.2% of the total population. Moreover, 58.6% of the total population are found married while 38.2% of them are unmarried during survey of the study area. A total of 3.2% identified as widow/widower/divorced. All over, health status among the households has been found quite well. Around 97.8% of the population are found physically normal, only 2.2% are found person with disabilities. Most individuals with physical challenges in the surveyed population primarily struggle with vision impairment, deaf or hard of hearing, intellectual disability. Table 5-35 shows the Demographic Profile of the study area.

Table 5-35: Profile- Age, Marital Status and Health Status of the Project Area of Influence

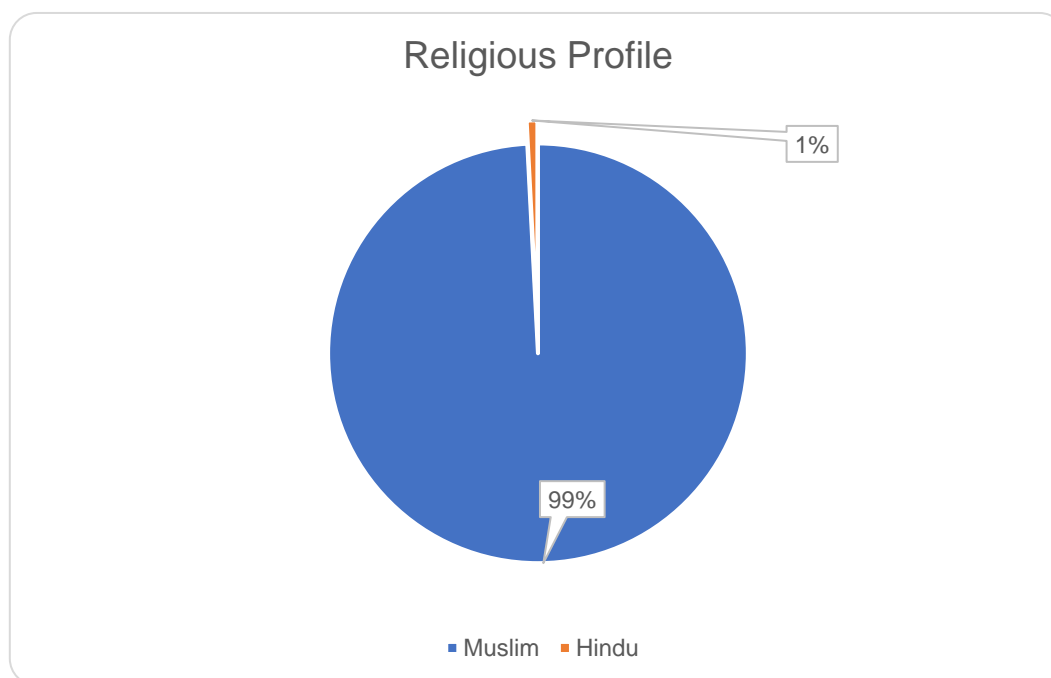
S/N	Demographic Information		Population	
			No	%
1	Population	Male	523	53.0
		Female	467	47.0
		Total	990	100.0
2	Age	Below 14	242	24.4
		15 to 18	64	6.5
		19 to 20	34	3.4
		21 to 30	180	18.2
		31 to 40	196	19.8
		41 to 50	137	13.8
		51 to 65	105	10.6
		Above 65 years	32	3.2
		Total	990	100.0
3	Marital Status	Married	580	58.6
		Unmarried	378	38.2
		Widow/Widower	30	3.0
		Divorced	2	0.2
		Total	990	100.0
4	Health Status	No Disability or incurable diseases	968	97.8
		Person with disabilities	22	2.2
		Total	990	100.0

Source: EQMS Socio Economic and land-owner Survey, March 2024

5.8.3.2 Religious Affiliation

According to the Population and Housing Census (2011), the population of the project area of influence is dominated by the Muslim community constituting almost 96.58% of the total population. The remaining 3.4% is Hindu and 0.01% is Christian.

Similar to the Population and Housing Census (2011), the socio-economic survey reveals that the majority of project area of influence are Muslim (99%) while rest 1% are Hindu by faith. The Figure 5-66 shows the religious profile of the Project Area of Influence:

Figure 5-66: Religious Profile of the Project Area of Influence

Source: EQMS Socio Economic Survey, March 2024

5.8.3.3 Ethnic Composition

According to the Population and Housing Census (2011), only seven households with twenty members from the Chakma, Garo, Tripura, and Marma ethnic groups were found within a 5-kilometer radius of the project site. These households resided in Bausia, Bhabar Char, Hossaindi, Tenger Char, and Pirijpur. However, during the socio-economic survey and consultations with local people conducted by the study team, it was revealed that no indigenous or ethnic minority populations were present within this 5-kilometer area. Educational Status

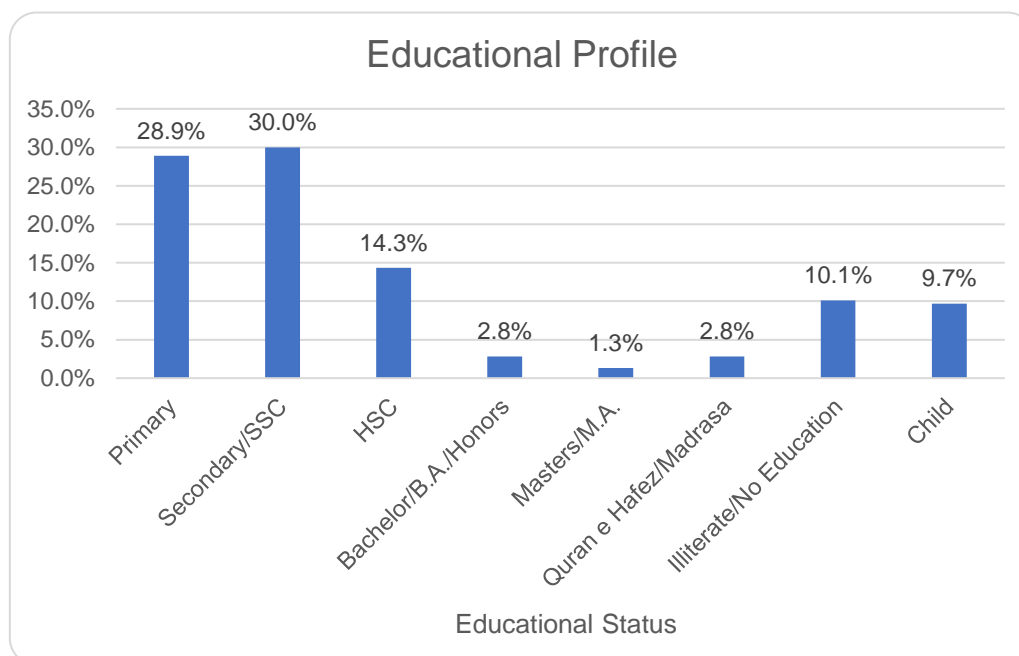
According to the Population and Housing Census (2011), the average literacy rate in the project area of influence is 51%, which is lower than the current national average literacy rate of Bangladesh at 74.66%³⁷. However, results from the socio-economic survey show that literacy rate of the project area of influence is 80.2% where the largest segment consists of individuals with primary education, comprising 28.9% of the total. Following closely is the secondary education or SSC (Secondary School Certificate) group, constituting 30.0%, suggesting a significant portion of the population has this level of education. The HSC (Higher Secondary Certificate) category accounts for 14.3%, reflecting the proportion of individuals who have pursued education beyond the secondary level. A smaller percentage, 2.8%, hold a bachelor's degree or equivalent, while an additional 1.3% have attained a master's degree or equivalent qualification. Interestingly, 2.8% of the population has received education through religious studies, including Quran e Hafez or Madrasa education. On the other end of the spectrum, the illiterate or no education group constitutes 10.1%, underscoring the diversity in educational backgrounds. Additionally, 9.7% of the population comprises children who are not currently attending school.

The above discussion indicates that the surveyed population exhibits a relatively higher level of literacy, potentially reflecting greater access to education and educational achievements within this group. The

³⁷ Population and Housing Census Preliminary Report, August 2022

data implies a positive educational landscape in comparison to the overall literacy situation in the country. Below Figure 5-67 depicted the education profile of the Project Area of Influence.

Figure 5-67: Education Profile of the Project Area of Influence



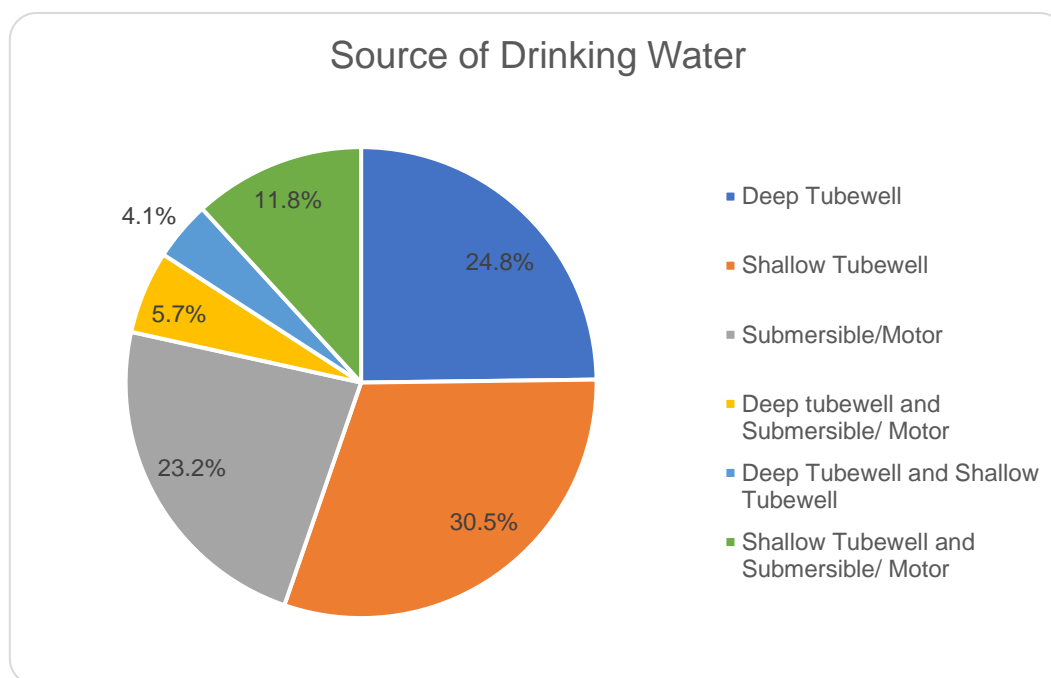
Source: EQMS Socio Economic Survey, March 2024

5.8.3.4 Public Utilities of Project AOI

5.8.3.4.1 Access to Water

In the project area of influence, 90.8% of the population use tube-well water and 3.1% of the population use tap water (The Population and Housing Census 2011). On the other hand, 6.1% of people have access to neither tube-well nor tap water.

In the project AOI during survey, it was found that all households have access to water for drinking, cooking and other regular household usage. Here 30.5% people source water from shallow tubewell 24.8% of the household collect water from deep tubewell and 23.2% of the household use submersible/motor for water collection. 21.5% of households obtain water from a combination of sources, such as both deep and shallow tubewells, or a mix of tubewells and submersible/motor sources. Below Figure 5-68 shows the status of access to safe water of the Project AOI.

Figure 5-68: Access to Water in the Project Area of Influence

Source: EQMS Socio Economic Survey, March 2024

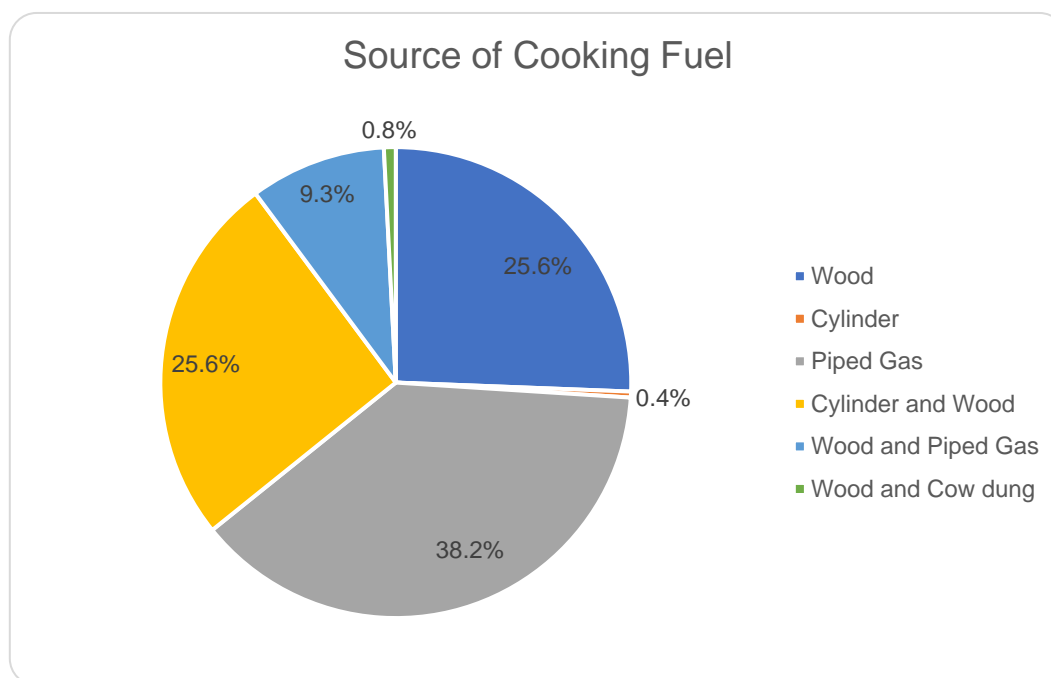
5.8.3.4.2 Energy Access

Electricity is an important indicator for measuring the quality of life. According to the Population and Housing Census (2011), on average 77.6% of the households had grid electricity connection in the study area whereas the socioeconomic survey results found that all the surveyed households (100%) have access to electricity from the grid.

5.8.3.4.3 Source of Cooking Fuel

The surveyed data outlines the diverse cooking fuel preferences within a given population. Piped gas emerges as the predominant choice, with 38.2% of households relying on this convenient and often cleaner energy source. Wood, a traditional fuel, is still widely used, accounting for 25.6% of households. A noteworthy 25.6% of households utilize a combination of cylinder and wood for their cooking needs, demonstrating a mix of traditional and modern fuel sources. Additionally, 9.3% of households opt for a combination of wood and piped gas, showcasing a hybrid approach to cooking methods. A small percentage (0.4%) relies solely on cylinders, while an even smaller fraction (0.8%) utilizes a combination of wood and cow dung for cooking. This diversified usage of cooking fuels reflects both traditional practices and a gradual shift towards more modern and efficient options, highlighting the varied energy preferences within the surveyed population. Energy access in the project area of influence presented hereunder Figure 5-69.

Figure 5-69: Source of Energy

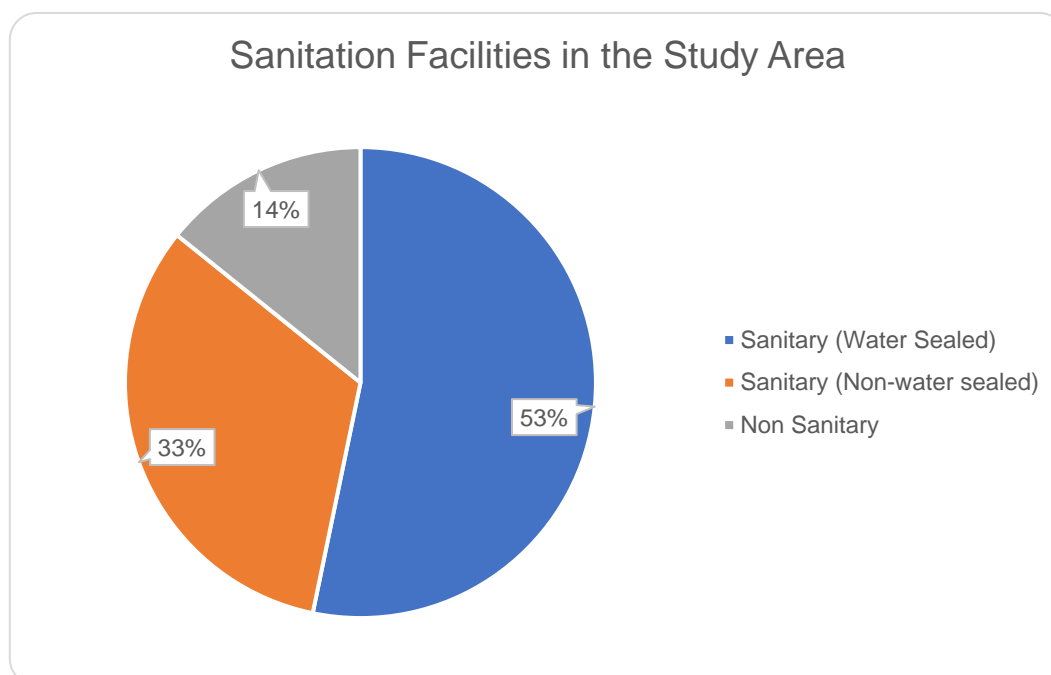


Source: EQMS Socio Economic Survey, March 2024

5.8.3.4.4 Sanitation Facility

Following the Population and Housing Census 2011, households in the study area those use water-sealed sanitary latrine and non-water-sealed sanitary latrine facility are 15% and 67.3% respectively. Whereas around 15.2% households avail themselves of non-sanitary facilities. The rest 2.5% of households have no access to hygienic latrine facilities.

In contrast, socioeconomic survey results demonstrate that 53.3% households of the project AOI are using sanitary latrine (water sealed) and 33% are using non-water seal sanitary latrine. Additionally, 14% of the households included in the survey use non-sanitary toilet facilities. Available sanitation facilities available in the project area of influence is presented in below Figure 5-70.

Figure 5-70: Sanitation Facilities in the Study Area

Source: EQMS Socio Economic Survey, March 2024

5.8.3.5 Access to Social Institution

Convenient and easy access to the market and medical services help households get basic needs and health services when it is necessary or urgent. Distance may create a barrier from easy access to these services which ultimately leads to poor livelihood status. On the contrary, easy access to social services leads to better livelihood and development.

Survey results have found that 40.7% of households have easy access to main markets, and they lie at best within 1 km distance from the main market from where they can get all the goods: including perishable & non-perishable, for their daily life. Whereas 55.7% are situated within a range of 1 to 3km. A smaller proportion, 3.7%, is located at a distance exceeding 3km. This information sheds light on the accessibility of market facilities for the surveyed population, indicating that a significant majority have relatively proximity to markets.

Easy access to hospitals enhances the frequency of health services taking. Higher distance may hinder taking health services which ultimately increase the health risk. Survey results have found that only 43.9% of households are staying between 1 to 3 km distance from the health service point. On the other hand, 55.3% more than 3 km distance from the hospital services. But this does not describe the overall scenario of the health service availability of the studied area. For general health service most of the people go to nearest Pharmacies and Dispensaries. General health services include paramedical and pharmacy services for normal or seasonal health problems. On the other hand, most of the surveyed people used to go to Local Clinics and Upazilla Hospitals for emergency treatment.

In the context of primary education, the data illustrates the distribution of social institutions based on their proximity. Notably, 37.4% of these institutions are located within less than 1km, indicating close accessibility for a substantial portion. Additionally, 57.3% of primary education institutions are situated within a range of 1 to 3km, providing reasonably convenient access. A smaller fraction, 5.3%, is positioned at a distance exceeding 3km, suggesting that a minority of the surveyed social institutions face greater geographical distance challenges concerning primary education access.

Table 5-36: Access to Social Institutions

SI No	Social Institutions	Distance		
		<1km	1 to 3km	>3km
1.	Market Distance	40.7%	55.7%	3.7%
2.	Hospital Distance	0.8%	43.9%	55.3%
3.	Primary Education	37.4%	57.3%	5.3%

Source: EQMS Socio Economic Survey, March 2024

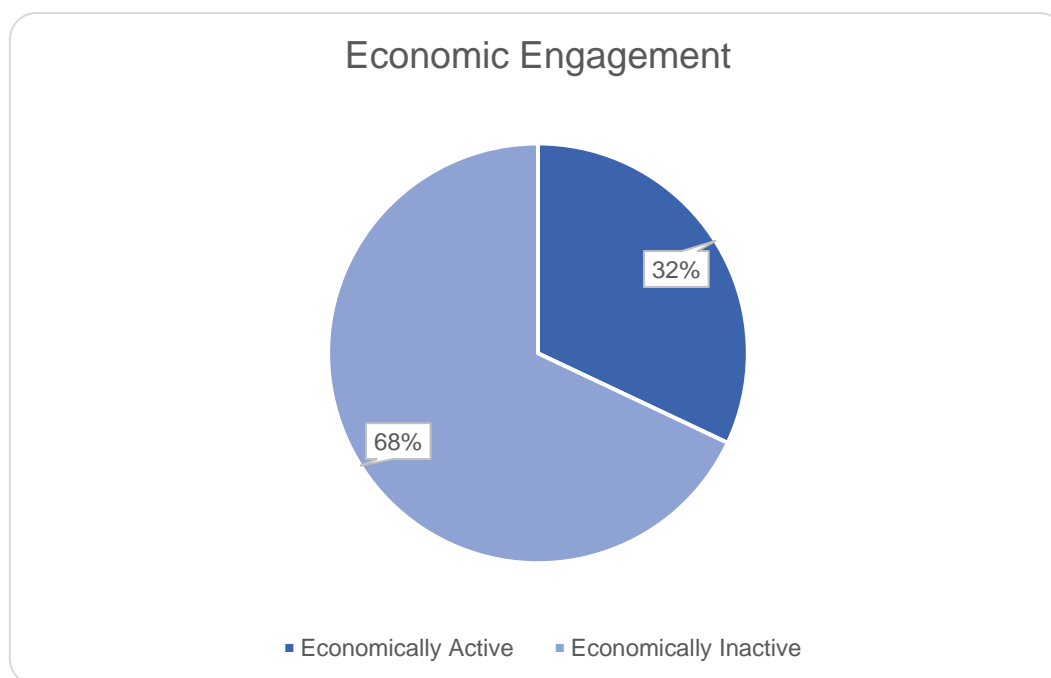
5.8.3.6 Common Property Resources (CPR)

In the vicinity of the proposed project site, a diverse array of common property resources exists within a 5-kilometer radius, essential for community welfare and infrastructural development. There are 111 mosques nearby, serving as pivotal centers for worship and community involvement, where the Dari Luterchar Khan bari Jame Masjid is the closest one to the project site. Additionally, four nearby Eidgah provide designated prayer grounds for Islamic festivals, with Luterchar Central Shahi Eidgah being the nearest among them.

For the Hindu community, the Sri Sri Durga Mandir, situated approximately 4 kilometers away from project site, holds significant cultural and religious importance. Seven nearby graveyards reflect a deep respect for traditions and honor for the deceased. Moreover, a notable presence of educational institutions, including 54 schools, three colleges, and five madrasas, underscores the commitment to education and human capital development. The presence of five hospitals ensures access to healthcare services, while nearby playgrounds and parks offer recreational options. Additionally, a branch of the Meghna River traverses the Luterchar Union, facilitating transportation and serving as a vital source for fishing, which sustains livelihoods in the area.

5.8.3.7 Economy and Employment**5.8.3.7.1 Economic Engagement**

In the study area, only 32% of the total surveyed population is involved in economic activities through various occupations. On the contrary, 68% of those polled are economically inactive. Figure 5-71 depicted the economic engagement of project area of influence.

Figure 5-71: Economic Engagement of Local People

Source: EQMS Socio Economic Survey, March 2024

5.8.3.7.2 Occupation Profile

According to the Population and Housing Census (2011), agriculture employs approximately 46.7% of people (including 68.5% males and 24.8% females) in the study area. Furthermore, a sizable portion of the study area's population 34.5% (including 17.7% males and 51.2% females) is employed in the service sector. In addition, the industrial sector employs 18.9% (including 13.8% males and 24.1% females) of the population.

In contrast, the survey conducted in the study area indicates that 68% of the population is economically inactive, attributed to various reasons. This includes 19.4% of males being students and 38.7% of females working as housewives. A detail of economically active and inactive populations according to their field of engagement of project area of influence is presented in Table 5-37.

Table 5-37: Economically Active and Inactive Populations Occupation Profile

Employment Status	Field of Engagement	Male (%)	Female (%)	Total (%)
Economically Active	Business	32.5%	0.3%	32.8%
	Day labor	3.5%	0.0%	3.5%
	Farming (Crop and Livestock)	16.7%	0.6%	17.4%
	Fishing	2.5%	0.0%	2.5%
	Service	24.9%	1.9%	26.8%
	Tailor	1.6%	1.0%	2.5%
	Doctor	0.3%	0.0%	0.3%
	Driver	2.8%	0.3%	3.2%
	Foreign Employee	1.9%	0.0%	1.9%
	Mason	1.0%	0.0%	95.5%
	Teacher	0.6%	95.5%	1.6%
	Rickshaw Puller	2.8%	0.0%	2.8%
	Others	3.2%	0.6%	3.8%

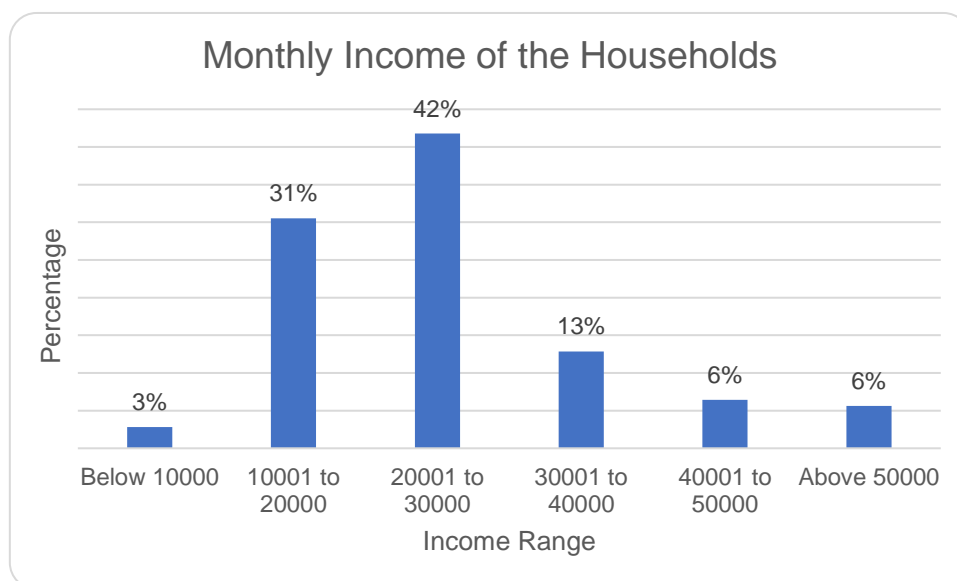
Employment Status	Field of Engagement	Male (%)	Female (%)	Total (%)
Sub-Total		94.3%	56.8%	100.0%
Economically Inactive	Elderly	5.2%	5.1%	10.3%
	Housewife	0.0%	38.7%	38.7%
	Child	7.7%	6.7%	14.4%
	Students	19.4%	16.1%	35.4%
	Unemployed/Job seeker	0.9%	0.3%	1.2%
Sub-Total		33.2%	66.8%	100.0%

Source: EQMS Socio Economic Survey, March 2024

5.8.3.7.3 Monthly Income

As per the socioeconomic survey, the data indicates that the majority of households (42%) fall within the income bracket of 20,000 to 30,000 BDT per month. In contrast, a mere 3% of households earn below 10,000 BDT monthly. The monthly income of the adjacent area is given in below Figure 5-72. . According to the World Bank, the international poverty line was updated to \$2.15 per day in 2022. For comparison at same units, the poverty line has been derived as monthly figures in BDT terms, based on current exchange rate (1 USD= 109.50 BDT) as BDT 7062.75 per month. As per the Household Income and Expenditure Survey 2022, the average household size in Bangladesh is 4.26. Thus, the average household monthly income is BDT 30,087. Around 76% of the surveyed households are fallen below the poverty line.

Figure 5-72: Monthly Income of the Study Area

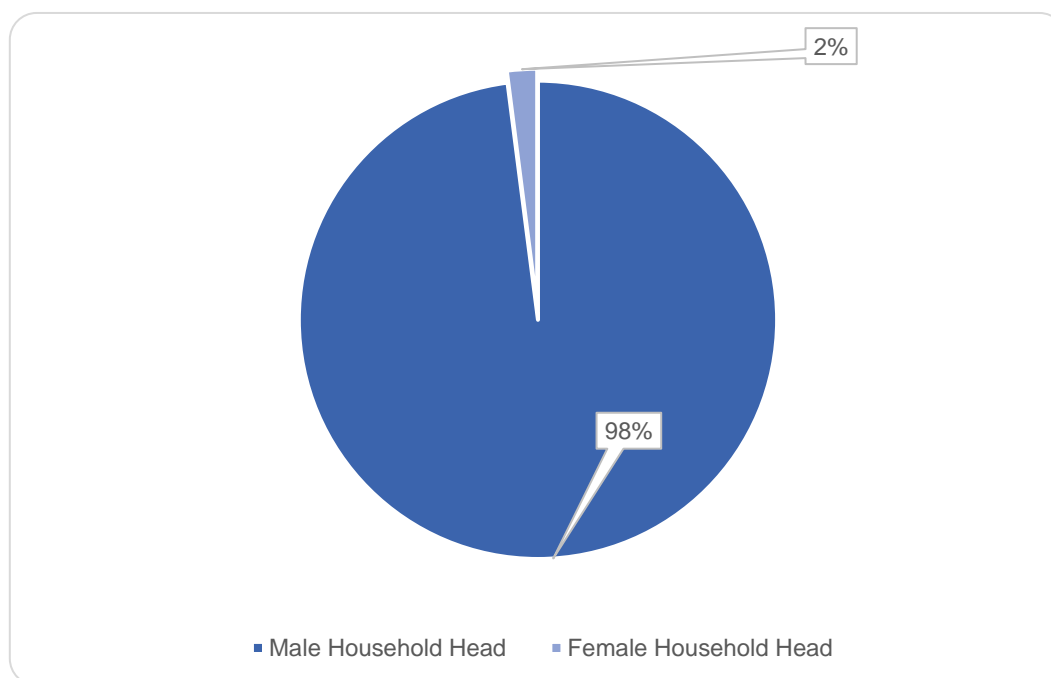


Source: EQMS Socio Economic Survey, March 2024

5.8.3.8 Gender Analysis

5.8.3.8.1 Household Head

Study finds the common patriarchic scenario in the local area. It has been found that only 2% households are headed by women.

Figure 5-73: Gender Analysis based on Household Head

Source: EQMS Socio Economic Survey, March 2024

5.8.3.8.2 Decision Making Power

The below Table 5-38 highlights significant gender disparities within households, particularly in land ownership, decision-making, and financial control. Males dominate these aspects, while females have limited representation. Despite slight variations, both genders participate equally in raising poultry and other animals at home. These findings underscore the importance of promoting gender-inclusive practices for equitable household dynamics.

Table 5-38: Gender Analysis based on Decision Making Power

SI No	Components	Male	Female	Both
1.	Decision Making Power in family matters	37.8%	0.4%	61.8%
2.	Decision Making Power in financial matters	60.6%	0.4%	39.0%

Source: EQMS Socio Economic Survey, March 2024

5.8.3.8.3 Gender Based Violence

In response to inquiries regarding awareness of various forms of gender-based violence, 53.7% of the respondents affirmed their awareness, while 46.3% of the respondents opined that they were unaware about the different forms of gender based violence. Only 1.2% of respondents believed gender-based violence to be a common issue, while a notable 98.8% of respondents do not believe gender-based violence is a common issue in their community.

Table 5-39: Perception regarding Gender Based Violence

SI No	Components	Yes	No
1.	Awareness about the different forms of gender-based violence? (Physical, emotional, sexual, economic, etc.)	53.7%	46.3%

SI No	Components	Yes	No
2.	Believe gender-based violence as a common issue in your community.	1.2%	98.8%

Source: EQMS Socio Economic Survey, March 2024

5.8.3.9 Social Issues

The provided data outlines the perceptions of individuals regarding various aspects of their environment, with responses categorized into different levels of concern. Concerning security, 3.7% of respondents deemed it to be at a high level, while the majority perceived it as either moderate (33.3%) or low (37.4%). A noteworthy 25.6% reported having no problems with security. Regarding road conditions, 10.2% of respondents characterized it as high, while a significant portion saw it as moderate (41.5%) or low (31.3%). A minority (17.1%) reported having no problems with road conditions. Concerns about the accidental rate were expressed by 8.1% of respondents at a high level, while 24.4% perceived it as moderate and 35.0% as low. A substantial portion (32.5%) reported having no problems with the accidental rate. In terms of health and disease, 11.0% of respondents rated it as high, 34.1% as moderate, and 32.1% as low. A smaller percentage (22.8%) reported having no problems with health and disease.

The data reflects diverse perceptions within the surveyed population concerning security, road conditions, accidental rates, and health-related concerns. The varying levels of reported problems in each category emphasize the need for tailored interventions and strategies to address the specific concerns of the community.

Table 5-40: Present Social Issues in the Study Area

SL#	Details		Frequency	Percent (%)
1	Security	High	8	3.7%
		Moderate	82	33.3%
		Low	92	37.4%
		No Problem	63	25.6%
Total			245	100.0%
2	Road Condition	High	24	10.2%
		Moderate	102	41.5%
		Low	77	31.3%
		No Problem	42	17.1%
Total			245	100.0%
3	Accidental Rate	High	19	8.1%
		Moderate	60	24.4%
		Low	86	35.0%
		No Problem	80	32.5%
Total			245	100.0%
4	Health and Disease	High	26	11.0%
		Moderate	84	34.1%

SL#	Details		Frequency	Percent (%)
		Low	79	32.1%
		No Problem	56	22.8%
Total			245	100.0%

Source: EQMS Socio Economic Survey, March 2024

5.8.3.10 Environmental Issues

The survey data presents the perceptions of individuals within a surveyed population regarding various environmental issues, categorized by frequency and percentage. Concerns about water pollution were reported, with 28.0% of respondents perceiving it as high, 44.3% as moderate, and 27.6% as low. Interestingly, none of the respondents reported having no problems with water pollution. Participants expressed their views on sound pollution, with 15.9% categorizing it as high, 40.2% as moderate, and 43.9% as low. Similar to water pollution, none of the respondents reported no problems with sound pollution. Air pollution was a significant concern, with 30.5% of respondents viewing it as high, 35.0% as moderate, and 34.6% as low. As observed in the previous categories, no respondents reported having no problems with air pollution. In terms of deforestation, 11.0% of respondents perceived it as high, 25.6% as moderate, and a majority of 63.4% as low. Like other environmental issues, no respondents reported having no problems with deforestation. Concerns about water logging were relatively lower, with only 0.8% perceiving it as high, 28.9% as moderate, and 34.1% as low. A notable 36.2% of respondents reported having no problems with water logging.

In summary, the data indicates varying levels of concern among the surveyed population regarding environmental issues such as water pollution, sound pollution, air pollution, deforestation, and water logging. These perceptions highlight the need for targeted environmental conservation efforts and community awareness programs to address specific concerns raised by the community. The following Table 5-41 showing the present environmental issues.

Table 5-41: Present Status of Environmental Issues in the Study Area

SL#	Details		Frequency	Percent (%)
1	Water Pollution	High	68	28.0%
		Moderate	109	44.3%
		Low	68	27.6%
		No Problem	0	0.0%
Total			245	100.0%
2	Ambient Noise Pollution	High	38	15.9%
		Moderate	99	40.2%
		Low	108	43.9%
		No Problem	0	0.0%
Total			245	100.0%
3	Ambient Air Pollution	High	74	30.5%
		Moderate	86	35.0%
		Low	85	34.6%
		No Problem	0	0.0%

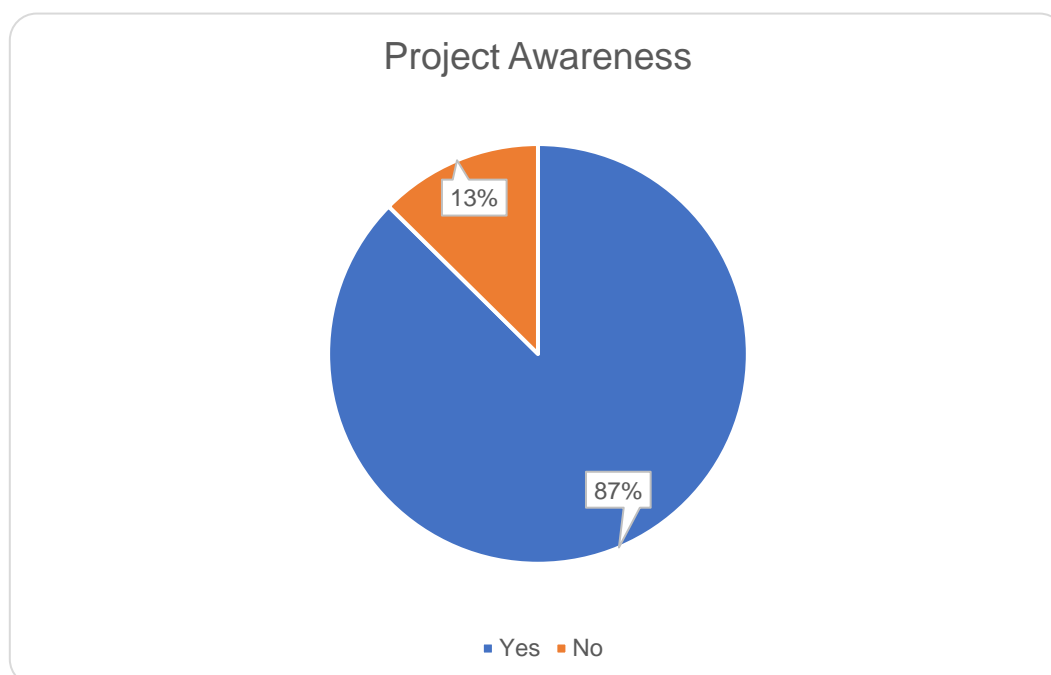
SL#	Details		Frequency	Percent (%)
Total			245	100.0%
4	Deforestation	High	26	11.0%
		Moderate	63	25.6%
		Low	156	63.4%
		No Problem	0	0.0%
Total			245	100.0%
5	Water Logging	High	2	0.8%
		Moderate	70	28.9%
		Low	84	34.1%
		No Problem	89	36.2%
Total			245	100.0%

Source: EQMS Socio Economic Survey, March 2024

5.8.3.11 Project Awareness

Project awareness and perception may hinder or facilitate any project work's successful implementation. Moreover, community perception will lead to guide maintaining project activities in line of environmental & social standards. The survey result shows that 87% of total households are completely aware of this proposed project. They informed about the project from their family members, neighbors and local leaders. Conversely, 13% of total households are found indifferent and know nothing regarding this project.

Figure 5-74: Awareness about the Project

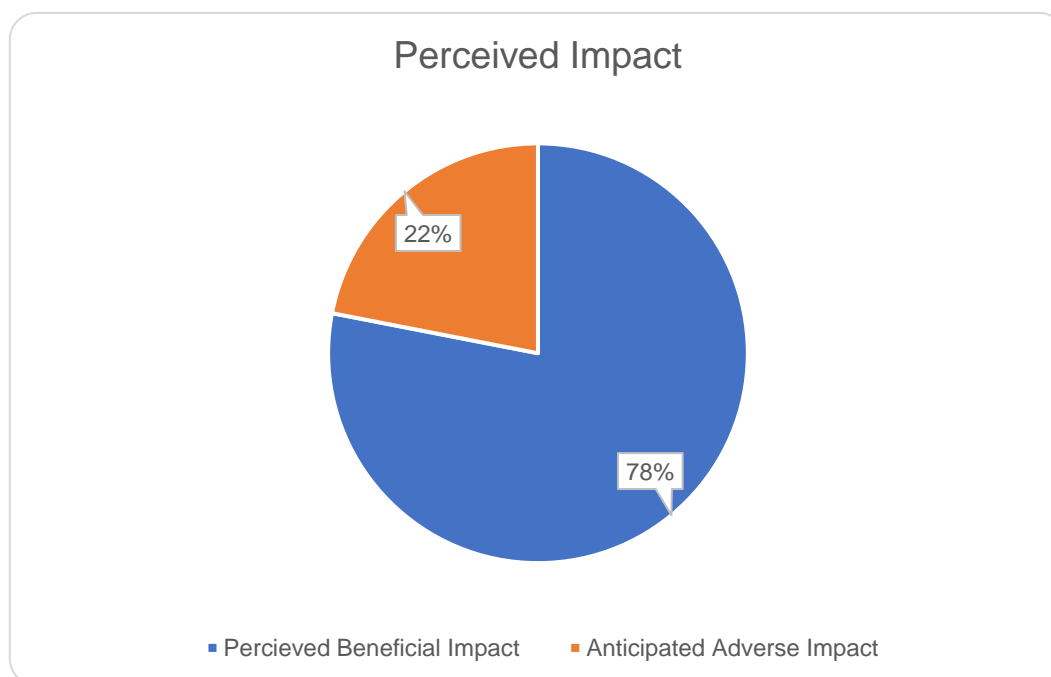


Source: EQMS Socio Economic Survey, March 2024

5.8.3.12 Perceived Impact

The data indicates a prevailing positive sentiment, with 78.1% perceiving a beneficial impact from the project. This optimistic outlook suggests a widespread belief in the project's potential to bring positive change or benefits to the community. Meanwhile, the 21.9% anticipating adverse impacts highlights a smaller but notable segment expressing concerns about potential negative consequences.

Figure 5-75: Perceived Impact of Local People



Source: EQMS Socio Economic Survey, March 2024

5.8.4 Socioeconomic Profile of Landowners

5.8.4.1 Demographic Profile

This survey focused on landowners in the study area. Out of the 251 individuals residing in the surveyed region, the study concentrated on 60 households. Among these households, 59 were headed by males, and 1 were led by females. The average household size was found to be 4.18 members.

Table 5-42: Demographic Information of the Landowners

HH	Male HH	Female HH	Male		Female		Total pop.	HH size
			Pop.	%	Pop.	%		
60	59	1	134	53	117	47	251	4.18

Source: EQMS Land-owner Survey, March 2024

The surveyed population, consisting of landowners, exhibits a gender distribution of approximately 53% males and 47% females. Regarding age distribution within the surveyed households, the largest segment (19.5%) falls within the 21 to 30 years range, with another significant portion (16.3%) falling between 31 to 40 years. Furthermore, 15.1% are aged between 41 to 50 years, while the elderly population (65 years and above) constitutes about 6.8%. In terms of marital status, 68.1% of the total population is identified as married, while 30.7% are unmarried. Additionally, 1.2% are classified as widow/widower/divorced. Overall, the health status of the households appears favorable, with 95.6% of

the population reported as physically normal and only 4.4% facing different types of disabilities. Table 5-43 shows the Demographic Profile of the study area.

Table 5-43: Profile- Age, Marital Status and Health Status of the Study Area

S/N	Demographic Information		Land-owners	
			%	
1	Population	Male	134	53.0
		Female	117	47.0
		Total	251	100.0
2	Age	Below 14	41	16.3
		15 to 18	15	6.0
		19 to 20	16	6.4
		21 to 30	49	19.5
		31 to 40	41	16.3
		41 to 50	38	15.1
		51 to 65	34	13.5
		Above 65 years	17	6.8
		Total	251	100.0
3	Marital Status	Married	171	68.1
		Unmarried	77	30.7
		Widow/Widower	2	0.8
		Divorced	1	0.4
		Total	251	100.0
4	Health Status	No Disability or incurable diseases	240	95.6
		Person with Disabilities	11	4.4
		Total	251	100.0

Source: EQMS land-owner Survey, March 2024

5.8.4.2 Religious Affiliation

Based on the outcomes of the landowner survey, it is evident that the study area is overwhelmingly Muslim dominated, with the entire population identified as followers of the Islamic faith.

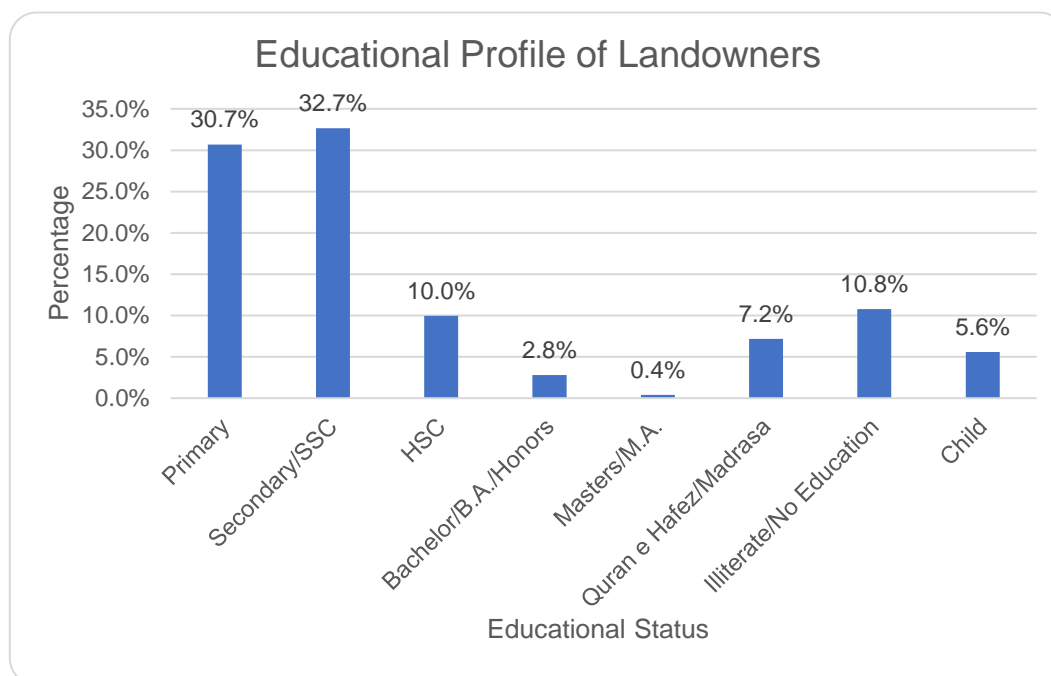
5.8.4.3 Educational Status

As per the primary data gathered from the survey, the predominant educational attainment in the study area is completion of secondary level education, constituting the majority at 32.7%. A significant portion of the population (30.7%) has completed primary school, while access to higher secondary education is reported by 10% of the population. Further educational achievements include 2.8% and 0.4% of individuals who have completed Bachelors and Masters or equivalent degrees, respectively. The survey findings also indicate an illiteracy rate of 16.4%. The literacy rate of the landowners (83.6%) is higher than that of the national literacy rate of Bangladesh³⁸ (74.7). As the updated population census data of 2022 has not been published yet, the literacy rate of the landowners is not compared to the union data.

³⁸ Population and Housing Census Preliminary report – August 2022

As per the Population and Housing Census 2011, the literacy rate of Luter Char union was 48.6 which is lower than that of the landowners. Below Figure 5-76 depicted the education profile of the landowners.

Figure 5-76: Education Profile of the Landowners



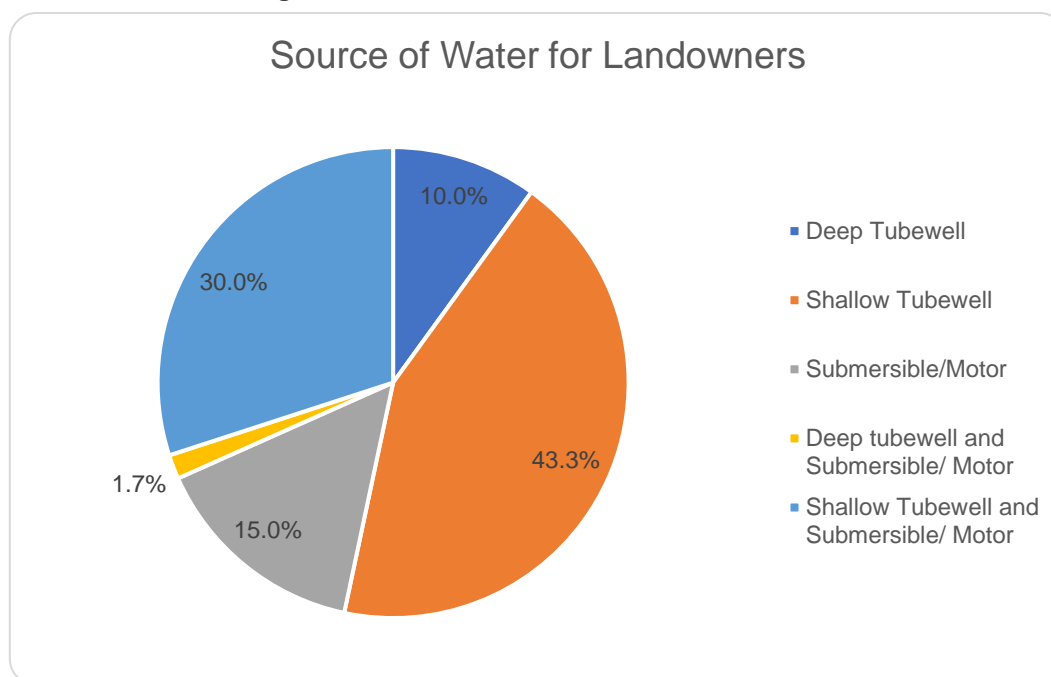
Source: EQMS Landowner Survey, March 2024

5.8.4.4 Public Utilities

5.8.4.4.1 Access to Water

Here 43.3% people source water from shallow tubewell. 30% of the household collect water from both deep tubewell and shallow tubewell. Only 15% of the household use submersible/ motor for water collection. Below Figure 5-77 shows the status of study area's access to safe water.

Figure 5-77: Source of Water for Landowners



Source: EQMS Landowner Survey, March 2024

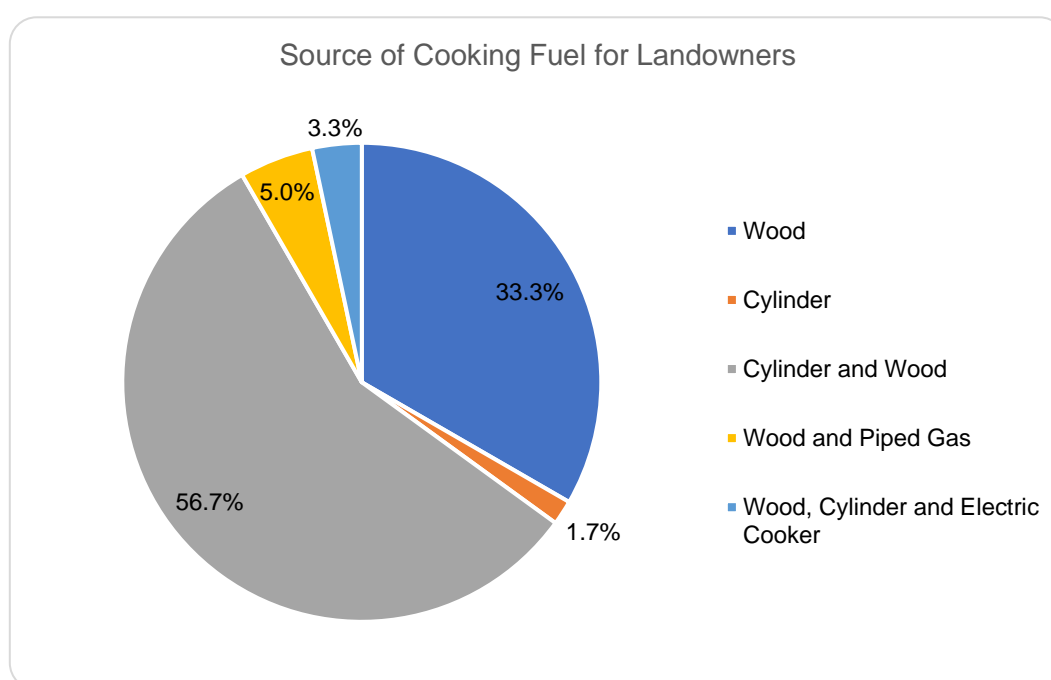
5.8.4.4.2 Energy Access

Similar to the residents of local areas, the landowners also have access to electricity from the grid.

5.8.4.4.3 Source of Cooking Fuel

A combination of cylinder gas and fuelwood is utilized by 56.7% of households for cooking, while 33.3% rely solely on firewood. Piped gas is currently unavailable as a cooking fuel option for landowners.

Figure 5-78: Source of Cooking Fuel

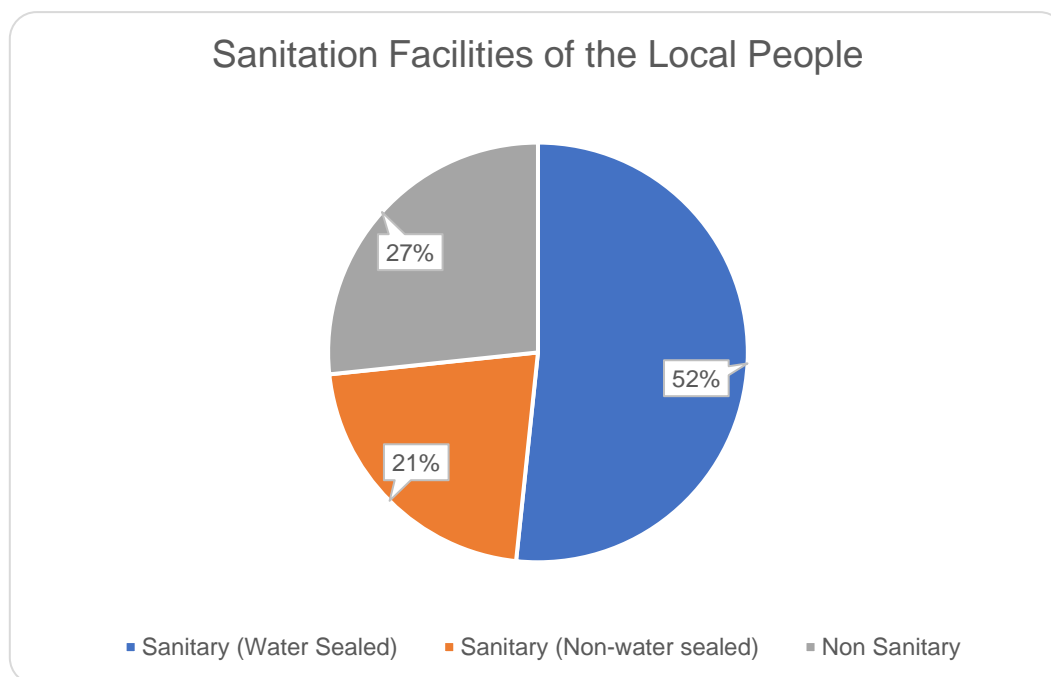


Source: EQMS Landowner Survey, March 2024

5.8.4.4 Sanitation Facility

Primary survey results demonstrate that 51.7% households of the landowners are using sanitary latrine (water sealed) and 26.7% are using Non sanitary latrine. Available sanitation facilities available for the landowners is presented in below Figure 5-79.

Figure 5-79: Sanitation Facilities of the Landowners



Source: EQMS Landowner Survey, March 2024

5.8.4.5 Access to Social Institution

The provided data stems from a survey specifically conducted among landowners in the study area, outlining the distances of crucial social institutions. In terms of market accessibility, approximately 33.3% of the surveyed landowners find themselves within a proximity of less than 1km, while 65.0% reside in the 1 to 3km range. A minimal 1.7% of landowners are situated at a distance greater than 3km from the market. In contrast, when examining the distance to hospitals, none of the surveyed landowners reside within 1km, with the majority (91.7%) located more than 3km away. A smaller proportion, 8.3%, falls within the 1 to 3km range.

When it comes to primary education, a significant 76.7% of the surveyed landowners are conveniently located within less than 1km from primary education institutions. About 21.7% are situated in the 1 to 3km range, while a minimal 1.7% find themselves at a distance exceeding 3km from primary educational facilities.

Table 5-44: Access to Social Institutions (Landowners)

SI No	Social Institutions	Distance		
		<1km	1 to 3km	>3km
1.	Market Distance	33.3%	65.0%	1.7%
2.	Hospital Distance	0.0%	8.3%	91.7%
3.	Primary Education	76.7%	21.7%	1.7%

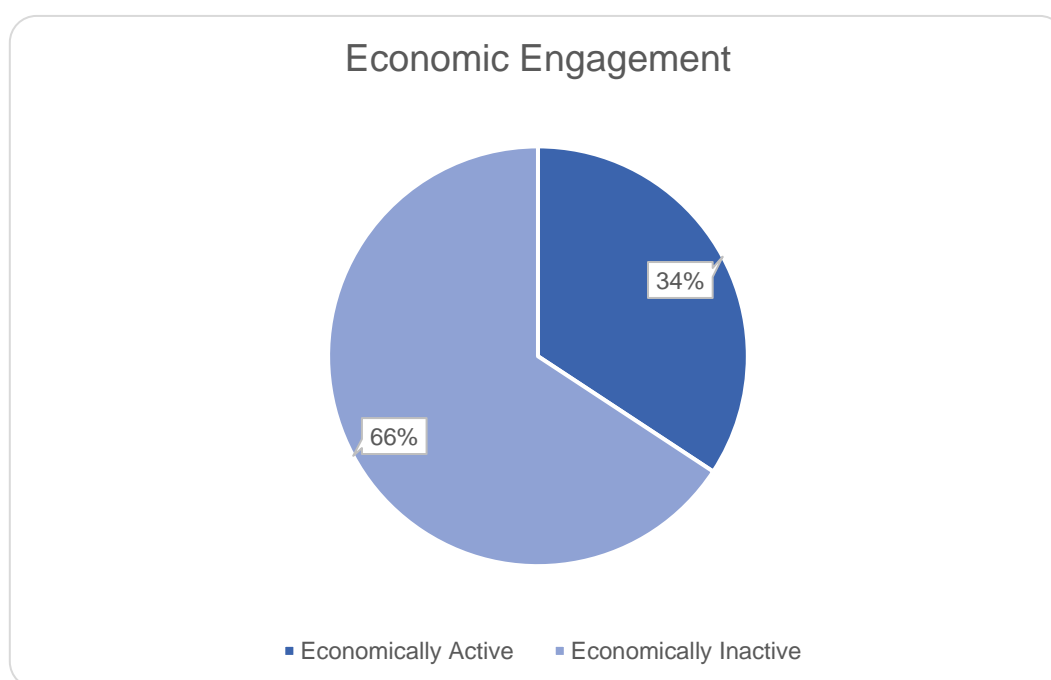
Source: EQMS Landowner Survey, March 2024

5.8.4.6 Economy and Employment

5.8.4.6.1 Economic Engagement

In the study area, only 34% of the total surveyed population is involved in economic activities through various occupations. On the contrary, 66% of those polled are economically inactive. Figure 5-80 depicted the economic engagement of study area.

Figure 5-80: Economic Engagement of Landowners



Source: EQMS Landowner Survey, March 2024

5.8.4.6.2 Occupation Profile

The socio-economic survey results in the study area reveal that the predominant occupation among economically active males is different types of business (36%) such as small business, grocery shop, restaurant business, wholesale, and retail business of raw materials like vegetable. The survey conducted in the study area indicates that 68% of the population is economically inactive, attributed to various reasons. This includes 16% of males being students and 48% of females working as housewives. A detail of economically active and inactive populations according to their field of engagement of study area is presented in Table 5-45.

Table 5-45: Economically Active and Inactive Populations Occupation Profile

Employment Status	Field of engagement	Male (%)	Female (%)	Total (%)
Economically Active	Business	36.0%	0.0%	36.0%
	Day labor	5.0%	0.0%	5.0%
	Farming (Crop and Livestock)	19.0%	0.0%	19.0%
	Fishing	5.0%	0.0%	5.0%
	Foreign employee	7.0%	0.0%	7.0%
	Riksha Puller	5.0%	0.0%	5.0%
	Service	16.0%	0.0%	16.0%
	Kabiraj	1.0%	1.0%	2.0%
	Tailor	2.0%	1.0%	3.0%

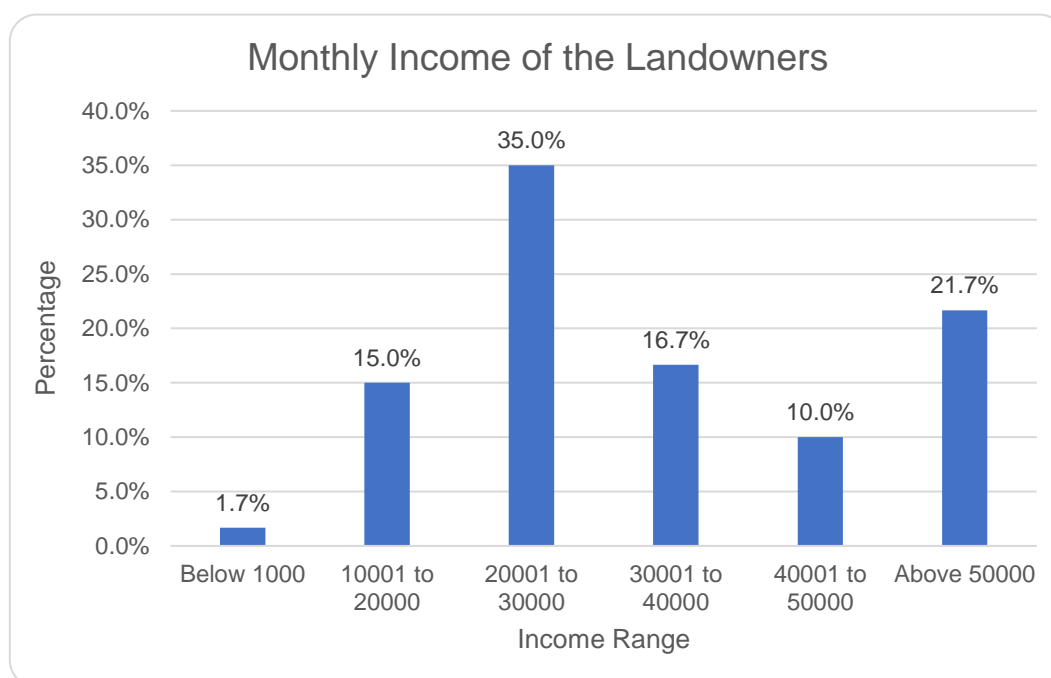
Employment Status	Field of engagement	Male (%)	Female (%)	Total (%)
	Driver	1.0%	0.0%	1.0%
	Others specify	1.0%	0.0%	1.0%
Sub-Total		98.0%	2.0%	100.0%
Economically inactive	Elderly	3.0%	4.0%	7.0%
	Housewife	0.0%	48.0%	48.0%
	Child	5.0%	5.0%	10.0%
	Student	16.0%	12.0%	28.0%
	Unemployed/Job Seeker	5.0%	2.0%	7.0%
Sub-Total		28.0%	72.0%	100.0%

Source: EQMS Landowner Survey, March 2024

5.8.4.6.3 Monthly Income

According to the respondent from landowner group, it is found that 35% (from total respondents) of the household's income range is between 20000 to 30000 BDT and only 1.7% of the households have an income of below 10000 BDT. The monthly income of the respondent's household from landowner group is given in below Figure 5-81. As mentioned in section 5.8.3.8.3, the average household monthly income is BDT 30,087. Around 51.7% of the surveyed landowners have fallen below the poverty line.

Figure 5-81: Monthly income of the Landowners

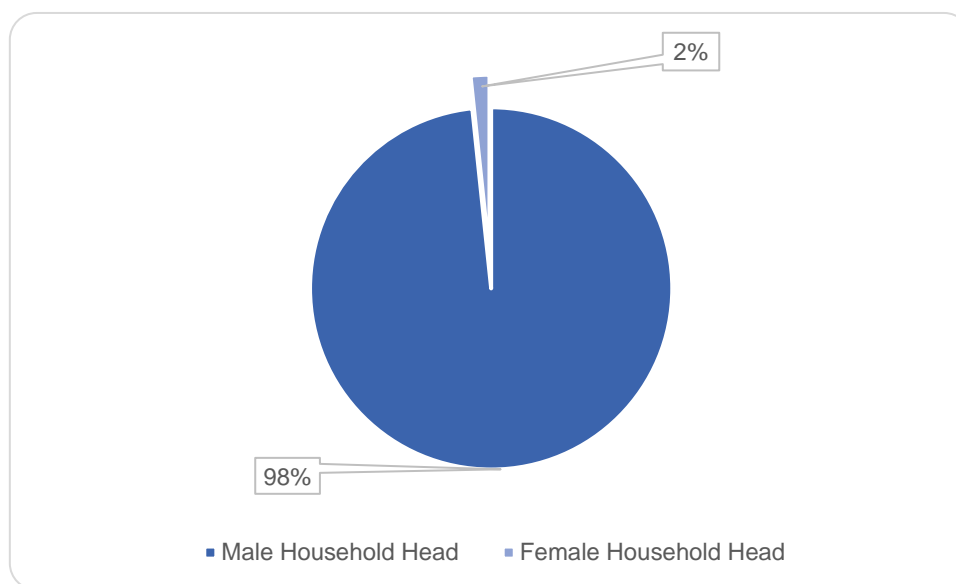


Source: EQMS Socio Socioeconomic, March 2024

5.8.4.7 Gender Analysis

5.8.4.7.1 Gender Analysis Based on Household Head

Study finds the common patriarchic scenario in the local area. It has been found that only 2% households are headed by women.

Figure 5-82: Gender Analysis based on Household Head

Source: EQMS Landowner Survey, March 2024

5.8.4.7.2 Decision Making Power

The Landowner Survey provides illuminating insights into the gender dynamics of the project's Landowners community. Notably, decision-making for family matters appears collaborative, with 56.7% involving both genders, while financial decisions are predominantly led by males (63.3%).

Table 5-46: Gender Analysis

SI No	Components	Male	Female	Both
3.	Decision Making Power in family matters	43.3%	0.0%	56.7%
4.	Decision Making Power in financial matters	63.3%	0.0%	36.7%

Source: EQMS Socio Economic Survey, March 2024

5.8.4.7.3 Gender Based Violence

Awareness of gender-based violence is high (55.0%), whereas nobody of the landowner people perceives gender-based violence as a common issue in their community.

Table 5-47: Gender Based Violence

SI No	Components	Yes	No
1.	Awareness about the different forms of gender-based violence? (Physical, emotional, sexual, economic, etc.)	45.0%	55.0%
2.	Believe gender-based violence as a common issue in your community.	0.0%	100.0%

Source: EQMS Landowner Survey, March 2024

5.8.4.8 Social Issues

In the Landowner Survey, a closer look at present social issues in the study area reveals notable trends. Notably, 51.7% of respondents report no security problems, an improvement from the community socioeconomic survey. Road conditions also show positive changes, with 45.0% noting no problems, indicating an upward shift. Accidental rates and health concerns continue to demonstrate progress, as

more respondents report no issues compared to the community socioeconomic survey. These positive shifts underscore ongoing efforts to address social challenges, emphasizing the community's commitment to enhancing overall well-being. Continued focus on these areas is pivotal for sustained improvements and continued positive change.

Table 5-48: Present Social Issues in the Study Area

SL#	Details		Frequency	Percent (%)
1	Security	High	2	3.3%
		Moderate	13	21.7%
		Low	14	23.3%
		No Problem	31	51.7%
Total			60	100.0%
2	Road Condition	High	7	11.7%
		Moderate	9	15.0%
		Low	17	28.3%
		No Problem	27	45.0%
Total			60	100.0%
3	Accidental Rate	High	2	3.3%
		Moderate	14	23.3%
		Low	16	26.7%
		No Problem	28	46.7%
Total			60	100.0%
4	Health and Disease	High	5	8.3%
		Moderate	7	11.7%
		Low	22	36.7%
		No Problem	26	43.3%
Total			60	100.0%

Source: EQMS Landowner Survey, March 2024

5.8.4.9 Environmental Issues

The survey provides insights into environmental concerns within the landowners of the study area. Water pollution emerges as a significant issue, affecting 72.3% of landowners at high or moderate levels. Sound pollution is predominant, with 68.3% reporting low levels, indicating a less alarming scenario compared to other environmental factors. Air pollution, though prevalent, is reported at high or moderate levels by 35.0% of respondents. Deforestation concerns are relatively low, impacting 21.5% of respondents at high or moderate levels. Water logging affects a smaller proportion, with 16.7% reporting high or moderate levels. These findings underscore the need for targeted environmental conservation initiatives, emphasizing the importance of community-wide efforts to address specific challenges and promote a healthier living environment.

Table 5-49: Present Status of Environmental Issues in the Study Area

SL#	Details		Frequency	Percent (%)
1	Water Pollution	High	69	28.0%
		Moderate	109	44.3%
		Low	68	27.6%
		No Problem	0	0.0%
Total			60	100.0%
2	Ambient noise levels	High	8	13.3%
		Moderate	11	18.3%
		Low	41	68.3%
		No Problem	0	0.0%
Total			60	100.0%
3	Ambient air qiality	High	12	20.0%
		Moderate	9	15.0%
		Low	39	65.0%
		No Problem	0	0.0%
Total			60	100.0%
4	Deforestation	High	7	2.8%
		Moderate	9	3.7%
		Low	44	17.9%
		No Problem	0	0.0%
Total			60	100.0%
5	Water Logging	High	1	1.7%
		Moderate	9	15.0%
		Low	14	23.3%
		No Problem	36	60.0%
Total			60	100.0%

Source: EQMS Landowner Survey, March 2024

5.8.4.10 Information about the Bargadars (Sharecroppers)

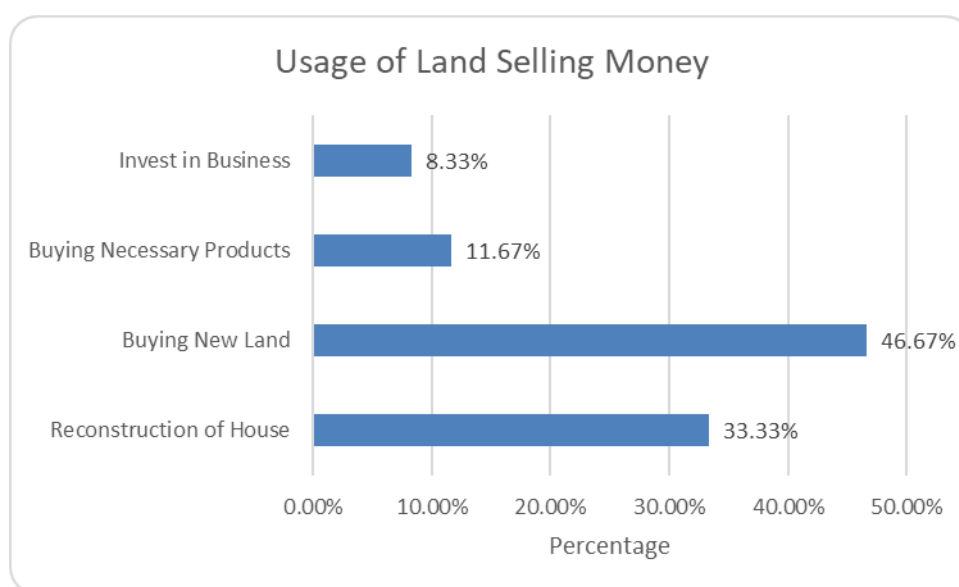
The proposed project area is fall under low land. Hence, single crop agricultural sharecropping practices were conducted there. As per socio-economic survey during the study period a very marginal number (3.3% out of 60 of landowners) of sharecroppers (5 person under 2 landowners) were identified. Moreover, during the consultation with the landowners, sharecroppers, local influential people, Upazila Chairman, Union Parishad Chairman and local people, it was identified that the landowners were very much satisfied after getting the higher price of land compared to the market price. There were some landowners, who also worked as sharecroppers in and around the project area and the other lands. In further consultation with sharecroppers and landowners it was confirmed that informal arrangements were in place between them and that most of the PAPs leasing lands were at the same time owners of

affected plots. The availability of additional land in the area was also confirmed during the consultations and it was also referred that compensation allowed them to access land in other areas to continue their economic activity. As they got a high amount of land price, they already procured other lands for agricultural practices. So, the impact of land procurement on the sharecroppers is limited.

5.8.4.11 Usage of Land Selling Money

The landowners used the money received from sold land for different purposes such as Buying necessary item for household 11.67%, invest in business 8.33% and buying new land parcel is 46.67%. Figure 5-83 shows the details about the usage of the land selling price.

Figure 5-83: Usage of Land Selling Money

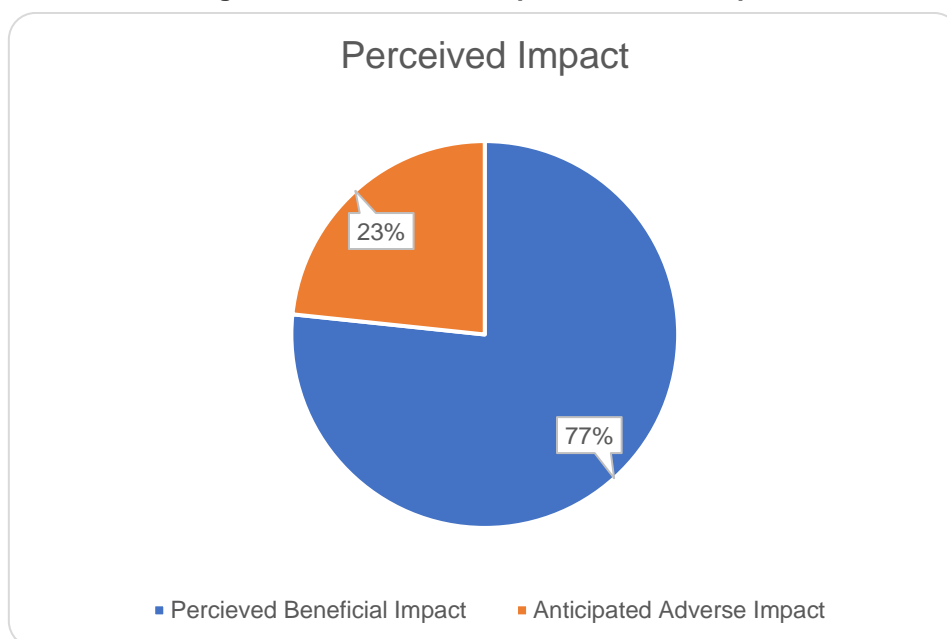


5.8.4.12 Project Awareness

All the surveyed landowners were clearly informed about the project.

5.8.4.13 Perceived Impact

Derived from the perspectives of landowners, the data reveals a generally positive outlook, with 76.7% perceiving a beneficial impact from the project. This underscores a favorable reception among landowners regarding the project's potential to yield positive outcomes or improvements in the community. On the flip side, 23.3% express concerns about anticipated adverse impacts, emphasizing the importance of acknowledging and addressing these apprehensions to foster sustained community support. The insights gathered from landowners are crucial for project stakeholders to align strategies with community expectations, ensuring collaborative and well-received project implementation.

Figure 5-84: Perceived Impact of Local People

Source: EQMS Socio Economic Survey, March 2024

5.8.5 Katha (Brush Pile) Fishing Survey

5.8.5.1 Katha Fishing

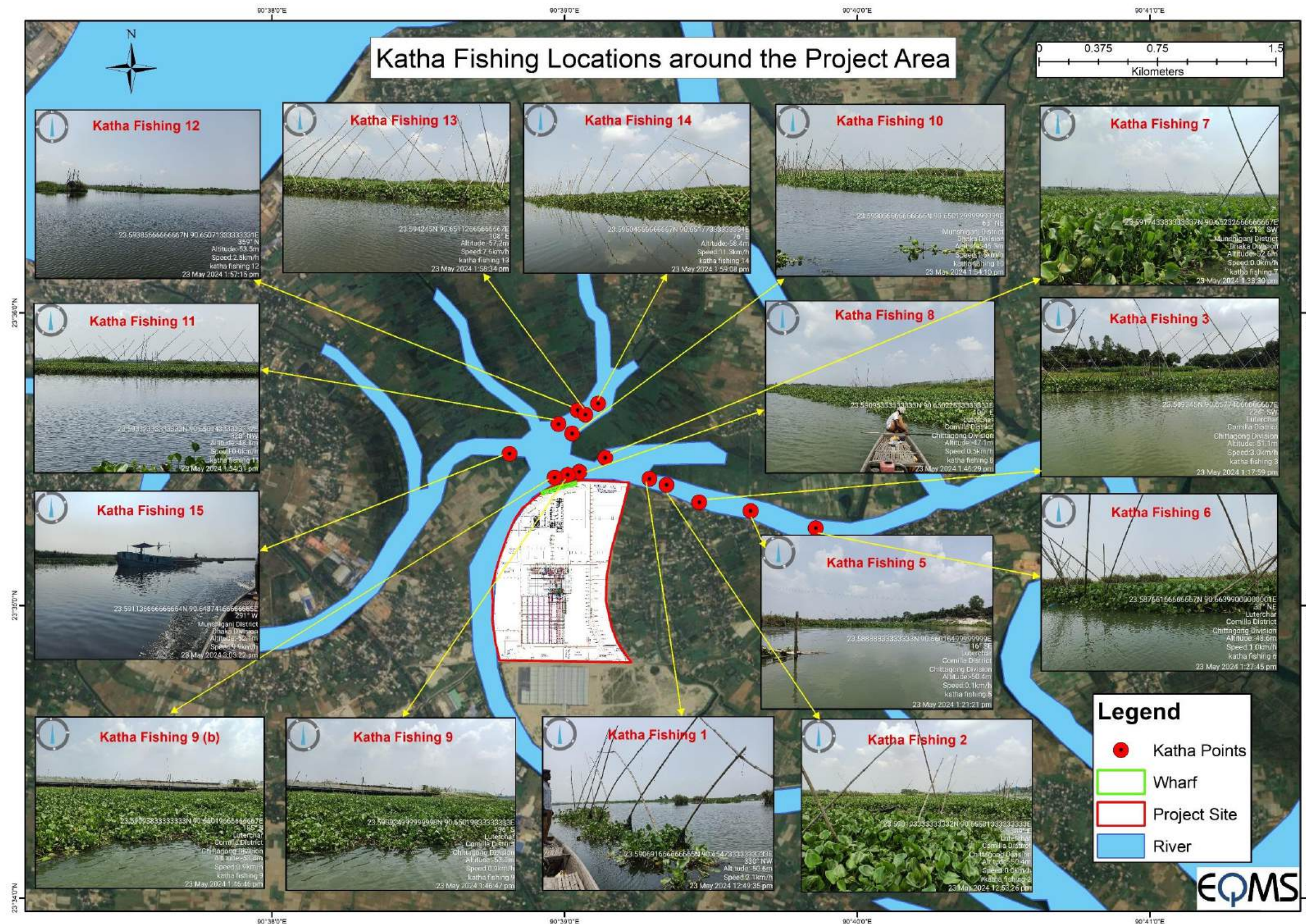
The term katha varies regionally with several synonyms such as jhag, katta and jhata. This fishing technique is also called komar and is operated in the main river, river channel, oxbow lakes of Bangladesh. Katha is also known as Fish Aggregating Device (FAD), (Middendorp et al. 1996).

For the most part this fishery is operated in secondary rivers, canals, beels, floodplains and reservoirs. The fishery lasts for 5-7 months each year (September to March) when the water level decreases and rivers and canals become calm and cool. Katha are usually constructed with branches from bushy trees such as the hizole (*Barringtonia* sp.), gamboling (*Eugenia* sp.) or babla (*Acacia* sp.) or water hyacinth (*Eichhornia crassipes*). This type of shelter attracts fish, and they accumulate in the katha in large numbers. Several bamboo poles are fixed around the katha to preserve its structure. Water hyacinth (*Eichhornia crassipes*) is often used to cover it.

To fish the katha, it is encircled with a ber jal or seine net. After 1-2 days (Wahab and Kibria 1994) all the branches and bushes are removed. The fish are caught by jhaki jal (cast net) and by hand. Usually, 4-5 people are involved. Finally, the ber jal is pulled through the katha to remove the remaining fish. Fishes like mola, chanda, gutum, taki, puti, baim, kholisha and chela are caught using this method. The fishery can operate by day or night (Ahmed and Hambrey 1999).

5.8.5.2 Location of the Katha Fishing in the Study Area

Figure 5-85: Location of katha Fishing



Source: EQMS Field Survey, May 2024

5.8.5.3 Legal and policy Review

According to the 'The Protection and Conservation of Fish Act, 1950' (Appendix D-6:) and subsequent amendment-2013 (Appendix D-7:) the construction of permanent or temporary structures in the wetlands, the use of nets of below prescribed mesh sizes, in addition to the catching of undersized fish, using of fixed engine (any net, cage, trap or other contrivance for catching fish, fixed in the earth or made stationary in any other way) are strictly prohibited. Thus, the Katha fishing is prohibited according to fisheries regulations in Bangladesh.

5.8.5.4 Methodology

The most common method (qualitative approach) was undertaken to gather information from the Katha owners. In-depth interviews were held with the Katha owners, following a checklist to obtain details about Katha fishing and losses of income.

To understand the Katha fishing activities in the Meghna River channel, the study team visited the site on May 23, 2024, and June 3, 2024. The team surveyed 1 km upstream and 1 km downstream from the Wharf area. The team identified 15 (fifteen) number of Kathas in the area (Shown in Figure 5-85.)

A total of 8 (eight) interviews were conducted with the katha owners. Among them, 5 (five) Katha owners were interviewed on-site, while 3 (three) were interviewed by telephone. These 8 (eight) people are the owners of 10 (ten) kathas out of 15 (fifteen). During the interviews, discussed about the details of the procedure of Katha fishing method, present status of the katha owners and their dependency. The details consultation notes are provided in Appendix D-9:

5.8.5.5 Findings and Discussions

During the field visit, a total of 15 (fifteen) kathas were found within the study area. Out of those, 3 (three) are adjacent to the Wharf area, which are outside the project boundary. 6 (six) are in the north side of the wharf area outside the project boundary within the distance of 500 meters and the rest are at the southeast part of the Meghna River branch which is the upstream portion. No kathas were found downstream within 1 km area. The map indicating the Katha points has been given in Figure 5-85.

The Katha owners depend on alternative income sources beyond Katha fishing, with an average dependency on it of only around 30%. The major alternative income sources are agricultural activities, fishing in the Meghna River, and working as daily laborers.

Two katha owners mentioned that they harvest fish from their kathas once every two months, except during the rainy season. The remaining owners typically harvest fish from their kathas once or twice a year. During the establishment period and harvesting period, they employ 4 to 5 people as seasonal labor. These laborers are hired on daily basis payment for 5 to 7 days. These labors are not permanently work in these kathas, rather also involve in other kathas and other income generating activities like agricultural works, fishing in the river. These laborers are randomly appointed from the community.

Katha owners typically invest between BDT 100,000 to 300,000 for the establishment of their kathas including the labor cost. During operation, the owners themselves usually provide various types of fish feed. They typically start feeding two months before fish harvesting, when there are no surrounding nets, only bamboo poles, and shading tree branches. The owners and laborers working for kathas use small non-motorized boats to get access to their kathas.

Usually Giant River Prawn (*Macrobrachium rosenbergii*) is the most available fish collected from the kathas. Besides, Sarpunti (*Systomus sarana*), Shol (*Channa striatus*), Tengra (*Mystus tengara*), Rui (*Labeo rohita*), Catla (*Labeo catla*) etc fish species are also available in the kathas.

Fish collected from Kathas is typically sold in local fish markets, with occasional instances where locals directly purchase them on the spot. On average, the earnings from Katha fishing amount to between BDT 150,000 to 200,000 per year per katha based on the area size and katha point in the river channel.

CHAPTER 6

Identification of Potential Environmental and Social Impacts

6 IDENTIFICATION OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

6.1 Introduction

Potential environmental and social impacts have been identified through a systematic process whereby the activities (both planned and unplanned) associated with the construction and operation of the Project have been considered with respect to their potential to interact with environmental and social resources or receptors. The impact assessment and evaluation has been done in two stages:

- Potential interactions between Project activities and identified receptors; and
- Consideration of the information gathered on the extent and nature of the Project activities, the existing condition and sensitivities of the baseline and the prioritization of these possible interactions in terms of their potential to cause significant impacts.

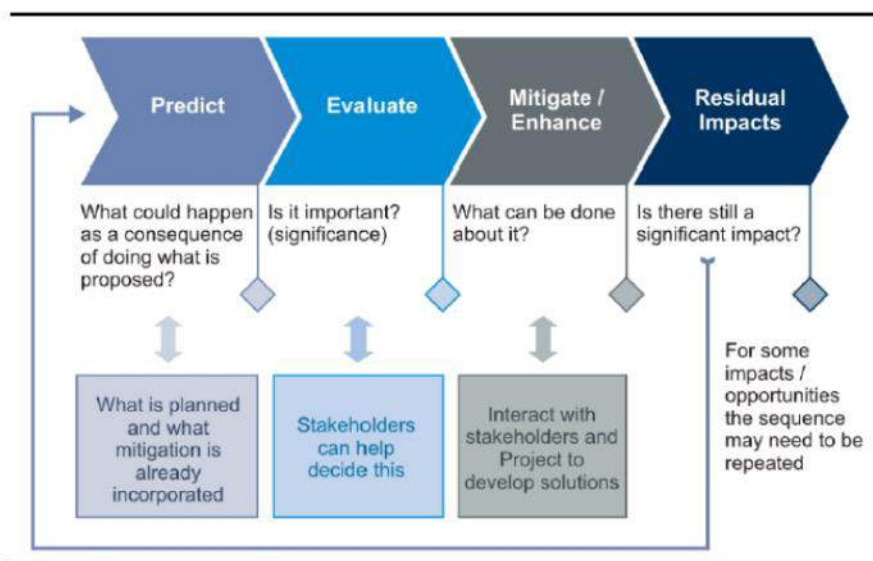
6.2 Impact Assessment Methodology

The impact assessment has involved the prediction, evaluation, and mitigation of impacts and reporting on impacts including residual impacts and cumulative impacts. The main impact assessment steps are summarized below and comprise of:

- Potential Impact Prediction: determination of what could potentially happen to resources/receptors as a consequence of the Project and its associated activities.
- Impact Evaluation: Evaluation of the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value, and/or importance of the affected resource/receptor.
- Mitigation and Enhancement Measures: Identification of appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- Residual Impact Evaluation: Evaluation of the significance and scale of the environmental impacts predicted to remain after the application of mitigation measures.

The ESIA has evaluated potential impacts using a methodology based on the evaluation of the "significance" of identified issues and impacts on baseline parameters. Analysis of the baseline results and the incremental impacts of the project has been assessed in accordance with the national guidelines for air, water, and noise emissions; standards mentioned in the ECR, 2023 and with reference to the IFC's Performance Standards and Environmental, Health and Safety (EHS) Guidelines, including the General Guidelines, IFC Environmental, Health, and Safety Guidelines for Integrated Steel Mills, 2007, IFC Environmental, Health, and Safety Guidelines for Ports, Harbors, and Terminals, 2017.

The impact assessment has covered the full project lifecycle, including preconstruction and construction activities, operations, and decommissioning. The impact assessment involves the prediction, evaluation, and mitigation of impacts, and reports on impacts including residual impacts (impacts remaining after all possible mitigation has been incorporated) and cumulative impacts. Impact prediction has taken into account control measures that are part of the project design. Additional mitigation measures aimed at further reducing predicted impacts have been proposed where necessary or appropriate.

Figure 6-1: Impact Assessment Process for the ESIA Study

The impacts have been identified and quantified for the intensity using the modelling and/or matrix techniques and evaluated as major, medium, minor or insignificant impacts on the environment and communities in the study area. Aspects that are considered in the impact assessment, for both the construction and operation phase of the project, include land ownership and use, indigenous population, water quality; noise; ecology; waste; landscape and visual; traffic; flood, and other natural disaster risks, soil and groundwater; socio-economic; and health. The environmental, socioeconomic, and project information are collected to assess the potential impacts of the proposed activities. The issues among others are to be studied including potential project impacts.

The principal aim of this task was to identify and assess potential impacts on various environmental components due to the proposed Project. Based on baseline data collected for the study area, information on the type and quantity of emission of pollutants (to be provided by the client), and surveys of the study area, EQMS' ESIA team has identified and predicted potential impacts due to the proposed Project on the surrounding environment both during construction and operation stages of the Project.

The methodology for the impact assessment has followed the relevant guidelines of the Environment Conservation Rules, 2023. It involves the prediction, evaluation, and mitigation of impacts, and reports on impacts including residual impacts (impacts remaining after all possible mitigation has been incorporated) and cumulative impacts.

The key issues identify after collecting the baseline information. Each issue consists of components that on their own or in combination with each other give rise to potential impacts, either positive or negative, from the project onto the environment or from the environment onto the project. In the ESIA the significance of the potential impacts has been considered before and after identified mitigation is implemented, for direct, indirect, and cumulative impacts, in the short and long term.

6.2.1 Potential Impact Prediction

Prediction of environmental impacts is the most vital component in the impact assessment study as it provides quantitative information on likely environmental impacts from a project well in advance. The diverse range of potential impacts considered in the impact assessment process typically results in a wide range of prediction methods being used, including quantitative, semi-quantitative, and qualitative techniques.

6.2.2 Impact Evaluation

Once the identification of potential impacts is completed, each potential impact is described in terms of its various relevant characteristics (e.g., nature, extent, duration, intensity/severity, irreplaceable loss of resources, and probability). The terminology and designations used to describe impact characteristics are shown in Table 6-1.

Table 6-1: Impact characteristics terminology

Characteristics	Definition	Designations
Nature	A description indicating the relationship of the potential impact to the project (in terms of cause and effect).	Direct Indirect Induced
Extent	The “reach” of the potential impact (e.g., confined to a small area around the project footprint, projected for several kilometers, etc.).	Project Site Local Regional National Trans-Boundary
Duration	The time period over which a resource/receptor is potentially affected.	Short Term Medium Term Long Term Permanent - Mitigated Permanent - No Mitigation
Intensity/severity	The degree to which the project affects or changes the environment.	Insignificant Low Medium High Very High
Irreplaceable loss of resources	The degree to which the project will cause a loss of irreplaceable resources.	Low Medium High
Probability	The likelihood or the chances that the impacts will occur.	Unlikely Low Medium High Definite

6.2.2.1 Nature of Impacts

The nature of impacts is an assessment of the type of effect the activity is likely to have on the surrounding affected environment. The description includes what is being affected and its magnitude. The nature of the impact will be classified as positive or negative and direct, indirect, and induced.

Direct	Potential/possible Impacts will be generated directly from the project activities and their associated facilities, which are directly linked with the project. (e.g., discharge of untreated wastewater from construction camps into a nearby water body may lead to a decline in water quality).
Indirect	Potential/possible Impacts will be generated from secondary sources which are induced by the project activities. (e.g., impacts of air emissions such as CO ₂ on

	climate change, NO _x may lead to acid rains, VOC may lead to low-level atmospheric ozone when combined with NO _x in the presence of sunlight).
Induced	Potential/possible Impacts will be generated (which are not part of the Project) due to the effect/consequence/outcome of the Project (e.g., an influx of camp followers resulting from the importation of a large project workforce).

6.2.2.2 Extent and Location of Impacts

Extent and location indicate the spatial area that may be affected by the proposed project activities or their associated facilities (Table 6-2).

Table 6-2: Geographical extent of impacts

Extent	Description
Project Site	Potential/possible impacts' area only at or within the project site/project boundary.
Local	Potential/possible impacts' area is not only limited to the site, but also its immediate surrounding areas/receptors.
Regional	Potential/possible impacts' area extends to the immediate surrounding areas along with adjacent areas.
National	Potential/possible impacts' area considered at a national level.
Trans-Boundary	<ul style="list-style-type: none"> Impact is considered not only at the national level but also within the neighboring country. Impact is considered a global level.

6.2.2.3 Duration of Impacts

Duration measures the lifetime/existence/continuation of the impact (Table 6-3).

Table 6-3: Duration of impacts

Duration	Description
Short Term	Potential/possible impact duration is a very limited time or length of construction/decommissioning period.
Medium Term	Potential/possible impact duration will continue after the construction period but stop/discontinue/cease within a tenure of 10 years.
Long Term	Potential/possible impact duration will continue for more than 10 years or the entire operational life of the project.
Permanent – Mitigated	Potential/possible impact will remain after the operational life of a project, but appropriate mitigation measures reduce the impact.
Permanent – No Mitigation	<ul style="list-style-type: none"> Potential/possible impact will remain after the operational life of the project. No mitigation measures will reduce the impact after implementation.

6.2.2.4 Intensity/severity of Impacts

Intensity/severity is the degree to which the project affects or changes the environment; it includes a measure of the reversibility of impacts (Table 6-4).

Table 6-4: Intensity of impacts

Intensity	Description
Insignificant	Changes due to potential/possible impact are minor, not visible/noticeable, natural functioning of the environment is not affected.
Low	<ul style="list-style-type: none"> The natural functioning of the environment is minimally affected. Natural, cultural, and social functions and processes can be reversed to their original state if mitigation measure is taken.
Medium	<ul style="list-style-type: none"> Environment remarkably distorted/disturbed/impacted, still functions, if in a modified way. Negative impacts cannot be fully reversed.
High	<ul style="list-style-type: none"> Cultural and social functions and processes distorted/disturbed/impacted. Potentially ceasing to Environmental function temporarily. Negative impacts cannot be fully reversed.
Very High	<ul style="list-style-type: none"> Natural, cultural, and social functions and processes permanently cease, and valued, important, sensitive, or vulnerable systems or communities are substantially affected. Negative impacts cannot be reversed.

6.2.2.5 Potential for Irreplaceable Loss of Resources

Potential for Irreplaceable Loss of Resources is the degree to which the project will cause a loss of irreplaceable resources (Table 6-5).

Table 6-5: Potential for irreplaceable loss of resources

Potential for Irreplaceable Loss of Resources	Description
Low	No irreplaceable/unique resources will be impacted.
Medium	Irreplaceable/unique resources can be replaced, with mitigation measures/efforts and will be replaced after a certain period of time.
High	Potential/possible Impact replaces a particular/vulnerable resource.

6.2.2.6 Probability

Probability is the likelihood or the chances that the impacts will occur (Table 6-6).

Table 6-6: Probability of impacts

Probability	Description
Unlikely	Under normal conditions, no potential/possible Impact is expected.
Low	The probability of the impact occurring is low due to its design or historic experience.
Medium	There is a distinct probability of the impact occurring.
High	It is most likely that the impact will occur.
Definite	The impact will occur regardless of any prevention measures.

6.2.2.7 Magnitude

The magnitude is calculated as extent + duration + intensity + potential impact on irreplaceable resources.

Magnitude essentially describes the intensity of the change that has the potential to occur in the resource/receptor as a result of the potential impact. The magnitude designations themselves are universally consistent, but the definitions for these designations vary depending on the resource/receptor.

In the case of a potential positive impact, no magnitude designation (aside from 'positive') is assigned. It is considered sufficient for the ESIA to indicate that the project has the potential to result in a potential positive impact, without characterizing the exact degree of positive change that may occur.

6.2.2.8 Significance

The significance will be rated by multiplying the consequence of the impact and the probability of occurrence (i.e., Magnitude × Probability = Significance).

Table 6-7: Significance of issues (based on environmental parameters)

Significance	Description
Positive Impact	Potential/possible impacts that have a beneficial impact on affected media
Very low	No action is required.
Low	<ul style="list-style-type: none"> Impacts are within the acceptable range. Potential/possible impacts such as localized or short-term effects on habitat, species, or environmental media.
Medium-Low	<ul style="list-style-type: none"> Impacts are within the acceptable range but should be mitigated to lower significance levels wherever possible. Potential/possible impacts such as localized, long-term degradation of sensitive habitat or widespread, short-term impacts on habitat, species, or environmental media.
Medium-High	<ul style="list-style-type: none"> Potential/possible impacts are significant and require attention. Mitigation is required to reduce the negative impacts to acceptable levels. Potential/possible impacts such as localized but irreversible habitat loss or widespread, long-term effects on habitat, species, or environmental media.
High	<ul style="list-style-type: none"> Impacts are of great importance, mitigation is crucial. Potential impacts such as significant, widespread, and persistent changes in habitat, species, or environmental media. Potential impacts such as persistent reduction in ecosystem function on a landscape scale or significant disruption of a sensitive species.
Very High	<ul style="list-style-type: none"> Impacts are unacceptable. Potential impacts such as loss of a significant portion of a valued species or loss of effective ecosystem function on a landscape scale.

Potential social impacts are inherently variable because community response to a potential impact, perceptions of existing and changing conditions, and the degrees of vulnerability are all heavily dependent on local conditions and the human factor. The significant designations for potential social impacts take into consideration social science expertise and previous experience in Bangladesh regarding the relationships between individuals, communities, government agencies, NGOs, and special interest groups, and different industries.

Table 6-8: Potential social impact significance

Significance	Definition
Positive Impact	Potential/possible impacts that have a beneficial impact on affected stakeholders.
Very Low	Potential/possible impacts that are practically indistinguishable from the social baseline, with little to no potential impacts or concerns from affected external stakeholders.
Low	Potential/possible impacts that are short-term nuisance or inconvenience; potentially affected external stakeholders concerned but likely able to adapt with relative ease.
Medium-Low	Potential/possible impacts such as localized or short-term effects; potentially affected stakeholders concerned but likely able to adapt with relative ease.
Medium-High	Potential/possible impacts such as local-to-regional (sub-national) or medium-term effects; potentially affected stakeholders concerned and raise the issue as a high priority but may be able to adapt with some targeted support or assistance.
High	Potential/possible impacts such as local-to-national or long-term effects; potentially affected stakeholders concerned and raised as a high priority; may not be able to adapt without targeted support or assistance to maintain a pre-impact livelihood.
Very High	Potential/possible impacts such as local-to-global or irreversible long-term effects; potentially affected stakeholders concerned raise the issue as a high priority and are likely, not able to adapt without targeted support or assistance.

To determine potential public health impacts, the assessment team considers the public which has the potential to be exposed to various aspects and potential impacts of the project, whether it is a permanent resident with continuous exposure or periodic exposure to a fisher transiting through the project area. The significant determinations for potential public health impacts take into consideration local and regional public health expertise and previous experience in Bangladesh regarding the relationships between individuals, communities, health care providers, government agencies, NGOs, and different industries.

Table 6-9: Potential public health impact significance

Significance	Definition
Positive Impact	Potential/possible impacts that have a beneficial impact on the affected stakeholder.
Very low	No impact to the public.
Low	Potential/possible illness or adverse effect with limited or no impacts on the ability to function and medical treatment is limited or not necessary.
Medium-Low	Potential/possible illness or adverse effects with mild to moderate functional impairment requiring medical treatment or management.
Medium-high	Potential/possible serious illness or severe adverse health effects requiring a high level of medical treatment or management.
High	Potential/possible serious illness or chronic exposure of a few resulting in life-shortening effects.

Significance	Definition
Very High	Potential/possible serious illness or chronic exposure of many resulting in life-shortening effects.

6.2.3 Mitigation and Enhancement Measures

Once the significance of an impact has been characterized, the next step is to evaluate what mitigation and enhancement measures are defensible. These are commonly incorporated into the project as commitments. Mitigation is aimed at preventing, minimizing or managing significant negative impacts to as low as reasonably practicable and optimizing and maximizing any potential benefits of the project, where applicable.

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated project activities) and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude.

6.3 Impact Identification

The potential impacts have been identified through a systematic process whereby the activities (both planned and unplanned) associated with the project have been considered with respect to their potential to interact with environmental and social resources or receptors within the AOI.

The interaction matrix enables a methodical identification of the potential interactions each project activity may have on the range of resources/receptors within the area of influence i.e., the study area of the project. Based on the activities involved in this project, an impact interaction matrix for all phases has been presented in Table 6-10.

Table 6-10: Impact identification matrix for the proposed project

Project Activity	Environmental Resources/Receptors	Environmental Components																											
		Physical Environment													Biological Environment						Social Environment								
		Aesthetic & Visual Impact	Land use/Land Resources	Landscape/Topography	Soil quality/Resources	Sediment Quality	Surface Water Quality	Surface Water Quantity	Ground Water Quality	Ground Water Quantity	Ambient Air Quality	GHG Emission	Ambient Noise Level	Vibration level	Hydrology/Drainage Pattern	Vegetation /Flora	Fish Fauna	Avifauna & Chiroptero fauna	Herpetofauna	Terrestrial Mammals	Aquatic Mammals	Occupational Health & safety	Economy and Livelihood	Employment	Traffic (Road & River)	Population Displacement	Infrastructure and services	Community Health & Safety	Social Conflict
Pre-construction Phase																													
Preliminary survey and licensing process																													
Land Purchase/ lease																													
Site cleaning/trees/vegetation removal																													
Soil collection and transportation to the site																													
Land filling, soil compaction & levelling																													
Construction Phase																													
Establishment of labor camp & accommodation																													
Solid waste handling & disposal																													
Sewage disposal																													
Transportation, unloading, storage, and handling of construction materials, machinery																													
Preparation/mixing of construction material																													
Construction of wharf																													
Civil Construction																													
Mechanical and Electrical Activities																													
Maintenance and replacement of machinery																													
Demobilization of construction machinery																													
Disposal of construction wastes																													
Operation Phase																													
Transportation of steel scrap and metal																													
Unloading and transfer operations and storage in the stockyard																													
Emission generated from the operation of furnace, maintenance of equipment and machinery.																													
Fugitive emissions																													
Noise and vibration from the operation of the furnace and rolling mill, sorting of scrap and loading, storage and transport of finished product																													
Utilization of wharf and transportation of material via Meghna River																													

Project Activity	Environmental Resources/Receptors	Environmental Components																												
		Physical Environment														Biological Environment						Social Environment								
		Aesthetic & Visual Impact	Land use/Land Resources	Landscape/Topography	Soil quality/Resources	Sediment Quality	Surface Water Quality	Surface Water Quantity	Ground Water Quality	Ground Water Quantity	Ambient Air Quality	GHG Emission	Ambient Noise Level	Vibration level	Hydrology/Drainage Pattern	Vegetation /Flora	Fish Fauna	Avifauna & Chiroptero fauna	Herpetofauna	Terrestrial Mammals	Aquatic Mammals	Occupational Health & safety	Economy and Livelihood	Employment	Traffic (Road & River)	Population Displacement	Infrastructure and services	Community Health & Safety	Social Conflict	Archaeology & Cultural Heritage
Utilization of groundwater for plant operation																														
Generation, treatment, and disposal of effluent																														
Domestic, solid, and other non-hazardous waste handling, storage, and disposal																														
Hazardous material and waste storage																														
Maintenance and replacement of equipment																														
Greenbelt development																														
Emergency due to natural disasters																														
Decommissioning Phase																														
Dismantling of infrastructure and replacement of dysfunctional equipment and installations																														
Waste disposal																														

6.4 Potential Environmental and Social Impacts and Risks

6.4.1 Impacts during Pre-construction Phase

6.4.1.1 Impact due to Land Procurement

All the lands belonging to MRSML are situated within a privately-owned economic zone named Cumilla Economic Zone (CuEZ), which is under the ownership of one of MGI's sister concerns. This economic zone has been officially approved by the Bangladesh Economic Zone Authority (BEZA), an autonomous body of the Bangladesh government. Before receiving BEZA's approval and the formal declaration of the economic zone, MGI underwent a thorough verification process mandated by the government. Cumilla Economic Zone (CuEZ) was incorporated in 2017, which obtained the prequalification license to establish the Economic Zone at Meghna Upazila, Cumilla in 2016.

As per consultation with BEZA and available secondary resources, to establish a Private Economic Zone at Sonachar Mouza of Meghna Upazilla under Cumilla District, MGI authorities applied to the Executive Chairman of Bangladesh Economic Zone in June 2015. The required amount of land was 246.37 acres. In response to this application, BEZA published a gazette on June 01, 2021, to raise grievances within 21 days for those who are likely to be impacted by the establishment of this private economic zone. BEZA confirmed that no grievances were raised, and no litigations were found within the given timeframe. After the cutoff date for raising grievances and completion of other verification processes, BEZA published another gazette on March 20, 2022, announcing the area as the Cumilla Economic Zone. BEZA issued the Private Economic Zone license to CuEZ on April 10, 2022.

No physical displacement was identified, instead economic displacement was incurred due to the land procurement. However, the compensation implemented allowed these affected PAPs access to new land and the continuity of their economic activity, reducing to the minimum the residual impact on economic displacement. As part of the socioeconomic survey some sharecroppers (that developed cultivation in the CuEZ area prior the land acquisition) were identified also.

In further consultation with sharecroppers and landowners it was confirmed that informal arrangements were in place between them and that most of the PAPs leasing lands were at the same time owners of affected plots. The availability of additional land in the area was also confirmed during the consultations and it was also referred that compensation allowed them to access land in other areas to continue their economic activity. Industrialization in the region would also have a positive impact in terms of increase in employment and allied opportunities, better infrastructure and amenities, etc. whose benefits are not only restricted at the local site level but also at the Union level. The impact significance due to land procurement is Low. In terms of the nature of impact, the impact is likely to be direct, extent is project site, and duration is long term. The impact significance due to land procurement is low.

Impact	Impact due to Land Procurement				
Impact Nature	Direct	Indirect		Induced	
Impact Scale	In and around project site				
Frequency	During all phases of the project				
Extent and Location	Project Site	Local	Regional	National	Trans boundary
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High

Potential for Irreplaceability/ Vulnerability	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
Significance of impact consider Low						

Mitigation Measures

- Provision of preference to the PAHs for direct/indirect project employment opportunities.
- Unskilled labor during the project construction phase would be sourced from the local community; and
- Training would be provided to the local people for their skill enhancement.

With implementation of the precautionary and the mitigation measures above mentioned impacts due to land procurement would be very low.

6.4.1.2 Impact on Land Use Patterns

Approximately, 71 acres of land will be required for the establishment of the proposed steel manufacturing plant and associated facilities of the project. Since the project is going to be constructed in the economic zone on the developed land, the new installation will not pose any significant impact on land, the changes will be restricted to plant premises only. The land use pattern of the proposed project is under the industrial category.

Preparatory activities like the construction of access roads, storage yards, etc. will be spread around the project site and would not generally have any significant impact. No other temporary sites will be used for construction works or the housing of construction workers.

Impact	Impacts on land use								
Impact Nature	Direct		Indirect			Induced			
Impact Scale	Approximately, 71 acres of land will be required								
Frequency	Permanent and covers all the phases								
Extent and Location	Project Site	Local		Regional		National		Trans Boundary	
Impact Duration	Short Term	Medium Term		Long-term		Permanent-mitigated		Permanent-no mitigation	
Impact Intensity/ Severity	Insignificant	Low		Medium		High		Very High	
Potential for Irreplaceable Loss of Resources	Low			Medium			High		
Probability of Impact	Unlikely	Low		Medium		High		Definite	
Impact Significance	Very Low	Low	Medium-low		Medium-high		High		Very High
	Significance of impact consider <i>Very Low</i>								

6.4.1.3 Impact on Soil

Site preparation activities like removal of trees/bush/vegetation, soil collection, transportation, landfilling, and earthwork, etc. will impact on existing soil quality. Excavation denudes the topsoil and makes it lose. Destruction of topsoil leads to a reduction of fertility and removal of vegetation cover with associated hazards of soil erosion. Construction wastes, such as metal cutting, debris, and packaging

materials, may contaminate soil at the construction site. Liquid and solid wastes that will be generated from the construction labor camp facilities and improper disposal during the construction phase can pollute soil quality. Accidental spillage or inappropriate management of fuels, engine oil, and hazardous chemicals during the maintenance and replacement of vehicles and equipment can pollute surface soil.

Impact	Impacts on soil quality						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	In and around project site						
Frequency	covers all the phases						
Extent and Location	Project Site	Local		Regional	National		Trans Boundary
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceable Loss of Resources	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high	High		Very High
	Significance of impact consider <i>Very Low</i>						

6.4.2 Impacts during Construction Phase

6.4.2.1 Impact on Ambient Air

During construction, dust and exhaust emissions will be generated mainly during excavation, earthworks, civil work, and erection of structures, operation of DG set, heavy machinery and equipment operation, vehicle operations for transportation of workers, construction materials, and equipment's transportation by road and waterways. Welding of different structures also produces gases. Improper management of construction camps may also create a bad odor. It can affect the workers as well as the nearby community. Emission of Suspended Particulate Matter (SPM), Sulfur Dioxide (SO₂), Nitrogen Oxides (NO_x), Carbon Dioxide (CO₂), Carbon Monoxide (CO) may be emitted from the combustion of petroleum products in project-related vehicles, equipment, machinery, generators, and vessels, etc. during the construction period. Equipment deployed during the construction phase is also likely to result in a marginal increase in the levels of SO₂, NO_x, and CO₂. The emissions are temporary and not expected to contribute significantly to the ambient air quality and will be within prescribed limits by DoE, Bangladesh.

The quality of air is to be impacted during the construction phase of the flat steel manufacturing plant from dust generation and exhaust emissions from vehicular sources. The deterioration of air quality during construction is expected to be temporary. Dust will mainly result from excavation, earthworks, civil work, and erection of structures, operation of DG set, heavy machinery and equipment operation, vehicle operations for transportation of workers, construction materials, and equipment's transportation by road and waterways. Dust generated during construction period can negatively affect the construction workers, public and immediate vegetation. Dust can cause eye irritation, skin irritation, respiratory difficulties, and reduced visibility. Welding of different structures also produces gases. Improper management of construction camps may also create a bad odor. It can affect the workers as well as the nearby community. Emission of Sulfur Dioxide (SO₂), Nitrogen Oxides (NO_x), Carbon Dioxide (CO₂), Carbon Monoxide (CO) may be emitted from the combustion of petroleum products in project-related vehicles, equipment, machinery, generators, and vessels, etc. during the construction period. Equipment deployed during the construction phase is also likely to result in a marginal increase

in the levels of SO₂, NO_x, and CO₂. These emissions are anticipated to be generated in small concentrations and dispersed rapidly within the area leading to an impact of low magnitude. This indicates that these effects are localized and temporary, which implies that any deterioration in air quality at project location is unlikely to be significant and is expected to be transient.

Impact	Air quality degradation due to dust generation					
Impact Nature	Direct	Indirect		Induced		
Impact Scale	In and around project site					
Frequency	Limited to construction phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider medium-low					

Mitigation Measures: The mitigation measures which can be adopted to reduce the impact on air quality during construction phase may include the following:

- Regular sprinkling of water on open surface and dust grounds until paving is done.
- Strict compliance with the Occupational Safety and Health Administration (OSHA) requirements and Bangladesh Codes to ensure that for activities associated with high dust levels, workers are equipped with proper Personal Protective Equipment (PPE) like masks, eye goggles, helmets, safety harness, safety shoes and breathing equipment.
- Transportation of aggregates or other fine materials to be done in tarpaulin-covered trucks.
- Minimum storage period for sand and other dispersible construction materials.
- In case of excessive dust or pollutant emissions, it is preferred that construction activities are stopped until the source of such emissions has been identified and adequate control measures should be implemented.
- Development of a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment during the construction phase, for early detection of issues and avoidance of unnecessary pollutant emissions.
- Complaints of dust-related ailments among employees to be given access to medical attention.
- After taking the proper mitigation measures the impact will be minimized to low from medium low.
- All equipment and machinery used at the construction worksites should be maintained and operated in a manner such that they will not give rise to smoke emissions and will comply with the regulation.
- Avoid the use of diesel- or petrol-powered equipment by using electricity or battery-powered equipment where possible and if safety concerns can be overcome. Regularly maintain all diesel-powered equipment and reduce idling time to avoid emissions of NO_x, PM₁₀, and SO₂.
- Vehicle/equipment exhausts observed to be emitting significant black smoke from their exhausts will be serviced/replaced.
- No waste will be burnt on or around the project site.

After taking the proper mitigation measures the impact will be minimized to low from medium low.

6.4.2.2 Impact on Ambient Noise

Noise during construction phase of the project will be mainly generated from various construction activities, vehicles for transportation of construction materials, man and machinery, loading and unloading of construction materials, operations of construction machines and equipment, fabrication and handling of equipment and materials, grinding for welding and pipe facing and drilling, physical presence of the construction camp and movement of workers, construction equipment like bulldozers, scrapers, concrete mixer, crane, generator, etc. The noise produced during the construction will have a significant impact on the existing ambient noise levels. This increased level of noise can affect employees present in the construction site. Continuous exposure to such levels of noise (above 85 dB) for 8 hours per day may result in noise induced hearing loss.

Impact	Noise pollution and vibration due to construction activities					
Impact Nature	Direct	Indirect		Induced		
Impact Scale	In and around project site					
Frequency	Limited to construction phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider medium-low					

Mitigation Measures: The following mitigation measures can be adopted by the authorities during the construction phase:

- Noise Level need to be monitored once in monthly basis and If noise levels are found to be excessive, construction activities should be stopped until adequate control measures are implemented.
- Application of adequate general noise suppression measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery.
- Development of a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues, and to avoid unnecessary elevated noise level.
- Only well-maintained equipment should be operated on-site.
- Regular maintenance of equipment including lubricating moving parts, tightening loose parts, and replacing worn-out components shall be conducted.
- The amount of equipment operating simultaneously shall be reduced as far as practicable.
- Acoustic covers for all equipment and machinery that generate excessive noise.
- Ensure that all equipment and machinery and its mufflers are regularly serviced and immediately serviced or replaced, if damaged.
- Compliance with the Occupational Safety and Health Administration (OSHA) requirements and the Bangladesh Codes to ensure that for activities associated with high noise levels, workers are equipped with proper PPE (e.g., Earmuffs).

The impact on the noise quality will be minimized, and if necessary, mitigation measures are taken.

6.4.2.3 Impact on Water Quality

Surface water quality can be affected by run-offs from the construction site, mixing rainwater with sediments. Improper management of waste from construction activities and workers facilities may cause deterioration of surface water quality. The transportation of construction materials and equipment by road can increase dust pollution on the approach road. Similarly, excavation of soil or surface configuration at the construction site may increase the dust. As a result, this air-blown dust can accumulate in the nearest surface water body and increase the TSS.

The construction of a Wharf may introduce additional challenges. Accidental oil spills during the transportation of construction materials for the Wharf, especially from international sources, can potentially contaminate surface water. Domestic and sanitary waste from the construction labor camp may also pose a risk to the surface water resources in the project area. Oil spillage from the workshop, rainwater runoff, and water vessels may contaminate surface water near the construction site.

A lot of construction debris and other solid waste to be generated from construction camps and sites. Domestic garbage and sanitary wastewater will be generated from various facilities such as workers shed units, which shall have to be properly managed. During monsoon with the surface runoff, the waste may be washed away to contribute suspended solids in the nearest water bodies (Meghna River Branch). Oil spillage from the workshop and vessels, rainwater runoff, water vessel may contaminate surface water near the construction site. Proposed Wharf construction in the Meghna River Branch will increase the turbidity. It is expected that impacts on the water bodies will be limited during the construction phase of the proposed project.

Impact	water pollution due to construction activities					
Impact Nature	Direct	Indirect		Induced		
Impact Scale	Project construction site					
Frequency	Limited to construction phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider medium-low					

Mitigation Measures: The following mitigation measures can be adopted by the authorities to reduce the impact on the quality of water during the construction phase:

- Implementation of erosion control measures such as silt fences, to prevent soil erosion and sedimentation into nearby water bodies.
- Develop a comprehensive stormwater management process/drainage system to control runoff from construction sites.
- Ensure proper disposal of construction waste and debris to prevent pollutants from entering waterways.
- Regular inspections of construction sites to identify and address any potential sources of pollution.

- Provide training to construction workers on the importance of water quality protection and the proper implementation of mitigation measures.
- Oil leakage or spillage was contained and cleaned up immediately. Waste oil is to be collected and stored for recycling or disposal. During transportation of the construction materials, all the transportation vehicle has must keep the spill kit for any accidental oil spillage scenario and strictly follow the ERP for oil spillage.
- Oil and grease separator shall be used for wastewater generated from cleaning activities.
- Control water suppression during excavation and earth handling to minimize excess water and sediment disposal into surface water.
- Inspect and schedule preventive maintenance to all vehicles used to transport excavated and construction material.
- CSTP shall be constructed for the whole Economic Zone, and it will be take time, Considering this sanitary wastewater will be stored in the septic tank or in the portable STP before the construction of CSTP.; and after construction of CSTP, all sewage and liquid effluent treated to meet the standards specified in the ECR, 2023.
- Wherever reasonable and practicable, re-vegetate exposed ground as soon as possible to stabilize surfaces.

The impact will be non-significant if the water is properly managed with proper mitigation measures.

6.4.2.4 Impact on Soil

Site preparation activities like removal of trees/bush/vegetation, soil collection, transportation, landfilling, and earthwork, etc. will impact on existing soil quality. Soil for the land reclamation will be collected from outside of the project area. Excavation denudes the topsoil and makes it lose. Destruction of topsoil leads to a reduction of fertility and removal of vegetation cover with associated hazards of soil erosion. Construction wastes, such as metal cutting, debris, and packaging materials, may contaminate soil at the construction site. Liquid and solid wastes that will be generated from the construction labor camp facilities and improper disposal during the construction phase can pollute soil quality. Accidental spillage or inappropriate management of fuels, engine oil, and hazardous chemicals during the maintenance and replacement of vehicles and equipment can pollute surface soil.

Impact	Soil pollution due to construction activities				
Impact Nature	Direct	Indirect	Induced		
Impact Scale	Project construction site				
Frequency	Limited to construction phase				
Extent and Location	Project Site	Local	Regional	National	Trans Boundary
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High
Potential for Irreplaceable Loss of Resources	Low		Medium		High
Probability of Impact	Unlikely	Low	Medium	High	Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high	High
	Significance of impact consider medium-low				

Mitigation Measures: The following mitigation measures can be adopted by the authorities to reduce the impact on the quality of soil during the construction phase.

- The excavated topsoil should be kept in an earmarked area with tarpaulin cover, and the recreation of the topsoil should be done utilizing the prior removed preserved soil.
- Topsoil would be used for greenbelt of 10 m all around the project site (include most of the native plant species) which will significantly improve the ecology of the area.
- To avoid soil erosion, it is optimal to carry out construction work during dry season.
- A proper spill-response plan should be developed by the authority to minimize the negative impacts on soil in case of an unlikely event of fuel spillage.
- Implement a regular maintenance program for all equipment and machinery to prevent fuel spillage or leakage during construction activities.
- Manage spills of soil contaminants using standard engineering practices.
- Storage areas for oil, fuel, and chemicals to be surrounded by bunds or other containment devices to prevent any spilled oil, fuel, or chemicals from contaminating soils, sediment, water, or groundwater.
- Use of spill or drip trays to contain spills and leaks, and use of spill control kits to clean small spills and leaks.
- Installation of oil/water separators to treat surface runoff from bunded areas prior to discharge to the stormwater system.
- Waste management measures should include provisions to contain and dispose of construction wastes, prohibit waste discharge on the ground, and practice recycling as far as practicable.
- Dispose debris and waste in a designated area and as per plan to prevent degradation of soil.
- Provide dedicated storage areas for construction materials to minimize the potential for damage or contamination of the materials.
- Locate temporary stockpiles of spoils as far as possible from excavations.
- Provide enough space to allow for inspection between waste containers to identify any leaks or spills.
- Ensure storage areas have impermeable floor and containment.
- Dispose of hazardous waste by licensed authorities.
- Fuel tanks and chemical storage areas to be sited on sealed areas and provided with locks to prevent unauthorized entry.
- Preparation of guidelines and procedures for immediate clean-up actions following any spillages of oil, fuel, or chemicals.
- Development of a site-specific emergency response plan for soil clean-up and decontamination.
- Implementation of a training program to familiarize staff and workers with emergency procedures and practices related to contamination events.
- Training labor for waste disposal in designated areas and use of sanitation facilities.
- Implement a construction materials inventory management system to minimize over-supply of the construction materials, which may lead to disposal of the surplus materials at the end of the construction period.

6.4.2.5 Impact on Ecosystem and Biodiversity during Construction Phase of Steel Plant

6.4.2.5.1 Impacts on Terrestrial Flora

The proposed project site is located in a confined area of the Cumilla Economic Zone, featuring some seasonal grass species and a few medium-sized tree species. Along the boundary wall, some climbers were also found. The site is surrounded by modified habitat of agricultural lands, riverbank vegetation, and homestead vegetation. The activities during the construction phase generally comprise Site Preparedness, Civil Works, Electrical Works, Mechanical Works, and Installation works, which might impact terrestrial flora. However, no natural terrestrial vegetation was cleared to prepare the project site.

Dust generated from transportation and construction activities will lead to dust deposition on plant leaves, twigs, and stems, which may hamper pollination, photosynthesis, respiration, and other physiological processes of surrounding vegetation. In addition, installation of new furnace assembly and flooring of the project may generate emission of fugitive dust.

As a result, it will affect plant growth and cause diseases. During the construction period, there will be an influx of labor force from outside of the project area. The construction workers will primarily reside in the nearby habitation or the labor camp. The workers at the construction camp might fulfill their requirement for fuel and timber from nearby plantations. However, the baseline study represents that there are no threatened terrestrial plant species within the project Area of Influence (AOI).

Considering the project activities and potential biological receptors within the project AOI, the impact on terrestrial flora during the construction phase has been considered insignificant and assessed as **Very Low**.

Impact	Impacts on Terrestrial Flora								
Impact Nature	Direct		Indirect			Induced			
Impact Scale	Limited to project site and its adjacent areas								
Frequency	Limited to Construction Phase								
Extent and Location	Project Site	Local		Regional		National		Trans Boundary	
Impact Duration	Short Term	Medium Term		Long-term		Permanent-mitigated		Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low		Medium		High		Very High	
Potential for Irreplaceable Loss of Resources	Low			Medium			High		
Probability of Impact	Unlikely	Low		Medium		High		Definite	
Impact Significance	Very Low	Low	Medium-low		Medium-high		High		Very High
	Significance of impact consider Very Low								

Mitigation Measures

To mitigate these potential impacts on terrestrial flora during the construction phase of Greenfield Re-Rolling Steel Plant, it is crucial to implement the following mitigation measures:

- Controlling the release of airborne dust by applying water in the construction zone.
- Using tarpaulin sheets to cover materials that produce dust during transportation to the site.
- Using wood as fuel should be strictly prohibited. Contractor should provide workers with fuel for cooking and educating them not to use wood as fuel, thereby reducing the impact on vegetation in the vicinity of the project site

6.4.2.5.2 Impacts on Terrestrial Fauna

Impact on terrestrial fauna during the construction phase may occur due to the transportation of construction materials, movement of heavy construction equipment, oil spills, and excessive light, noise, and vibration generated from construction activities.

According to the field study, the project site is located on the bank of the tributaries of the Meghna River where several riverine islands exist, supporting several migratory bird species, although the habitat is not designated as an important bird area. The important bird area is located 91 km away from the project

sites. The project Area of Influence (AOI) supports a total of 57 avifaunal species of 31 family, and all of these recorded species are categorized as Least Concern (LC) according to the IUCN Red List of Threatened Species. A total of eight migratory bird species were recorded from the AOI. The most frequently seen migratory bird of AOI is the lesser whistling duck (*Dendrocygna javanica*) and the grey-headed lapwing (*Vanellus cinereus*), both of which are categorized as Least Concern (LC) in terms of their conservation significance. Almost all mammal and herpetofaunal species listed in the AOI are Least Concern (LC) except the Bengal Monitor (*Varanus bengalensis*), which is listed as Near Threatened (NT).

Therefore, the construction phase of the Greenfield Re-Rolling Steel Plant Project can have several impacts on terrestrial fauna due to various activities involved in the project. Here are potential effects on terrestrial fauna:

Machinery used in construction sites, as well as the transportation of construction materials and equipment, can produce noise and vibrations that impact the habitat and behavior of terrestrial fauna in the surrounding areas of the project site. Transportation of materials and manpower through access roads may disrupt wildlife movement, causing accidental injury or death. The dust generated from construction activities has the potential to settle on vegetation, disrupting the living ground of terrestrial fauna. Additionally, installation of new furnace assembly and flooring of the project may generate emission of fugitive dust and emissions of air pollutants from construction equipment can harm terrestrial fauna by adversely affecting their respiratory systems. Sensitive species may be particularly vulnerable to these pollutants. Excessive artificial lighting can impede the movement of herpetofauna species and affect the behavior, reproduction, and migration patterns of migratory birds. Leakage of oil, lubricants, and fuel introduces toxic substances into the soil, disrupting the natural ecosystem balance and causing soil contamination. This can affect plant growth and reproduction, impacting the health of wildlife exposed to contaminated plants or water.

Considering these issues, the impact of the construction phase of the Greenfield Re-Rolling Steel Plant Project on terrestrial fauna is evaluated to be **Low**.

Impact	Impact on Terrestrial Fauna						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Limited to project site and its adjacent areas						
Frequency	Limited to Construction Phase						
Extent and Location	Project Site	Local	Regional	National	Trans Boundary		
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation		
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High		
Potential for Irreplaceable Loss of Resources	Low		Medium		High		
Probability of Impact	Unlikely	Low	Medium	High	Definite		
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High	
	Significance of impact consider Low						

Mitigation Measures

To mitigate these potential impacts on terrestrial fauna during the construction phase, it is crucial to implement the following mitigation measures:

- Implementing noise-reduction measures during construction, such as scheduling noisy activities during non-sensitive times.
- Implement strict waste management protocols, proper disposal of hazardous waste, and regular monitoring to prevent soil contamination.
- Controlling dust by wetting construction areas and using dust control measures.
- Monitoring air quality and ensuring compliance with environmental regulations to limit pollutant emissions.
- Utilizing low-intensity lighting to reduce brightness and minimize glare.
- Limiting vehicle speed (20 km/hr) to avoid roadkill.
- Educating and raising awareness among workers to promote wildlife and natural resource conservation.
- Implementing rescue and relocation efforts for threatened or endangered species if any are found during construction work.

6.4.2.5.3 Impacts on Aquatic Ecosystem

Potential impact sources considering impacts on the Aquatic ecosystem during the construction phase include the discharge of construction wastes, leakage of oil, liquid and hazardous wastes, surface runoff, etc.

Tributaries of Meghna River and temporary waterbodies adjacent to the project area serve to provide major habitat for the fishes and other major aquatic organisms of the proposed project.

The primary impact will be changes in the chemical composition of surface water quality which may degrade the water quality. Discharge of waste into waterbodies through surface runoff might trigger eutrophication process and lead to the degradation of the aquatic ecosystem. Accidental disposal of construction waste, runoff of leakage oil and hazardous chemicals into nearby waterbodies might impact the physiological processes and behavioral characteristics of fish and other aquatic resources.

Considering the issues, the impact on the aquatic ecosystem during the project construction phase is evaluated to be **Low**.

Impact	Impact on Aquatic Ecosystem				
Impact Nature	Direct	Indirect		Induced	
Impact Scale	Limited to project site and its adjacent areas				
Frequency	Limited to Construction Phase				
Extent and Location	Project Site	Local	Regional	National	Trans Boundary
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High
Potential for Irreplaceable Loss of Resources	Low		Medium	High	
Probability of Impact	Unlikely	Low	Medium	High	Definite

Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider Low					

Mitigation Measures

To mitigate these potential impacts on the aquatic ecosystem during the construction phase, it is crucial to take following suggested mitigation measures:

- Keep all dangerous chemicals, oils, greases, solvents, and residues in a secure Place.
- Provision of barriers/control walls at construction material storage areas to avoid contamination by surface runoff.
- An appropriate stormwater and wastewater management system should be designed, including a retention system.
- A plan for accidental hazardous chemical spillage should be prepared and implemented.
- Workers should be aware of the importance of natural resources and should not dispose of or discharge into the waterbodies.
- All water discharges from the site should meet WB guidelines and sufficient controls put in place for this purpose.

6.4.2.6 Impact due to Construction of Wharf

6.4.2.6.1 Impact on Water Quality due to Construction of Wharf

As per the WBG EHS Guidelines for Ports, Harbors and Terminals, 2017, construction and operations of ports, harbors and terminals can have a significant impact on water quality. Construction activities (such as clearing of vegetation, reclamation, paving, and construction of buildings), and operational activities (such as maintenance activities, ship maintenance, and ship effluent disposal) can result in increased turbidity via suspension of sediment in the water column. In addition, the introduction of pollutants can have adverse impacts on aquatic flora and fauna (including benthic communities), and human health, for example excessive nutrient loading leading to eutrophication, oxygen depletion, and toxic algal blooms.

The construction of a wharf may introduce additional challenges such as accidental oil spills during the transportation of construction materials for the wharf, can potentially contaminate surface water. Domestic and sanitary waste from the construction labor camp may also pose a risk to the surface water resources in the project area.

Furthermore, the generation of construction debris and solid waste from construction camps and sites must be effectively managed. During the monsoon season, surface runoff can wash away waste materials, contributing to suspended solids in nearby water bodies, such as the Meghna River branch. It is important to note that the proposed wharf construction in the Meghna River branch is expected to increase turbidity in the water. However, it is anticipated that the impacts on the water bodies will be relatively limited during the construction phase of the project.

Impact	Surface water pollution due to construction activities of Wharf				
Impact Nature	Direct	Indirect		Induced	
Impact Scale	Project construction site				
Frequency	Limited to construction phase				
Extent and Location	Project Site	Local	Regional	National	Trans Boundary
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation

Impact Intensity/ Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low	Medium			High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider medium-low					

Mitigation Measures: The following mitigation measures can be adopted by the authorities to reduce the impact on the quality of water during the construction phase:

- Machinery and equipment will only be drained after separating solids through proper filtration methods.
- Silt fences and storm drain inlets with appropriate filters will be employed to reduce run-offs from construction sites.
- Spoiled earth will be stockpiled at a safe distance from drainage areas.
- Any oil leakage or spillage will be promptly contained and cleaned up, with waste oil collected and stored for recycling or disposal.
- Hazardous chemicals and fuels will be properly labeled and stored in bunded areas, with on-site storage limited to reduce the impact of potential spillage or mitigation failure.
- Water suppression during excavation and earth handling will be controlled to minimize excess water and sediment disposal into surface water.
- Vehicle maintenance and mechanical repairs will take place in designated locations, bound to capture, and control oil, grease, and other spills to prevent contamination of surface water resources.

6.4.2.6.2 Impact on Ecosystem and Biodiversity due to the Construction of Wharf

6.4.2.6.2.1 Impacts on Terrestrial Flora

The proposed wharf will be constructed as an associated facility of the Greenfield Re-Rolling Steel Plant, where ships will dock to load and unload cargo for the plant. The construction site of wharf is also located on the tributary of the Meghna Riverbank within the Cumilla Economic Zone. There will be no cutting or vegetation clearance in and around the project site for the construction of wharf. During the construction phase, activities that might impact terrestrial flora include the movement of construction vehicles, construction of project components, temporary labor influx, and negligence of workers, among other factors.

Dust generated from transportation and construction activities will lead to dust deposition on plant leaves, twigs, and stems which may hamper pollination, photosynthesis, respiration, and other physiological processes of surrounding vegetation. As a result, it will affect plant growth and cause diseases. In the construction period, there will be an influx of labor force from outside of the project area. The construction workers will primarily reside in the nearby habitation or the labor camp. The workers at the construction camp might fulfil their requirement of fuel and timber from nearby plantations. However, the baseline study represents no threatened terrestrial plant species within the project AOI.

Considering the project activities and potential biological receptors within the project AOI, the impact on terrestrial flora during the construction phase has been considered insignificant and assessed as **Very Low**.

Impact	Impact on Terrestrial Flora							
Impact Nature	Direct			Indirect			Induced	
Impact Scale	Limited to project site and its adjacent areas							
Frequency	Limited to Construction Phase							
Extent and Location	Project Site	Local		Regional		National		Trans Boundary
Impact Duration	Short Term	Medium Term		Long-term		Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium		High		Very High
Potential for Irreplaceable Loss of Resources	Low			Medium			High	
Probability of Impact	Unlikely	Low		Medium		High		Definite
Impact Significance	Very Low	Low	Medium-low		Medium-high		High	Very High
	Significance of impact consider Very Low							

Mitigation Measures

To mitigate these potential impacts on terrestrial flora during the construction phase of wharf, it is crucial to implement the following mitigation measures:

- Controlling the release of airborne dust by applying water in the construction zone.
- Using tarpaulin sheets to cover materials that produce dust during transportation to the site.
- Using wood as fuel should be strictly prohibited.
- Contractors should provide workers with fuel for cooking and educating them not to use wood as fuel, thereby reducing the impact on vegetation in the vicinity of the project site.

6.4.2.6.2.2 Impacts on Terrestrial Fauna

Potential impact sources considering impacts on terrestrial fauna during the construction of the wharf include generation of dust, noise and vibration from piling and installation of metal sheet and construction activities, excessive light, increased traffic from movements of vessels and vehicles, etc.

Dust generated from the construction work and movements of material-loaded vehicles can cause severe impacts on terrestrial fauna like residential and migratory birds. Noise and vibration from installation of metal sheet for wharf construction activities can disturb and disorient wildlife species residing adjacent to the wharf area which often leads to the displacement of fauna from their original habitats. This disturbance can have short-term or long-term effects on fauna, including changes in behavior, migration patterns, or breeding success. Also, increased traffic from the movement of construction material loaded vehicle can cause accidental harm or kills wildlife like small mammals, and herpetofauna.

Considering the issues, the impact on terrestrial fauna during the wharf construction phase is evaluated to be **Low**.

Impact	Impact on Terrestrial Fauna		
Impact Nature	Direct	Indirect	Induced
Impact Scale	Limited to project site and its adjacent areas		
Frequency	Limited to Construction Phase		

Extent and Location	Project Site	Local		Regional		National		Trans Boundary	
Impact Duration	Short Term	Medium Term		Long-term		Permanent-mitigated		Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low		Medium		High		Very High	
Potential for Irreplaceable Loss of Resources	Low			Medium			High		
Probability of Impact	Unlikely	Low		Medium		High		Definite	
Impact Significance	Very Low	Low	Medium-low		Medium-high		High		Very High
	Significance of impact consider Low								

Mitigation Measures

To mitigate these potential impacts on the terrestrial fauna during the construction phase, it is crucial to take the following suggested mitigation measures.

- Construction activities which generate noise and dust should be done during daytime and phased manner.
- Establishing buffer zones around sensitive habitats and employing noise-reducing techniques can help minimize the impact of noise and vibrations on terrestrial fauna including migratory birds.
- Restrict the speed limit of Vehicles (20 km/hr) to protect wildlife from any accidental issues or road kills.

6.4.2.6.2.3 Impacts on Aquatic Ecosystem

Impacts on Aquatic Ecosystem during wharf construction may happen due to the excavation, metal sheet installation activities for the foundation of the wharf, piling activities, leaching of construction debris, discharge of wastewater, and accidental spills of fuels or lubricants from machinery. The construction of the wharf includes slope stabilization and other activities which may involve altering the natural shoreline and adjacent habitats, such as wetlands and shallow water areas. This alteration can affect the distribution and abundance of aquatic species that rely on these habitats for feeding, breeding, and shelter.

The cargo which will be engaged in machinery transportation may spill/dispose oil, grease, food waste and other contaminants which might affect the fisheries resources and their habitat quality. Having disposed of such harmful substances into the Meghna River and its tributaries may create disturbance to fish habitat. Discharge of wash water from the construction site may increase the turbidity of the local fish which would affect the food supply for fish temporarily.

Wastewater from the wharf construction site activity might increase the silt content of the river water thus turbidity that may affect fish species even may cause death. Activities related to metal sheet installation for wharf construction will generate muddy water, and it will mix with river water, which will impact on fish and aquatic ecosystem. Underwater noise from metal sheet installation activities of wharf construction can create noise and block the movement of aquatic organisms thus imbalance the reproduction, behaviors, and migration patterns.

Considering the project activities and potential biological receptors within project AOI, the impact on the Aquatic ecosystem during wharf construction is assessed as **Low**.

Impact	Impact on Aquatic Ecosystem
--------	-----------------------------

Impact Nature	Direct		Indirect		Induced		
Impact Scale	Limited to project site and its adjacent areas						
Frequency	Limited to Construction Phase						
Extent and Location	Project Site	Local	Regional	National		Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation		
Impact Intensity/Severity	Insignificant	Low	Medium	High		Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High		
Probability of Impact	Unlikely	Low	Medium	High		Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Low						

Mitigation Measures

To mitigate these potential impacts on aquatic ecosystem during the construction phase of wharf, it is crucial to implement the following mitigation measures:

- Implement sediment barriers and silt fences to contain and prevent the dispersion of sediments resulting from excavation, and metal sheet installation activities.
- Deploy turbidity curtains around construction zones to minimize the impact on water clarity.
- Establish and enforce strict spill prevention protocols to minimize the risk of accidental spills of fuels or lubricants from machinery.
- Monitor and regulate the discharge of wastewater from the construction site to prevent adverse effects on aquatic life.
- Implement noise reduction measures during metal sheet installation activities to minimize underwater noise.

6.4.2.6.3 Impact on Katha (Brush Pile) Fishing due to Construction of Wharf

During the site visit, a total of 15 Kathas were identified within 1 km upstream and 1 km downstream from the Wharf area. However, only 3 of them—Katha Fishing 8, Katha Fishing 9, and Katha Fishing 9 (b)— (showed in Figure 5-85) resided adjacent to the northern part of the Wharf, which likely to be permanently impacted by the intervention of the wharf. These Katha owners depend on alternative income sources beyond Katha fishing, with an average dependency on katha fishing of only below 30%. The major alternative income sources are agricultural activities and fishing in the Meghna River. These katha owners harvest fish from their kathas around three to four times in a year. During the establishment period and harvesting period, they employ 4 to 5 people as seasonal labor. These laborers are hired on daily basis payment for 5 to 7 days. These labors are not permanently work in these kathas, rather also involve in other kathas and other income generating activities like agricultural works, fishing in the river. These laborers are randomly appointed from the community.

Katha owners typically invest between BDT 100,000 to 1,12,000 for the establishment of their kathas including the labor cost. During the harvesting process of katha fishing, the owners usually provide various types of fish feed in their dedicated kathas. They typically start feeding two months before fish harvesting, when there are no surrounding nets, only bamboo poles, and shading tree branches and water hyacinth. Following 2-3 months of feeding, these katha owners surround these kathas by their

own special nets (known as Seine net) and harvest fish from the kathas. On average, their earnings from Katha fishing amount to between BDT 120,000 to 200,000 per year per katha after all expenses.

As discussed with the MRSML, the three kathas adjacent to the wharf area won't be affected during the construction of the wharf as well as the proposed project. It is to be estimated that the operation of the wharf will be started from June 2026. During the operation phase, katha owners will be unable to harvest their kathas due to the regular movement of barges and the operation of the wharf. Consequently, these owners are expected to relocate or displace their kathas since they cannot continue their activities at their current location during operation phase. They will shift their kathas during their off season. Therefore, they require compensation prior to the operation phase, in accordance with the proposed compensation package (Details in Table 6-40).

The nature of the impact on physical and economic displacement of katha owners due to construction of wharf is indirect. The duration of the impact is assessed to be short-term. The Extent and Location of the impact is Local. The probability of the impact is Low. So, the impact significance is Low regarding their physical and economic displacement due to the construction of Wharf.

Impact	Impact on Katha (Brush Pile) Fishing due to Construction of Wharf						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Wharf Area						
Frequency	During the Construction Phase						
Extent and Location	Project Site	Local		Regional	National		Trans boundary
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Low						

Mitigation measures

The following steps should be taken to minimize the impact due to the operation of the wharf.

- The katha owners should get access to their fishing areas (Kathas) during the construction phase.
- The SEP and GRM for the project will be applicable to the impacted katha owners

6.4.2.7 Impacts due to Transportation of Raw Materials

During the construction phase, all the construction materials, equipment, machinery, manpower will be transported by road and waterway. It is expected that hundreds of vehicles per day will be required during the construction phase of the project. In that time vehicles, movement in the project site, and surrounding area will be increased due to the transportation of raw materials and construction materials. Therefore, the traffic load on the road as well as on the waterway may be increased during the construction period; thereby road and waterway accidents might be increased.

Impact	Impacts due to Transportation of Raw Materials					
Impact Nature	Direct		Indirect		Induced	
Impact Scale	Within the project location and surroundings					
Frequency	Limited to construction phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider low					

Mitigation Measures: The following mitigation measures can be adopted by the authorities to reduce the impacts due to transportation of raw materials during the construction phase.

- A Proper Traffic Management Plan (TMP) should be developed by the contractor prior to construction and follow it strictly.
- In this TMP, the road safety measures such as speed breakers, warning signs/lights, road safety signs, flagman, etc. should be included to ensure uninterrupted traffic;
- Movement especially at nearby the educational institute (Schools, College, Madrasah, etc.), community infrastructure (mosques, graveyards, playground, etc.), Bazar and health complex should be careful and control the speed and avoid unnecessary horns;
- In addition, BRTA traffic rules and regulations should be strictly followed;
- Avoid disturbance and careful during construction vehicle and equipment movement in the project site and approach road;
- Use of low Sulphur content fuel for vehicles operation;
- Limit the speed of construction vehicles in the construction site and project approach road, it shall be 20 km/hour;
- Use of mobile phone during driving is strictly prohibited in the construction site and approach road;
- Maintain vehicles and construction equipment in good working condition including regular servicing;
- Instruct the drivers to drive carefully in the project site;
- Instruct the drivers to avoid unnecessary horns and engine operation in the construction site and approach road;
- Adequate lighting facilities in the construction site; and
- Proper indication of accident-prone areas, education, and religious institutes in the project site.

6.4.2.8 Impacts due to Waste Generation and Disposal

There is potential for the spread of construction debris to areas outside that are marked for construction. The debris generated from construction activities can be carried along with ponds and streams flowing in the proximity of the plant. Construction debris can also contaminate wells, etc., in the proximity of the activity. The improper management of the above wastes may have potentially adverse impacts on the environment in the absence of appropriate mitigation measures.

Construction works may result in the generation of both non-hazardous and hazardous wastes which in turn may affect the soil and water quality, and the health and safety of workers. The non-hazardous wastes during the construction phase mainly include paper, wood, plastic, scrap metals, glass, and mud. On the other hand, hazardous waste includes absorbent materials, tires, metal drums, empty chemical containers, waste oil from machinery lubricants, etc.

Impact	Impacts due to Waste Generation and Disposal					
Impact Nature	Direct	Indirect		Induced		
Impact Scale	Project construction site					
Frequency	Limited to construction phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider medium-low					

Mitigation Measures: The following mitigation measures can be adopted by the authorities to reduce the impact from waste generation during the construction phase:

- A Construction Waste Management Plan as part of the site specific ESMPs should be developed and implemented.
- The solid waste should be collected in color-coded bins and disposed of in a particular segregated area as trash.
- A proper waste-management plan should be developed by the authorities.
- Chemicals and fuels should be stored in secondary containment.
- Domestic waste will be collected in special trash bins and temporarily stored onsite.
- Suitable waste containers will be provided at the places of waste generation to facilitate.
- safe and environmentally sound temporary storage.
- All containers will be clearly marked according to contents.

6.4.2.9 Impacts due to Wastewater Generation and Disposal

The proposed project is expected to generate wastewater during the construction phase to include black water (sewage water from toilets and sanitation facilities), briny discharges from plant and grey water (from sinks, showers, etc.) and from ready-mix/ civil construction area. The principal receptor would be nearby surface water bodies like the Meghna River and its branches. The potential impacts of improper management of waste streams could be of a short-term duration throughout the construction phase.

Impact	Impacts due to Wastewater Generation and Discharge				
Impact Nature	Direct	Indirect		Induced	
Impact Scale	Project construction site				
Frequency	Limited to construction phase				
Extent and Location	Project Site	Local	Regional	National	Trans Boundary
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation

Impact Intensity/ Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider medium-low					

Mitigation Measures: The following mitigation measures can be adopted by the authorities to reduce the impacts due to wastewater generation and discharge during the construction phase:

- Domestic sewage would be appropriately managed and disposed of;
- Establishment of the wastewater management plan at the project construction site;
- In the Meghna River and its branches, sewage water, chemical waste, etc. which are harmful to aquatic animals cannot be discharged;
- Any damaging activity to biodiversity shall not be accelerated/conducted in and around the construction site.
- Disposal of wastewater in an open environment is strictly prohibited;
- Instruct the workers to avoid improper disposal;
- Periodic monitoring will be carried out by the contractor to record generation and discharge of wastewater; and
- Stormwater will be collected through proper drainage channel and treated.
- Soil and sediment quality will be monitored by the contractor.

6.4.2.10 Enhancement of Local Economy

During the construction period the local economy will be enhanced by creating opportunities for business enhancement and employment opportunities for the local workforce. Local traders will likely benefit from the implementation of the proposed project. Economic impacts including potential for impacts on direct and indirect employment and additional job opportunities generation, funds for local development will likely occur. Thus, the impact significance should be considered as low and positive.

Impact	Enhancement of Local Economy						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Around the project area						
Frequency	Limited to construction phase						
Extent of Affected Stakeholders	Insignificant	Low	Medium	Moderate		High	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated		Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High		Very High	
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low	Medium	High		Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High

Significance of impact consider *Low (Positive)*

6.4.2.11 Impact on Traffic and Transportation

The main source of road traffic will be vehicles carrying equipment, construction material, and vehicles carrying workers on the project site.

The project will increase the volume of traffic and vehicular movement on the existing road which is the only way to access the site and upazila head quarter of Meghna and Homna of Cumilla district. The emphasize on traffic maintenance should be ensured by the project. Vehicular movement will increase during the construction phase for carrying construction materials and other relevant associated things for construction. Labor movement at the site during the construction phase also may cause traffic congestion at the site as they will also use local transport which will shrink the opportunity for locals while using transport. Exhaust emission from vehicles, likely to cause a rise in air pollutants. Excessive traffic movement also causes the increase of fugitive dust and also increases the probability of accidents involving human as well as domestic animals. Moreover, the noise and vibration related to increased traffic movement causes community disturbance.

During the construction phase of the project, construction materials like construction equipment and machinery will be transported to the site. An increase in local traffic is expected as a result of the vehicles carrying construction materials, machinery, and equipment. An increase in traffic volume on local roads may cause traffic congestion and accidents. However, the extra traffic load during the construction stage is not too high to impose a high-level impact on the road. Therefore, the impact significance is assessed as low.

Impact	Impact on Traffic and Transportation						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Within the project area						
Frequency	Limited to construction phase						
Extent of Affected Stakeholders	Insignificant	Low	Medium	Moderate	High		
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation		
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High		
Potential for Irreplaceability/Vulnerability	Low		Medium		High		
Probability of Impact	Unlikely	Low	Medium	High	Definite		
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High	
	Significance of impact consider Low						

Mitigation Measures

The following steps should be taken to minimize the impact due to increasing road traffic.

- All vehicles would undergo routine repair and maintenance to keep the vehicle in good operating condition.
- Sprinkling of water in dust prone activities like transportation on unmetalled road, digging works, material handling etc. would be taken up.

- Drivers and operators would be checked for fitness and any driver/operator impaired due to any reason, including but not confined to the influence of drugs and/or alcohol would not be allowed to drive.
- A speed limit of 20 km/hr. within the site would be followed and the use of mobile phones while driving would be prohibited.
- Implementation of a safety program (signage, speed restrictions, lights on trucks, truckload restrictions, etc.) within the construction area
- All drivers shall follow the speed limit, the direction of the signalman, sensitive locations, horn usage restrictions, etc.
- Appoint traffic personnel at the project entrance.

With the implementation of the precautionary and mitigation measures mentioned above, impacts on traffic movement would be negligible.

6.4.2.12 Local Conflict of Interest

Based on the manpower requirement data for the proposed project approximately 300-350 number of employments are expected in the construction phase. Both migrants and locals have the potential to be engaged in construction phase activities. Thus, the construction workers from another region of Bangladesh may have conflicts with the local community. The extent of affected stakeholder is low. The impact duration of local conflict of interest is medium term and its impact intensity is medium as well. The probability of this impact is low. As a result, the impact significance is assessed as low.

Impact	Local Conflict of Interest						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Within the project area and Local Communities						
Frequency	During Construction phase						
Extent of Affected Stakeholders	Insignificant	Low		Medium	Moderate		High
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Low						

Mitigation Measures

The following steps should be taken to minimize anything related to local conflict of interest.

- Job opportunities should be provided in a fair way.
- Clear information about the needs of labor (number and qualification) should be provided with local people ensure no labor will engage any function and any local argument.
- The job skills and the priorities for the affected people shall be taken into account and the workers can be chosen.

- Give priority of local people while recruiting employees for the project.
- Male and Female labor (if employed any) should receive the same wage to avoid conflict among the workers.
- Labor and security personnel should be well trained to deal with the community.

With implementation of the precautionary and the mitigation measures mentioned above impacts on due community conflict would be negligible.

6.4.2.13 Impact on Community Property Resources

The adjacent areas from the project area have no such commonly shared property except a very few open fields for roam around in the evening and some local institutions like Mosque, Growth center etc. Local people might have a chance to be confronted with the local property if not managed fairly. Therefore, the probability of the impact is low and the impact significance of community property resources during construction period is assessed as **Low**.

Impact	Impact on Community Property Resources						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	In and around the project area						
Frequency	Limited to construction phase						
Extent of Affected Stakeholders	Insignificant	Low		Medium	Moderate	High	
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low		Medium	High	Very High	
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High	
	Significance of impact consider Low						

Mitigation Measures

The following steps should be taken to minimize anything related to community property.

- Project will ensure prayer hall for the labor and staffs.
- Ensure the communal harmony is kept well while moving within it and with the local people for sharing the property.
- Arrangement of available tea stall and center for buying necessary things will ease the chance of conflict for sharing community property.

6.4.2.14 Impact Related to Gender Based Violence (GBV)/ Sexual Exploitation, Abuse and Harassment (SEAH)

Despite cultural practices, no gender-specific issues are observed and expected in the project area. The fact is that the participation of women in society is limited from a social and religious perspective, which has been observed during the field visit and consultation meeting. GBV and SEAH based issues

may be raised during construction phase of the project where women worker would work along with male worker. These issues may also arise between women member of local community and migrant workers who would be working during construction phase. However, during the construction phase, as per MSMRL, it is expected engagement of female labor will not occur, hence significant of the impact may be low.

Impact	Impact on Gender Based Violence							
Impact Nature	Direct		Indirect			Induced		
Impact Scale	Around project site							
Frequency	During all phases of the project							
Extent of Impact	Insignificant	Low		Medium	Moderate		High	
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High	
Potential for Irreplaceability/Vulnerability	Low			Medium		High		
Probability of Impact	Unlikely	Low		Medium	High		Definite	
Impact Significance	Very Low	Low	Medium-low		Medium-high		High	Very High
	Significance of impact consider Low							

Mitigation Measures

The following steps should be taken to minimize anything related to gender.

- Gender Assessment and potential mitigation around GBV is recommended to formulate by MSRML.
- Announce employment opportunities and recruitment notices widely, targeted at women as well as men.
- Technical training can be provided to the local workforce, especially women for inclusion in the operation and maintenance phase.
- Women are to be trained and empowered to be part of household energy solutions – their understanding and knowledge about their household energy need to be translated into defining the way forward on access to clean, affordable, and sustainable energy.
- Project will ensure no gender-based violence will occur due to the project with the following activities:
- Regular training programme should be carried out during induction of new worker.
 - Workers should be informed and alert regarding gender related sensitivity while visiting local villages for any needs.
 - Enough Complaint Box should be installed in various places in the MSRML plant area, within the community and worker accommodation to tackle the GBV issue.
 - Any grievance related to the GBV will be treated with high priority.

6.4.2.15 Labor Influx

The construction stage will involve the labor of unskilled, semi-skilled, skilled, and highly skilled type. However, it is envisioned that outsourced personnel will comprise mostly of skilled laborers and workers. During the project construction period around 300-350 workers will be engaged. The said number of laborers will create an influx of labor within the locality. Therefore, the anticipated impact is calculated as very low in this case. Thus, the overall impact significance of labor influx during the construction phase of the plant will be **Low**.

Impact	Labor Influx						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	In and around the project area						
Frequency	Limited to construction phase						
Extent of Affected Stakeholders	Insignificant	Low		Medium	Moderate	High	
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low		Medium	High	Very High	
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High	
	Significance of impact consider Low						

Mitigation Measure

The following mitigation measures should be taken to minimize the impact created due to labor influx.

- The labor camp and accommodation facility for regular employees should be constructed to meet the requirements of the applicable reference framework (IFC and EBRD Worker's Accommodation: Processes and Standards), in terms of space per worker, water and sanitation facilities, first aid, lighting and ventilation etc. and regular monitoring should be undertaken to ensure compliance through the project lifecycle.
- The labor camp should be located at a certain safe distance from the local community settlements, to minimize impacts on the local community due to the daily activities of the laborers
- MSMRL should ensure a monthly monitoring and regular auditing mechanism for monitoring the sub-contractors and suppliers with respect to compliance to the applicable reference framework, in terms of resources, migrant workers, child labor and forced labor, health and safety, payment of wages etc.
- Strengthen security personnel around labor camps in order to maintain adequate law and order and avoid any possible tensions between the migrant workforce and host community.
- Each worker and employee shall be provided a health and safety training as part of the induction process
- Create a labour management plan that will contain provisions to ensure non-discrimination and fair treatment for all workers. The labour influx management plan will also dictate the

requirement of workers at different stages of construction cycle, thereby helping in management of employment issues.

- Establish an internal grievance redressal mechanism in place, to allow for the employees and workers to report any concern or grievance related to work activities
- Prevention of massive movement within the locality for workers;
- Proper safety protocol should be taken under the labor management plan by EPC;
- Alert the migrant workers regarding GBV, local harmony and other socio-cultural aspects to avoid any kind of collision between labor and local people;
- Promoting collaboration with local authorities to enhance access of workers for their basic necessary that can be collected from the locality;
- Promoting use of local goods and other material to make a balance between workers and local people;
- Both project authority and EPC should set a management plan and maintain the coordination to minimize any kind of dispute to labor influx.

6.4.2.16 Spread of Infectious Diseases, such as HIV/AIDS

The entire construction phase will require the labor of unskilled, semi-skilled, skilled, and highly skilled nature. However, it is envisaged that outsourced personnel will comprise mostly of skilled laborers and workers. During Construction, in general, 300-350 migrant workers flow into the sites, who may have the possibility of HIV/AIDS, or any other infectious disease that can spread among local people. Thus, the overall impact significance during the construction phase of the plant will be **Very Low**.

Impact	Infectious Diseases, such as HIV/AIDS						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	In and around the project area						
Frequency	Limited to construction phase						
Extent of Affected Stakeholders	Insignificant	Low		Medium	Moderate	High	
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low		Medium	High	Very High	
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Very Low						

Mitigation Measure

The following mitigation measures should be taken to minimize the impact on Infectious Diseases, such as HIV/AIDS.

- Prevention of illness among workers by undertaking health awareness and education initiatives and by conducting immunization programs for workers.
- To provide treatment through standard case management in on-site and community health care facilities as necessary;

- Educating project personnel and area residents on risks, prevention, and available treatment;
- Promoting collaboration with local authorities to enhance access of worker's families and the community to public health services and promote immunization as necessary;
- Promoting use of repellents, clothing, netting, and other barriers to prevent insect bites;
- Prevention of larval and adult propagation through sanitary improvements and elimination of breeding habitats close to human settlements;
- Elimination of unusable impounded water;
- The Contractor will prepare and implement a Safety Plan related to infectious diseases prior to commencing work. This plan will include method statements for working methods, construction sequence, and safety arrangements.
- Prepare and disseminate Infectious Diseases related information (flyer/brochure) among the workers for awareness purpose.
- Training and workshops will be conducted on HIV/AIDS and infectious diseases.
- Workers will be screened on their health while induction.

6.4.2.17 Impact on Health and Safety

6.4.2.17.1 Occupational Health and Safety

The potential source of impact is given below:

- Noise from construction activities
- Impure drinking water
- Accidental injury
- Unhygienic sanitation system
- Congestion in dormitory

The effect of high noise levels on the operating person must be considered as this may cause permanent hearing loss. It is known that continuous exposure to high noise levels above 85 dB(A) affects the hearing acuity of the workers/operators and hence, should be avoided.

Pure drinking water along with a proper sanitation system is essential to keep the worker in good health. Accidental injury may happen during construction work. Congestion in workers living places may influence the spread of contagious diseases among the workers. Thus, the overall impact significance during the construction phase of the plant will be **Medium-low**.

Impact	Occupational Health and Safety				
Impact Nature	Direct	Indirect		Induced	
Impact Scale	Within the project area				
Frequency	Limited to construction Phase				
Extent and Location	Project Site	Local	Regional	National	Trans boundary
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High
Potential for Irreplaceability/Vulnerability	Low		Medium		High
Probability of Impact	Unlikely	Low	Medium	High	Definite

Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider <i>Medium-low</i>					

Mitigation Measure

The following mitigation measures should be taken to minimize the impact on occupational health and safety.

- The Contractor will prepare and implement a Health and Safety Plan prior to commencing work. This plan will include method statements for working methods, construction sequence, and safety arrangements.
- Measures will be implemented to reduce the likelihood and consequence of the following hazards:
 - falling from height.
 - falling into the water.
 - entanglement with machinery.
 - tripping over permanent obstacles or temporary obstructions.
 - slipping on greasy or icy walkways.
 - falling objects.
 - asphyxiation.
 - explosion.
 - contact with dangerous substances.
 - electric shock.
 - mistakes in operation.
 - variable weather conditions.
 - lifting excessive weights; and
 - Traffic operations.
- Competent and adequate resources of subcontractors will be used where construction activities are to be subcontracted.
- All persons working on site will be provided information about risks on Site and arrangements will be made for workers to discuss health and safety with the Contractor.
- All workers will be properly informed, consulted, and trained on health and safety issues.;
- Personal Protective Equipment (PPE) shall be worn at all times on the Site. This shall include appropriate safety shoes, safety eyewear, and hard hats. Non-slip or studded boots will be worn to minimize the risk of slips.
- Before starting work all the appropriate safety equipment and the first-aid kit will be assembled and checked as being in working order. The breathing apparatus will be tested at regular intervals in the manner specified by the makers.
- Daily Toolbox talks to be conducted prior to start of work.
- All lifting equipment and cranes will be tested and inspected regularly.
- Where sound levels cannot be reduced at the source, suitable hearing protection will be provided when noise levels indicate a Leq of more than 90 dB(A).
- The Contractor shall provide appropriate safety barriers with hazard warning signs attached around all exposed openings and excavations when the work is in progress.

The impact on Occupational Health and Safety will have medium intensity with project site extent for a medium duration which will result in an overall medium-low impact without mitigation. However, with proper implementation of the suggested mitigation, the impact will be reduced to very low.

6.4.2.17.2 Community Health Safety and Security

Possible sources of impacts on community health and safety during the construction phase are:

- Changes in environmental quality due to construction activities.
- Increased prevalence of disease arising from the influx of construction workers; and
- Heavy traffic movement.

Changes in the environmental quality of air, surface water, groundwater, and soil quality may occur as a result of construction activities. High noise levels are also expected from the operation of heavy machinery. The discharge of domestic waste effluent from sanitary facilities for construction workers may have the potential to cause contamination of surface water and groundwater in this area.

The influx of workers to the community may have an impact on public health, especially an increase in the prevalence of diseases. The influx of migrant laborers during construction can cause a mixing of the migrant workforce with the local people. This mixing of the groups may cause some adverse impacts on public health in the neighboring villages with the potential for the spread of infectious diseases like Acquired Immune Deficiency Syndrome (AIDS).

During site visit and consultation with MRSML it was identified that, MRSML already established a security management plan (Appendix F-4:). As a part of this security management plan, MRSML deployed security forces and established fences to ensure the security of the entire project site.

Measures such as proper collection, storage, and disposal of wastes, and construction of septic tanks to prevent contamination of water resources from sanitary effluents generated from labor camps will be implemented. Mitigation measures will be implemented to reduce the likelihood of contamination of surface and groundwater from sanitary effluents generated during construction. Thus, the overall impact significance during the construction phase of the plant will be **Low**.

Impact	Community Health and Safety							
Impact Nature	Direct		Indirect			Induced		
Impact Scale	Adjacent Communities and project workers							
Frequency	Limited to construction Phase							
Extent and Location	Project Site	Local		Regional	National		Trans Boundary	
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High	
Potential for Irreplaceable Loss of Resources	Low			Medium		High		
Probability of Impact	Unlikely	Low		Medium		High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High		Very High
	Significance of impact consider Low							

Mitigation Measures

The following mitigation measures will be put in place to reduce impacts on community receptors:

- Barriers will be provided to prevent the ingress of persons into the construction site and also to protect the public from exposure to hazards associated with construction activities.
- Avoiding the formation of stagnant water pools in and around the site.

- Implementation of a vector control program in labor camps and surrounding areas; and
- Emphasizing safety aspects among drivers, particularly with regard to the speed limit of 20 km/hr that will be enforced.
- Provisions under the Security Management Plan should be followed.
- Ensuring that only licensed drivers are employed by the Project.
- Avoiding peak hours for heavy vehicle movement where possible.
- Collaboration with local communities and responsible authorities to improve signage (e.g., pedestrian crossings, speed limits, etc.), visibility, and awareness of traffic and pedestrian safety.
- Screening, surveillance, and treatment of workers, through the provision of medical facilities and, where required, immunization programs.
- Free health checkup and awareness campaign for the community people regarding infectious diseases will be provided by MRSML.

Residual Impact

The impact on Community Health and Safety will have low intensity within adjacent communities and project workers for a short duration which will result in an overall Low impact without mitigation. However, with the proper implementation of suggested mitigation measures, the overall impact will be very low.

6.4.3 Impacts during Operation Phase

6.4.3.1 Impact on Air Quality

6.4.3.1.1 Air Dispersion Modelling

The operation phase of the proposed plant will involve air emissions from burning of scrap materials and fugitive dust emissions from scrap material storage, handling and transportation activities. The air dispersion modeling was conducted only for PM and NO₂ during the ESIA process, while the assessment of emission abatement solutions for other air pollutants will be carried out by MGI at a later stage. The impacts on air quality anticipated due to project activities have been discussed below:

6.4.3.1.2 Plant Operation

a. Raw Material Transport and Handling

The required steel scrap (grades HMS 1 & HMS 2) will be sourced from U.S.A and Europe. The scrap will be imported through the waterway. Firstly, scrap will be brought to the Chattogram port. From Chittagong anchorage to MRSML via Hatiya-Sandeep channel, Meghna River (Chandpur), and Meghna River sub-branches. Trans-shipment from large vessel to MGI-owned lighter vessel(s) (capacity: 1200-4000 MT) will be occurred at Chittagong outer anchorage. Unloading and loading will be done using crawler-type steel grabbers with hydraulic grabs and magnetic disks.

The cleaning system is an equipment designed by Vezzani SpA specifically to remove non-ferrous materials from steel scrap, whether processed or unprocessed. The cleaning system itself consists of several key components:

- Vibrating Conveyor
- Magnetic Drum
- Non-Ferrous Material Conveyor
- Bypass System for Heavy Material

The benefits of the Cleaning System are as follows:

- Enhanced Scrap Quality: By removing contaminants like concrete, glass, rust, paint, and insulation, the cleaning system significantly improves the quality of the scrap fed into the furnace.

- Reduced Melting Energy Consumption: Cleaner scrap requires less energy to melt in the furnace, leading to cost savings and a more environmentally friendly process.
- Increased Production: Improved scrap quality can potentially boost production rates by optimizing furnace operation.

b. Quality Control

Standards: Steel scrap is traded according to international specifications, primarily the US- based ISRI. The most widely traded ferrous scrap is ISRI specs 200 to 211.³⁹ The steel scrap mix shall be according to the European standards with a maximum quantity of contaminated scrap equal to 25% of the total scrap weight, with a uniform distribution in the buckets. The contaminated scrap shall have a maximum total content of combustible materials (i.e. grease, oil, rubbers, plastics, painting etc.) amounting to 0.25% of the total weight of the contaminated scrap. According to the ISRI guidelines for ferrous scrap, all grades shall be free of dirt, nonferrous metals, or foreign material of any kind, and excessive rust and corrosion. However, the terms “free of dirt, nonferrous metals, or foreign material of any kind” are not intended to preclude the accidental inclusion of negligible amounts where it can be shown that this amount is unavoidable in the customary preparation and handling of the particular grade involved.

Quality Requirements:

- The average scrap density shall be 944 kg/m³ with a maximum variation of $\pm 3\%$ Maximum scrap piece size is 1.5 x 0.5 x 0.5 m with a max section thickness of 0.1 m. Maximum weight of any piece of scrap is 1 t. Heavy pieces of scrap shall be properly embedded in lighter scrap according to Seller's instructions. The weight fraction of scrap pieces weighing more than 0.5 t each shall not exceed 5%. The total amount of heavy scrap (HMS, bundles, heavy pieces) shall not exceed 45% of the whole charge. The total amount of turning scrap shall not exceed 7% of the whole scrap charge.
- Impurity limits: S \leq 0.032%, P \leq 0.025%, Cr \leq 0.15%, Ni \leq 0.12%, SiO₂ \leq 1.5%
- No closed vessels, explosives, or toxic substances allowed.

Cleanliness Requirements:

- Minimal oxidation
- Free of vitreous enamel, oil, and lime enclosures
- Limited non-metallic fractions:
 - Dust < 1.3%
 - Moisture < 1.25%
 - Hydrocarbons < 0.19%
 - Inerts < 2.66% (SiO₂ < 0.98%)

Scrap quality can be verified by means of magnetic separation or exposure to sun / flame of a sampled quantity.

c. Source of Impact

The scrap materials will be melted in the electric arc furnace. The major pollutants of concern from the scrap material handling and burning are particulate matter (PM), Sulfur-di-Oxides (SO₂), and Nitrogen di-Oxides (NO₂) and Carbon Monoxide (CO). As stated there will be a limited percentage of chromium ($\leq 0.15\%$) in scrap and non-metallic hydrocarbons ($\leq 0.19\%$). The scrap will be free from explosives or toxic substances.

Air dispersion model has been performed considering the scrap material smelting in electric arc furnace as part of the impact assessment. The project will have a fume de-dusting plant for the primary, secondary and auxiliary suction lines fumes of the 150 tons tapped steel EAF. The fume de-dusting

³⁹ ISRI Scrap Specification Circular 2022

plant will capture and treat fumes of the following sources:

- Primary fumes line from the furnace roof (Direct Extraction System - DES);
- Secondary fumes line from the canopy hood arranged on the building roof over the furnace shell;
- Ladle Furnace (LF);
- Materials Handling System.

Fumes will be filtered by a suction type of filter design with bags. Treated fumes will be emitted through 45 m stack. Fumes from Reheat Furnace (RHF) will be emitted through 65 m stack. The air quality impacts of the proposed steel plant have been assessed using baseline information gathered through field studies, analysis of the information provided by the proponent and advanced air modelling using preliminary design, technical information, fuel rate and operating data.

Emission Inventory

The pollutants of concern released by the steel industry are Particulate Matter (PM), Nitrogen-di- Oxides (NO₂), Sulfur di-Oxide (SO₂) and Carbon Monoxide (CO). The resulting ground level concentration (GLC) from air quality modelling will be referred to the applicable limits of ambient air quality from schedule 1 of Bangladesh air pollution control rules 2022.

The emission inventory has been presented based on the guaranteed emission concentration from equipment. The emission inventory of the steel mill is presented in Table 6-11.

Table 6-11: Emission Inventory of Proposed Steel Mill

Pollutant	Unit	Emission Concentration	
		FTP Stack	RHF Stack
Particulate Matter (PM)	mg/Nm ³	30	30
Nitrogen di-Oxide (NO ₂)	mg/Nm ³	41	41
Sulfur Dioxide (SO ₂)	mg/Nm ³	29	29
Carbon Monoxide (CO)	mg/Nm ³	100	100
Oil Mist	mg/Nm ³	15	15
VOC	mg/Nm ³	20	20
PCDD/F	ng TEQ/ Nm ³	0.1	0.1
Chromium (Cr)	mg/Nm ³	4	4
Cadmium (Cd)	mg/Nm ³	0.2	0.2
Lead (Pb)	mg/Nm ³	2	2
Nickel (Ni)	mg/Nm ³	2	2
Hydrogen Chloride (HCl)	mg/Nm ³	10	10
Fluoride	mg/Nm ³	5	5
Hydrogen Fluoride (HF)	mg/Nm ³	10	10
H ₂ S	mg/Nm ³	5	5
Ammonia	mg/Nm ³	30	30
Benzo(a)pirene	mg/Nm ³	0.1	0.1

Pollutant	Unit	Emission Concentration	
		FTP Stack	RHF Stack
Tar fume	mg/Nm ³	5	5

Source: Meghna Re-Rolling and Steel Mills Ltd. (MRSML) and IFC EHS Guidelines for Integrated Steel Mills, 2007.

Emission Source

The proposed steel industry is located in Cumilla Economic zone. A glass industry is being built in the economic zone and other industries will be set up in the economic zone in the near future. There are some industries at the south and south-west of the economic zone e.g. Pioneer paper & Board Mills, Bashundhara Papers Mill, Bangkok Cable Industry, Poly Cable Industries Ltd, JMI Industrial Park etc. Generally, air pollution within the same airshed is from road dust, industrial emission, black smoke from diesel engines, construction dust, river transport, windblown dust from agricultural lands, domestic heating and cooking.

The project adopts the form of single-tube chimney of Fume Treatment Plant and Rotary Heat Furnace. The FTP and RHF chimney/stack height are 45 m and 65 m above finished ground level. The finished ground base elevation for the stack has been considered to be 16.2 meters. The location of the stacks is presented in Table 6-12.

Table 6-12: Stack Location of Proposed Steel Mill

Name	Stack/Chimney	X coordinate (meter)	Y coordinate (meter)	Base Elevation
Fume Treatment Plant	Stack 1	259977.79	2610431.58	16.2
Rotary Heat Furnace	Stack 2	260081.00	2610165.00	16.2

The air quality modelling assessment was based on maximum plant load factor. The maximum concentrations modelled are based on the plant operating 24 hours per day, seven days per week. Point source input parameter and emission rate are presented in Table 6-13.

Table 6-13: Source Input Parameter and Emission Rate of the Steel Mill

Parameter	Unit	Value	
		FTP	RHF
Stack Height	m	45	65
Stack Internal Diameter	m	6.5	3.7
Stack Exit Temperature	k	378	673
Gas Exit Velocity	m/s	15.59	10
Gas exit flow rate	m ³ /s	517.3	107.5
Emission Rate			
NO ₂	g/s	15.3	1.78
SO ₂	g/s	10.7	1.26
PM	g/s	3.7	1.30
CO	g/s	37.4	4.36

d. Prediction of Impact

The air dispersion modelling input data consisted of meteorological data, detailed information on the physical environment and design details for all emission points on-site. Using this input data, the model predicts ambient ground level concentrations beyond the site boundary for each hour of the modelled meteorological years. The model post-processes the data to identify the location and concentration of the worst-case ground level concentrations.

Emissions from the plant have been modelled using the AERMOD dispersion model (Version 12.0.0) which has been developed by the United States Environmental Protection Agency (USEPA). The model is a steady-state Gaussian plume model used to assess pollutant concentrations associated with industrial sources. The model has been designated the regulatory model by the USEPA for modelling emissions from industrial sources in both flat and complex terrain. Resulting GLCs were determined specifically for NO₂ -24hr and Annual average, CO-1hr and 8 hr, SO₂, and PM -24 hr and Annual average.

The resultant NO₂ concentrations are largely driven by the ambient chemical environment (i.e., the reaction of NO with ambient ozone to form NO₂) and the initial NO₂/NO_x ratio of the emissions. The model has been run for NO₂ considering Tier 1 (NO₂/NO_x ratio 1:1) to determine the worst condition.

Background Concentration

Baseline concentration of the criteria pollutants is accounted for different duration. Primary ambient air quality samples were taken from five locations in the dry season. According to the baseline air quality monitoring, the current air quality of the study area is well within the standard. Two industries are being built within the Cumilla economic zone. Several industries will be established within the economic zone in future. Long term air quality data is required to determine whether the airshed degraded or non-degraded. There is no continuous air quality monitoring station in Gazaria area. Hence, the background concentration from primary air quality monitoring was converted into various averaging periods for compliance monitoring using the following power law relationship (OMOE, 2014).

$$C_{\text{long}} = C_{\text{short}} (t_{\text{short}}/t_{\text{long}})^p$$

where:

C_{long} = the concentration for the longer averaging time

C_{short} = the concentration for the shorter averaging time

t_{short} = the shorter averaging time (in minutes)

t_{long} = the longer averaging time (in minutes)

p = the power law exponent

For ambient air assessments a p value of 0.28 is used (OMOE, 2014) for gaseous pollutants. In case of dust particle, the p value is considered as 0.5 to convert annual or 24 hr concentration of particulate matter in ambient air (Beychok, 2005). This methodology is deemed to give conservative estimates and thus, is appropriate for this case. Maximum value has been taken among five primary air quality monitoring locations to determine the worst-case scenario. Table 6-14 shows the maximum background concentration.

Table 6-14: Maximum Background Concentration of Criteria Pollutants

Criteria Pollutants	Averaging time	Concentration $\mu\text{g}/\text{m}^3$	Standard Concentration (APCR, 2022) $\mu\text{g}/\text{m}^3$
Particulate Matter (PM ₁₀)	24-hr	53.7	150
	Annual	2.8	50
Particulate Matter (PM _{2.5})	24-hr	42.3	65

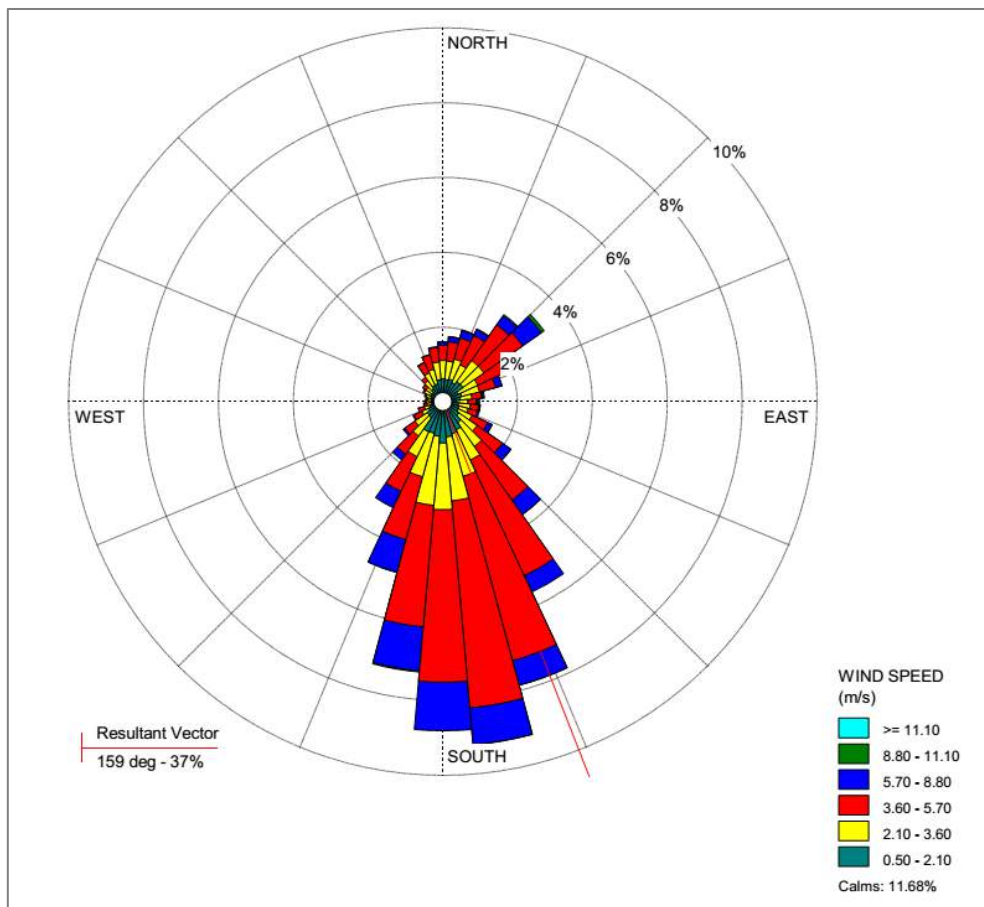
Criteria Pollutants	Averaging time	Concentration $\mu\text{g}/\text{m}^3$	Standard Concentration (APCR, 2022) $\mu\text{g}/\text{m}^3$
Sulfur Dioxide (SO_2)	Annual	2.2	35
	1-hr	49.4	250
	24-hr	27.6	80
Nitrogen Dioxide (NO_2)	24-hr	42.5	80
	Annual	8.2	40
Carbon Monoxide (CO)	1-hr	1611	20000
	8-hr	900	5000

Meteorology

Air quality is dependent on the rate of pollutant emissions into the atmosphere and the ability of the atmosphere to disperse the pollutant emissions. The dispersion of air pollutants is affected by local meteorological patterns. The wind direction controls the path that air pollutants follow from the point of emission to the receptors. In addition, wind speeds affect the time taken for pollutants to travel from source to receptor and the distance over which air pollutants travel. As a result, wind speeds also impact the dispersion of air pollutants. Therefore, it is important to assess local meteorological patterns to assess potential air quality effects.

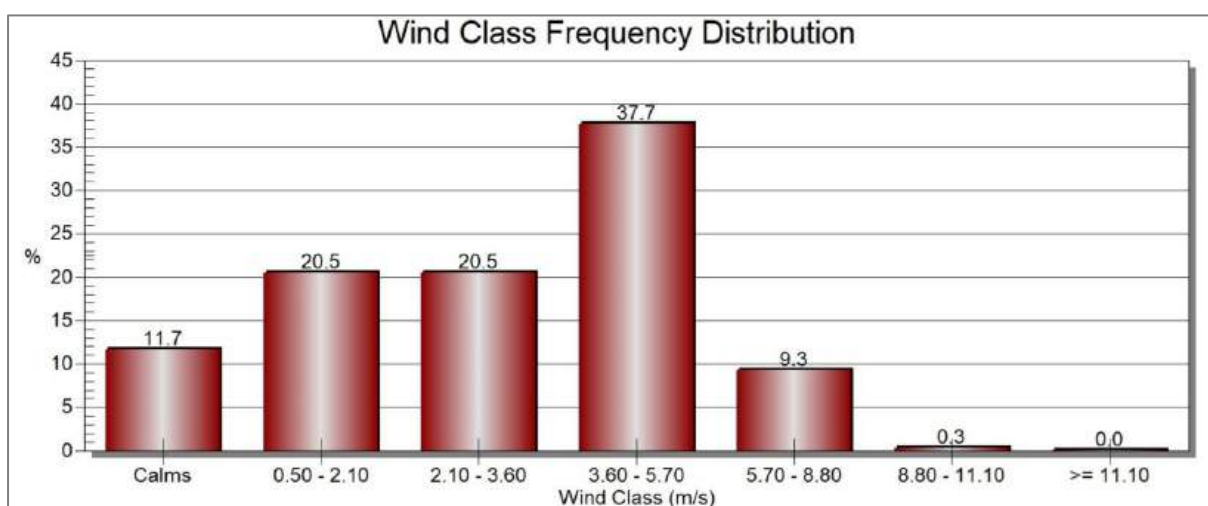
AERMET (Version #12.0.0), AERMOD's meteorological pre-processor requires hourly surface observations along with concurrent twice-daily upper air observations. As such, the dispersion modelling used three years (2020-2023) of meteorological data from lakes environment MM5 data. Figure 6-3 shows a 3-year (2020-2023) wind rose for meteorological data from lakes environment MM5 data over the study area and Figure 6-2 shows a frequency distribution of the wind over 7 wind speed class ranges. Mesoscale wind direction model shows that prevailing wind direction throughout the year from south by east to north by west (9.17%) followed by south to north (8.8%) and SSE-NNW (8.0%). The highest wind speed varies between 3.60-5.70 m/s at 37.7% whereas 11.7% calm wind. Average wind speed over the study area is 3.17 m/s. It has been concluded that the receptors present at the North by east direction are more susceptible to pollution generated from plant.

Figure 6-2: Annual Wind Rose of the Study Area



Source: Data acquired from Lakes Environmental

Figure 6-3: Wind Class Frequency Distribution of Meteorological Data (Jan. 1, 2020 – Dec. 31, 2023)



Source: Data acquired from Lakes Environmental

Study Area

An area, 7.5 km x 7.5 km centering the proposed steel plant has been selected for the air quality analysis. The plant boundary and air quality-modeling domain are presented in Table 6-15.

Table 6-15: Project Site Coordinates

Domain	Easting (m)	Northing (m)
Project Boundary		
Project Center	259969.05	2610442.06
Model Domain		
Northeast Corner	264969.05	2615442.06
Northwest Corner	254969.05	2615442.06
Southeast Corner	264969.05	2605442.06
Southwest Corner	254969.05	2605442.06

UTM Zone: N 46

The model was set up to examine the impact of emissions on the area surrounding the site using a series of receptors. A receptor is a location at which the model will calculate maximum process contributions (PCs) / GLCs. A multi-tier grid receptor system was established with the site at steel mill stack location. A multi-tier grid with 3 receptor grids of varying resolution was established.

A 500m x 500m grid with receptors at 50m spacings was created with the development site at its centre. Around this, a coarser 3km x 3km grid with 100m receptor spacings was created from centre. A third 7.5km x 7.5km grid with 200m receptor spacings was created around this. Grid network is presented in Table 6-16.

This network used Cartesian (X, Y) receptors with UTM coordinates. Base elevation of all the receptors were found using terrain elevations interpolated from SRTM (~30 m) Digital Elevation Model (DEM) data. In addition, 232 discrete cartesian receptors also taken into consideration, where the sensitive receptors and air quality monitoring locations are located (Table 6-17).

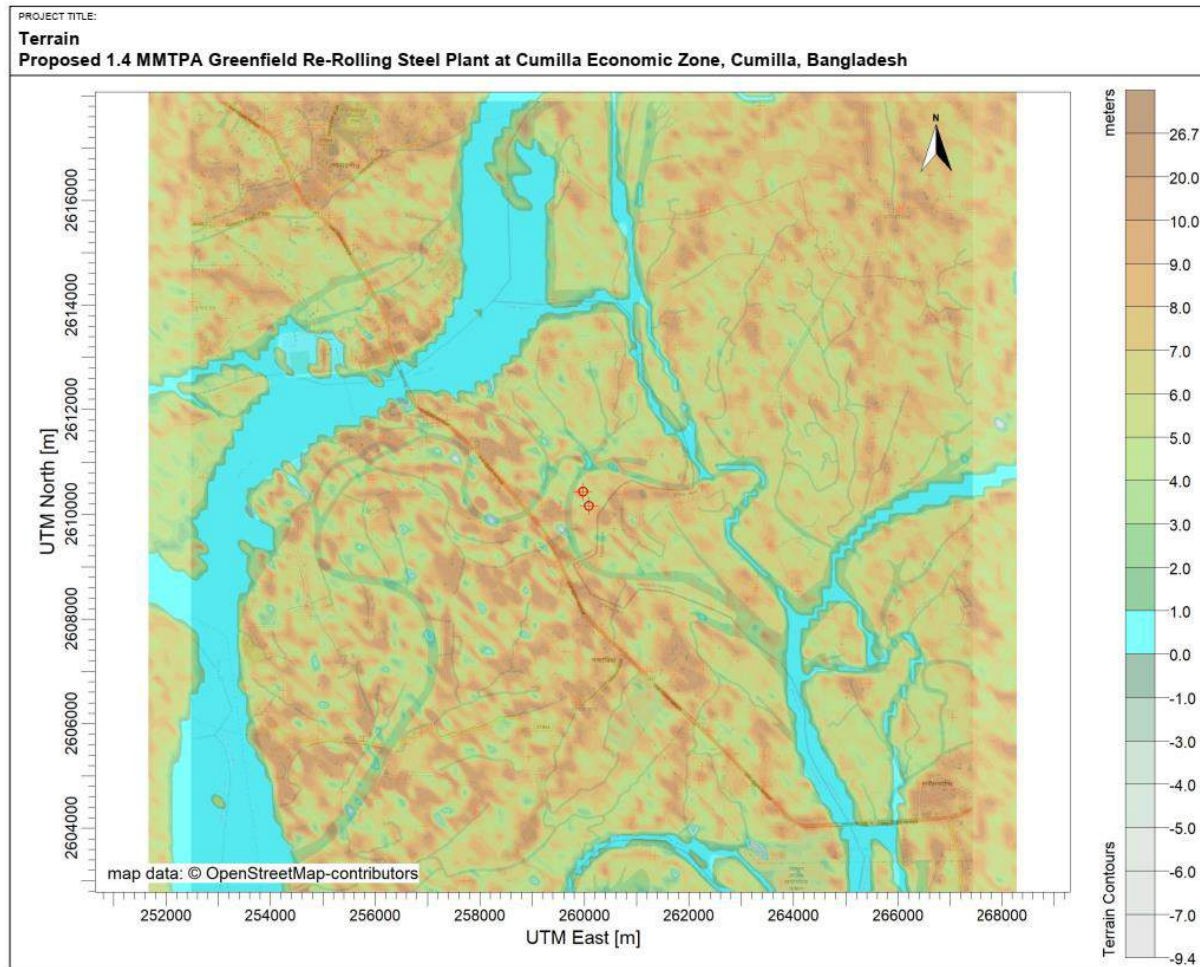
Table 6-16: Multi-Tier Grid Receptors

Tier	Distance from Center (m)	Tier Spacing (m)
1	500	50
2	3000	100
3	7500	200

Terrain

A terrain height for each of the receptors on the grid was input to the model in order to accurately represent the changing elevations of the surrounding landscape. Terrain data for the AERMAP model were taken from the 30 m SRTM database. The elevation of the 7.5 km area varies between -9.4 to 26.7m. Terrain of the study area is flat including river. The land elevation of the study area is presented in Figure 6-4.

Figure 6-4: Land Elevation of the Study Area



Source: Shuttle Radar Topography Mission (SRTM)

Sensitive Receptors

It is important to identify the sensitive receptors in and around the project surroundings for the air quality impact assessment. A total of six air quality samples were collected from different sensitive receptors. Besides air quality monitoring locations, a total of 226 discrete sensitive receptors have been identified based on the field visit and google imagery analysis. Air Quality monitoring location is presented in Table 6-17. Figure 6-5 shows the sensitive receptor locations within the model domain.

Table 6-17: Air Quality Monitoring Location

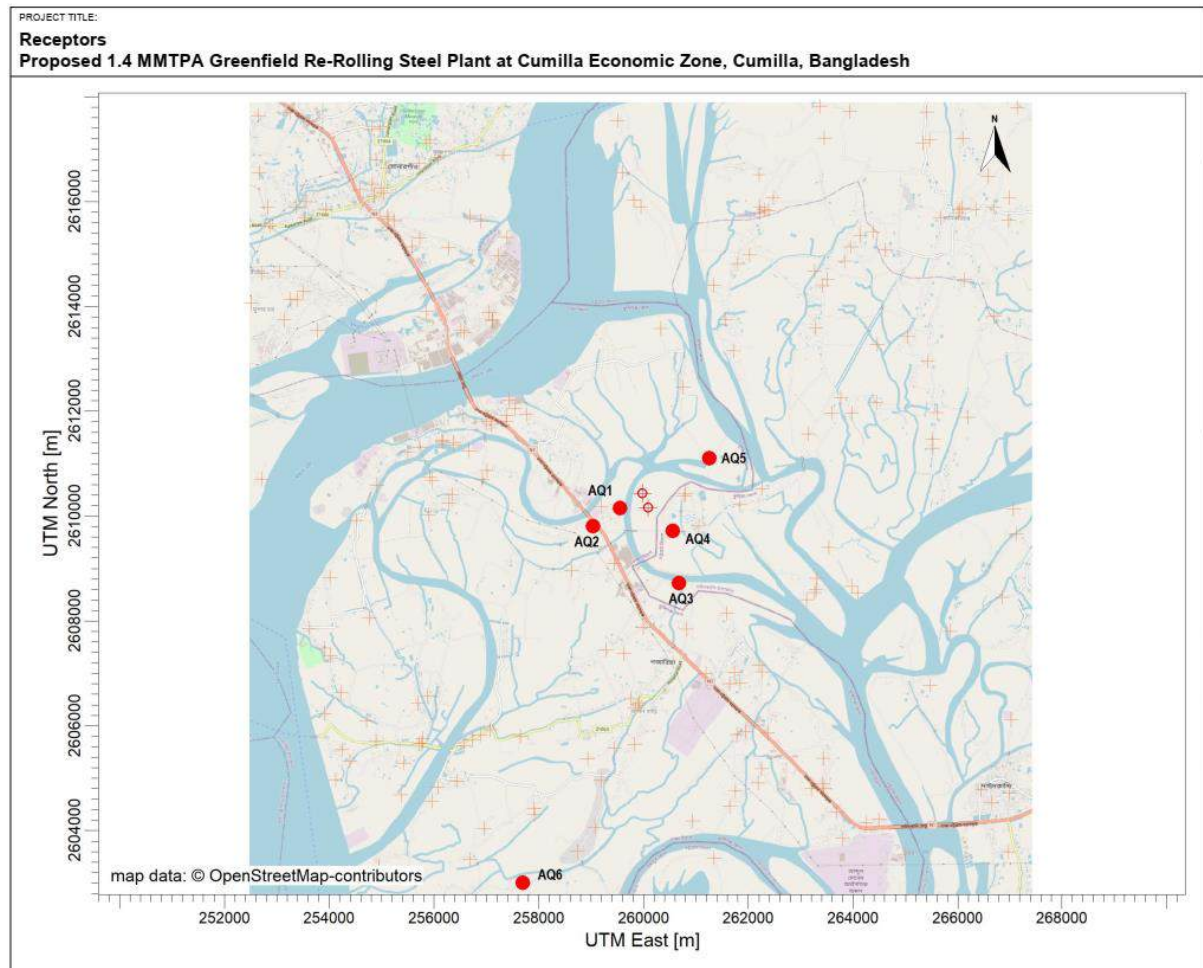
ID	Receptor's Location Name	Coordinate*	
		X	Y
AQ-1	Hazi Umor Faruqe Khondokar's Hause, Boroikandi, vaterchar, Gazaria, Munshiganj	23°35'3.00"N	90°38'38.00"E
AQ-2	Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhaber Char, Gazaria, Munshiganj	23°34'28.00"N	90°38'35.00"E
AQ-3	Noyakandi asroykendro, vitikandi, Gazaria, Munshiganj	23°34'15.00"N	90°39'21.00"E

ID	Receptor's Location Name	Coordinate*	
		X	Y
AQ-4	Project Site, Luterchar Answar Camp, CEZ, Meghna-Homna Road, Meghna, Cumilla	23°34'49.00"N	90°39'14.00"E
AQ-5	Joshim Uddin saheb ar bari, 9no word Abdullahpur, Meghna, Cumilla	23°35'35.00"N	90°39'38.00"E
AQ-6	Amin's house, Jastitola, Imampur, Gazaria, Munshiganj	23°31'8.99"N	90°37'37.00"E

*UTM-46

Source: Field Visit

Figure 6-5: Location of Sensitive Receptors



*UTM-46

Source: Field Visit and Google Earth Imagery

Model Input Data

The input parameters considered for the air dispersion modelling have been summarized in Table 6-18.

Table 6-18: Input Data Considered for Air Dispersion Modeling Exercise

No.	Scenario	Value
1	Control Pathway	
	Dispersion option	Default Option with stack-tip downwash, elevated terrain effect, use of calms processing routine, use of missing data processing routine and no exponential decay
2	Meteorological Input	
	Met Input Data	Meteorological data from 1 January 2021 to 31 December 2023 (Pre-processed Meteorological Data) Upper air data meteorological data (i.e. atmospheric stability class, mixing height, vertical wind profile, etc.) have been used
	Wind Speed Categories	Default
	Latitude	259977.79m N
	Longitude	2610431.58m E
	Base Elevation	9.82 m
3	Receptor Pathway	
	Flagpole Receptor Height	1.5 m
	Tier	Distance (m)
	1	500
	2	3000
	3	7500
	Sensitive Receptor	232
4	Source Pathway	Point Source
5	Output Pathway	Pollutants Ground Level Concentration
	PM ₁₀	1 Hourly, 24 Hourly and Annual
	PM _{2.5}	1 Hourly, 24 Hourly and Annual
	SO ₂	1 Hourly, 24 Hourly and Annual
	NO ₂	1 Hourly, 24 Hourly and Annual
	CO	1 Hourly, 8 Hourly and Annual

Modelling Result and Discussion

The following assumptions were used for the air quality modeling:

Background level concentration: Primary air quality data for dry season was collected from the study area. Since there is no continuous air quality monitoring station, primary baseline monitoring data has been used for background concentration. Highest concentration data were used for NO₂, SO₂, CO and PM to analyse the worst-case scenario. Different scenarios have been considered for the air dispersion modelling as follows–

- A. Only Project Contribution (Project only)** – Primary air quality monitoring data shows that the airshed is non-degraded in terms of NO₂, SO₂, CO, PM₁₀ and PM_{2.5}. Air dispersion modelling was done considering the model input data, stack details, gas exit temperature, velocity and emission rate presented in Table 6-18 and Table 6-12. The PM emission from Table 6(B) of the IFC-WB EHS Guidelines for Integrated Steel Mills 2007 does not give the breakdown of PM₁₀ or PM_{2.5}. Therefore, it has been assumed that PM=PM₁₀=PM_{2.5}, the proposed steel mill will have the same contribution of PM₁₀ and PM_{2.5} as PM.
- B. Project Operation Period (Project Contribution + Background Concentration)** – this includes project contribution, background concentration from primary air quality monitoring. Highest background concentration has been taken for analyzing worst case scenario.

Major sources of pollution from the plant will be NO₂, SO₂, CO and Particulate Matter. The proposed steel mill has different provisions for air pollution abatement measures therefore, the model has been

carried out considering mitigation measures. Based on the emission rates, operating data, meteorological data as well as the assumption given above, following section presents the results of air quality modelling.

6.4.3.1.2.1 Nitrogen Dioxide (NO₂)

Project Contribution Only

The air quality assessment is made in relation to ensuring compliance with the national standards and WHO guideline value. Due to the proposed plant operation, the 24-hourly predicted maximum NO₂ concentration found as 11.9 µg/m³ (259777.80m E 2611131.50m N) at 727 meters to the north by west direction of the FTP stack location. The proposed steel mill will contribute maximum Ground Level Concentration (GLC) of 1.55 µg/m³ (annual averaging time) of NO₂ to the airshed considering Tier 1 (NO₂/NO_x = 1). The annual predicted maximum NO₂ concentration was found as 1.55 µg /m³ (259977.80m E 2611031.51m N) at 598 meters to the north direction of the FTP stack. The results of ambient air quality modeling for NO₂ are presented in Table 6-19. In terms of impact on health, the maximum 24 hourly NO₂ contribution to GLC with a 41 mg/Nm³ emission concentration and 45 m stack height is about 14.9% of 24-hourly national standard (Schedule-1 of Air Pollution Control Rules 2022), 9.9% Interim Target 1 (IT1) value and 47.6% of WHO Air Quality Guideline (AQG) value. The plant will contribute about 3.9% of the annual national standard value and Interim Target 1 (IT1) value, 15.5% of WHO annual Air Quality Guideline (AQG) value. NO₂ Isopleths of 24-hourly and annual due to the steel mill operation are shown in Figure 6-6 and Figure 6-7. It shows that the maximum NO₂ concentration due to the only project operation will not exceed none of the national standard, WHO AQG guideline value and Interim Target 1 value.

Project Contribution + Background Concentration

During the scenario-2 analysis, the highest background concentration has been taken from primary air quality monitoring for worst case analysis. Short term maximum 24-hourly baseline concentration was found 54.5 µg/m³ (68.1% of national standard-APCR, 45.4% of Interim Target 1 value and 218.0% of WHO Air Quality Guideline value) and annual maximum baseline concentration estimated as 8.2 µg/m³ which is 20.5% of national standard, 20.5% of Interim Target 1 value and 82.0% of WHO Air Quality Guideline (AQG) value (Table 6-19). Hence, the background maximum NO₂ concentration is within the national standard whereas 24-hourly value exceeded the WHO Air Quality Guideline value. The project contribution including baseline concentration shows that the 24 hours and annual maximum concentration are 54.5 µg/m³ (68.1% of national standard-APCR, 45.4% of Interim Target-1 value and 218.0% of WHO Air Quality Guideline value) and 9.8 µg/m³ (24.4% of national standard and Interim Target-1 value, 97.5% of WHO guideline value). It can be concluded that only the project will contribute less than 25% of national standard NO₂ value to the airshed.

Table 6-19: Results of Air Quality Modeling for NO₂ due to Proposed Steel Mill Operation

Scenario	Max. Concentration (µg/m ³)		Max. Concentration Location	APCR, 2022 ^a (µg/m ³)	WHO, 2021 ^b (µg/m ³)		% of APCR 2022 standard	% of WHO 2021 Value	
	Avg. Time	Max. Value			IT1	AQG		IT1	AQG
Only Project Operation	24-hr.	11.9	259777.80 2611131.50	80	120	25	14.9	9.9	47.6
	Annual	1.55	259977.80 2611031.51	40	40	10	3.9	3.9	15.5
Baseline Concentration (µg/m ³)- Worst Scenario	24-hr.	42.6	260561.00 2609720.00	80	120	25	53.3	35.5	170.4
	Annual	8.2	260561.00 2609720.00	40	40	10	20.5	20.5	82.0

Scenario	Max. Concentration (µg/m ³)		Max. Concentration Location	APCR, 2022 ^a (µg/m ³)	WHO, 2021 ^b (µg/m ³)		% of APCR 2022 standard	% of WHO 2021 Value	
	Avg. Time	Max. Value			IT1	AQG		IT1	AQG
Project Operation + Maximum background concentration	24-hr.	54.5	-	80	120	25	68.1	45.4	218
	Annual	9.8	-	40	40	10	24.4	24.4	97.5

^aSchedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

Note: IT1- Interim Target 1, AQG- Air Quality Guideline

Figure 6-6: NO₂ Isopleths- 24 Hourly Average Maximum GLC for Proposed Steel Mill

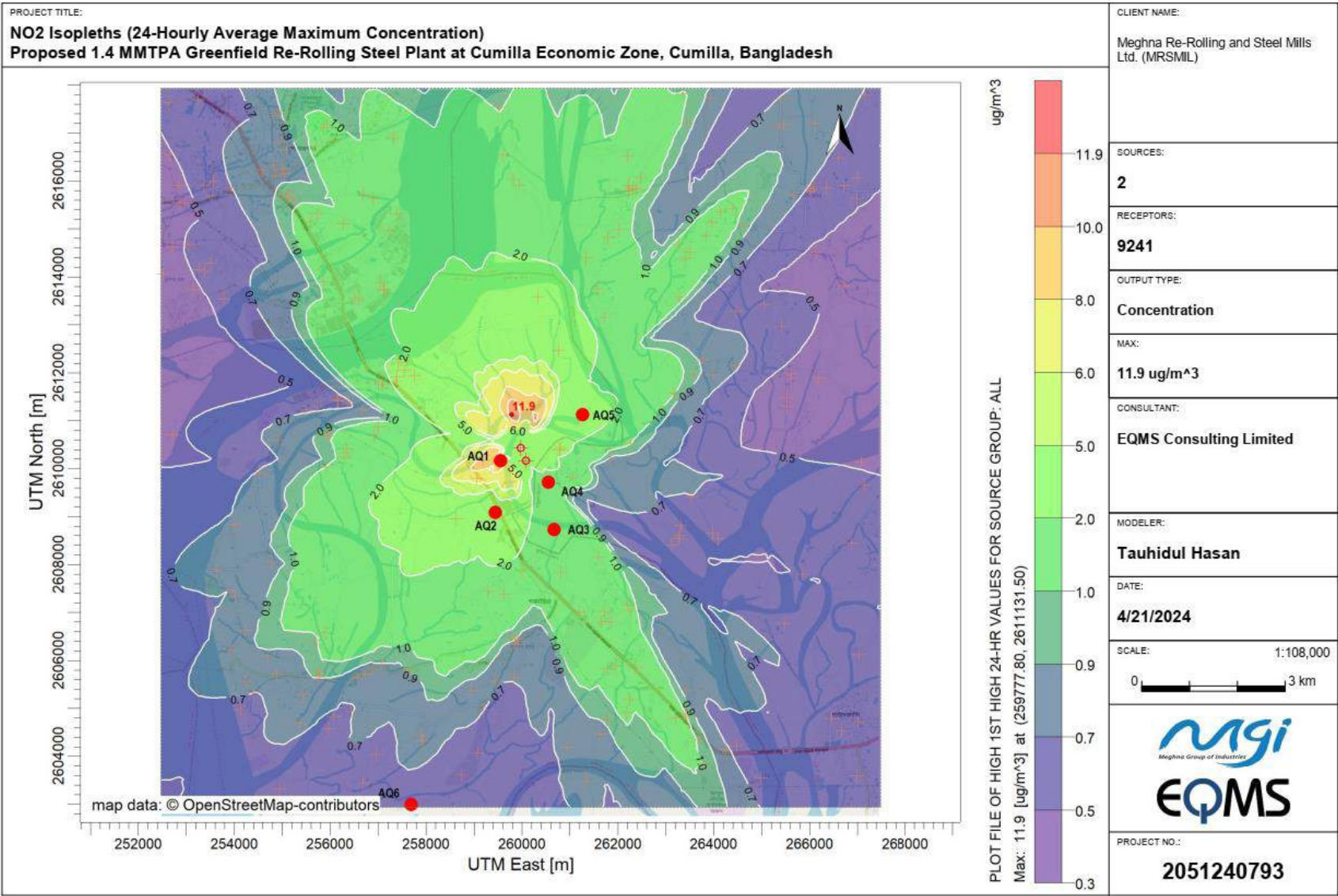
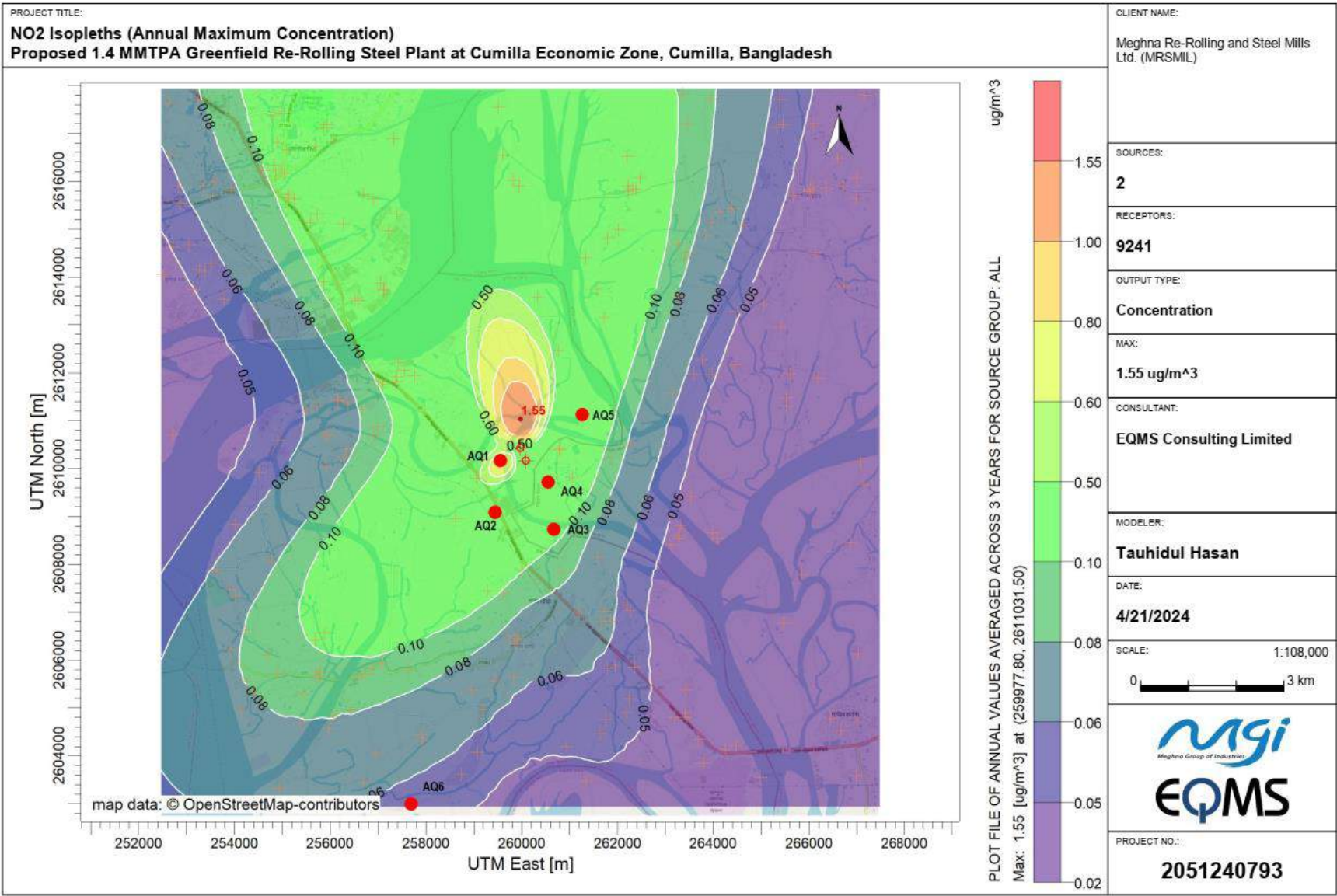


Figure 6-7: NO₂ Isopleths- Annual Maximum GLC for Proposed Steel Mill



Project Contribution on Sensitive Receptors

A total of five air quality monitoring was conducted at the sensitive location during the baseline monitoring period. Table 6-20 presents that the 24-hourly maximum NO₂ was found 8.47 µg/m³ at AQ6 to 42.5 µg/m³ at AQ4 whereas annual NO₂ concentration estimated as 1.6 µg/m³ at AQ6 to 8.1 µg/m³ at AQ4. Table 6-20 presents that the predicted 24-hourly and annual NO₂ concentration due to only steel mill operation varies between 0.6 µg/m³ (AQ6) – 8.5 µg/m³ (AQ1) and 0.06 µg/m³ (AQ6) -0.74 µg/m³ (AQ1) at 6 air quality monitoring locations. It reveals that predicted NO₂ concentrations on air quality monitoring locations are well within the national standard.

Table 6-20 shows that total 24-hourly NO₂ concentration (maximum baseline concentration + proposed steel mill operation) varies in between 9.1 µg/m³ (AQ6) – 44.0 µg/m³ (AQ4). Annual NO₂ concentration found in the range of 1.7 µg/m³ (AQ6) – 8.3 µg/m³ (AQ4). Among the 5 receptors, the maximum 24-hourly and annual GLC of 43.7 ug/m³ and 8.3 ug/m³ were found at AQ4 (Infront of Ansar Camp at project site in Cumilla Economic Zone). It shows that the sum of project contribution and maximum baseline concentration are well within both 24 hourly and annual national standards and WHO interim target 1 value whereas exceeded the 24-hourly WHO Air Quality Guideline value at AQ2, AQ3 and AQ4.

Besides the 9009 grid receptors within the model area, another 232 discrete cartesian receptors including 6 air quality monitoring locations were taken into consideration in the model as sensitive receptor and modelled to know the project contribution on these receptors. The 24-hourly NO₂ concentration was found in the range of 0.38 µg/m³ – 8.86 µg/m³ due to the only proposed steel mill operation. The highest NO₂ concentration 8.86 µg/m³ was found at SR87 (61 no. Tengerchar Govt.Primary School) with 828 m south-west direction from the FTP stack location. The annual NO₂ concentration was found in between 0.03 µg/m³ – 0.72 µg/m³ among the sensitive receptors. The highest annual concentration 0.72 µg/m³ was found at SR4 (75 No. Boroikandi Bhatarchar Govt. Primary School) with 550 m SSW direction from the FTP stack location. The 24 hourly and Annual NO₂ concentration on the sensitive receptors due to the proposed steel mill operation is presented in **Appendix H-1**.

The project itself does not result in any exceedance of the standard and guidelines value of NO₂. The Short-term impacts on health tend to be less severe than long term impacts (e.g. eye irritation versus increased mortality) and the maximum short-term concentration from the project is unlikely.

Table 6-20: Predicted Concentration of NO₂ at Air Quality Monitoring Locations due to Plant Operation

Scenario	Avg. Time	Concentration (µg/m ³)						APCR, 2022 ^a	WHO, 2021 ^b	
		AQ1	AQ2	AQ3	AQ4	AQ5	AQ6		IT1	AQG
Baseline Air Quality (Maximum)	24-hr.	16.4	28.6	32.5	42.5	14.9	8.47	80	120	25
	Annual	3.1	5.5	6.2	8.1	2.9	1.6	40	40	10
Only Project Operation	24-hr.	8.5	3.9	1.8	1.5	3.2	0.6	80	120	25
	Annual	0.74	0.26	0.11	0.19	0.17	0.06	40	40	10
Only project + maximum baseline concentration	24-hr.	24.9	32.5	34.3	44.0	18.1	9.1	80	120	25
	Annual	3.9	5.7	6.3	8.3	3.0	1.7	40	40	10

^aSchedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

6.4.3.1.2.2 Sulfur Dioxide (SO₂)

Only Project Contribution

The air quality assessment is made in relation to ensuring compliance with the national standards and WHO guideline value. Due to the proposed steel mill operation, 1- hourly maximum SO₂ concentration was found 19.8 µg/m³ (7.9% of national standard) at 506.6 m (259577.80 m E 2610131.50 m N) SSW direction from the FTP stack location whereas 24- hourly SO₂ concentration was found to be 8.32 µg/m³ (10.4% of national standard, 6.7% of Interim Target 1 value and 20.8% of WHO Air Quality Guideline value) at (259777.80 m E 2611131.50m N) with 727 meters to the north by west direction from the FTP stack location. The results of ambient air quality modeling for SO₂ are presented in Table 6-21. The project alone SO₂ contribution to the airshed is negligible and within the national standard. SO₂ Isopleths of 1 hourly and 24-hourly due to the proposed steel mill operation are shown in Figure 6-8 and Figure 6-9.

Table 6-21: Results of Air Quality Modeling for SO₂ due to Proposed Steel Mill Operation

Scenario	Max. Concentration (µg/m ³)		Max. Concentration Location	APCR, 2022 ^a (µg/m ³)	WHO, 2021 ^b (µg/m ³)		% of APCR 2022 standard	% of WHO 2021 Value	
	Avg. Time	Max. Value			IT1	AQG		IT1	AQG
Only Project Operation	1-hr.	19.8	259577.80 2610131.50	250	-	-	7.9	-	-
	24-hr.	8.32	259777.80 2611131.50	80	125	40	10.4	6.7	20.8
Baseline Concentration (µg/m ³)- Worst Scenario	1-hr.	49.4	260561.00 2609720.00	250	-	-	19.8	-	-
	24-hr.	27.6	260561.00 2609720.00	80	125	40	34.5	22.1	69.0
Project Operation + Maximum background concentration	1-hr.	69.2	-	250	-	-	27.7	-	-
	24-hr.	35.9	-	80	125	40	44.9	28.7	89.8

^a Schedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

Project Contribution + Background Concentration

The 24-hourly maximum background concentration of SO₂ found as 27.6 µg/m³ and 1-hourly SO₂ estimated as 49.4 µg/m³ which are well within the national ambient air quality standard, WHO Air Quality Guideline value and Interim Target-1 value. Only steel mill operation will contribute 1-hourly 19.8 µg/m³ (7.9% of national standard) and 24-hourly 8.32 µg/m³ (10.4% of national standard, 6.7% of Interim Target-1 value and 20.8% of WHO Air Quality Guideline value). Table 6-21 shows that the project contribution including baseline concentration for 1-hourly and 24-hourly maximum concentration stands 69.2 µg/m³ (27.7% of national standard-APCR) and 35.9 µg/m³ (44.9% of national standard-APCR, 28.7% of Interim Target-1 value and 89.8% of WHO Air Quality Guideline value). It can be stated that only the project will contribute insignificant SO₂ in the airshed.

Figure 6-8: SO₂ Isopleths- 1 Hourly Average Maximum GLC for the Proposed Steel Mill

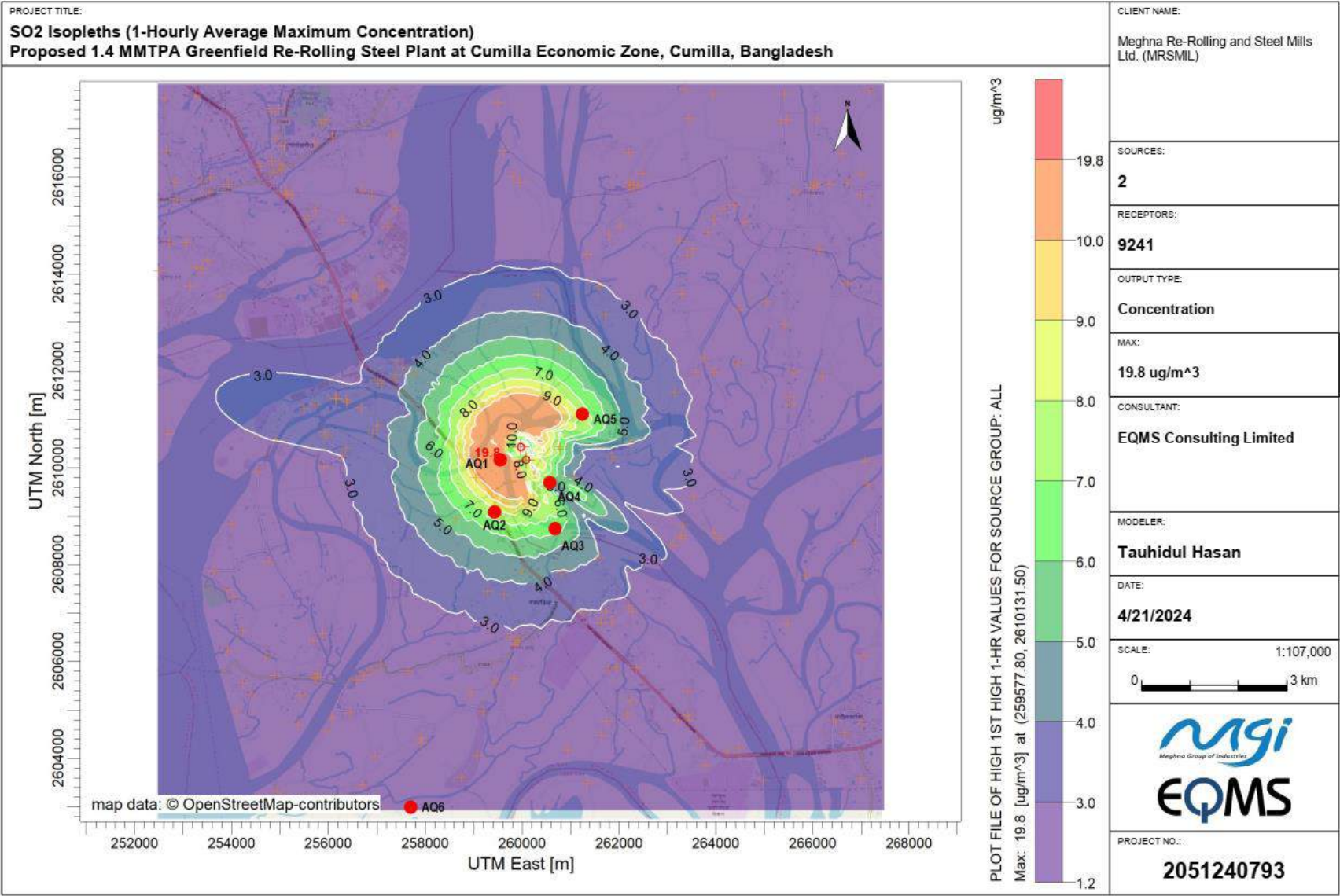
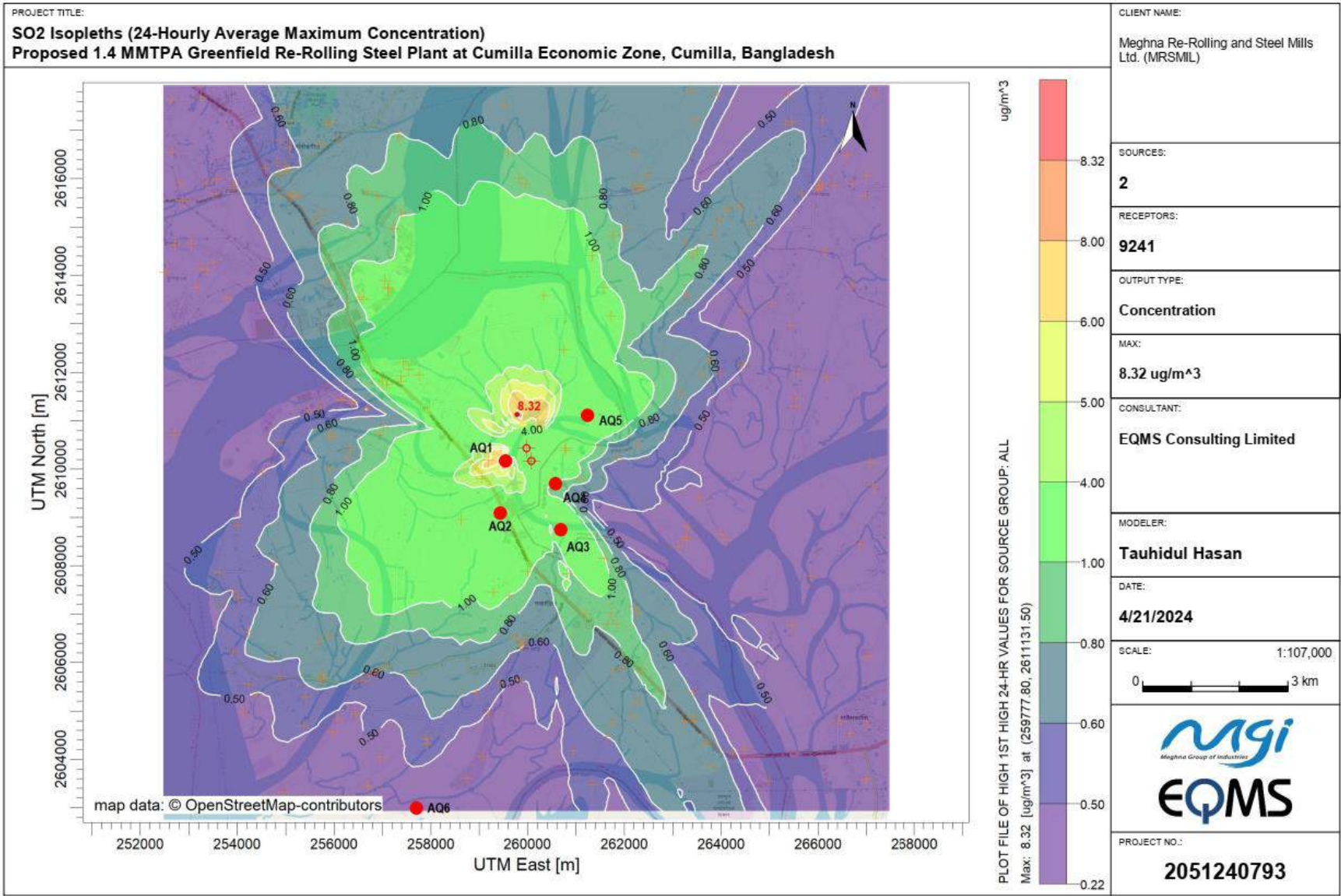


Figure 6-9: SO₂ Isopleths- 24 Hourly Average Maximum GLC for the Proposed Steel Mill



Project Contribution on Sensitive Receptors

Total six air quality monitoring were conducted during the baseline monitoring period. Table 6-22 presents that during the baseline monitoring the maximum 24-hourly SO₂ was found 6.7 µg/m³ (AQ6)- 27.6 µg/m³ (AQ4) whereas 1-hourly SO₂ concentration estimated as 12.0 µg/m³ (AQ6)- 49.4 µg/m³ (AQ4). The model shows 1-hourly and 24-hourly SO₂ concentration due to the proposed steel mill operation will contribute to the range of 2.4 µg/m³ (AQ6) – 18.2 µg/m³ (AQ1) and 0.43 µg/m³ (AQ6) – 5.93 µg/m³ (AQ1) at 6 air quality monitoring locations.

Table 6-22 shows that total 1-hourly SO₂ concentration (maximum baseline concentration + proposed steel mill operation) varies in between 14.3 µg/m³ (AQ6) – 55.0 µg/m³ (AQ4). Whereas 24-hourly SO₂ concentration found in the range of 7.1 µg/m³ (AQ6) – 28.6 µg/m³ (AQ4). Among the 6 receptors, the maximum 1-hourly GLC of 55.0 ug/m³ and 24-hr GLC of 28.6 ug/m³ were found at AQ4 (project site).

Besides the 9009 grid receptors within model area, another 232 discrete cartesian receptors including 5 air quality monitoring locations were considered in the model as sensitive receptor and modelled to know the project contribution on these receptors. The 1-hourly SO₂ concentration was found in the range of 2.4 µg/m³ – 18.2µg/m³ at 226 sensitive receptors within the modelled domain due to the only steel mill operation. The highest 1- hourly SO₂ concentration 18.2 µg/m³ was found at SR4 (75 No. Boroikandi Bhaterchar Govt. Primary School) with 550 m SSW direction from the stack location. The 24-hourly SO₂ concentration was found in between 0.26 µg/m³ – 6.20 µg/m³ among the sensitive receptors. The highest 24-hourly SO₂ concentration 6.20 µg/m³ was found at SR87 (61 no. Tengerchar Govt.Primary School) with 828 m south-west direction from the stack location. It shows that SO₂ contribution due to the only project operation on the receptors is negligible. The 1 hourly and 24 hourly NO₂ concentration on the sensitive receptors due to the proposed steel mill operation is presented in **Appendix H-2**.

Table 6-22: Predicted Concentration of SO₂ at Air Quality Monitoring Locations due to Proposed Steel Mill Operation

Scenario	Avg. Time	Concentration (µg/m ³)						APCR, 2022 ^a	WHO, 2021 ^b	
		AQ1	AQ2	AQ3	AQ4	AQ5	AQ6		IT1	AQG
Baseline Air Quality (Maximum)	1-hr.	27.3	29.9	33.0	49.4	22.6	12.0	250	-	-
	24-hr.	15.3	16.7	18.5	27.6	12.6	6.7	80	125	40
Only Project Operation	1-hr.	18.2	7.7	5.9	5.6	7.4	2.4	250	-	-
	24-hr.	5.93	2.74	1.26	1.04	2.24	0.43	80	125	40
Only project + maximum baseline concentration	1-hr.	45.5	37.7	39.0	55.0	29.9	14.3	250	-	-
	24-hr.	21.2	19.5	19.7	28.6	14.8	7.1	80	125	40

^aSchedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

6.4.3.1.2.3 Carbon Monoxide (CO)

Only Project Contribution

Due to the proposed steel mill operation, 1- hourly maximum CO concentration was found 116 µg/m³ (0.6% of national standard and 0.3% of WHO Air Quality Guideline Value) at 533.6 m (259627.80 m E 2610831.50 m N) NW by N direction from the FTP stack whereas 8- hourly CO concentration was found 83.3 µg/m³ (1.7% of national standard and 0.8% of WHO Air Quality Guideline Value) at 611 m (259477.80 m E 2610781.50 m N) to the North-west direction from the FTP stack location. The results of ambient air quality modeling for CO are presented in Table 6-23. The project alone CO contribution

to the airshed is within the standard and found to be negligible. CO Isopleths of 1 hourly and 8-hourly due to the proposed steel mill operation are shown in Figure 6-10 and Figure 6-11.

Table 6-23: Results of Air Quality Modeling for CO due to Proposed Steel Mill Operation

Scenario	Max. Concentration (µg/m³)		Max. Concentration Location	APCR, 2022 ^a (µg/m³)	WHO, 2021 ^b (µg/m³)		% of APCR 2022 standard	% of WHO 2021 Value	
	Avg. Time	Max. Value			IT1	AQG		IT1	AQG
Only Project Operation	1-hr.	116	259627.80 2610831.50	20000	-	35000	0.6	-	0.3
	8-hr.	83.3	259477.80 2610781.50	5000	-	10000	1.7	-	0.8
Baseline Concentration (µg/m³)- Worst Scenario	1-hr.	1611	260561.00 2609720.00	20000	-	35000	8.1	-	4.6
	8-hr.	900	260561.00 2609720.01	5000	-	10000	18.0	-	9.0
Project Operation + Maximum background concentration	1-hr.	1727.0	-	20000	-	35000	8.6	-	4.9
	8-hr.	983.3	-	5000	-	10000	19.7	-	9.8

^a Schedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

Project Contribution + Background Concentration

The 1-hourly maximum background concentration (baseline concentration) of CO was found as 1611 µg/m³ and 8-hourly CO was found as 900 µg/m³ which are well within the national ambient air quality standard and WHO Air Quality Guideline (AQG) value. Only proposed steel mill operation will contribute 1-hourly 116 µg/m³ (0.6% of national standard and 0.3% of WHO Air Quality Guideline Value) and 8-hourly 83.3 µg/m³ (1.7 % of national standard and 0.8% of WHO Air Quality Guideline Value). Table 6-23 shows that the total CO concentration including project contribution and baseline concentration for 1-hourly, and 8-hourly are 1727.0 µg/m³ (8.6% of national standard-APCR and 4.9% of WHO Air Quality Guideline Value) and 983.3 µg/m³ (19.7% of national standard-APCR and 9.8% of WHO Air Quality Guideline Value). It shows that the total CO concentration (project contribution + maximum baseline concentration) is well within the standard.

Figure 6-10: CO Isopleths- 1 Hourly Average Maximum GLC for the Proposed Steel Mill Operation

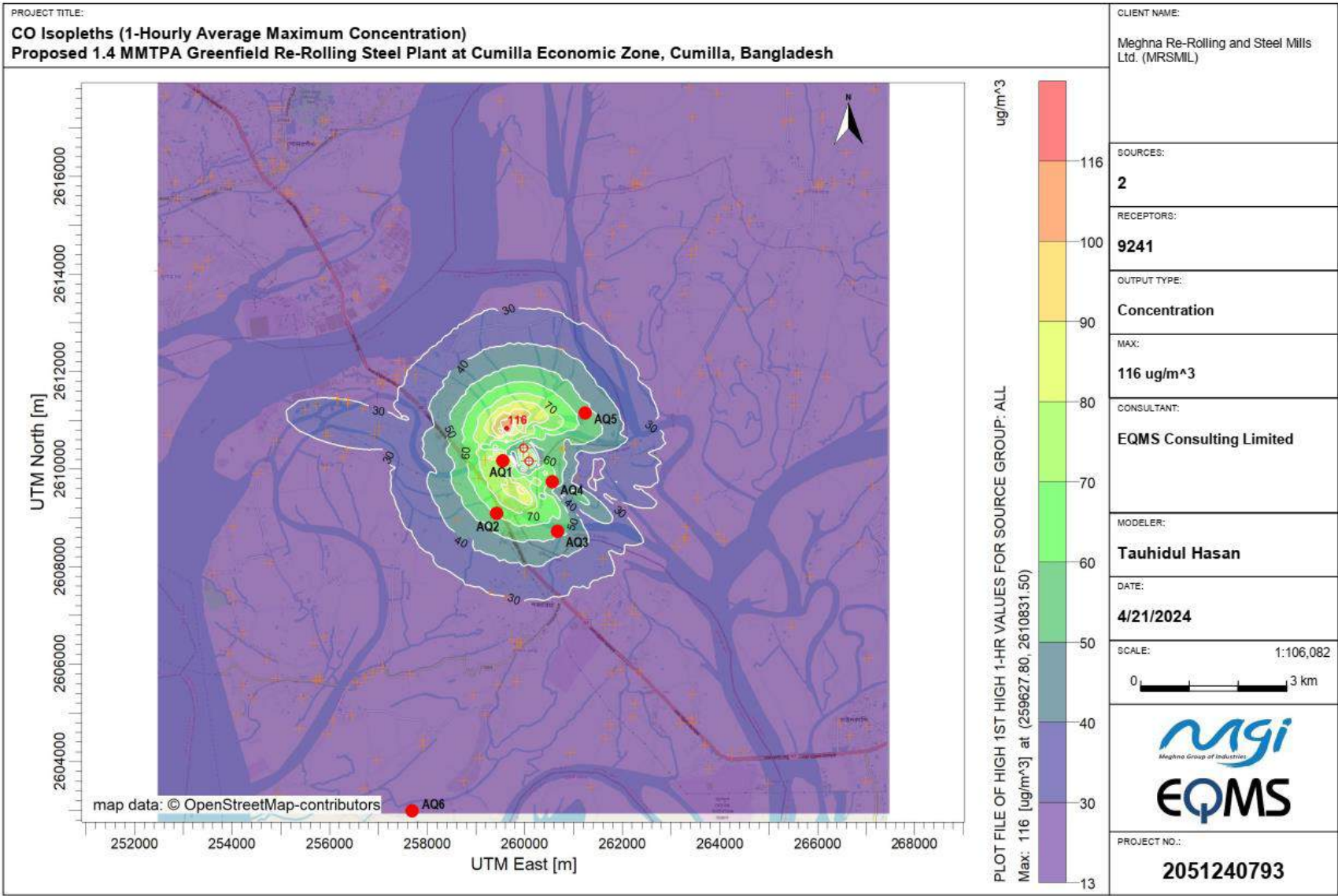
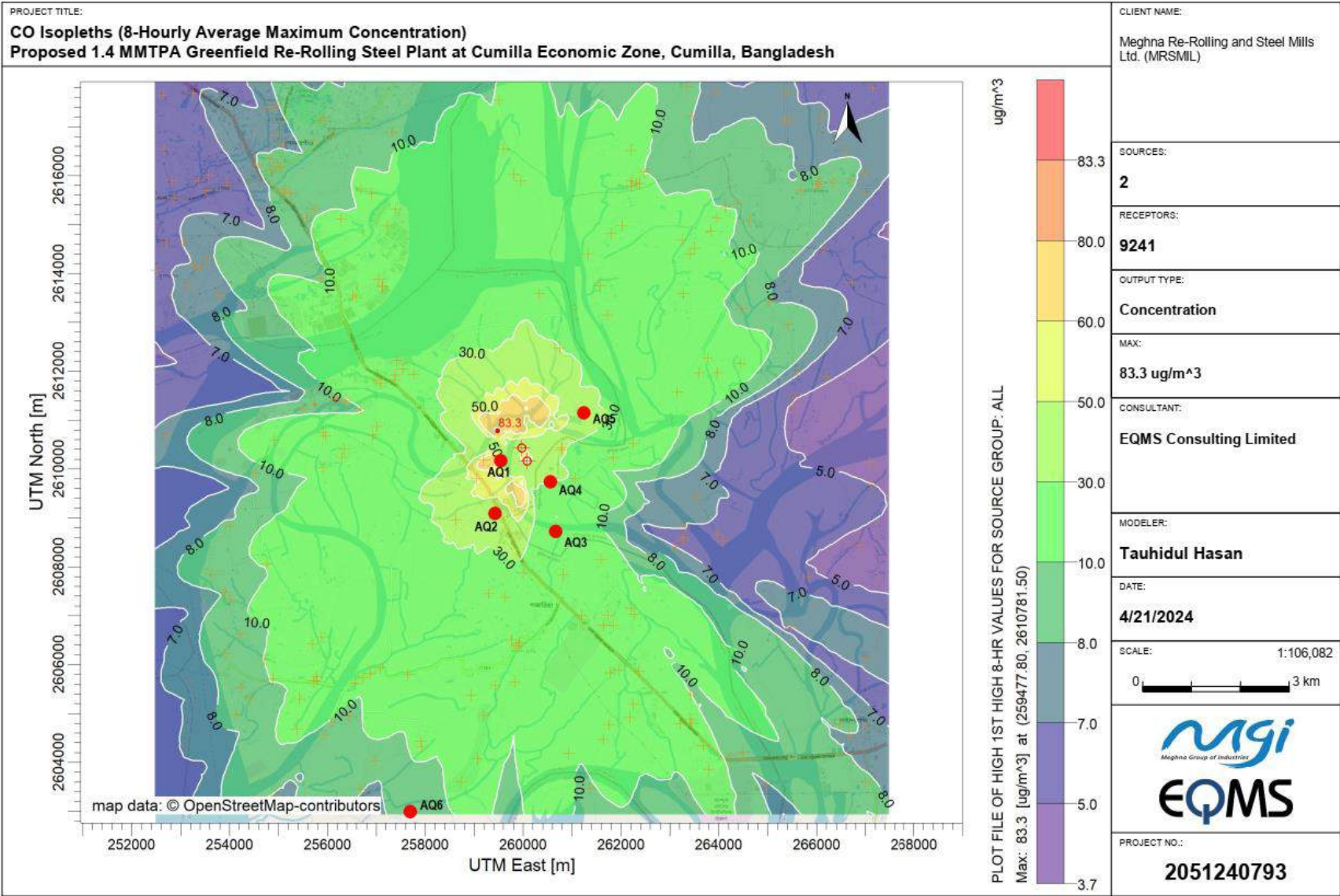


Figure 6-11: CO Isopleths- 8 Hourly Average Maximum GLC for the Proposed Steel Mill Operation



Project Contribution on Sensitive Receptors

Total six air quality monitoring were conducted during the baseline monitoring period. Table 6-24 presents that the maximum 1-hourly CO was found 716 $\mu\text{g}/\text{m}^3$ (AQ6) – 1611 $\mu\text{g}/\text{m}^3$ (AQ5) whereas 8-hourly CO concentration found 400 $\mu\text{g}/\text{m}^3$ (AQ6)- 900 $\mu\text{g}/\text{m}^3$ (AQ5). The model shows 1-hourly and 8-hourly CO concentration due to the proposed Steel mill operation will contribute to the range of 20.9 $\mu\text{g}/\text{m}^3$ (AQ6) – 80.1 $\mu\text{g}/\text{m}^3$ (AQ1) and 8.4 $\mu\text{g}/\text{m}^3$ (AQ6) – 50.7 $\mu\text{g}/\text{m}^3$ (AQ1) on 6 air quality monitoring locations.

Table 6-24 shows that the sum of 1 hourly maximum baseline concentration and due to proposed steel mill operation CO concentration varied in between 736.9 $\mu\text{g}/\text{m}^3$ (AQ6) – 1665.1 $\mu\text{g}/\text{m}^3$ (AQ5). Whereas 8-hourly CO concentration found in the range of 408.4 $\mu\text{g}/\text{m}^3$ (AQ6) – 936.7 $\mu\text{g}/\text{m}^3$ (AQ5). Among the 6 receptors, the maximum 1-hourly and 8-hourly GLC of 1665.1 $\mu\text{g}/\text{m}^3$ and 936.7 $\mu\text{g}/\text{m}^3$ were found at AQ5 (Joshim Uddin's House, Abdullahpur, Meghna, Cumilla).

Besides the 9009 grid receptors within the model area, another 232 discrete cartesian receptors including 6 air quality monitoring locations present within model domain were considered in the model as sensitive receptor and modelled to know the project contribution on these receptors. The 1-hourly CO concentration was found in the range of 14.0 $\mu\text{g}/\text{m}^3$ – 76.6 $\mu\text{g}/\text{m}^3$ at 226 sensitive receptors within the modelled domain due to the only proposed steel mill operation. The highest 1- hourly CO concentration 76.6 $\mu\text{g}/\text{m}^3$ was found at SR4 (75 No. Boroikandi Bhaterchar Govt. Primary School) with 550 m SSW direction from the stack location. The 8-hourly CO concentration was found in between 4.5 $\mu\text{g}/\text{m}^3$ – 64.4 $\mu\text{g}/\text{m}^3$ among the sensitive receptors. The highest 8-hourly CO concentration 64.4 $\mu\text{g}/\text{m}^3$ was found in SR87 (61 no. Tengerchar Govt.Primary School) at 828 m south-west direction from the stack location. It shows that CO contribution due to the only project operation on the receptors is negligible. The 1 hourly and 8 hourly CO concentration on the sensitive receptors due to the proposed steel mill operation is presented in **Appendix H-3**.

Table 6-24: Predicted Concentration of CO at Air Quality Monitoring Locations

Scenario	Avg. Time	Concentration ($\mu\text{g}/\text{m}^3$)						APCR, 2022 ^a	WHO, 2021 ^b	
		AQ1	AQ2	AQ3	AQ4	AQ5	AQ6		IT1	AQG
Baseline Air Quality (Maximum)	1-hr.	895	1074	1253	1074	1611	716	20000	-	35000
	8-hr.	500	600	700	600	900	400	5000	-	10000
Only Project Operation	1-hr.	80.1	62.0	50.8	56.6	54.0	20.9	20000	-	35000
	8-hr.	50.7	42.9	25.4	28.6	36.7	8.4	5000	-	10000
Only project + maximum baseline concentration	1-hr.	975.1	1136.0	1303.9	1130.7	1665.1	736.9	20000	-	35000
	8-hr.	550.7	642.9	725.4	628.6	936.7	408.4	5000	-	10000

^aSchedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

6.4.3.1.2.4 Particulate Matter (PM₁₀)

Only Project Contribution (Project Only)

The particulate matter emission concentration is considered as 30 mg/Nm³. Since there is no fraction of particulate matter as PM₁₀ and PM_{2.5} in national standard and WHO guidelines hence, it has been assumed that PM=PM₁₀=PM_{2.5}, the proposed steel mill will have the same contribution of PM₁₀ as PM which is considered worst case scenario. The proposed steel plant will contribute maximum Ground Level Concentration (GLC) of 3.4 $\mu\text{g}/\text{m}^3$ (24-hourly averaging time) of PM₁₀ to the airshed based on an emission concentration of 30 mg/Nm³. The 24-hourly predicted maximum PM₁₀ concentration was found as 3.4 $\mu\text{g}/\text{m}^3$ (259877.80m E 2611131.50m N) at 710 meters to the north by west direction of the stack.

The annual predicted maximum PM₁₀ concentration was found as 0.47 µg /m³ (259977.80m E 2610831.50m N) at 400 meters to the north direction of the FTP stack. The results of ambient air quality modeling for PM₁₀ are presented in Table 6-25. In terms of impact on health, the maximum project contribution to GLC with a 30 mg/Nm³ emission concentration and 45 m stack height is about 2.3% of the short term 24-hourly national standard (Schedule-1 of Air Pollution Control Rules 2022) and Interim Target-1 value, 7.6% of WHO Air Quality Guideline value for PM₁₀. The plant will contribute about 0.9% of the annual national standard, 0.7% of Interim Target-1 value and 3.1% of WHO Air Quality Guideline value. It shows that PM₁₀ contribution to the airshed due to the proposed steel mill operation is negligible. PM₁₀ Isopleths of 24-hourly and annual due to the steel mill operation are shown in Figure 6-12 and Figure 6-13.

Table 6-25: Results of Air Quality Modeling for PM₁₀

Scenario	Max. Concentration (µg/m ³)		Max. Concentration Location	APCR, 2022 ^a (µg/m ³)	WHO, 2021 ^b (µg/m ³)		% of APCR 2022 standard	% of WHO 2021 Value	
	Avg. Time	Max. Value			IT1	AQG		IT1	AQG
Only Project Operation	24-hr.	3.4	259877.80 2611131.50	150	150	45	2.3	2.3	7.6
	Annual	0.47	259977.80 2610831.50	50	70	15	0.9	0.7	3.1
Baseline Concentration (µg/m ³)- Worst Scenario	24-hr.	53.7	260561.00 2609720.00	150	150	45	35.8	35.8	119.3
	Annual	2.8	260561.00 2609720.00	50	70	15	5.6	4.0	18.7
Project Operation + Maximum background concentration	24-hr.	57.1	-	150	150	45	38.1	38.1	126.9
	Annual	3.3	-	50	70	15	6.5	4.7	21.8

^aSchedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

Project Contribution + Background Concentration

During the scenario-2 analysis, the highest background concentration has been taken from primary air quality monitoring for worst case analysis. 24-hourly maximum baseline concentration was found as 53.7 µg/m³ which is 35.8 % of national standard, 35.8% of Interim Target-1 value and 119.3% of WHO Air Quality Guideline value whereas annual concentration estimated as 2.8 µg/m³ (5.6% of national standard-APCR, 4.0% of Interim Target-1 value and 18.7% of WHO Air Quality Guideline value) (Table 6-25). Hence, the background maximum PM₁₀ concentration is within the national standard whereas exceeded the 24-hourly WHO Air Quality Guideline value. The project contribution including baseline concentration shows that the 24 hours and annual maximum concentration of PM₁₀ are 57.1 µg/m³ (38.1% of national standard and Interim Target-1 value, 126.9% of WHO Air Quality Guideline value and) and 3.3 µg/m³ (6.5% of national standard-APCR, 4.7% of Interim Target-1 value and 21.8% of WHO guideline value). It can be concluded that only the project will contribute insignificant PM₁₀ on the airshed compared to the present ambient air quality.

Figure 6-12: PM₁₀ Isopleths- 24 Hourly Maximum GLC for the Proposed Steel Mill

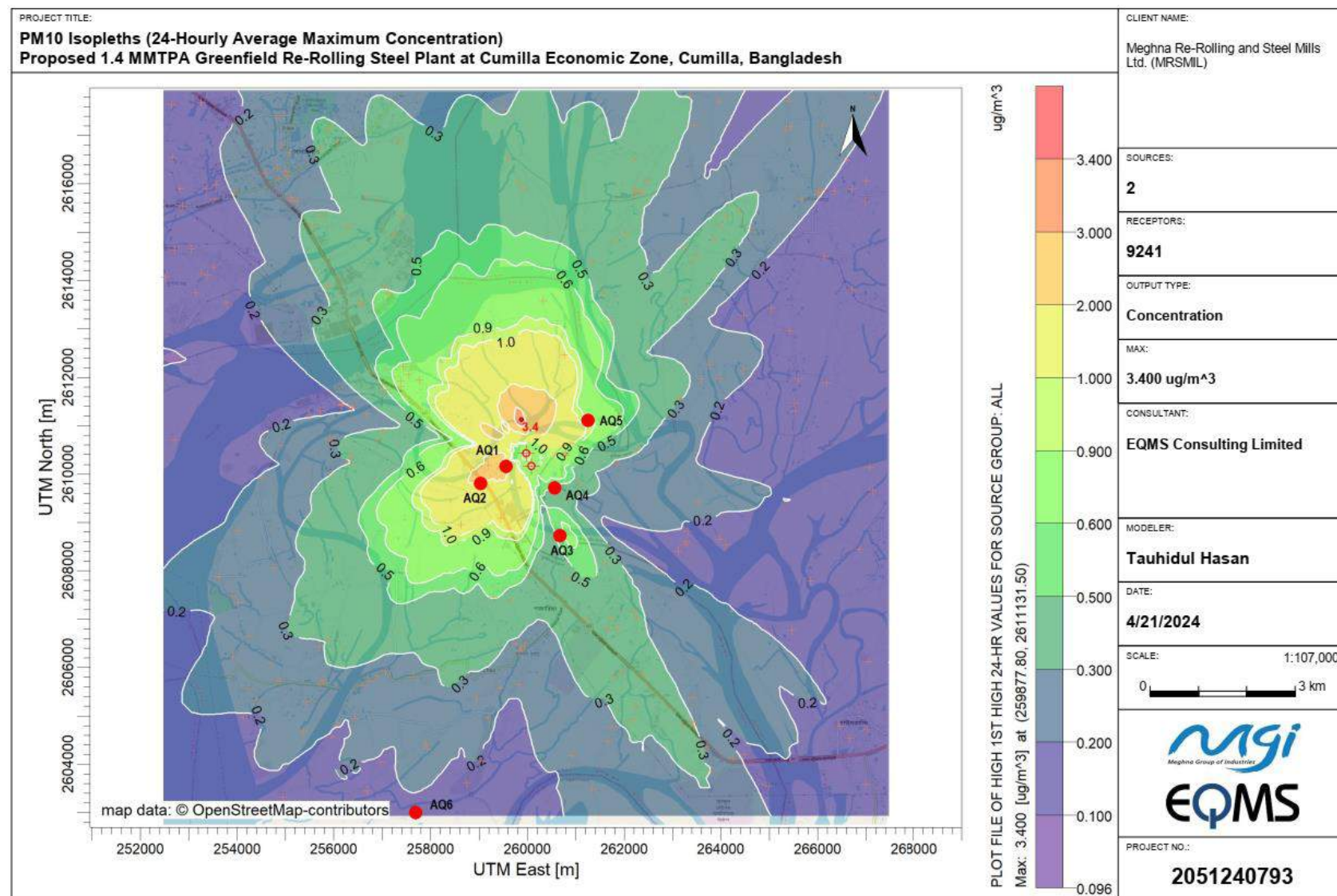
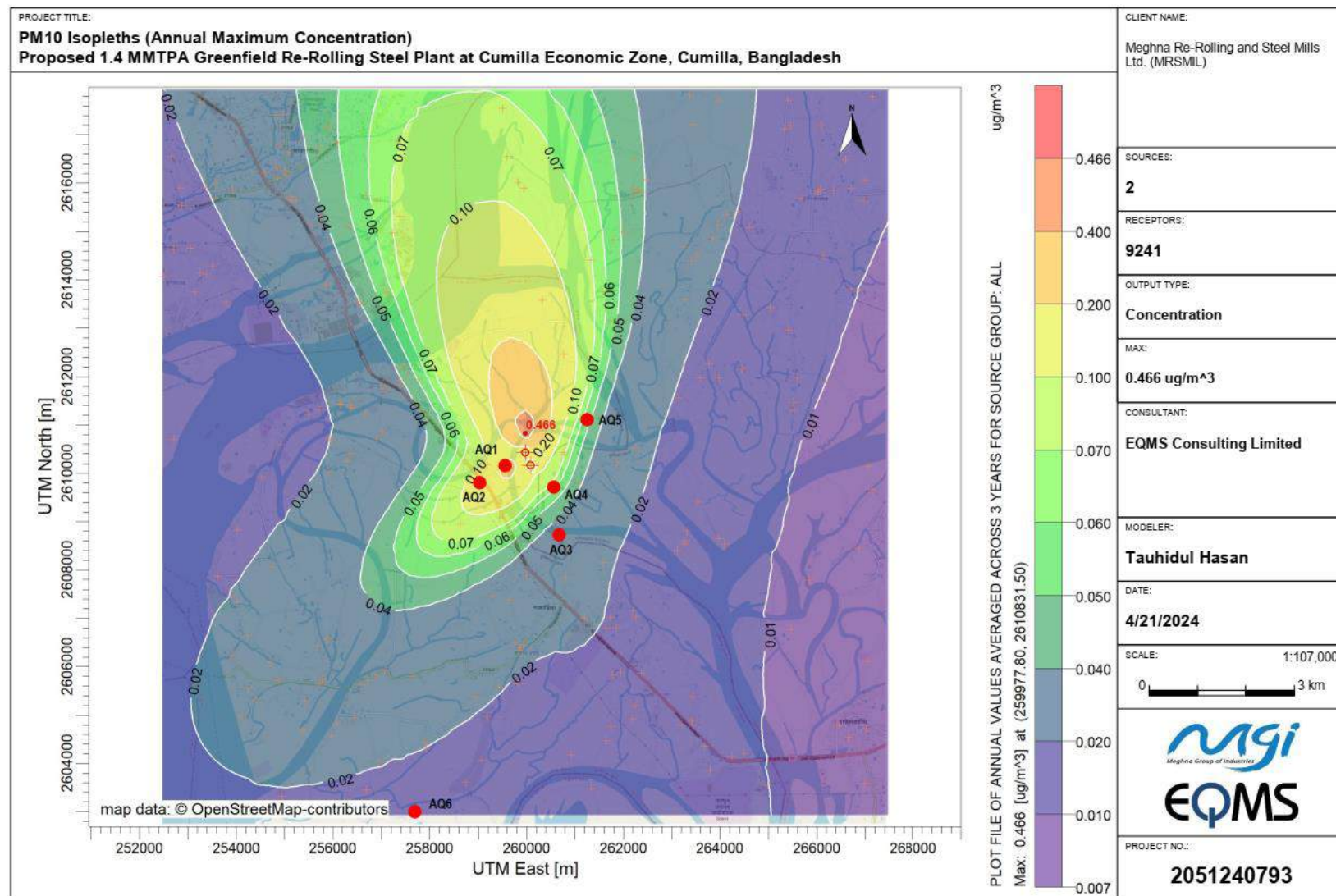


Figure 6-13: PM₁₀ Isopleths- Annual Maximum GLC for the Proposed Steel Mill



Project Contribution on Sensitive Receptors

A total of six air quality monitoring was conducted at the sensitive location during the baseline monitoring period. Table 6-26 presents that the maximum 24-hour PM_{10} was found $26.5 \mu\text{g}/\text{m}^3$ at AQ1 to $53.7 \mu\text{g}/\text{m}^3$ at AQ4 whereas annual PM_{10} concentration estimated as $1.39 \mu\text{g}/\text{m}^3$ at AQ1 to $2.81 \mu\text{g}/\text{m}^3$ at AQ4. Table 6-26 shows that the predicted 24-hourly and annual PM_{10} concentration due to only steel mill operation were varied $0.19 \mu\text{g}/\text{m}^3$ (AQ6) – $2.06 \mu\text{g}/\text{m}^3$ (AQ1) and $0.02 \mu\text{g}/\text{m}^3$ (AQ6) – $0.21 \mu\text{g}/\text{m}^3$ (AQ1) at 6 air quality monitoring locations. It reveals that predicted PM_{10} concentrations on sensitive receptors are well within national standard.

Table 6-26 shows that total 24-hourly PM_{10} concentration (maximum baseline concentration + proposed steel mill operation) varies in between $15.9 \mu\text{g}/\text{m}^3$ (AQ6) – $54.2 \mu\text{g}/\text{m}^3$ (AQ4). Annual PM_{10} concentration found in the range of $0.8 \mu\text{g}/\text{m}^3$ (AQ6) – $2.6 \mu\text{g}/\text{m}^3$ (AQ2). Among the 6 receptors, maximum 24-hr GLC of $54.2 \mu\text{g}/\text{m}^3$ was found at AQ4 (Project site) and the maximum annual GLC of $2.6 \mu\text{g}/\text{m}^3$ was found at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj).

Besides the 9909 grid receptors within the model area, another 232 discrete cartesian receptors including 6 air quality monitoring locations present within the domain were inserted in the model as sensitive receptor and modelled to know the project contribution on these receptors. The 24-hourly PM_{10} concentration was found in the range of $0.11 \mu\text{g}/\text{m}^3$ – $2.31 \mu\text{g}/\text{m}^3$ on the 226 sensitive receptors due to the only operation of proposed steel mill. Among the sensitive receptors, the highest PM_{10} concentration $2.31 \mu\text{g}/\text{m}^3$ was found at SR87 (61 no. Tengerchar Govt. Primary School) with 828 m south-west direction from the stack location. The annual PM_{10} concentration was found in between $0.008 \mu\text{g}/\text{m}^3$ – $0.206 \mu\text{g}/\text{m}^3$ among the sensitive receptors. The highest annual concentration $0.206 \mu\text{g}/\text{m}^3$ was found at SR4 (75 No. Boroikandi Bhatarchar Govt. Primary School) with 550 m SSW direction from the stack location. It shows that PM_{10} contribution due to the only project operation on the receptors is insignificant. The 24 hourly and Annual PM_{10} concentration on the sensitive receptors due to the proposed steel mill operation is presented in **Appendix H-4**.

Table 6-26: Predicted Concentration of PM_{10} at Air Quality Monitoring Locations

Scenario	Avg. Time	Concentration ($\mu\text{g}/\text{m}^3$)						APCR, 2022 ^a	WHO, 2021 ^b	
		AQ1	AQ2	AQ3	AQ4	AQ5	AQ6		IT1	AQG
Baseline Air Quality (Maximum)	24-hr.	26.5	47.5	31.7	53.7	26.7	15.7	150	150	45
	Annual	1.39	2.49	1.66	2.81	1.40	0.82	50	70	15
Only Project Operation	24-hr.	2.06	1.18	0.57	0.50	0.92	0.19	150	150	45
	Annual	0.213	0.085	0.035	0.062	0.053	0.02	50	70	15
Only project + maximum baseline concentration	24-hr.	28.6	48.7	32.3	54.2	27.6	15.9	150	150	45
	Annual	1.6	2.6	1.7	2.9	1.5	0.8	50	70	15

^aSchedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

6.4.3.1.2.5 Particulate Matter ($PM_{2.5}$)

Project Contribution (Project Only)

Since there is no fraction of particulate matter as PM_{10} and $PM_{2.5}$ in national standard and WHO guidelines. Therefore, it has been assumed that $PM=PM_{10}=PM_{2.5}$, the proposed steel mill will have the same contribution of $PM_{2.5}$ as PM_{10} which is considered as worst-case scenario. The proposed steel plant will contribute maximum Ground Level Concentration (GLC) of $3.4 \mu\text{g}/\text{m}^3$ (24-hourly averaging time) of $PM_{2.5}$ to the airshed based on an emission concentration of $30 \text{ mg}/\text{Nm}^3$. The 24-hourly predicted

maximum PM_{2.5} concentration was found as 3.4 µg /m³ (259877.80m E 2611131.50m N) at 710 meters to the north by west direction of the stack. The annual predicted maximum PM_{2.5} concentration was found as 0.47 µg /m³ (259977.80m E 2610831.50m N) at 400 meters to the north direction of the FTP stack. The results of ambient air quality modeling for PM_{2.5} are presented in Table 6-27. In terms of impact on health, the maximum project contribution of PM_{2.5} to GLC with a 30 mg/Nm³ emission concentration and 45 m stack height is about 5.2% of the short term 24-hourly national standard (Schedule-1 of Air Pollution Control Rules 2022), 4.5% of Interim Target-1 value and 22.7% of WHO Air Quality Guideline values for PM_{2.5}. The plant will contribute about 1.3% of the annual national standard and Interim Target-1 value, 9.3% of WHO Air Quality Guideline value. It shows that PM_{2.5} contribution to the airshed due to the proposed still mill operation is negligible. PM_{2.5} Isopleths of 24-hourly and annual due to steel mill operation are shown in Figure 6-14 and Figure 6-15.

Table 6-27: Results of Air Quality Modeling for PM_{2.5}

Scenario	Max. Concentration (µg/m ³)		Max. Concentration Location	APCR, 2022 ^a (µg/m ³)	WHO, 2021 ^b (µg/m ³)		% of APCR 2022 standard	% of WHO 2021 Value	
	Avg. Time	Max. Value			IT1	AQG		IT1	AQG
Only Project Operation	24-hr.	3.4	259819.05 2611192.00	65	75	15	5.2	4.5	22.7
	Annual	0.47	259969.05 2610942.00	35	35	5	1.3	1.3	9.3
Baseline Concentration (µg/m ³)- Worst Scenario	24-hr.	42.4	260561.00 2609720.00	65	75	15	65.2	56.5	282.3
	Annual	2.2	260561.00 2609720.00	35	35	5	6.3	6.3	44.0
Project Operation + Maximum background concentration	24-hr.	45.8	-	65	75	15	70.4	61.0	305.0
	Annual	2.7	-	35	35	5	7.6	7.6	53.3

^aSchedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

Project Contribution + Background Concentration

During the scenario-2 analysis (project contribution + background concentration), the highest background concentration has been taken from primary air quality monitoring for worst case analysis. 24-hourly maximum baseline PM_{2.5} concentration was found as 42.4 µg/m³ which is 65.2 % of national standard, 56.5% of Interim Target-1 value and 282.3% of WHO Air Quality Guideline value whereas annual concentration estimated as 2.2 µg/m³ (6.3% of national standard-APCR, 44.0% of WHO Air Quality guideline value and 6.3% of Interim Target-1 value) (Table 6-27). Hence, the background maximum PM_{2.5} concentration is within the national standard and Interim Target-1 value whereas exceeded the 24-hourly WHO Air Quality Guideline value. The project contribution including baseline concentration shows that the 24 hours and annual maximum PM_{2.5} concentration are 45.8 µg/m³ (70.4% of national standard, 61.0% of Interim Target-1 value and 305.0% of WHO guideline value) and 2.7 µg/m³ (7.6% of national standard-APCR and Interim Target-1 value, 53.3% of WHO Air Quality Guideline value). The only project contribution is less compared to the baseline concentration. It can be concluded that the PM_{2.5} contribution due to the only project operation will be insignificant.

Figure 6-14: PM_{2.5} Isopleths- 24 Hourly Average Maximum GLC for the Proposed Steel Mill

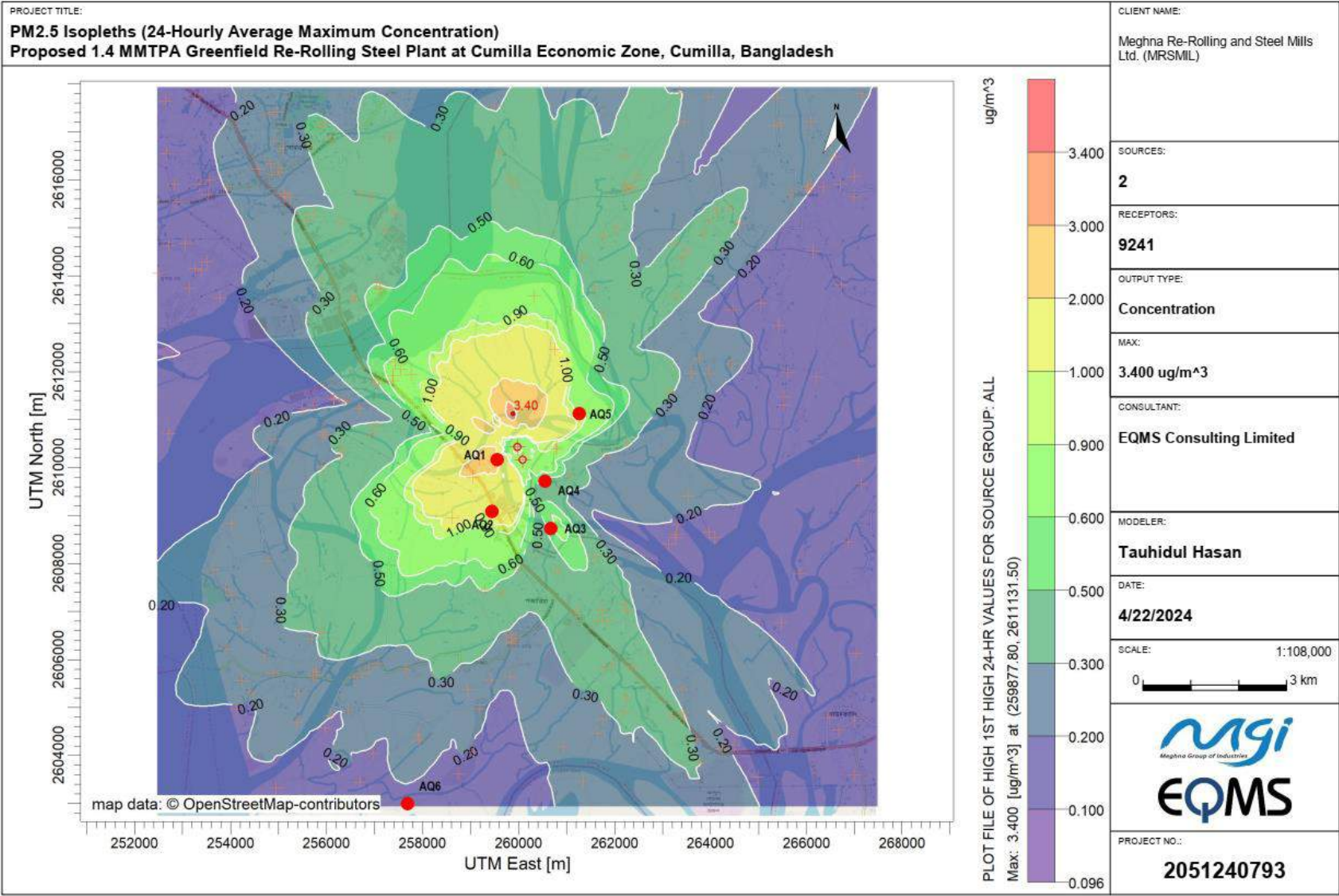


Figure 6-15: PM_{2.5} Isopleths- Annual Maximum GLC for the Proposed Steel Mill



Project Contribution on Sensitive Receptors

A total of six air quality monitoring was conducted at the sensitive location during the baseline monitoring period. Table 6-28 presents that the maximum 24-hour PM_{2.5} was found 10.9 µg/m³ at AQ6 to 42.3 µg/m³ at AQ4 whereas annual PM_{2.5} concentration estimated as 0.57 µg/m³ at AQ6 to 2.21 µg/m³ at AQ4. Table 6-28 shows that the predicted 24-hourly and annual PM_{2.5} concentration due to only steel mill operation varied 0.19 µg/m³ (AQ6) – 2.06 µg/m³ (AQ1) and 0.02 µg/m³ (AQ6) – 0.21 µg/m³ (AQ1) at 6 air quality monitoring locations. It reveals that predicted PM_{2.5} concentrations on sensitive receptors due to the only proposed steel mill operation are well within national.

Table 6-28 shows that total 24-hourly PM_{2.5} concentration (maximum baseline concentration + proposed steel mill operation) varied in between 11.1 µg/m³ (AQ6) – 42.8 µg/m³ (AQ4). Annual PM_{2.5} concentration found in the range of 0.6 µg/m³ (AQ6) – 2.3 µg/m³ (AQ2). Among the 6 receptors, maximum 24-hr GLC of 42.8 ug/m³ and annual GLC of 2.3 were found at AQ4 (Project site).

Besides the 9009 grid receptors within the model area, another 232 discrete cartesian receptors including 6 air quality monitoring locations present within the domain were considered in the model as sensitive receptor and modelled to know the project contribution on these receptors. The 24-hourly PM₁₀ concentration was found in the range of 0.11 µg/m³ – 2.31 µg/m³ on the 226 sensitive receptors due to the only operation of proposed steel mill. Among the sensitive receptors, the highest PM_{2.5} concentration 2.31 µg/m³ was found at SR87 (61 no. Tengerchar Govt. Primary School) with 828 m south-west direction from the stack location. The annual PM_{2.5} concentration was found in between 0.008 µg/m³ – 0.206 µg/m³ among the sensitive receptors. The highest annual concentration 0.206 µg/m³ was found at SR4 (75 No. Boroikandi Bhaterchar Govt. Primary School) with 550 m SSW direction from the stack location. It shows that PM_{2.5} contribution due to the only project operation on the receptors is insignificant. The 24 hourly and Annual PM = PM₁₀ = PM_{2.5} concentration on the sensitive receptors due to the proposed steel mill operation is presented in **Appendix H-4**.

Table 6-28: Predicted Concentration of PM_{2.5} at Air Quality Monitoring Locations

Scenario	Avg. Time	Concentration (µg/m ³)						APCR, 2022 ^a	WHO, 2021 ^b	
		AQ1	AQ2	AQ3	AQ4	AQ5	AQ6		IT1	AQG
Baseline Air Quality (Maximum)	24-hr.	17.3	38.5	22.4	42.3	18.8	10.9	65	75	15
	Annual	0.91	2.02	1.17	2.21	0.98	0.57	35	35	5
Only Project Operation	24-hr.	2.06	1.18	0.57	0.50	0.92	0.19	65	75	15
	Annual	0.213	0.085	0.035	0.062	0.053	0.02	35	35	5
Only project + maximum baseline concentration	24-hr.	19.4	39.7	23.0	42.8	19.7	11.1	65	75	15
	Annual	1.1	2.1	1.2	2.3	1.0	0.6	35	35	5

^aSchedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

^b WHO Global Air Quality Guideline Value 2021

6.4.3.1.2.6 Fugitive Emission

Particulate matter (PM) may be generated in each of the process steps, and may contain varying concentrations of mineral oxides, metals (e.g. arsenic, cadmium, mercury, lead, nickel, chromium, zinc, manganese), and metal oxides. As per WBG EHS Guidelines for Integrated Steel Mills 2007, the sources include melting and refining activities and heating furnaces (depending on type of fuels used); mechanical actions (e.g. scarfing and grinding); and handling of materials (e.g. raw materials, additive, recycled and waste materials, and by-products).

Electric arc furnaces (EAFs) generate particulate matter during melting; oxygen injection and decarbonizing phases (primary off gas emissions); and charging / tapping (secondary off-gas emissions).

Recommended measures to prevent and control particulate matter emissions from EAFs include:

- Quick cooling of gas followed by bag filters. The bag filters can be primed with absorbents (e.g. lime or carbon) to further capture volatile impurities.
- Use of direct off-gas extraction and canopy hood enclosures and cleaning.

In the casting area (ingots and continuous casting), particulate matter and metals arise from the transfer of molten steel to the mold and from the cutting to length of the product by oxy-fuel torches during continuous casting. Exhausts should be fitted to filters and other relevant abatement equipment, especially in the casting and rolling, and finishing shops, where relevant.

Mechanical Actions: Scarfing and grinding activities may generate particulate matter emissions. Exhausts should be fitted to filters chosen based on the specified activity.

Impact Significance

It is evident from **air dispersion modeling results** that the project emissions will be well within the ambient air quality standards of Bangladesh and overall contribution of the project for different criteria pollutants. The proposed steel manufacturing plant will have sufficient stack height to disperse air pollutants avoiding surrounding structures and therefore, there is no chance to build up excess pollutants near the project site. The impact significance on the ambient air quality due to proposed steel manufacturing plant operation is **low**.

Impact	Air quality degradation					
Impact Nature	Direct	Indirect			Induced	
Impact Scale	In and around project site					
Frequency	During Operation Phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider Low					

Mitigation Measures: The following mitigation measures can be applied by the authorities to reduce the impact on the quality of air during the operational and maintenance phase.

- Adoption of a dust suppression system.
- Bag filters to be used as particulate control equipment.
- Sufficient exhaust fans should be provided near the melting hearth to take the heat outside.
- A simple, linear layout for material handling operations should be designed to reduce the need for multiple transfer points.
- Modern roads in the plant area should be paved to reduce dust emissions.

- Emissions from melting phase can be controlled by negative pressure generated from suction hoods.
- Particulates from finishing operations can be controlled by cyclone separators.
- Hopper based exhaust system is to be installed for efficient expulsion of heat and fumes.
- Dust extraction and dust handling systems shall be installed to reduce fugitive dust emissions.
- The loading and unloading equipment and products shall be used with a minimized height of drop to the stockpile to reduce the generation of fugitive dust.
- Laying of concrete/blacktopped roads for vehicle movement.
- Regular sweeping of roads.
- Vehicles and equipment should not be left idle when not in use to minimize exhaust emissions of NO_x, PM₁₀, and SO₂.
- Adopting good housekeeping measures at MRSML to reduce dust build-up.
- Use indoor or covered stockpiles or, when open-air stockpiles are unavoidable, use water spray system, dust suppressants, windbreaks, and other stockpile management techniques.
- Design a simple, linear layout for material handling operations to reduce the need for multiple transfer points.
- Maximize use of enclosed silos to store bulk powder.
- Enclose conveyer transfer points with dust-controls.
- Clean return belts in the conveyor belt systems to remove loose dust.
- Implement routine plant maintenance and good housekeeping to keep small leaks and spills to a minimum.
- Implement correct loading and unloading practices.
- Proper PPE will be used by workers for protection from fugitive emission and periodic indoor air quality monitoring will be conducted.
- Development of greenbelt all around the plant boundary to arrest the fugitive emissions.
- Regular monitoring of the air quality at identified locations.

The impacts in this phase can be mitigated to very low from low by adopting mitigation measures.

6.4.3.2 Cumulative Air Quality Impact Assessment

The key air polluting industries situated in the Meghnaghat Industrial Area are power plants and cement plants. The cumulative impact on air quality due to the present operational and proposed power plants and key air polluting industries were assessed by modelling projected emission rates using the USEPA approved AERMOD 12.0.0 view dispersion model. Information of stack details for the power plants and industries has been collected from the available secondary sources. However, due to unavailability of all requisite information, certain assumptions considering the type of industries & their configuration were done during the modelling study. In the Meghnaghat area, almost all industries run on natural gas except one HFO based power plant.

As a result, SO₂ contribution is less compared to NO₂. Hence, air dispersion model run for only PM and NO₂. The standard values of the modelled parameter are presented below Table 6-29.

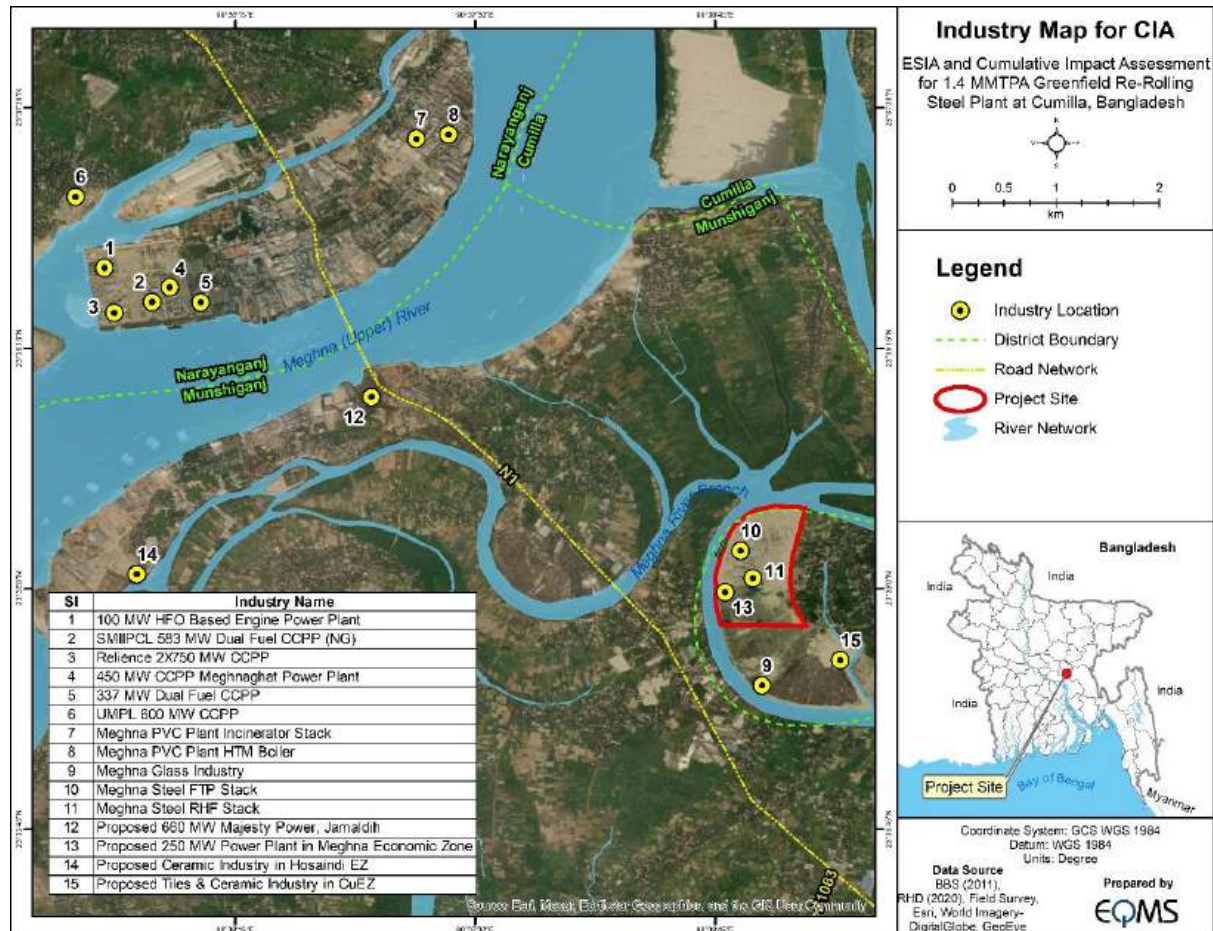
Table 6-29: Bangladesh Standard values and WHO guideline value

Pollutant	Averaging Period	Unit	WHO Guideline Value		Bangladesh Standard
			Guideline Value	Interim Target-1	
NO ₂	24-hr	µg/m ³	25	120	80
	Annual	µg/m ³	10	40	40
PM ₁₀	24-hr	µg/m ³	45	150	150
	Annual	µg/m ³	15	70	50

6.4.3.2.1 Locations of the Sources of Emissions

The Figure 6-16 shows the locations of point sources of emissions from all industries that were taken into consideration for the CIA study. The sources include FTP and RHF stacks of Meghna Steel, stacks of Meghna Glass Industry and one Tiles and Ceramic Industry within the CuEZ. The rest of the point sources were found outside the boundary of the economic zone.

Figure 6-16: Locations of the Sources of Emissions



Source: EQMS, May 2024

6.4.3.2.2 Model Input Details

For modelling of air dispersion of NO₂ and PM in AERMOD, different source-controlled emission details of various projects in the Aol are given in **Appendix H-7**.

Table 6-30: A Summary of Information on the Emission Sources

Industry	Stack Number	Stack height	UTM Coordinate		Emission Concentration* (mg/m ³)		Fuel Type	Source
			East	North	PM ₁₀	NO ₂		
100 MW HFO based engine power plant	12	30	254384.09	2613240.87	137.3	350	HFO	100 MW HFO based engine power plant
SMIPCL 583 MW Dual Fuel CCPP (NG)	1	75	254801.13	2612907.11	10.6	39.8	NG	SMIPCL
Reliance 2X750 MW CCPP	2	70	254462.81	2612808.29	7.9	40.3	NG	Reliance

Industry	Stack Number	Stack height	UTM Coordinate		Emission Concentration* (mg/m ³)		Fuel Type	Source
			East	North	PM ₁₀	NO ₂		
450 MW CCPP Meghnaghat Power Plant	2	60	254960.61	2613046.02	6.8	34.9	NG	Meghnaghat Power Plant
337 MW Dual Fuel CCPP	2	75	255231.94	2612896.50	8.0	50.1	NG	337 MW Dual Fuel CCPP
UMPL 600 MW CCPP	1	75	254138.98	2613929.23	3.9	47.2	LNG	UMPL
Meghna PVC Plant (Incinerator Stack)	1	50	257168.76	2614433.35	20	200	NG	Meghna PVC Plant
Meghna PVC Plant (HTM Boiler)	2	46	257455.00	2614472.00	20	200	NG	Meghna PVC Plant
Meghna PVC EDC Cracker Stack	1	36.9	257181.66	2614442.86	-	200	NG	Meghna PVC Plant
Meghna PVC EDC/VCM Boiler Stack	2	30	257354.77	2614562.75	-	100	NG	Meghna PVC Plant
Meghna Glass Industry	1	80	260145.42	2609135.22	0.54	27.1	NG	Meghna Glass Industry
Meghna Steel (FTP Stack)	1	45	259977.79	2610431.58	30	41	NG	Meghna Steel
Meghna Steel (RHF Stack)	1	65	260081.25	2610165.18	30	41	NG	Meghna Steel
Proposed 660 MW Majesty Power, Jamal dih	1	65	256731.11	2611961.33	6.7	42.1	NG	Majesty Power
Proposed 250 MW Power Plant in Meghna Economic Zone	1	65	259835.31	2610036.27	6.7	42.1	LNG	Proposed HFO based powerplant at CuEZ
Proposed Ceramic Industry in Hosendi EZ	1	10	254622.27	2610294.03	52.5	61.6	NG	Hosendi EZ
Proposed Tiles & Ceramic Industry in CuEZ	1	10	260842.51	2609366.63	48.1	56.5	NG	Ceramic industry

Source: EQMS Survey, May 2024

* Emission concentrations are obtained from secondary sources.

6.4.3.2.3 Concentration of Particulate Matter (PM₁₀)

The major contribution of the particulate matter in the Meghna industrial area are power plants, cement industries, chemicals, road traffic and construction activities. In the Meghna industrial area, there is one operational HFO based power plant, six units' gas-based power plant, two proposed gas-based power plant. The emission of PM from oil-based plants is higher than gas-based power plants. Also, there is a proposed glass industry in Meghna economic zone and one ceramic & tiles industry in Hosendi economic zone. There is a PVC plant in the Meghna Economic Zone. The particulates produced by

natural gas combustion are usually less than 1 micrometer (micron) in diameter and are composed of low molecular weight hydrocarbons that are not fully combusted.

The Project Under Consideration (PUC) is a natural gas-based steel mill that is being constructed in the Cumilla Economic Zone owned by Meghna group. The emission concentration of PM from FTP stack and RHF stack have been considered 30 mg/Nm³. Hence, it will not contribute significant PM to the air shed.

Other than industrial activity, development stressors like road & traffic and construction material handling and storage activities are also contributing to the PM in the air-shed. The Dhaka-Chattogram Highway passing near to the project site and Meghna-Homna Road passing inside the Cumilla economic zone. The existing traffic load on the highways is quite high. A significant number of vehicles will also be plying on the Meghna-Homna Road while Cumilla economic zone is functional. The burning of fossil fuel (oil/gas) in the vehicle plying on these roads has been generating PM through tail pipe emissions. Restrained dust due to operation of vehicles on the badly maintained road is also generating considerable amount of particulate. Vehicular emissions are likely to be dispersed locally along the transport corridors. Future industrial growth and urbanization will lead to an increase in the traffic load and the increased traffic volume will result in more PM emissions.

The contribution of PM from key industrial sources (power plants, PVC, Glass and ceramic) on the ambient air quality in the Meghna Industrial area was understood through predictions from the EPA Regulatory Model (AERMOD), as described above. The predictions were made at the locations selected for primary air quality monitoring during the ESIA study to enable appropriate comparison and analysis of the predicted results. The air quality modelling results for 24 hourly and annual maximum ground level concentrations (GLCs) are presented in Table 6-31. The isopleths generated for different scenarios, representing both 24-hourly maximum GLCs is presented in Appendix H-8.

Table 6-31: Predicted 24-Hourly Maximum Ground Level Concentration of PM₁₀

Monitoring Locations	Monitored Conc. of PM (µg/m ³)	Predicted 24 Hourly Max Concentration of PM ₁₀ (µg/m ³)							
		Power Plant			Existing PVC Industry	Proposed Glass Industry	Proposed Ceramic Industry	Meghna Steel	All Sources (Existing and Proposed)
		Existing	Proposed	All					
AQ1	26.5	0.92	0.27	1.07	1.37	0.0090	0.07	2.06	1.84
AQ2	47.5	0.92	0.52	1.04	1.28	0.0127	0.14	1.18	1.85
AQ3	31.7	0.71	0.17	0.75	0.93	0.0039	0.28	0.57	1.25
AQ4	53.7	0.74	0.29	0.79	1.03	0.0087	0.31	0.50	1.37
AQ5	26.7	0.73	0.12	0.74	0.74	0.0041	0.12	0.92	0.88
AQ6	15.7	1.18	0.11	1.19	0.71	0.0015	0.05	0.19	1.30

The air quality modelling study shows that the predicted contribution of PM₁₀ from existing power plant varied from 0.71 µg/m³ (minimum) i.e. only 2.2% of the monitored PM concentration at AQ3 (Noyakandi asroykendro, vitikandi, Gazaria, Munshiganj) to 1.18 µg/m³ (maximum) i.e. 7.5% of monitored PM concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj).

The predicted contribution of PM₁₀ from proposed power plant varied from 0.11 µg/m³ (minimum) i.e. only 0.67% of the monitored PM concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj) to 0.52 µg/m³ (maximum) i.e. 1.1% of monitored PM concentration at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj).

The predicted contribution of PM₁₀ from proposed and existing power plant varied from 0.74 µg/m³ (minimum) i.e. only 2.76% of the monitored PM concentration at AQ5 (Joshim Uddin saheb ar bari, 9no

word Abdullahpur, Meghna, Cumilla) to $1.19 \mu\text{g}/\text{m}^3$ (maximum) i.e. 7.56% of monitored PM concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj).

The contribution of PM_{10} from existing PVC plant varied from $0.71 \mu\text{g}/\text{m}^3$ (minimum) i.e. 4.5 % of the monitored PM concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj) to $1.37 \mu\text{g}/\text{m}^3$ (maximum) i.e. 5.2% of monitored PM concentration at AQ1 (Hazi Umor Faruqe Khondokar's Hause, Boroikandi, vaterchar, Gazaria, Munshiganj).

The contribution of PM_{10} from proposed Glass industry varied from $0.002 \mu\text{g}/\text{m}^3$ (minimum) i.e. 0.009 % of the monitored PM concentration at AQ6 to $0.013 \mu\text{g}/\text{m}^3$ (maximum) i.e. 0.026% of monitored PM concentration at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Mosjid, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj).

The air quality modelling study shows that the predicted contribution of PM_{10} from proposed ceramic industries varied from $0.05 \mu\text{g}/\text{m}^3$ (minimum) i.e. only 0.33% of the monitored PM concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj) to $0.31 \mu\text{g}/\text{m}^3$ (maximum) i.e. 0.58% of monitored PM concentration at AQ4 (Project Site, Luterchar Answar Camp, CEZ, Meghna-Homna Road, Meghna, Cumilla).

The contribution of PM_{10} from the PUC (Meghna Steel Industry) varied from $0.19 \mu\text{g}/\text{m}^3$ (minimum) i.e. 1.18 % of the monitored PM concentration at AQ6 to $2.06 \mu\text{g}/\text{m}^3$ (maximum) i.e. 7.66% of monitored PM concentration at AQ1 (Hazi Umor Faruqe Khondokar's Hause, Boroikandi, vaterchar, Gazaria, Munshiganj).

The contribution of PM from existing and future industries including power plants, ceramic, PVC, and Glass has been predicted through modelling study. The modelling result reveals that industrial and power sector will cumulatively result in increased PM concentrations varying from $0.88 \mu\text{g}/\text{m}^3$ (minimum) at AQ5 (Joshim Uddin saheb ar bari, 9no word Abdullahpur, Meghna, Cumilla) to $1.85 \mu\text{g}/\text{m}^3$ (maximum) at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Mosjid, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj).

The past, present and future industrial activity will cumulatively impact the condition of the Meghna area air shed. The proposed Meghna steel industry area is non-degraded airshed. Major air polluting industries (Power plant, Cement, PVC) are located on the right bank of the Meghna River which is almost 4.3 km from the project location. PM contribution from road traffic and cement industries has not been assessed due to the data limitation. It is assumed that these two sectors have significant PM contributing. Specially road traffic generates significant PM contribution as huge number of traffic plying on the Dhaka-Chattogram highway. The model shows that the contribution of PM from existing and proposed power plant, PVC, Ceramic and glass industries on air quality monitoring locations is insignificant. Also, the contribution of PM from PUC towards PM concentrations in the air shed is assessed to be low.

6.4.3.2.4 Concentration of NO_2

The air quality monitoring result shows that the NO_2 concentration is well within the national standard. There is no major industry in the study area. The major contribution in the study area is road traffic. Daily huge number of vehicles plying on the Dhaka-Chattogram highway which are the key NO_2 emission source in the study area.

There are six units operating gas based and one operating oil-based plant in Meghna industrial area. Combustion of fossil fuel (gas and oil) at high temperature results in generation of NO_2 . The emission of NO_2 from oil-based power plants is almost three times higher than gas-based power plant.

The PUC, i.e. Meghna Steel mill within will generate NO_2 during the process of combustion of fossil fuel at high temperatures. The proposed power plant will adopt fume treatment plant to meet the statutory standard of NO_2 emission from the stack.

A 2X750 MW gas-based power plant will come into operation this year. Also, a 660 MW power plant will also be built in the near future on the left bank of Meghna River. Cumilla Economic zone has a plan to install a 250 MW gas-based power plant. These power plants will generate NO₂, due to combustion of fossil fuel (gas) at high temperature. As discussed, burning of fossil fuel (gas) and the smelting process will generate NO₂.

As stated above, the one major highway and Meghna-Homna passing through the study area act as stressor on the air environment. NO₂ emission from the traffic is due to burning of fossil fuel and resultant tailpipe emissions. The future industrial growth and urbanization is expected to increase the corresponding traffic load. The increased traffic volume will also result in an increase in the NO₂ emissions.

The contribution of NO₂ from key industrial sources (power plants and other industries) in the air shed in the Meghna Industrial area was understood through predictions from the EPA Regulatory Model (AERMOD), as described above. The air quality modelling results for 24 hourly maximum ground level concentrations (GLCs) are presented in Table 6-32 while the isopleths generated for different scenarios, representing both 24 hourly maximum GLCs, is presented in Appendix H.

Table 6-32: Predicted 24-Hourly Maximum Ground Level Concentration of NO₂

Monitoring Locations	Monitored Conc. of NO ₂ (µg/m ³)	Predicted 24 Hourly Max Concentration of NO ₂ (µg/m ³)							
		Power Plant			Existing PVC Industry	Proposed Glass Industry	Proposed Ceramic Industry	Meghna Steel	All Sources (Existing and Proposed)
		Existing	Proposed	All					
AQ1	16.4	3.12	2.51	4.85	2.04	1.20	10.09	8.5	6.20
AQ2	28.6	3.61	4.92	5.97	1.70	1.70	8.05	3.9	8.45
AQ3	32.5	2.92	1.81	4.68	1.28	0.53	9.12	1.8	5.86
AQ4	42.5	2.59	2.82	4.55	1.28	1.17	3.27	1.5	5.91
AQ5	14.9	2.27	1.25	2.89	1.03	0.55	5.66	3.2	3.73
AQ6	8.47	4.51	1.08	5.44	0.72	0.21	9.5	0.6	5.62

The air quality modelling study shows that the predicted contribution of NO₂ from existing power plant varied from 2.27 µg/m³ (minimum) i.e. only 2.27% of the monitored NO₂ concentration at AQ5 (Joshim Uddin saheb ar bari, 9no word Abdullahpur, Meghna, Cumilla) to 4.51 µg/m³ (maximum) i.e. 53.23% of monitored NO₂ concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj).

The predicted contribution of NO₂ from proposed power plant varied from 1.08 µg/m³ (minimum) i.e. only 12.72% of the monitored NO₂ concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj) to 4.92 µg/m³ (maximum) i.e. 17.2% of monitored NO₂ concentration at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj).

The predicted contribution of NO₂ from proposed and existing power plant varied from 2.89 µg/m³ (minimum) i.e. only 19.37% of the monitored NO₂ concentration at AQ5 (Joshim Uddin saheb ar bari, 9no word Abdullahpur, Meghna, Cumilla) to 5.97 µg/m³ (maximum) i.e. 20.86% of monitored PM concentration at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj).

The contribution of NO₂ from existing PVC plant varied from 0.72 µg/m³ (minimum) i.e. 8.56% of the monitored NO₂ concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj) to 2.04 µg/m³ (maximum) i.e. 12.43% of monitored NO₂ concentration at AQ1 (Hazi Umor Faruque Khondokar's Hause, Boroikandi, vaterchar, Gazaria, Munshiganj).

The contribution of NO₂ from proposed Glass industry varied from 0.21 µg/m³ (minimum) i.e. 2.43 % of the monitored NO₂ concentration at AQ6 to 1.70 µg/m³ (maximum) i.e. 5.96% of monitored NO₂ concentration at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Mosjid, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj).

The air quality modelling study shows that the predicted contribution of NO₂ from proposed ceramic industries varied from 3.27 µg/m³ (minimum) i.e. only 7.69% of the monitored NO₂ concentration at AQ4 (Project Site, Luterchar Answar Camp, CEZ, Meghna-Homna Road, Meghna, Cumilla) to 10.09 µg/m³ (maximum) i.e. 61.5% of monitored NO₂ concentration at AQ1 (Hazi Umor Faruqe Khondokar's Hause, Boroikandi, vaterchar, Gazaria, Munshiganj).

The contribution of NO₂ from the PUC (Meghna Steel Industry) varied from 0.6 µg/m³ (minimum) i.e. 7.08 % of the monitored NO₂ concentration at AQ6 to 8.5 µg/m³ (maximum) i.e. 51.8% of monitored NO₂ concentration at AQ1 (Hazi Umor Faruqe Khondokar's Hause, Boroikandi, vaterchar, Gazaria, Munshiganj).

The contribution of NO₂ from existing and future industries including power plants, ceramic, PVC, and Glass has been predicted through modelling study. The modelling result reveals that industrial and power sector will cumulatively result in increased NO₂ concentrations varying from 3.73 µg/m³ (minimum) at AQ5 (Joshim Uddin saheb ar bari, 9 no word Abdullahpur, Meghna, Cumilla) to 8.45 µg/m³ (maximum) at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Mosjid, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj).

The past, present and future industrial activity will cumulatively impact the condition of the Meghna area air shed. The proposed Meghna steel industry area is non-degraded airshed. Major air polluting industries (Power plant, Cement, PVC) are located on the right bank of the Meghna River which is almost 4.3 km from the project location. NO₂ contribution from road traffic has not been assessed due to the data limitation. It is assumed that road traffic has a significant NO₂ contribution. The model shows that the contribution of NO₂ from existing and proposed power plant, PVC, Ceramic and glass industries on air quality monitoring locations varied 3.73 µg/m³ to 8.45 µg/m³ which can be assessed as to be low. The maximum contribution of NO₂ from PUC is 8.5 µg/m³ towards NO₂ concentrations in the air shed which is 10.6% of national standard whereas 51.83% of air quality monitoring value. As a result, the significance can be assessed to be low as the airshed is non-degraded.

6.4.3.3 Impact on Noise level

During operational phase noise is mainly generated from machinery, pumps and power generators, etc. The current-carrying coil, with its electromagnetic field, is subject to substantial radial and axial vibration forces whose frequency is equal to twice the operating frequency of the furnace. As a result, a medium frequency furnace operating at 250Hz will generate noise with a frequency of 500Hz. Apart from the sound emitted directly by the furnaces, vibrations are transmitted to other furnace parts in the form of structure-borne noise. Although, there might occur instances where machines may malfunction, resulting in generation of noise at high levels causing disturbance or minor injury to workers. The other source capable of noise generation during the operational phase might be the installed alarms on the production line.

6.4.3.3.1 Noise Modelling

Source of Noise

Major sources of noise during operation of the MRSML

- Operation of the re-rolling mill
- Billet processing units
- Operation of crane
- Movement of Conveyor Belt
- Metal feeding system

- Metal melting section
- Cooling tower fans
- Fume treatment plant
- Compressors, pumps, generators
- Unloading of raw material at jetty area
- Loading of finished products at the warehouse
- Slag treatment plant operations

Noise Level Guidelines

Department of Environment, Bangladesh has set standard for noise level for different area of use. Noise standard as per Bangladesh Noise Control Act 2006 is presented in Table 6-33.

Table 6-33: Noise standard for Bangladesh

SI no	Category of area/zone	Decibel dB(A) Leq	
		¹ Day Time	Nighttime
1	Silent zone	50	40
2	Residential Area	55	45
3	Mixed zone	60	50
4	Commercial Area	70	60
5	Industrial Area	75	70

¹Daytime is defined as the period 6.00 am-9.00 pm and night-time is defined as the period 9.00 pm-6.00 am.

International Finance Corporation (IFC) has also set EHS guidelines for ambient noise level. EHS noise guidelines of IFC are given **Table 6-34**.

Table 6-34: IFC noise level guidelines

Receptor	One Hour LAeq (dBA)	
	Day time 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

Noise Level Monitoring

Existing noise level in and around the steel plant has been monitored.

Modeling Methodology:

The environmental noise prediction model Sound PLAN 8.2 has been used for modeling noise emissions from the operation of metal processing industry. The major noise sources are re-rolling mills, cranes, pumps, cooling tower fans, conveyor belts, metal feeding systems, billet processing units. Noise generated from these sources is given in **Table 6-35** below.

Table 6-35: Noise generated from major sources at MRSML.

SN	Description	Quantity	Distance (m)	Sound Pressure Level dB(A)	Occurrence
1.	Electric Arc Furnace (elevation from ground approx. +10m)	1	10	105	Average during power-on time

SN	Description	Quantity	Distance (m)	Sound Pressure Level dB(A)	Occurrence
2.	Ladle furnace (elevation from ground approx. +7m)	1	2.5	95	Average during power-on time
3.	Material Handling System	1	1	85	Continuous during operation
4.	Ladle preheater & dryer	1	5	85	During ladle preheating/drying
5.	Ladle wrecking stations	1	5	95	During removal refractory
6.	FTP main fans (1.5 meters above ground level)	3	1.5	93	Continuous
7.	FTP stack	1	1.5	105	Continuous
8.	Bag filter perimeter (1.5 meters above ground level)	1	1.5	80	Continuous
9.	Tundish wrecking station (front - elevation from ground approx. +3m)	1	1.5	99	Active only during tundish debricking
10.	Tundish preheating stations (elevation from ground approx. +13m)	2	1.5	97.9	1 unit active during operation
11.	Tundish drying stations (ground level)	1	1.5	93.8	1 unit active during operation
12.	CCM caster platform (elevation from ground approx. +13m)	1	1.5	88	Continuous during casting
13.	Steam exhaust fan (elevation from ground approx. +6m)	1	1.5	85	Continuous during casting
14.	CCM - Cutting machine	1	1.5	99	Active during blooms cutting
15.	CCM - Discharging roller table/Cooling Bed	1	1.5	86.5	Continuous during casting
16.	R.H.F Fans - Combustion air	1	1.5	90	Continuous during operation
17.	R.H.F Area - Charging	1	1.5	95	Continuous during operation
18.	R.H.F Area	1	1.5	92	Continuous during operation
19.	R.H.F Area - Discharging	1	1.5	85	Continuous during operation
20.	RM Roughing stands	6	3	87.1	Continuous during rolling
21.	Crop shear	2	3	92	Intermittent
22.	RM finishing stands	6	3	93.8	Continuous during rolling
23.	Water Quenching Box	2	3	90	Continuous during rolling
24.	Cooling Bed	1	2	92	Continuous
25.	Slag Treatment Plant	1	5	90	Continuous during operation

Source: MGI, 2024

The embedded noise control measures are installing mufflers, shock absorbers, and vibration isolation pads. For example, installing mufflers on dust removal fans and outlets and placing the fans indoors to

reduce noise. In the process low-noise mechanical equipment, pumps and other equipment will be selected. For process equipment that produces larger noise (such as electric furnaces, LF furnaces, etc.), soundproof doors and windows will be used in the operating rooms near the sound source. The combustion air fan room of the heating furnace shall be muffled, and a silencer shall be installed at the entrance of the combustion air fan to reduce the noise level. The discharge pipe of the air compressor station is equipped with a silencer. The instrument room is equipped with soundproof doors and windows, and the noise of each equipment in the air compressor station meets the standard requirements. In terms of the overall layout, on the premise of meeting the technical requirements, the high-noise workshop should be placed in the middle of the factory as much as possible to reduce the impact on the external environment. At the same time, the office building will be placed at the edge of the factory away from larger noise sources.

With the mitigation measures Noise escape from the metal processing buildings is 75 dB (A). The noise escape from compressors and pump rooms is 75 dB(A). Day time noise from cooling tower will be maximum 75 dB(A). It has been assumed that cooling tower fans speed will be decreased by 20% during nighttime and noise generation from fan will be decreased by 5 dB (A). Noise generated at unloading area will be 85 dB(A) and loading of finished products at the warehouse will create 75 dB(A) noise. Operation of equipment with 100% usage scenario was modeled to cover the operation phase of the expansion Project. As a conservative approach to the assessment, atmospheric absorption during sound transmission was not included in the assessment. In addition, to represent a worst-case scenario for the assessment, all equipment was assumed to be operating simultaneously. In order to assess the impact on noise reflection/ barrier due to the structures, buildings within the steel plant have been taken into consideration. For cumulative impact assessment noise generated from the Meghna Glass Industry is considered. Noise escape from the glass industry processing unit is assumed 75 dB(A).

Modeling Output

Based on the noise propagation from the steel plant noise contour map has been prepared using the modeling tool. Day and nighttime noise contour map for the steel mill during operation phase are shown in **Figure 6-17** and **Figure 6-18** respectively.

Predicted noise level in the receptors point during operation of the steel mill is shown in **Table 6-36**.

Table 6-36: Predicted Noise Levels at Receptors during operation of MRSML

Receptor	Category of Area/Receptor	Baseline Sound Pressure Levels at Receptors, Leq (dBA) ¹		Predicted Sound Pressure Levels at Receptors, Leq (dBA)		Total Sound Pressure Level (Baseline + Predicted), Leq (dBA)		Applicable National Standards, dB(A) ² as per Land use		WBG EHS Guidelines General	
		Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn
NL1	Commercial	65	67.2	42.6	42.2	65.0	67.2	70	60	70	70
NL2	Industrial	50.2	35.4	36.3	35.5	50.4	38.5	75	70	70	70
NL3	Silent	53.2	45.4	34.9	34.5	53.3	45.7	50	40	55	45
NL4	Residential	61.7	49	41.3	41.3	61.7	49.7	55	45	55	45
NL5	Silent	50.3	45.5	35.2	34.8	50.4	45.9	50	40	55	45
NL6	Mixed	51.7	48.5	34.6	34.3	51.8	48.7	60	50	70	70

Receptor	Category of Area/Receptor	Baseline Sound Pressure Levels at Receptors, Leq (dBA) ¹		Predicted Sound Pressure Levels at Receptors, Leq (dBA)		Total Sound Pressure Level (Baseline + Predicted), Leq (dBA)		Applicable National Standards, dB(A) ² as per Land use		WBG EHS Guidelines General	
		Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn
NL7	Mixed	51.5	45.5	37	37	51.7	46.1	60	50	70	70
NL8	Residential	45.5	35.6	35.1	34.5	45.9	38.1	55	45	55	45
NL9	Silent	53.4	47.8	43.5	43.3	53.8	49.1	50	40	55	45
NL10	Residential	52.5	45.5	38.7	38.7	52.7	46.3	55	45	55	45

1) Ambient noise levels as monitored during the baseline survey.

2) Noise Pollution Control Rules, 2006

Predicted noise level in the receptors point during operation of the steel mill and glass industry is shown in **Table 6-37**.

Table 6-37: Predicted Noise Levels at Receptors during operation of MRSML and MGIL

Receptor	Category of Area/Receptor	Baseline Sound Pressure Levels at Receptors, Leq (dBA) ¹		Predicted Sound Pressure Levels at Receptors, Leq (dBA)		Total Sound Pressure Level (Baseline + Predicted), Leq (dBA)		Applicable National Standards, dB(A) ² as per Land use		WBG EHS Guidelines General	
		Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn
NL1	Commercial	65	67.2	43.9	43.4	65.0	67.2	70	60	70	70
NL2	Industrial	50.2	35.4	49	47.5	52.7	47.8	75	70	70	70
NL3	Silent	53.2	45.4	42.3	42.2	53.5	47.1	50	40	55	45
NL4	Residential	61.7	49	43.7	43.7	61.8	50.1	55	45	55	45
NL5	Silent	50.3	45.5	36	35.6	50.5	45.9	50	40	55	45
NL6	Mixed	51.7	48.5	36.5	36.3	51.8	48.8	60	50	70	70
NL7	Mixed	51.5	45.5	40.1	40.1	51.8	46.6	60	50	70	70
NL8	Residential	45.5	35.6	35.7	35.2	45.9	38.4	55	45	55	45
NL9	Silent	53.4	47.8	43.9	43.7	53.9	49.2	50	40	55	45
NL10	Residential	52.5	45.5	40.7	40.7	52.8	46.7	55	45	55	45

Noise modeling has also been conducted for the steel factory and glass industry combinedly to assess the cumulative impact. Day and nighttime noise contour map for the steel mill and glass industry combined operation are shown in **Figure 6-19** and **Figure 6-20**.

Figure 6-17: Noise contour map for MRSML operation during daytime (Leq day)

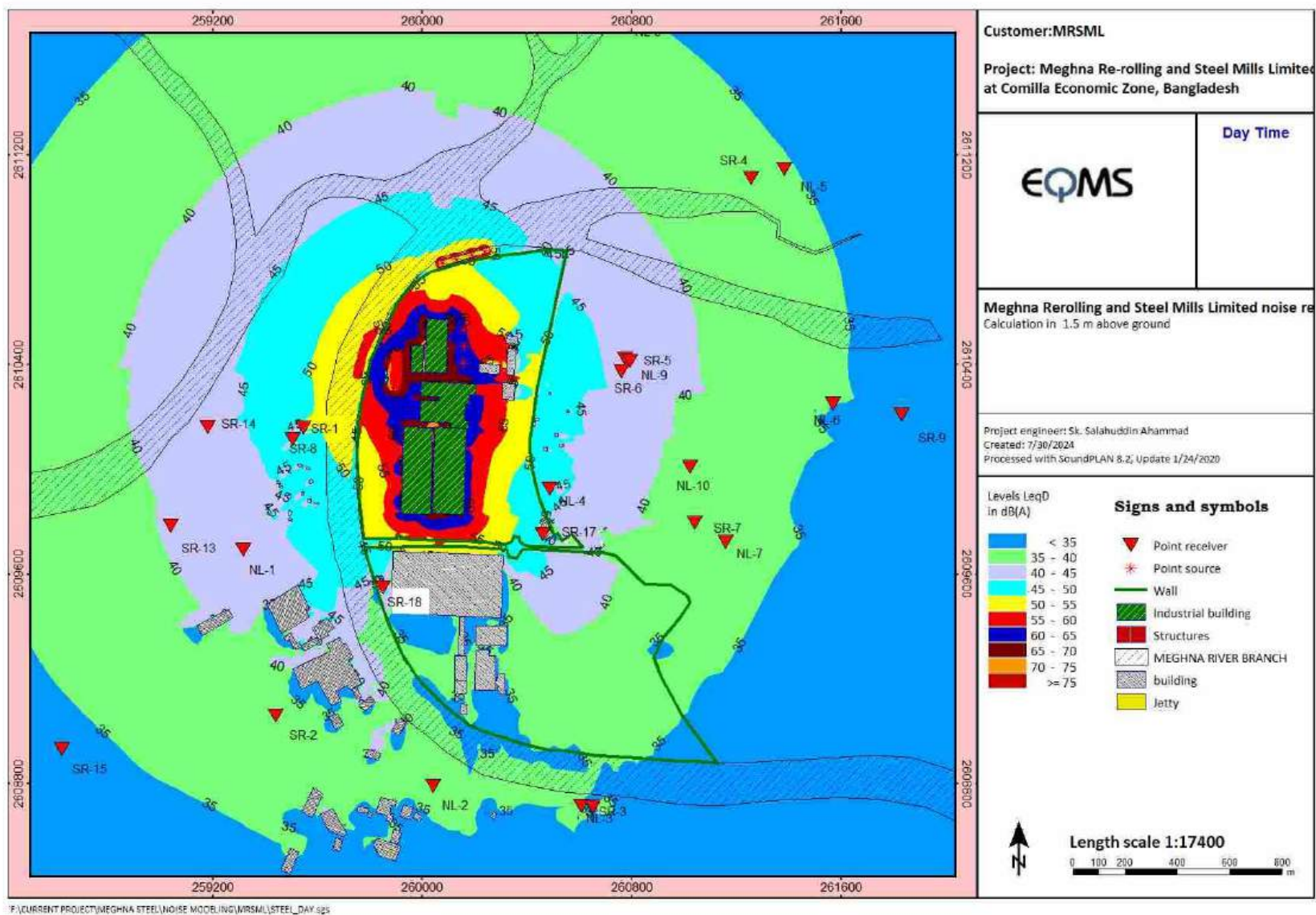


Figure 6-18: Noise contour map for MRSML operation during nighttime (Leq night)

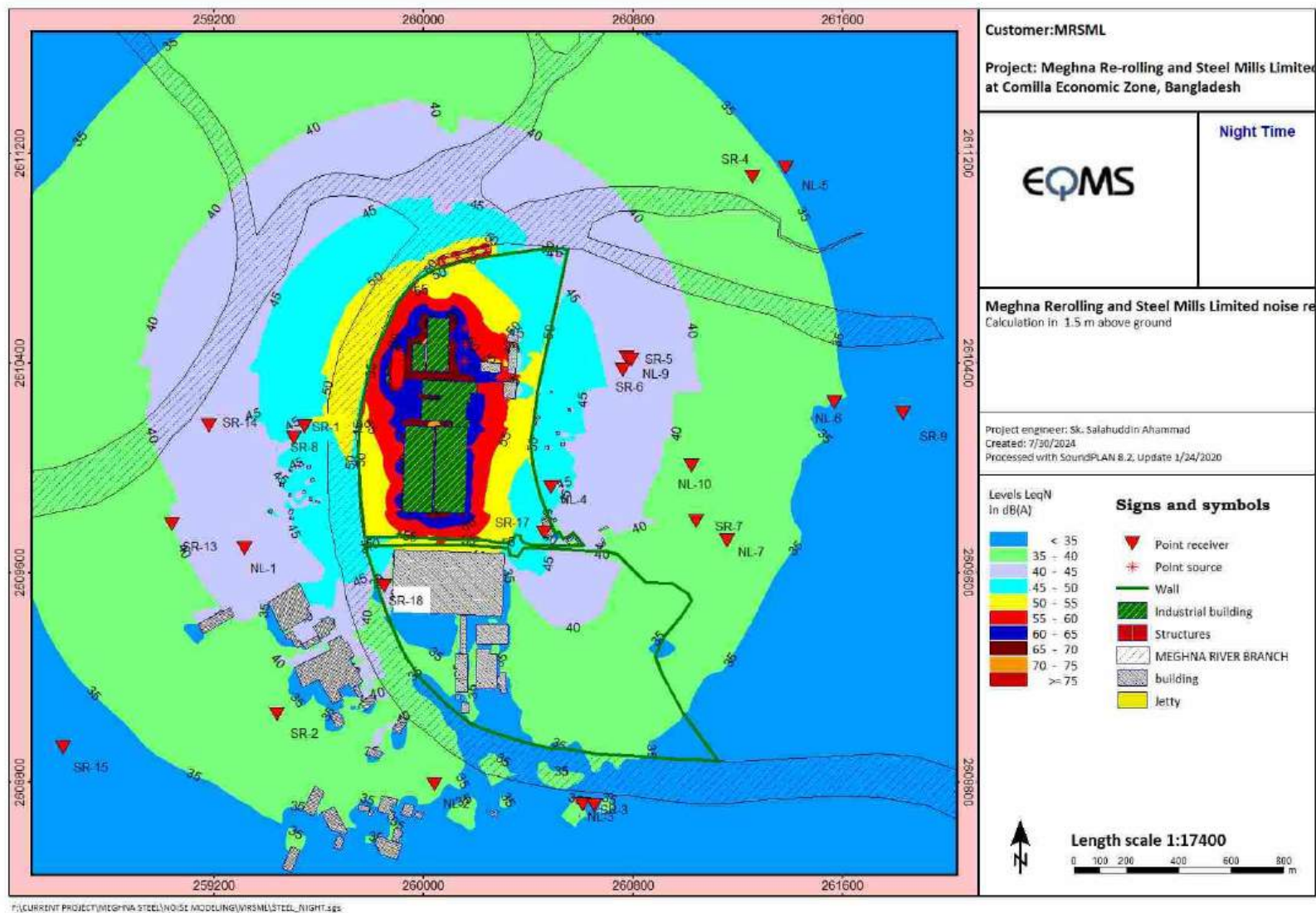


Figure 6-19: Noise contour map for MRSML and MGIL combined operation during daytime (Leq day)

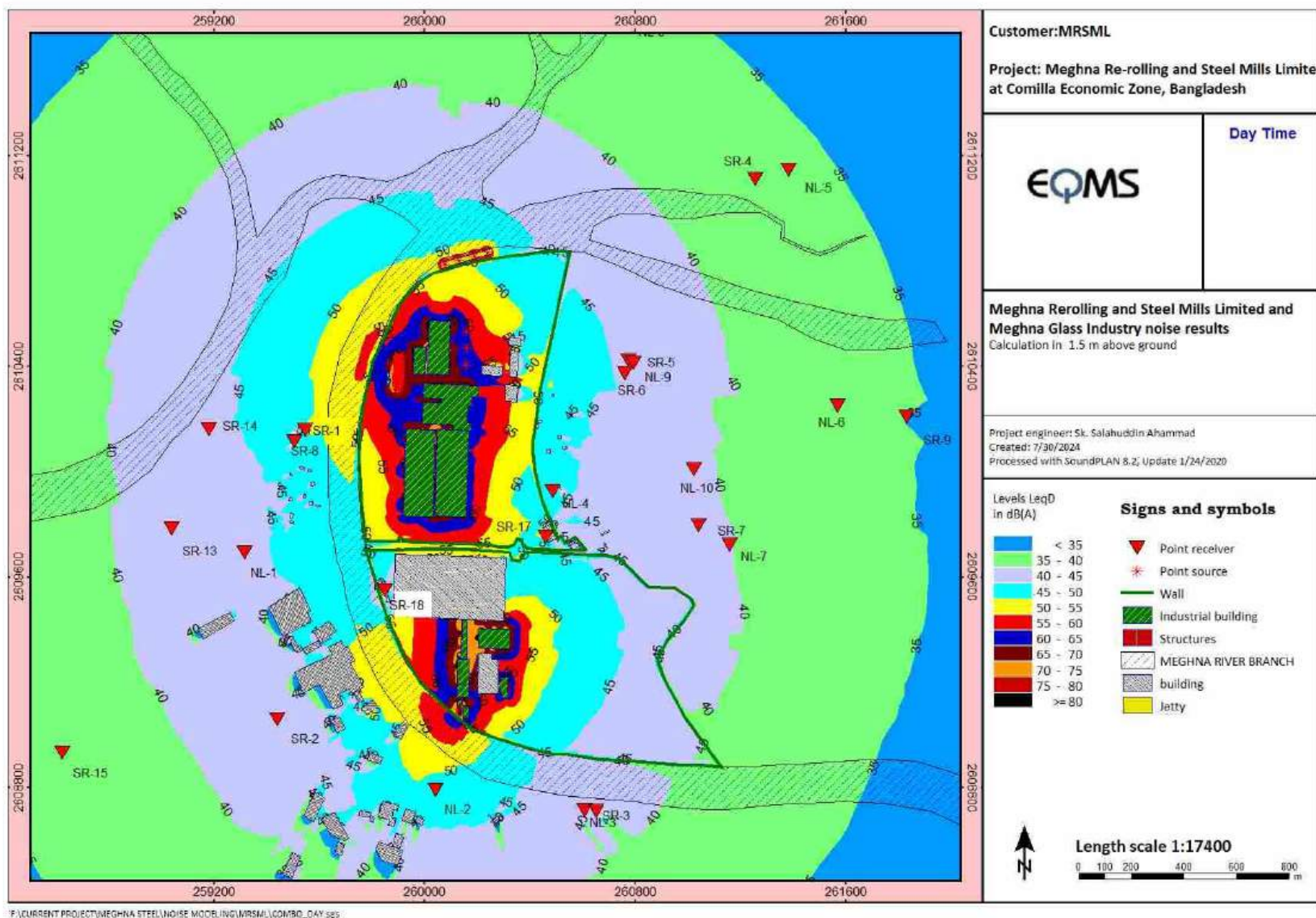
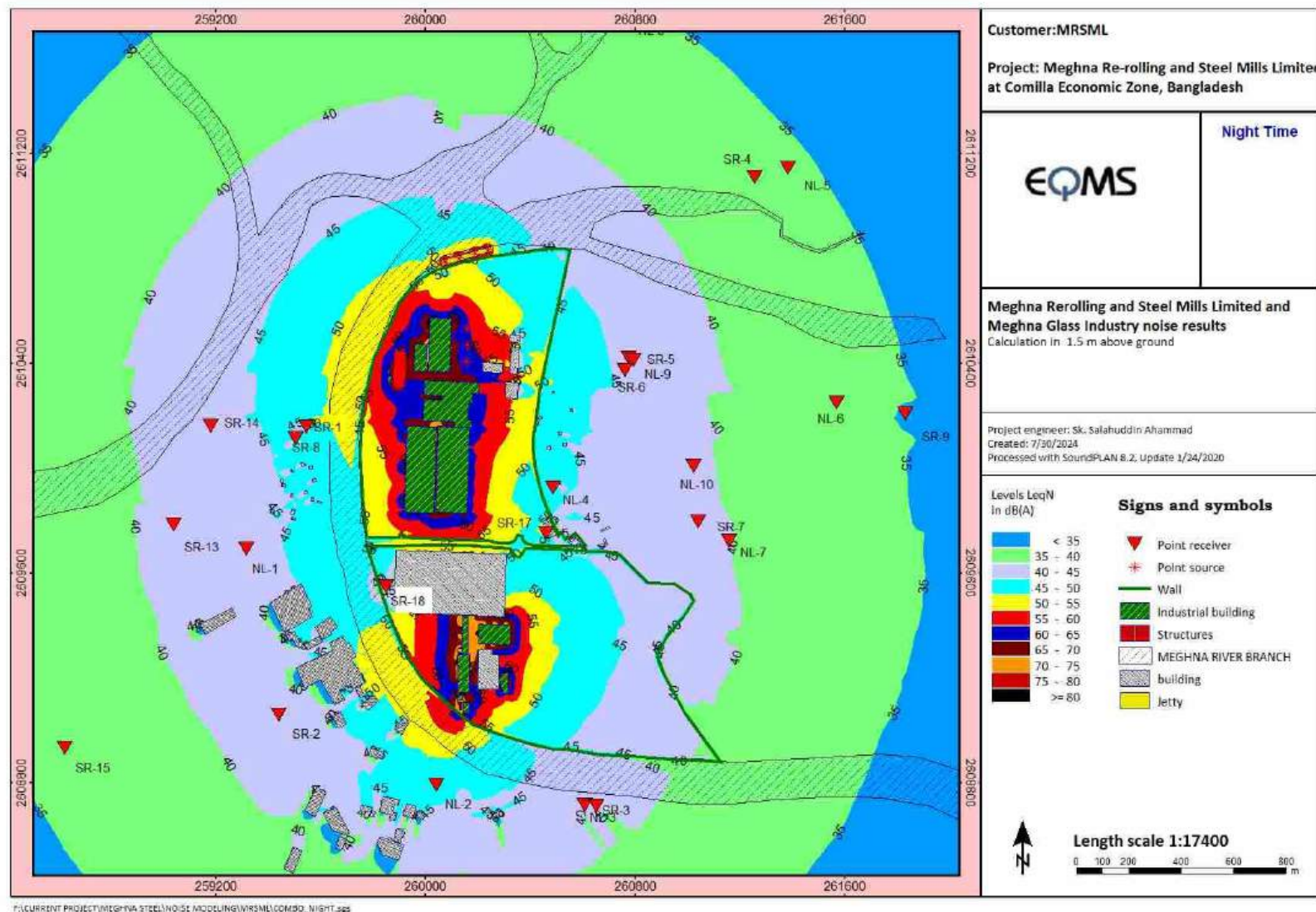


Figure 6-20: Noise contour map for MRSML and MGIL combined operation during nighttime (Leq night)



Noise level has been predicted at all sensitive receptors within the 2 km radius of the steel mills. Predicted noise at the sensitive receptors for MRSML steel mill operation and combined operation of MRSML and MGIL is presented in **Table 6-38** and **Table 6-39** respectively.

Table 6-38: Predicted Noise Levels at Sensitive Receptors during operation of MRSML

Receptor	Name	Category of Area/Receptor	Baseline Sound Pressure Levels at Receptors, Leq (dBA) ⁴⁰		Predicted Sound Pressure Levels at Receptors, Leq (dBA)		Total Sound Pressure Level (Baseline + Predicted), Leq (dBA)		Applicable National Standard, dB(A) as per Land use		WBG EHS Guidelines General	
			Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn
SR-1	Hazi Umor Faruqe Khondokar's Hause, Vaterchar, Gazaria, Munshiganj	Residential	50.3	45.5	51.2	50.3	53.8	51.5	55	45	55	45
SR-2	Roujatul Jannah shahi jame Mosjid, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj	Residential	50.2	35.4	37.3	36.7	50.4	39.1	55	45	55	45
SR-3	Noyakandi asroykendro, vitikandi, Gazaria, Munshiganj	Residential	53.2	45.4	34.7	34.3	53.3	45.7	55	45	55	45
SR-4	Joshim Uddin Saheb's House, 9 no word Abdullahpur, Meghna, Cumilla	Residential	50.3	45.5	36.2	35.7	50.5	45.9	50	40	55	45
SR-5	Luter Char Government Primary School	Silent	53.4	47.8	43.3	43.1	53.8	49.1	50	40	55	45
SR-6	Luterchar Mofizul Islam High School	Silent	53.4	47.8	43.8	43.7	53.9	49.2	50	40	55	45
SR-7	Luterchar South Govt. Primary School	Silent	51.5	45.5	37.8	37.8	51.7	46.2	50	40	55	45
SR-8	Primary School, Gazaria	Silent	50.3	45.5	46.6	45.9	51.8	48.7	50	40	55	45
SR-9	Meghna Residential Model School & College	Silent	51.7	48.5	32.7	32.4	51.8	48.6	50	40	55	45

⁴⁰ Baseline Sound Pressure Levels at Receptors have been taken from representative existing monitoring data.

Receptor	Name	Category of Area/Recept or	Baseline Sound Pressure Levels at Receptors, Leq (dBA) ⁴⁰		Predicted Sound Pressure Levels at Receptors, Leq (dBA)		Total Sound Pressure Level (Baseline + Predicted), Leq (dBA)		Applicable National Standard, dB(A) as per Land use		WBG EHS Guidelines General	
			Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn
SR-10	Mohammadpur Govt. Primary School	Silent	51.7	48.5	31	30.6	51.7	48.6	50	40	55	45
SR-11	S.D Khan Memorial Primary School	Silent	53.2	45.4	29.4	28.9	53.2	45.5	50	40	55	45
SR-12	Nateshwar Govt. Primary School	Silent	53.2	45.4	28.5	28.2	53.2	45.5	50	40	55	45
SR-13	Bhater Char Dewan Abdul Mannan.Pilot High School	Silent	50.3	45.5	40.5	39.9	50.7	46.6	50	40	55	45
SR-14	61no Tengerchar Govt.Primary School	Silent	50.3	45.5	43.1	42.4	51.1	47.2	50	40	55	45
SR-15	Anarpura Idial Kindergarten	Silent	50.2	35.4	34	33.5	50.3	37.6	50	40	55	45
SR-16	18 No. Alipura Govt. Primary School	Silent	53.2	45.4	30.4	29.9	53.2	45.5	50	40	55	45
SR-17	MRSML Dormitory ⁴¹	Residential	61.7	49.0	50.5	50.5	62.0	52.8	55	45	55	45
SR-18	MGIL Dormitory	Residential	61.7	49.0	46.1	45.6	61.8	50.6	55	45	55	45

⁴¹ For the dormitory buildings, MRSML will comply with the WHO Guideline value for dwelling indoor for sleep at night-time (LAeq 30dB): [efaidnbmnnnibpcajpcglclefindmkaj/https://docs.wind-watch.org/WHO-Communitynoise.pdf](https://docs.wind-watch.org/WHO-Communitynoise.pdf)

Table 6-39: Predicted Noise Levels at Sensitive Receptors during operation of MRSML and MGIL

Receptor	Name	Category of Area/Receptor	Baseline Sound Pressure Levels at Receptors, Leq (dBA) ⁴²		Predicted Sound Pressure Levels at Receptors, Leq (dBA)		Total Sound Pressure Level (Baseline + Predicted), Leq (dBA)		Applicable National Standard, dB(A) as per Land use		WBG EHS Guidelines General	
			Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn
SR-1	Hazi Umor Faruqe Khondokar's Hause, Vaterchar, Gazaria, Munshiganj	Residential	50.3	45.5	51.3	50.5	53.8	51.7	55	45	55	45
SR-2	Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhabar Char, Gazaria, Munshiganj	Residential	50.2	35.4	42.9	42.2	50.9	43.0	55	45	55	45
SR-3	Noyakandi asroykendro, vitikandi, Gazaria, Munshiganj	Residential	53.2	45.4	42.5	42.4	53.6	47.2	55	45	55	45
SR-4	Joshim Uddin Saheb's House, 9 no word Abdullahpur, Meghna, Cumilla	Residential	50.3	45.5	36.9	36.5	50.5	46.0	50	40	55	45
SR-5	Luter Char Government Primary School	Silent	53.4	47.8	43.7	43.5	53.8	49.2	50	40	55	45
SR-6	Luterchar Mofizul Islam High School	Silent	53.4	47.8	44.2	44.1	53.9	49.3	50	40	55	45
SR-7	Luterchar South Govt. Primary School	Silent	51.5	45.5	40.8	40.7	51.9	46.7	50	40	55	45
SR-8	Primary School, Gazaria	Silent	50.3	45.5	46.6	45.9	51.8	48.7	50	40	55	45
SR-9	Meghna Residential Model School & College	Silent	51.7	48.5	34.9	34.7	51.8	48.7	50	40	55	45
SR-10	Mohammadpur Govt. Primary School	Silent	51.7	48.5	32.7	32.4	51.8	48.6	50	40	55	45
SR-11	S.D Khan Memorial Primary School	Silent	53.2	45.4	34.8	34.5	53.3	45.7	50	40	55	45
SR-12	Nateshwar Govt. Primary School	Silent	53.2	45.4	33.3	33.2	53.2	45.7	50	40	55	45
SR-13	Bhater Char Dewan Abdul Mannan.Pilot High School	Silent	50.3	45.5	41.7	41.1	50.9	46.8	50	40	55	45
SR-14	61no Tengerchar Govt.Primary School	Silent	50.3	45.5	43.5	42.8	51.1	47.4	50	40	55	45
SR-15	Anarpura Ideal Kindergarten	Silent	50.2	35.4	37	36.4	50.4	38.9	50	40	55	45
SR-16	18 No. Alipura Govt. Primary School	Silent	53.2	45.4	36.7	35.8	53.3	45.9	50	40	55	45

⁴² Baseline Sound Pressure Levels at Receptors have been taken from representative existing monitoring data.

Receptor	Name	Category of Area/Receptor	Baseline Sound Pressure Levels at Receptors, Leq (dBA) ⁴²		Predicted Sound Pressure Levels at Receptors, Leq (dBA)		Total Sound Pressure Level (Baseline + Predicted), Leq (dBA)		Applicable National Standard, dB(A) as per Land use		WBG EHS Guidelines General	
			Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn	Leqd	Leqn
SR-17	MRSML Dormitory ⁴³	Residential	61.7	49.0	51.4	51.4	62.1	53.4	55	45	55	45
SR-18	MGIL Dormitory	Residential	61.7	49.0	46.4	45.9	61.8	50.7	55	45	55	45

⁴³ For the dormitory buildings, MRSML will comply with the WHO Guideline value for dwelling indoor for sleep at night-time (LAeq 30dB): [efaidnbmnnnibpcajpcglclefindmkaj/https://docs.wind-watch.org/WHO-Communitynoise.pdf](https://docs.wind-watch.org/WHO-Communitynoise.pdf)

Impact Significance

Baseline noise level in some monitoring places have already been exceeded the standard. Noise contribution from the steel mill operation will not contribute more than 3 dB(A) at the monitoring point and thus maintaining the standard noise level permissible for that area. It is clearly viewed in the noise contour plot that with embedded noise control measures high level noise will be kept within the factory boundary. Due to the operation of the steel mills and the glass industry, an increase of 1-3 dB(A) in noise levels may be experienced. It is observed that daytime incremental noise at SR-1 is 3.4 dB(A) for the operation of MSRML which is 3.5 dB(A) for the operation of both MSRML and MGIL without exceeding the standard value. Proper boundary wall should be maintained to keep incremental noise less than 3 dB(A) at SR-1. It is also observed that the nighttime incremental noise level at SR- 1, 8, 17 are greater than 3 dB(A) during operation of MSRML which is also true for the operation of both MSRML and MGIL. To maintain a residential ambience at both dormitories, noise control measures (such as double-layered windows and doors) should be implemented. SR-8 location is a School, and it is closed during nighttime. Based on the results it is predicted that the significance of impact will be Low for the noise generation from the steel industry.

Impact	Impact on ambient noise level due to operation MRSML						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	In and around project site						
Frequency	Limited to operational phase						
Extent and location	Project Site	Local	Regional		National	Trans boundary	
Impact Duration	Short Term	Medium Term	Long-term		Permanent – Mitigated	Permanent – no mitigation	
Impact Intensity/ severity	Insignificant	Low	Medium		High	Very High	
Potential for irreplaceable loss of resources	Low		Medium			High	
Probability of Impact	Unlikely	Low	Medium		High		Definite
Impact Significance	Very low	Low	Medium-Low	Medium-high		High	Very High
	Significance of impact is considered as Low						

Mitigation Measures:

Noise level in steel industry project operation can be controlled to a tolerable limit by implementing following mitigation measures:

- To maintain residential ambience at both the dormitories, noise control measures (such as double layered windows, doors etc.) should be taken. For the dormitory buildings, MRSML will comply with the WHO Guideline value for dwelling indoor for sleep at night-time (LAeq 30dB).
- Maintenance of mufflers on engine exhausts and compressor components.
- Maintenance of acoustic enclosures for equipment (e.g., compressor) causing radiating noise.
- Maintenance of vibration isolation for mechanical equipment; and
- Avoid the unnecessary use of alarms, horns, and sirens.
- A green belt along the boundary for the factory should be developed.
- Regular lubrication and preventive maintenance of machinery is to be done during manufacturing of steels to reduce vibration.
- Comply with the noise emission criteria as per the Noise Pollution (Control) Rules, 2006.

- Ensure closed door operation of the noise generating units.
- Ensure Receptor's noise control measures such as wall, double-layered windows and doors etc.
- Comply with the noise emission criteria as per the Noise Pollution (Control) Rules, 2006.
- Monitor ambient noise levels in and around the Project site as per the Environment Monitoring Plan formulated for the project, which will comply with both National Regulatory requirements and WBG General EHS Guidelines.
- A noise analysis of all major plant components will be carried out during commissioning of the plant to ensure compliance with the specification and guaranteed performance.

With proper mitigation measures noise impact will be very low.

6.4.3.4 Impact on Water Resources

Water Quality:

Water is required for plant operation, such as cooling of furnace coils, furnace body, and rollers of continuous casting machine. The water used in furnace coils and furnace body is recycled; however, a significant amount of water is lost due to evaporation in the cooling system. Groundwater will be used and will be sourced by installing deep wells. Also, surface water (Meghna River Branch) will be used to meet the requirement of make-up water. The overall amount of ground water to be extracted for cooling will depend on the quality of water, and the operational efficiency of the overall cooling process. The extraction of such a huge quantity of ground water is expected to have a significant impact on the present ground water level. Also, the water is being recycled in the facility using various filters before it goes to operation using a water treatment plant. The impact on surface water might occur if untreated water from the facility goes into the sewage system. Also, raw materials will be transported to the plant via waterways. The spillages from the vessel would be the main source of surface water pollution.

Stormwater runoff:

Stormwater runoff can pick up various pollutants, including heavy metals, oils, grease, chemicals, and sediment, from manufacturing processes, storage areas, and equipment. These pollutants can contaminate surface water bodies, groundwater, and soil if not properly managed. Contaminants may accumulate in sediments, bioaccumulate in aquatic organisms, and disrupt ecosystem functions in the Meghna branch river and surrounding waterbodies. According to MGI, MRSML will install a stormwater drainage system that will be connected to the CETP of the CuEZ. The stormwater will be collected through multiple surface and subsurface drains and stored in several reservoirs. The water will be sent to CETP of the CuEZ for the removal of contaminants such as oils, heavy metals etc. As per the Master Plan of CuEZ, the treated water will be reused for non-potable purposes within the economic zone, such as dust suppression, gardening, car wash etc.

Makeup Water Abstraction from Meghna River branch:

The proposed steel plant's estimated total consumptive makeup water requirement is approximately 647 m³/hr (0.1877 m³/s). The maximum discharge of the Meghna River was estimated to be 34,477 m³/sec; while the minimum discharge of 9,582 m³/sec, based on data obtained from the Bangladesh Water Development Board (BWDB) for the Meghna Bridge Station (ferry), located near the MRSML.

The minimum discharge, or the lean season flow, has been considered for assessing the impact on the Meghna River's water resources. According to available data, approximately 80% of the water is utilized for irrigation, while around 12% is used for domestic and industrial purposes. With this consideration, available water (minimum flow) is 766.61 m³/s.

The total makeup water abstraction required for the proposed steel plant constitutes approximately 0.0245% of the available water during minimum flow conditions in the river and about 0.007% of the

total water flow at minimum flow conditions. Therefore, the impact of water abstraction for the project on the Meghna River's water resources would be very limited.

Industrial Wastewater and Sewerage:

According to MGI, a Wastewater Treatment Plant is not required for MRSML based on the production process. However, a Water Treatment Plant will be established for MRSML, and MGI has confirmed that a zero-discharge plan will be implemented,

MGI has also confirmed that CETP and CSTP are shared facilities, not associated facilities, and CETP is not relevant for the proposed project. The land lease agreement with CuEZ, specifically mentioned in document sr. 06, page-02, states that the lessee is responsible for paying any rates or fees levied on the property by the lessor for services such as domestic garbage disposal and sanitary services.

The location for the outfall of the CSTP has not been determined yet by CuEZ.

The discharge standards outlined in the Environment Conservation Rules, 2023, (Schedule-3-Sewage discharge) Annex-E5 and (Schedule-4-Industrial wastewater) Annex-E6, will be applied to the CSTP and CETP, respectively.

Therefore, the overall impact significance is Medium-Low.

Impact	Impact on Water Resource					
Impact Nature	Direct		Indirect		Induced	
Impact Scale	In and around project site					
Frequency	During operation phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider Medium-Low					

Mitigation Measures: The following mitigation measures can be adopted by the authorities to reduce the impact on water quality and water resources during the operational and maintenance phase.

- Implementation of a robust monitoring and testing program to regularly assess groundwater quality.
- Implementation of spill prevention measures to minimize the risk of accidental spills of hazardous materials. Proper ERP and cleanup in the event of a spill will be followed to prevent contaminants from reaching groundwater.
- Greenbelt of 10 m all around the project site to prevent runoff and infiltration of pollutants into nearest water bodies.
- To minimize the dependency on groundwater, drawing water from Meghna River and its branches would be a good solution for domestic use.
- Stormwater should be separated from process and sanitary wastewater streams in order to reduce the volume of wastewater to be treated prior to discharge

- Surface runoff from process areas or potential sources of contamination should be prevented. Where this approach is not practical, runoff from process and storage areas should be segregated from potentially less contaminated runoff.
- When water quality criteria allow, stormwater should be managed as a resource, either for groundwater recharge or for meeting water needs at the facility.
- Runoff from areas without potential sources of contamination should be minimized (e.g. by minimizing the area of impermeable surfaces) and the peak discharge rate should be reduced (e.g. by using vegetated swales and retention ponds);

6.4.3.5 After taking proper mitigation measures the impact will reduce to low. Impact on Soil Quality

The quality of soil can be impacted by the waste materials produced during the operational stage of steel manufacturing. Slag, which is the major solid wastage during operation, when dumped on soil can be attributable to a loss of soil productivity.

Impact	Impact on Soil					
Impact Nature	Direct	Indirect		Induced		
Impact Scale	Impact zone will be limited to project site					
Frequency	Operation phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider Low					

Mitigation Measures: The following mitigation measures can be adopted to reduce the negative impacts of solid wastage on the quality of soil.

- The solid wastage should be kept in an identified secured area within the plant boundary and should not be dumped in arbitrary land adjacent to the project. Materials from the wastage which can be recycled should be sold to a third-party for secondary use.
- A proper solid waste management plan as part of the plant ESMS should be developed to reduce the dumping of hazardous materials on soil and maximize the utilization of solid wastes through practical ventures.
- As suggested in WBG EHS Guidelines for Integrated Steel Mills, 2007, EAFs produce a significant amount of slag. Where reuse of EAF slag is not financially or technically feasible, it should be disposed of, along with the dust from the treatment of off-gas, in a landfill designed with consideration of slag and dust characteristics. Local geological conditions also should be considered when locating slag heaps.

With proper mitigation measures in place the impact on soil can be low to non-significant.

6.4.3.6 Impact due to Waste Generation

The generation of such wastes fully depends on the quality and quantity of raw materials used in the process. The main industrial waste generated from the proposed plant will be slag. Slag gets collected from the pots, as well as the ladle furnace in molten form and becomes solidified after a while. The slag collected from the furnaces is usually governed by the scrap used and varies in nature. It usually consists of oxides of iron, manganese, magnesium and silicon and a host of other complex compounds, which may include alumina, calcium oxides, silicates, sulfides, and rare earth metal oxides. Beside slag, solid dust particle also gets collected as a form of solid industrial wastage from the filters. Other types of waste, e.g. waste bag filter, packages of hazardous materials, oil wastage, lubricant, domestic waste, etc. will be generated in limited amounts. Those wastes will be collected by the third-party vendor (waste collector) appointed by the MRSML.

Impact	Impact due to Waste Generation and Management					
Impact Nature	Direct		Indirect		Induced	
Impact Scale	Impact zone will be limited to project site					
Frequency	Operation Phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider Low					

Mitigation Measures: The following mitigation measures can be adopted to reduce the generation of solid wastes:

- All waste produced within the plant will be separated from the source in accordance with internal procedures. They will be classified as either hazardous or non-hazardous, following the best prevailing practices in Hazardous Waste Management and Handling within the industry. Depending on their characteristics, waste will be packaged in drums or jumbo bags and appropriately labeled with details and the date of generation. Following labeling, the waste will be transported to the designated storage location, a covered shed with concrete flooring. Then the waste will be disposed of at a designated dumping site through a DoE authorized vendor.
- The waste collection and disposal agreement between the authorized vendor and MRSML will be done prior to the construction phase of the project.
- Efforts should be made to utilize the solid waste to the maximum extent possible. The furnace slag can be used in cement plant, brick manufacturing, rail ballast, or as road laying material.
- Solid dust generated can be used in brick and ceramic industry.
- Other types of wastes, e.g. waste bag filter, packages of hazardous materials, oil wastage, lubricant, domestic waste, etc. will be collected by the third-party vendor (waste collector) appointed by the MRSML.
- Effluent should be treated in the treatment facility of MSMRL prior to discharge to the local drainage network or sewage network.

6.4.3.7 Impact on Ecosystem and Biodiversity during Operation Phase of Steel Plant

6.4.3.7.1 Impact on Terrestrial Flora

Potential impacts on terrestrial flora during the operation phase will be the deposition of dust emitted from vehicle movement (transportation of raw materials and unloading process) and Gaseous emissions like NO₂, SO₂ and Particulate matter (PM) from the operation process, etc. The main source of pollutants will be fugitive and stack emissions from the plant may contribute to an increase in concentrations of PM, SO₂, and NO₂ pollutants.

During the operational phase, solid waste called steel slag (induction furnace slag) will be generated. This waste, when dumped in the environment, could threaten floral diversity by reducing land fertility.

Dust deposition on leaf surfaces reduces the photosynthesis process due to shedding effects. NO₂ mostly affects the leaves and seedlings by forming crystalloid structures in the stroma of chloroplasts and swelling the thylakoid membrane. As a result, the photosynthetic activity of the plant is reduced. SO₂ in moist environments may be transferred to sulfuric acid resulting in acid rain which can cause harm to biota.

Considering the project activities and potential biological receptors within the project AOI, the impact on terrestrial flora during the operation phase might be less significant and assessed as **Low**.

Impact	Impact on Terrestrial Flora						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Project Area of Influence						
Frequency	Limited to Operation Phase						
Extent and Location	Project Site	Local		Regional	National		Trans Boundary
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceable Loss of Resources	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Low						

Mitigation Measures

To mitigate these potential impacts on terrestrial flora during the operation phase of Re-Rolling Steel Plant, it is crucial to implement the following mitigation measures:

- Water sprinklers should be deployed along the transport routes if necessary
- Transportation of materials only through covered trucks should be made mandatory
- Dust extraction and dust handling systems along with smoke treatment plant shall be installed to reduce fugitive dust emissions
- It is highly recommended to turn steel waste (steel slag) into eco-friendly construction material as an alternative to bricks and stone chips
- Stack emissions should be monitored on regular basis and monitoring record should be maintained

- Prepare and implement a greenbelt development plan

6.4.3.7.2 Impact on Terrestrial Fauna

The operation phase of industrial activities can have adverse effects on terrestrial fauna, which can be attributed to various factors such as excessive light emission, noise pollution and vibration caused by the plant and generators, as well as increased vehicular movements for the transportation of workers and raw materials.

The higher noise level produced from different activities may cause disturbance and behavioral changes of the faunal species like migratory bird species found adjacent to the proposed project site. Artificial lighting may result in the attraction of some wildlife living in the project adjacent area, leading to their disoriented movement and confusion behavior.

Vehicles will be operated for transporting workers and the number of vehicles will increase in the project area. The movement of vehicles will create dust emissions and exhaust emissions from the burning of fossil fuels. Dust emissions from the operational activities might impact respiration of the fauna and avifaunal species. In the case of small mammals and herpetofauna, some unwanted accidental events could occur from heavy vehicular movements.

According to the baseline, several migratory bird species were recorded from the project AOI. Artificial lights will hamper the feeding and foraging activity of migratory bird species as well as their migration orientation.

Improper disposal of steel slag, food waste, cardboard, paper, packaging, plastic, etc., not only degrades the aesthetic value of the area but may also potentially cause health hazards to wild fauna in the form of water and soil contamination.

Considering the issues, the impact on terrestrial fauna during the operation phase might be less significant. Therefore, it is assessed as **Low**.

Impact	Impact on Terrestrial Fauna						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Project Area of Influence						
Frequency	Limited to Operation Phase						
Extent and Location	Project Site	Local		Regional	National		Trans Boundary
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceable Loss of Resources	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Low						

Mitigation Measures

To mitigate these potential impacts on terrestrial fauna during the operation phase, it is crucial to implement the following mitigation measures:

- Utilize noise barriers and soundproofing measures around plant and generator areas to mitigate noise pollution.
- Install shields and directional lighting to minimize light emissions, reducing disturbance to migratory bird species.
- Schedule noisy activities during periods of lower wildlife sensitivity (i.e. avoid noisy activities during early morning and evening), especially for migratory bird species
- To prevent any accidental harm to wildlife, it is important to enforce a speed limit of 20 km/hr for vehicles.
- Establish proper waste disposal protocols to prevent the contamination of water and soil from steel slag, food waste, cardboard, paper, packaging, plastic, etc.

6.4.3.7.3 Impact on Aquatic Ecosystem

The proposed Re-Rolling Steel Plant is set to be established on the bank of a tributary of the Meghna River. According to the project description, locally sourced ferrous scrap will be transported by road to the main on-site storage area of Cumilla Economic Zone. However, scrap purchased from international markets will be delivered by Handymax seagoing vessels to the coast of Bangladesh, which could then be brought to the project site via river network from the Chattogram Port. Accidental spillage and waste disposal from ships/barges used for raw material transportation may affect the water quality of the sea and associated river reduce the diversity of aquatic flora and fisheries resources.

Transportation activities involving ships and barges can contribute to sedimentation and increased turbidity, potentially affecting the feeding and breeding grounds of aquatic organisms.

Improper disposal of steel slag, food waste, cardboard, paper, packaging, plastic, etc., in the waterbody not only degrades the aesthetic value of the river but may also potentially cause health hazards to aquatic organisms in the form of water and soil sediment contamination.

Hence, considering the project activities and potential biological receptors within the project AOI, the impact on the aquatic ecosystem during the operation phase might be significant and is assessed as **Low**.

Impact	Impacts on Aquatic Ecosystem						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Project Area of Influence						
Frequency	Limited to Operation Phase						
Extent and Location	Project Site	Local	Regional	National	Trans Boundary		
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation		
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High		
Potential for Irreplaceable Loss of Resources	Low		Medium		High		
Probability of Impact	Unlikely	Low	Medium	High	Definite		
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High	
	Significance of impact consider Low						

Mitigation Measures

To mitigate these potential impacts on aquatic ecosystem during the operation phase of Re-Rolling Steel Plant, it is crucial to implement the following mitigation measures:

- Implement strict waste management protocols to prevent improper disposal of steel slag, food waste, cardboard, paper, packaging, plastic, etc.
- Conduct regular inspections and monitoring of ships and barges to prevent accidental spillage and waste disposal during transportation.
- Establish emergency response protocols to address and contain any spills or accidents promptly.
- Collaborate with local authorities and environmental organizations to ensure compliance with regulations and standards for water quality and ecosystem protection.

6.4.3.8 Impacts Due to Operation of Wharf

6.4.3.8.1 Impacts on Water Resources due to Operation of Wharf

The operation of a Wharf can significantly impact water resources. Discharges from ships, cargo handling, and maintenance activities can introduce pollutants into the water, affecting water quality and harming aquatic ecosystems. Increased marine traffic raises the risk of ship-related accidents and oil spills, further compromising water quality. Stormwater runoff can carry pollutants into nearby water bodies, and water usage for Wharf activities can strain local water resources.

Impact	Impact on Water Resource					
Impact Nature	Direct		Indirect		Induced	
Impact Scale	In and around project site					
Frequency	During operation phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider Low					

Mitigation Measures: The following mitigation measures can be adopted by the authorities to reduce the impact on water quality and water resources during the operational and maintenance phase.

- Develop and regularly update spill response plans to minimize the risk of oil spills. Provide spill response training for staff and ensure the availability of appropriate spill response equipment.
- Minimize excavation impacts through careful planning and the use of sediment containment measures.
- Implement effective stormwater management systems to prevent pollutants from entering water bodies. This may involve the use of sediment basins, vegetative buffers, and filtration systems.
- Promote water conservation practices within the Wharf facility to reduce water consumption. Implement measures such as recycling and reusing water where possible.

- Conduct routine water quality monitoring to track changes and identify potential issues promptly. Adjust operations as needed based on monitoring results.
- Engage with local communities and stakeholders to raise awareness of water resource protection and involve them in the development of environmental management plans.
- Ensure strict adherence to all relevant environmental regulations and permits and maintain open communication with regulatory authorities.
- Where possible, implement habitat restoration or enhancement projects to offset any ecological damage caused by Wharf operations.
- Explore innovative technologies for reducing environmental impacts, such as eco-friendly anti-fouling coatings for ship hulls or energy-efficient cargo handling equipment.

After taking proper mitigation measures the impact will reduce to low.

6.4.3.8.2 Impact on Ecosystem and Biodiversity due to the Operation of the Wharf

6.4.3.8.2.1 Impact on Terrestrial Flora and Fauna

As per the WBG EHS Guidelines for Ports, Harbors, and Terminals, 2017, construction and operation of new port and terminal facilities, or the expansion of existing facilities, involves the reclamation, clearing and paving (or compacting) of land for loading/unloading zones, bulk dry/liquid and containerized cargo storage areas, fuel depots, buildings, and roads; the alteration of coastlines for construction of breakwaters, shipyards, dockyards, wharves, piers, and vessel berths; and the transformation of the seabed to establish vessel basins (including areas for vessel turning) and navigation channels through excavation. These activities and related infrastructure, in addition to typical port operational activities, may result in alteration of terrestrial, freshwater, brackish and marine habitats, with impacts to flora and fauna and related biodiversity.

The operation of the wharf may pose potential impacts on terrestrial flora and fauna, primarily stemming from increased vehicular traffic associated with raw material unloading from ships/barges. These impacts include heightened noise, dust, and vibration generated during the unloading and movement of vehicles.

The increased vehicular activity can result in the dissemination of dust, noise pollution, and vibrations. These factors have the potential to adversely affect various terrestrial fauna, including small mammals, herpetofauna, and both residential and migratory bird species. Such disturbances may disrupt their migration patterns and natural behaviors, ultimately impacting their access to essential resources like food, water, and shelter. Moreover, continuous vehicular noise and disturbance can compel wildlife to retreat to unsafe areas. Dust generated from transportation activities will lead to dust deposition on plant leaves, twigs, and stems, which may hamper pollination, photosynthesis, respiration, and other physiological processes of surrounding vegetation.

Accidental spills or releases of pollutants during wharf operations, such as fuel or chemicals, may further exacerbate the situation by contaminating surrounding land areas. This pollution can detrimentally affect vegetation, soil quality, and water sources, subsequently diminishing the availability of food and suitable habitats for terrestrial wildlife.

The heightened vehicular traffic, comprising trucks, trailers, and heavy machinery, also raises the risk of collisions with terrestrial wildlife. Animals, including mammals, birds, and reptiles, may traverse roads or pathways near the wharf, oblivious to the fast-moving vehicles, thus increasing the likelihood of fatal accidents.

Based on the project activities and the potential biological receptors within the AOI, the impact on the terrestrial flora and fauna during the operation of the wharf is expected to be **Low**.

Impact	Impact on Terrestrial Flora and Fauna						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Project Area of Influence						
Frequency	Limited to Operation Phase						
Extent and Location	Project Site	Local	Regional	National	Trans Boundary		
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation		
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High		
Potential for Irreplaceable Loss of Resources	Low		Medium		High		
Probability of Impact	Unlikely	Low	Medium	High	Definite		
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High	
	Significance of impact consider Low						

Mitigation Measures

To mitigate these potential impacts on terrestrial flora and fauna during the operation phase of wharf, it is crucial to implement the following mitigation measures:

- Implement reduced speed limits (20 km/hr) in the vicinity of the wharf area.
- Utilize water spraying techniques to suppress fugitive dust emissions in the wharf area.
- Implement measures to control leaching of hazardous chemicals into adjacent land.
- Prohibiting the dumping of contaminated waste from trucks and lorries.
- Install acoustic barriers in areas with high noise levels to mitigate discomfort to terrestrial fauna near the wharf area.

6.4.3.8.2.2 Impact on Aquatic Ecosystem

The operation of the wharf poses potential impacts on aquatic ecosystems, including fish, crustaceans, plankton, and benthos. These impacts arise from various sources, including waste disposal from raw material loading vehicles and ships/barges, accidental spillage from ships/barges, and the leaching of hazardous chemicals, grease, and lubricants from machinery used in operational activities at the wharf.

Improper disposal of waste from raw material loading vehicles and ships/barges can result in the release of pollutants such as plastics, oils, chemicals, and other debris into the aquatic ecosystem. This pollution can obstruct the respiration of aquatic organisms, disrupt their habitats, and degrade water quality.

Accidental spillage of substances from ships/barges, such as fuel, lubricants, or other corrosive chemicals, can cause immediate and long-term effects on the aquatic ecosystem. The leaching of hazardous chemicals from machinery used in wharf operations, such as grease and lubricants, can introduce toxins into the aquatic environment. These spills can contaminate the water and potentially lead to the death of aquatic organisms.

Considering the project activities and potential biological receptors within the project AOI, the impact on the aquatic ecosystem during the operation of the wharf is assessed as **Low**.

Impact	Impact on Aquatic Ecosystem
--------	-----------------------------

Impact Nature	Direct		Indirect		Induced	
Impact Scale	Project Area of Influence					
Frequency	Limited to Operation Phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider Low					

Mitigation Measures

To mitigate these potential impacts on aquatic ecosystem during the operation phase of wharf, it is crucial to implement the following mitigation measures:

- Establish designated waste collection areas and ensure regular waste removal to prevent waste accumulation near the wharf and the potential risk of accidental discharge into the aquatic ecosystem.
- Install effective spill containment systems, such as booms and barriers, around ships/barges and loading areas to prevent accidental spills from spreading into the water.
- Utilize containment systems, such as drip trays or secondary containment, to capture and prevent the release of hazardous chemicals into the environment.
- Conduct regular monitoring of fish mortality and disturbance of fish and aquatic animals during wharf operation phase.
- Provide education and training to staff and contractors on proper waste handling procedures to minimize the potential for pollution.

6.4.3.8.3 Impact on Katha (Brush Pile) Fishing due to Operation of Wharf

During the study preparation it has been identified that there are 15 Kathas within 1 km up stream and 1 km downstream from the Wharf. Three kathas adjacent to wharf area will be permanently impacted due to the intervention of wharf, and the katha owners need to be relocated prior to the operation of the wharf. A compensation package (Details in Table 6-40) has been proposed to mitigate their loss and to relocate them to other vacant areas.

According to river traffic data (of 24th May 2024 and 28th May 2024) from the study area, the average movement of 18 barges, 9 motorized trawlers, 3 non-motorized fishing boats has found, so far (Table 5-17). However, the owners of Katha fishing (excluding the permanently impacted 3 (three) katha owners) expressed no concerns regarding this current river traffic movement as the location of their kathas are not in the navigation route of river channel. Additionally, they expressed their preference not to have a high number of barge movements during both the construction and operation phases. As discussed with MRSML, only 1 (one) additional barge will be added to the existing traffic load, due to the operation of Wharf for Steel Plant, whose impact is limited.

The nature of the impact Katha Fishing due to operation of wharf is direct. The duration of the impact is assessed to be long-term. The Extent and Location of the impact is Local. The probability of the impact is Definite. So, the impact significance is High regarding the operation of Wharf.

Impact	Impact on Katha Fishing due to Operation of Wharf						
Impact Nature	Direct			Indirect		Induced	
Impact Scale	River Channel (1 km up stream and 1 km downstream from the Wharf)						
Frequency	During the operation Phase						
Extent and Location	Project Site	Local		Regional	National		Trans boundary
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider <i>High</i>						

Mitigation Measures

The following steps should be taken to minimize the impact due to the operation of the wharf.

- A one-time compensation plan, including establishment cost and a one-time income from Katha, is proposed to be provided to the affected katha owners prior to the operation phase.
- Technical support to increase the yield in the other economic activities the PAPs are involved with to balance the loss income of the katha fishing.
- The SEP and GRM for the project will be applicable to the katha owners

Table 6-40: Details about Loss and Compensation for the Impacted Katha Owners

S L #	Name of Katha Owner	Location Code (Katha Point)	Existing Facilities in Kathas			Dependency		Amount of Loss (BDT)	Compensation (BDT)	Compensation type	Compensation frequency
			Establishment Cost (BDT)	One time Income from Katha (BDT)	Net Yearly Income from Katha (BDT)	Yearly Income from Multiple Sources including Katha (BDT)	Dependency on income from katha (%)				
	A	B	C	D	E	F	G	H	I	J	K
1.	Khurshid Miah Sarker (Contact No - +8801605-272642) Fathers name: Kashem Sarker NID No – 4180480164	Katha Fishing 8	1,12,000	37,500	1,50,000	4,50,000	33%	1,49,500	1,49,500	Cash	Once
2.	Alamgir Hossain (Contact No - +8801845-585047) Fathers name: Suruj Mia NID No - 5530459972	Katha Fishing 9	1,00,000	30,000	1,20,000	5,40,000	22%	1,30,000	1,30,000	Cash	Once
3.	Ahsanullah Sarker (Contact No - +8801827-805522) Fathers name: Kashem Sarker NID No - 3730460353	Katha Fishing 9 (b)	1,00,000	50,000	2,00,000	6,64,000	30%	1,50,000	1,50,000	Cash	Once
Total									4,29,500		

Calculation Notes: G = E/Fx100, H= C+D and I= H

6.4.3.9 Impact on Traffic and Transportation

The increase in traffic numbers for this project may add extra traffic pressure that can result in obstruction of traffic on Meghna-Homna Road from N1. Also, for river traffic, accidental contamination from oil spill from cargo vessel that would carry the scrap materials for the proposed plant. The inflow of vehicles and water vessels during operation is likely to generate noise, exhaust emission and dust emissions. However, only one (1) medium-sized scrap-carrying vessel will deliver scrap materials from Chittagong port through the main Meghna River to the proposed MRSML project site. Therefore, the impact significant on Road and river traffic during the operation of the plant will be **Medium-low**.

Impact	Impact on Traffic and Transportation						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Around the project area						
Frequency	Limited to operation phase						
Extent of Affected Stakeholders	Insignificant	Low	Medium	Moderate		High	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated		Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High		Very High	
Potential for Irreplaceability/ Vulnerability	Low		Medium		High		
Probability of Impact	Unlikely	Low	Medium	High		Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider <i>Medium-low</i>						

Mitigation measures

The following steps should be taken to minimize the impact due to increasing road and river traffic.

Road Traffic:

- A Traffic Management Plan (TMP) should be developed by MRSML prior to project operation and strictly adhered to.
- Collaboration will be undertaken with local communities and responsible authorities to improve signage (e.g., pedestrian crossings, speed limits, etc.), visibility and awareness of pedestrian safety.
- The transportation of any kind of waste shall be carried out in the covered condition.
- A speed limit of 20 km/hr within the site would be followed and use of mobile phones while driving would be prohibited.
- Adoption of stakeholder measures for avoidance of traffic incidents like display of educational materials and signboards to ensure elderly and children are aware of the increased traffic risk and safety measures.
- Appoint flagman at the entry point from the highway. Also, engage security guards and flagman in the main point of the road manage the flow of traffic.
- Proper management of traffic (both road and river) shall be taken to control the congestion and shortage of local transport.

- Avoiding peak hours for heavy vehicles movement where possible.
- No overloaded vehicle operation will be ensured. MRSML to ensure the truck weights will be within the limits of local road loads especially the bridge capacity (highway to CuEZ connecting bridge).
- Enforcing speed limits. Speed restrictions on vehicles entering and leaving the site.
- The engines and exhaust systems of all vehicles and equipment used will be maintained as such that exhaust emissions are low and do not breach statutory limits set for the concerned vehicles or equipment type.
- Vehicles and equipment should not be left idle when not in use to minimize exhaust emissions of NO_x, PM₁₀, and SO₂.
- All drivers will be instructed to follow traffic norms strictly.

River Traffic:

- Depending upon the tidal activity the movement of scrap carrying vessels would be operated.
- As a part of River traffic management, it would be ensured that there is proper safety warning signage for river jetty areas, prevent spills or discharges of oil, cargo, sewage, grey water etc.

Residual Impact

With the implementation of the precautionary and mitigation measures mentioned above impacts due to increasing traffic would be very low.

6.4.3.10 Local Conflict of Interest

As employment opportunities will also be increased during the operation period, local people might have an influence of getting jobs in the plant which may raise tension between the outside official with local people. Based on the manpower requirement data for the project, approx. 700 persons/day of workers will engage during the operation. Throughout the whole operation period, approximately 700 people from various designations (engineer, technicians, operator etc.) are expected in total, including the high official (CEO, GM) on plant operation.

Impact	Local Conflict of Interest						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Within the project area						
Frequency	Limited to the operation phase						
Extent of Affected Stakeholders	Insignificant	Low		Medium	Moderate		High
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Very Low						

Mitigation Measures

The following steps should be taken to minimize anything related to local conflict of interest.

- Job opportunities should be provided in a fair way.
- Clear information about the needs of labor (number and qualification) should be provided with local people ensure no labor will engage any function and any local argument.
- The job skills and the priorities for the affected people shall be taken into account and the workers can be chosen.
- Give priority to local people while recruiting employees for the project.
- Male and Female labor should receive the same wage to avoid conflict among the workers.

6.4.3.11 Community Property

The adjacent areas have local institutions like Mosque, Growth center etc. Local people might have a chance to be confronted with the local property if not managed fairly. Therefore, the impact significance of community property during operation period is assessed as **Low**.

Impact	Impact on Community Property						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	In and around the project area						
Frequency	Limited to construction phase						
Extent of Affected Stakeholders	Insignificant	Low		Medium	Moderate		High
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Low						

Mitigation Measures

The following steps should be taken to minimize anything related to community property.

- Project will ensure prayer hall for the labor and staffs.
- Ensure the communal harmony is kept well while moving within it and with the local people for sharing the property.
- Arrangement of available tea stall and center for buying necessary things will ease the chance of conflict for sharing community property.
- Make sure people from the project have not created any shortage of local resources as the local people have also shared the same.

- Grocery and other necessary elements should be installed within the project boundary to avoid shortage of local resources.

6.4.3.12 Gender Based Violence (GBV)/ Sexual Exploitation, Abuse and Harassment (SEAH)

Despite cultural practices, no gender-specific issues are observed and expected in the project area. The fact is that the participation of women in society is limited from a social and religious perspective, which has been observed during the field visit and consultation meeting. However, during the operation phase, female labor from technical and non-technical aspects will be engaged within the project location. Thus, the overall impact significance of Gender during the construction phase of the plant will be **Very Low**.

Impact	Impact Related to Gender Based Violence (GBV)/ Sexual Exploitation, Abuse and Harassment (SEAH)						
Impact Nature	Direct			Indirect		Induced	
Impact Scale	In and around the project area						
Frequency	Limited to the operation phase						
Extent of Affected Stakeholders	Insignificant	Low		Medium	Moderate		High
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/ Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceability/ Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Very Low						

Mitigation Measures

The following steps should be taken to minimize anything related to gender.

- Project will ensure no gender-based violence will occur due to the project.
- Women will be heard if any issue raised by them and will be mitigated with high priority.
- Announce employment opportunities and recruitment notices widely, targeted at women as well as men.
- Technical training can be provided to the local workforce, especially women for inclusion in the operation and maintenance phase.
- Women are to be trained and empowered to be part of household energy solutions – their understanding and knowledge about their household energy need to be translated into defining the way forward on access to clean, affordable, and sustainable energy.
- Workers should be informed and alert regarding gender related sensitivity while visiting local villages for any needs.

6.4.3.13 Labor Influx

The construction stage will involve the labor of unskilled, semi-skilled, skilled, and highly skilled type. However, it is envisioned that outsourced personnel will comprise mostly of skilled laborers and workers. During the project operation period around 700 technical and non-technical people will be engaged. The said number of laborers will create an influx of labor within the locality. Therefore, the anticipated impact is calculated as very low in this case. Thus, the overall impact significance of labor influx during the construction phase of the plant will be **Low**.

Impact	Labor Influx						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	In and around the project area						
Frequency	Limited to operation phase						
Extent of Affected Stakeholders	Insignificant	Low	Medium	Moderate	High		
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation		
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High		
Potential for Irreplaceability/Vulnerability	Low		Medium		High		
Probability of Impact	Unlikely	Low	Medium	High	Definite		
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High	
	Significance of impact consider Low						

Mitigation Measure

The following mitigation measures should be taken to minimize the impact created due to labor influx.

- Prevention of massive movement within the locality for workers;
- Proper safety protocol should be taken under the labor management plan by MRSML.
- Alert the migrant workers regarding GBV, local harmony and other socio-cultural aspects to avoid any kind of collision between labor and local people.
- Promoting collaboration with local authorities to enhance access of workers for their basic necessary that can be collected from the locality.
- Promoting use of local goods and other material to make a balance between workers and local people.
- Both project authority and EPC should set a management plan and maintain the coordination to minimize any kind of dispute to labor influx.

6.4.3.14 Enhancement of Local Economy

This project will alter the simple and quiet rural nature of the locality, which exists today. As there will be a flow of financial and material resources, there remains a large possibility of growth of population in the business, trade, commerce, and service sectors. The large inflow of financial and material resources accompanied with the urban culture complete with technological inputs as modern housing, water closets, radio, television, synthetic fibers, use of steel and aluminum, use of LPG/electricity for domestic cooking would all contribute towards changing the socioeconomic environment of the areas

as this would introduce a mixed culture emphasizing urban traits in place of traditional, prevalent rural customs. The economic, cultural, and technological changes are likely to induce social stress and ethical changes. All this would change the local lifestyle.

Thus, a simple backward community may be transformed into a semi-urban complex within a short time frame. Such impacts are inevitable, that could also be felt in case of the proposed project; however, these would be attempted to be controlled and minimized by ensuring suitable human management, stable working conditions, security, and the provision of adequate compensation. Thus, this impact should be considered as Low and Positive for the operation phase of the proposed project.

Impact	Enhancement of Local Economy						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Around the project area						
Frequency	Limited to construction phase						
Extent of Affected Stakeholders	Insignificant	Low		Medium	Moderate		High
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceability/Vulnerability	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high		High	Very High
	Significance of impact consider Low (Positive)						

6.4.3.15 Spread of Infectious Diseases, such as HIV/AIDS

The entire operation phase will require only skilled and highly skilled labor. However, it is envisaged that outsourced personnel will comprise mostly skilled laborers and workers. During operation, in general, about 700 people will be involved in the plant operation. Both technical and non-technical sides will require the said number of people for the smooth operation of the plant. There are some people who might have chances to engage with the community people. Therefore, infectious diseases could spread among the community and plants as well. The overall impact significance due to Infectious Disease such as HIV/AIDS without mitigation measures during the operation phase will be Low.

Impact	Infectious Diseases such as HIV/AIDS				
Impact Nature	Direct	Indirect		Induced	
Impact Scale	Around the project area				
Frequency	Limited to operation phase				
Extent of Affected Stakeholders	Insignificant	Low	Medium	Moderate	High
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation

Impact Intensity/ Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceability/ Vulnerability	Low		Medium	High		
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider Low					

Mitigation Measure

In order to minimize the impact, preventive measures against such diseases, the following measures shall be considered and implemented.

- Inform workers of the risk of disease and the need for adhering to all preventative and control measures.
- Recommend a specific medical assessment of workers for histoplasmosis prior to the start of the project. This may include chest x-rays, serologic (blood) tests, and skin tests. Also consider pulmonary function tests, fitness to wear a respirator, and immunization against tetanus.
- Ensure that hygiene facilities have been installed or are available (for example temporary showers)
- Health screening and regular checkup should be ensured.
- Health awareness campaigns and knowledge dissemination should occur on a regular (OHS will decide the frequency) basis.
- Posting of signs warning of potential health risks
- Emergency procedures/key contact person/phone/fax/cell/e-mail

However, with the proper implementation of suggested mitigation measures, the overall impact will be Very low.

6.4.3.16 Impact on Health and Safety

6.4.3.16.1 Occupational Health and Safety

Occupational health and safety impacts associated with steel plant operations include fire and explosion, contact with hot surfaces, chemical hazards, working in confined spaces, heat, noise, Fire hazards and indoor air quality.

The project embedded control measures are as follows:

- A Permit to Enter system would be established to ensure that only authorized persons gain entry to the site.
- Personal Protective Equipment (PPE) shall be always worn on the site. This should include appropriate safety shoes, safety eyewear and hard hats. non-slip or studded boots would be worn to minimize the risk of slips.

Fire and explosion hazards at EAF, air separation area and casting area of the plant may result from the presence of combustible gases and liquids, oxygen, and ignition sources during loading and unloading activities, and /or leaks and spills of flammable products.

Confined space entry (storage tanks, secondary containment areas, storm water/wastewater management infrastructure etc.) by workers and the potential for accidents may vary among plant facilities depending on design, onsite equipment, and infrastructure.

These risks could create long term impacts to the health and safety of the operation workforce and therefore the impact severity is assessed to be medium. Measures would be implemented to ensure that these risks are considered prior to the commencement of operation, and that all risks are communicated to the workforce. Appropriate PPE would be provided, and equipment maintained and inspected regularly.

In summary, the operation and maintenance of the plant will have risks of industrial accidents and fatalities for workers. Both direct employees and contractors would be exposed to such risks. Thus, the overall impact significance without mitigation measures during the operation phase of the plant will be **Medium-low**.

Impact	Occupational Health and Safety					
Impact Nature	Direct		Indirect		Induced	
Impact Scale	Impact zone will be regional/national					
Frequency	Limited to Operation Phase					
Extent and Location	Project Site	Local	Regional	National	Trans Boundary	
Impact Duration	Short Term	Medium Term	Long-term	Permanent-mitigated	Permanent-no mitigation	
Impact Intensity/Severity	Insignificant	Low	Medium	High	Very High	
Potential for Irreplaceable Loss of Resources	Low		Medium		High	
Probability of Impact	Unlikely	Low	Medium	High	Definite	
Impact Significance	Very Low	Low	Medium-low	Medium-high	High	Very High
	Significance of impact consider			Medium-low		

Mitigation Measures

To minimize the risk of industrial accidents and fatalities to workers during operations, the following mitigation measures are proposed:

- An Occupational Health & Safety Plan would be prepared by MRSML/MGI that would cover aspects of health & safety hazards, their prevention and control procedure and identify training needs and frequency.
- The OHS Manual will be prepared and stringently followed during the operation of the steel plant process.
- The Project would adopt a total safety control system, which aims to prevent probable accidents such as fire accidents or chemical spills.
- Firefighting systems, such as sprinklers, portable extinguishers (appropriate to the flammable hazard in the area) and automated fire extinguishers would be provided at strategic locations with clear labelling of the extinguisher type.
- Plant equipment at hot temperatures that can pose risk to workers would be identified and protected to prevent accidental contact.
- Training on handling, hazard due to contact with hot surfaces especially in the casting section would be provided; PPEs (gloves, insulated clothing would be used)

- Constant monitoring of pressure, density and temperature of gas pipeline; installation of pressure safety valves to prevent any explosion.
- A safety manual for storage and handling of Hazardous chemicals would be prepared and implemented.
- The staff would be trained in first aid and firefighting procedures. The emergency rescue team would support the first aid and firefighting team.
- An onsite medical facility and first-aid centre with the trained personnel to be made available.
- Training and rehearsal of the emergency response procedures by the emergency team members and personnel on site would be completed periodically.
- A safe assembly area would be identified, and evacuation of the premises would be practiced regularly through mock drills.
- Safe work practices would be developed to provide for the control of hazards during operation and maintenance.
- A near miss and accident reporting system would be followed and corrective measures shall be taken to avoid / minimize near miss incidents.
- Accident/Incident register to be maintained.
- Safety measures in the form of Dos and Don'ts would be displayed at strategic locations.
- Safety audits would be conducted periodically as per the regulatory requirements.
- Firefighting system would be tested periodically; and
- All hydrants monitor and valves would be visually inspected every month.
- Fire safety certificate from the Fire Service and Civil Defense must be obtained prior to operation.
- Indoor air quality is required to be monitored periodically.
- Monitoring of occupational hazards in the working environment designed and implemented by accredited professionals as part of an Occupational health and safety monitoring program.

With the implementation of mitigation, the measured impact will be Low.

6.4.3.16.2 Community Health, Safety and Security

During the operation phase of the project the main sources of impacts on community health and safety are:

- Noise from the plant
- Vehicular movement
- Gaseous emissions from the project

Community health and safety may be impacted during operation phase due to noise generation and gaseous emissions. There might have a chance of being affected by gaseous pollution which could impact on human health. Mostly breathing difficulties, particularly for people with asthma and heart disease, headache, vomiting could be seen during operation phase. The flue gas treatment system will be implemented to mitigate the impacts due to gaseous emissions. Deterioration of surface water quality due to discharge of wastewater would also impact local community. Proper consultation and information should be disseminated among the community people.

During site visit and consultation with MRSML it was identified that, MRSML already established a security management plan (Appendix F-4:). As a part of this security management plan, MRSML deployed security forces and established fences to ensure the security of the entire project site.

The planned green belt within the plant also significantly reduces the impact of noise and air pollution on the surrounding environment

The nature of the impact on community health, safety and security is direct. The duration of the impact is assessed to be medium-term. The Extent and Location of the impact is Local. The probability of the impact is medium. Hence impact on community health safety due to plant operation would be Low.

Impact	Community Health Safety and Security						
Impact Nature	Direct		Indirect			Induced	
Impact Scale	Adjacent Communities and project workers						
Frequency	Limited to Operation Phase						
Extent and Location	Project Site	Local		Regional	National		Trans Boundary
Impact Duration	Short Term	Medium Term		Long-term	Permanent-mitigated		Permanent-no mitigation
Impact Intensity/Severity	Insignificant	Low		Medium	High		Very High
Potential for Irreplaceable Loss of Resources	Low			Medium		High	
Probability of Impact	Unlikely	Low		Medium	High		Definite
Impact Significance	Very Low	Low	Medium-low	Medium-high	High		Very High
	Significance of impact consider Low						

Mitigation Measures

- The machinery and vehicles should be equipped with mufflers, silencers, foam, rubber, and other soundproofing materials necessary to reduce operation noise; the diesel generators should be covered with a canopy.
- Only well-maintained equipment will be operated on-site.
- Regular maintenance of equipment, such as lubricating moving parts, tightening loose parts, and replacing worn-out components, should be conducted.
- Machinery and construction plants that may be in intermittent use (e.g., trucks) shall be shut down or throttled down during non-work periods.
- Provisions under the Security Management Plan should be followed.
- Low-noise equipment shall be used as far as practicable.
- The amount of equipment operating simultaneously shall be reduced as far as practicable.
- Developing a Disaster Management Plan (DMP) to charter proper protocol to be followed in the event of a disaster in order to limit the impact on the local community.
- Disclose potential disasters and potential risks from the plant to the local community as well as the plan of action on the emergency protocol in the event of these accidents.
- Disclose and generate awareness on the DMP as well the measures and protocols prescribed by the same.
- Train employees and plant personnel in health and safety as well as handling and managing disasters and emergency events.
- Proper combustion along with appropriate air pollution control devices can reduce emissions of these substances to acceptable levels.
- Appropriate and suitable technological solutions can reduce the impact of gaseous pollution.
- Maintain harmonious relations with the community and create a feedback system.
- Maintain sound labor and management relations to avoid conflict and disruption in operation.
- Firefighting systems, such as sprinklers, portable extinguishers (appropriate to the flammable hazard in the area), and automated fire extinguishers will be provided at strategic locations with

clear labeling of the extinguisher type. The main hydrant will also be available around the buildings. An automated fire detection system will be in place on all floors. Implementing proper mitigation measures the impact will be low.

6.4.3.17 Energy Conservation and Efficiency

As per MGI, the electricity required for scrap to billet conversion will be 325 kWh per ton whereas electricity required for billet to MS rod conversion will be 60 kWh per ton and Electricity for other common equipment will be 110 kWh per ton. Total electricity consumption 495 kWh/ton electricity which is equivalent to 1782 MJ/ton.

Natural gas will be the primary fuel used directly in the production process of steel during continuous casting. As per the Feasibility Study, September 2023, about 7,000 nm³/h of gas is required for production purposes which will be sent to the factory from the natural gas station. Natural Gas required for billet to MS rod conversion is 35 m³/ ton equivalent to 1330 MJ/ton.

6.4.3.17.1 Comparison with Best Practice

The energy consumption per ton of steel production at MRSML is 3.1 GJ, which is slightly higher than the international best practice value of 2.6 GJ⁴⁴.

6.5 Cumulative Impact Assessment

Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones.⁴⁵ For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities. Affected communities are defined as local communities directly affected by the project.

As part of the requirements for financing the Meghna Re-Rolling and Steel Plant located at the Cumilla Economic Zone (CuEZ), several gaps in the Environmental Impact Assessment (EIA) report and associated Project documentation prepared to get an Environmental Clearance Certificate (ECC) from the national regulatory authority have been identified that require supplementing and/or enhancing to bring them up to Lender standards, including the need to provide a Cumulative Impact Assessment (CIA). Meghna Re-Rolling and Steel Mills Ltd. (MRSML) selected EQMS Consulting Limited, Bangladesh to undertake the Environmental and Social Impact Assessment (ESIA) including CIA following the IFC Performance Standards.

The primary purpose of this CIA was to identify the potential cumulative impacts associated with the Meghna Re-Rolling and Steel Plant, other proposed projects in the Cumilla Economic Zone (CuEZ), and other applicable third-party projects.

The methodology in this CIA has been based on the principles of the IFC guidance, which is laid out in the IFC 'Good Practice handbook for CIA and Management' (IFC, 2013). This provides a practical and preliminary six-step approach for developers in emerging markets to conduct a CIA that meets such requirements. It is not always possible to follow this methodology word-for-word and the IFC guidance document is exactly that - a useful guide. Where there are deviations from the guidance - because of the specifications of the Project and other activities - or lack of information about third-party other projects/ initiatives, then the reasons are stated.

⁴⁴ Industrial Energy Efficiency Benchmarking Report for Iron and Steel Sector, Australian Energy Agency

⁴⁵ IFC. (2013). Good Practice Handbook - Cumulative Impact Assessment and Management: Guidance for Private Sector in Emerging Markets. International Finance Corporation.

Valued Environmental and Social Components (VECs) included within this assessment and listed in the IFC guidance are features identified within the following categories:

- Ecosystem services.
- Physical environment (i.e., non-living environmental components, including air quality, noise level, surface water, groundwater, landscapes, soils, etc.).
- Aquatic environment and ecology (i.e., aquatic habitat, flora, and fauna).
- Terrestrial environment and ecology (i.e., terrestrial habitat, flora, and fauna).
- Social conditions (i.e., residents of local communities, local economy, health, human rights).

The findings of the CIA indicate that impacts are unlikely to cause any significant environmental consequences. While some of the impacts are negative, most of them can be mitigated with minor to negligible residual impacts. Topics, where impacts of minor significance occur, include:

- Ambient Air Quality
- Ambient Noise Level
- Ground and Surface Water
- Aquatic Ecology
- Socioeconomic
- Community Health, Safety, and Security

The CIA approaches to managing cumulative impacts revolves around the development of mitigation measures (either changes in design or construction/operational methods, or external measures (e.g., local outside the site boundary, regionally) such as compensation). Measures have been provided where applicable to further reduce any potential impacts of the MRSML Project and wider CuEZ.

This report is a first-stage assessment of cumulative impacts (and signposts of potential cumulative risk areas) that the MRSML, Department of Environment (DOE), and Bangladesh Economic Zone Authority (BEZA) can continue to build upon as plans for additional development are progressed.

MRSML will monitor its respective contribution to cumulative impacts as part of its environmental and social management systems and plans.

It is acknowledged that MRSML will not be able to individually manage all the effects of cumulative impacts, to which Project and other CuEZ activities have the potential to contribute. MRSML is committed to participating in regular and ongoing cooperation within the wider master plan and any other relevant stakeholders (e.g., Government bodies) to ensure that management efforts at the strategic level are effective.

MRSML is therefore encouraged to participate in regular and ongoing cooperation with DOE, BEZA, and other relevant stakeholders, new developers (as appropriate), and government institutions to ensure that management efforts at the strategic level are effective. This requires leadership from MRSML, DOE, and BEZA on the issue of CIA, including future directions of study, monitoring, and collation of information from the different areas, projects, and initiatives in the CuEZ area.

A detailed standalone Cumulative Impact Assessment has been prepared in compliance with IFC Good Practice Handbook for CIA and Management, 2013.

CHAPTER 7

Environmental and Social Management Plan

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 Introduction

The main purpose of the Environmental and Social Management Plan (ESMP) is to identify project-specific actions that will be undertaken by the project authority for mitigation of the specific impacts identified in the proposed project. These actions will be incorporated into the project management system and integrated into the implementation at various stages of project development. The ESMP describes both generic good practice measures and site-specific measures, the implementation of which is aimed at mitigating the potential impact associated with the project activity.

7.2 Objectives of the Environmental and Social Management Plan

The main objective of the ESMP is to warrant that the development in an identified particular study area needs to be entangled with judicious utilization of non-renewable resources and to ensure that the stress/load on the ecosystem is within its permissible assimilative capacity i.e., its' carrying capacity. In the above context assimilative capacity refers to the maximum amount of pollution load that can be discharged into the environment without affecting the designated use of various environmental attributes and is governed by dilution, dispersion, and removal due to physicochemical and biological processes. An effective ESMP ensures that these environmental requirements and objectives are satisfied during all phases of the project. The long-term objectives of the ESMP for all the environmental attributes are as under:

- To comply with the requirements of applicable framework.
- To comply with all the regulations/applicable laws stipulated by the DoE.
- To create good working conditions for employees.
- To encourage and achieve the highest performance and response from individual employees and contractors.
- To plan out the complete strategy to take care of stakeholder engagement.
- Budgeting and allocation of funds for environmental and social management.
- Continuous development and search for innovative technologies for a cleaner and better future environment.
- To contribute significantly to sustainable development.

7.3 Environmental Mitigation Measures

7.3.1 During Construction Phase

The possible environmental impacts during the construction phase have been already identified and assessed in Chapter-6 in this ESIA report. For mitigating the possible environmental impacts, mitigation measures for the construction phase are proposed in Table 7-1.

Table 7-1: Mitigation measures during construction phase

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
Air Quality	<ul style="list-style-type: none"> Dust generation 	<ul style="list-style-type: none"> Regular sprinkling of water on open surface and dust grounds until paving is done. Strict compliance with the Occupational Safety and Health Administration (OSHA) requirements and Bangladesh Codes to ensure that for activities associated with high dust levels, workers are equipped with proper Personal Protective Equipment (PPE) like masks, eye goggles, helmets, safety harness, safety shoes and breathing equipment. Transportation of aggregates or other fine materials to be done in tarpaulin-covered trucks. Minimum storage period for sand and other dispersible construction materials. In case of excessive dust or pollutant emissions, it is preferred that construction activities are stopped until the source of such emissions has been identified and adequate control measures should be implemented. Development of a regular inspection and scheduled maintenance program for vehicles, machinery, and equipment during the construction phase, for early detection of issues and avoidance of unnecessary pollutant emissions. Complaints of dust-related ailments among employees to be given access to medical attention. After taking the proper mitigation measures the impact will be minimized to low from medium low. 	Appointed contractor	Project management team and designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	<ul style="list-style-type: none"> Exhaust emissions 	<ul style="list-style-type: none"> All equipment and machinery used at the construction worksites should be maintained and operated in a manner such that they will not give rise to smoke emissions and will comply with the regulation. Avoid the use of diesel- or petrol-powered equipment by using electricity or battery-powered equipment where possible and if safety concerns can be overcome. Regularly maintain all diesel-powered equipment and reduce idling time to avoid emissions of NO_x, PM₁₀, and SO₂. Vehicle/equipment exhausts observed to be emitting significant black smoke from their exhausts will be serviced/replaced. No waste will be burnt on or around the project site. 	Appointed contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
Noise Level	<ul style="list-style-type: none"> Increased in ambient noise 	<ul style="list-style-type: none"> If noise levels are found to be excessive, construction activities should be stopped until adequate control measures are implemented. Application of adequate general noise suppression measures. This could include the use of well-maintained mufflers and noise suppressants for high noise generating equipment and machinery. Development of a regular maintenance schedule of all vehicles, machinery, and equipment for early detection of issues, and to avoid unnecessary elevated noise level. Only well-maintained equipment should be operated on-site. Regular maintenance of equipment including lubricating moving parts, tightening loose parts, and replacing worn-out components shall be conducted. The amount of equipment operating simultaneously shall be reduced as far as practicable. Acoustic covers for all equipment and machinery that generate excessive noise. Ensure that all equipment and machinery and its mufflers are regularly serviced and immediately serviced or replaced, if damaged. Compliance with the Occupational Safety and Health Administration (OSHA) requirements and the Bangladesh Codes to ensure that for activities associated with high noise levels, workers are equipped with proper PPE (e.g., Earmuffs). 	Appointed contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
Water Resources	<ul style="list-style-type: none"> Surface water and groundwater contamination 	<ul style="list-style-type: none"> Machinery and equipment would be drained only after separation of solids through proper measures. Silt fences and storm drain inlets having appropriate filters can be used to minimize the run-off from construction sites. The spoiled earth should be stockpiled at a safe distance from the drain. Waste management measures should include provisions to contain and dispose of construction wastes, prohibit waste discharge on the ground or any surface watercourse, and practice recycling as far as practicable. Vehicle servicing areas and wash bays are located within roofed and cemented areas. The drainage in these covered areas connected to oil/water separator and channelized properly to the land/inland waters. Oil leakage or spillage was contained and cleaned up immediately. Waste oil is to be collected and stored for recycling or disposal. Oil and grease separator shall be used for wastewater generated from cleaning activities. Locate temporary stockpiles of spoils as far as possible from drainage swales, groundwater resources, and surface water resources (at least 100 m away) and preferably down the topographic gradient of watercourses. The chemical and fuel storage should be over impervious flooring under proper sheds. Primary, secondary and tertiary mode of containments to be provided. Spill kits to be made available. Cover temporary stockpiles with tarpaulin when not in use. 	Appointed contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> • Control water suppression during excavation and earth handling to minimize excess water and sediment disposal into surface water. • Discharge wastewater from excavation to the surface water bodies will be strictly prohibited due to ecological sensitivities. The discharge will either be temporary storage tanks for removal or to a temporary treatment system prior to discharge to a discharge point. • Disposal of construction wastes into the river, ponds, or haors will be strictly prohibited. • Minimize soil exposure time during construction activities. • Inspect and schedule preventive maintenance to all vehicles used to transport excavated and construction material. • Adequate sanitary facilities, i.e., toilets provided for the construction workforce. • Workers trained in the use of designated areas/bins for waste disposal and encouraged to use toilets. • Sanitary wastewater shall be treated in septic tanks and soak pits; and all sewage and liquid effluent treated to meet the standards specified in the ECR, 2023. • Vehicles used to transport spoil to have tarpaulin securely covering load. • Vehicles should pass through a bunded wheel wash station upon exiting the construction work areas in order to control and manage wastewater and sediment. • Vehicle maintenance and mechanical repairs are to occur in dedicated, designed locations, bounded to capture and control 		

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<p>oil, grease, and other spills to prevent flow into surface water resources.</p> <ul style="list-style-type: none"> Wherever reasonable and practicable, re-vegetate exposed ground as soon as possible to stabilize surfaces. 		
Water Quality	<ul style="list-style-type: none"> Impact due to Construction Activities 	<ul style="list-style-type: none"> Ensure proper storage, transportation and handling of hazardous waste in the project site by the experienced person. Designate one location to store fuel, machinery and other materials. Develop and implementation of accidental spill prevention plan to prevent and contain accidental spills. Direct disposal of waste into the water body is strictly prohibited. Provide sufficient number of latrine and bin, and aware the workers to use the bins and keep clean the latrine for better health management. The contractor will be responsible for ensuring that any wastewater discharged meets the standards stipulated in Schedule-4 of ECR, 2023. 	Appointed contractor	Project management team and designated HSE team
Soil Quality	<ul style="list-style-type: none"> Soil contamination Soil erosion 	<ul style="list-style-type: none"> The excavated topsoil should be kept in an earmarked area with tarpaulin cover, and the recreation of the topsoil should be done utilizing the prior removed preserved soil. Topsoil would be used for greenbelt strengthening within the plant and its periphery. To avoid soil erosion, it is optimal to carry out construction work during dry season. A proper spill-response plan should be developed by the authority to minimize the negative impacts on soil in case of an unlikely event of fuel spillage. 	Appointed contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> • Implement a regular maintenance program for all equipment and machinery to prevent fuel spillage or leakage during construction activities. • Manage spills of soil contaminants using standard engineering practices. • Storage areas for oil, fuel, and chemicals to be surrounded by bunds or other containment devices to prevent any spilled oil, fuel, or chemicals from contaminating soils, sediment, water, or groundwater. • Use of spill or drip trays to contain spills and leaks, and use of spill control kits to clean small spills and leaks. • Installation of oil/water separators to treat surface runoff from bunded areas prior to discharge to the stormwater system. • Waste management measures should include provisions to contain and dispose of construction wastes, prohibit waste discharge on the ground, and practice recycling as far as practicable. • Dispose debris and waste in a designated area and as per plan to prevent degradation of soil. • Provide dedicated storage areas for construction materials to minimize the potential for damage or contamination of the materials. • Locate temporary stockpiles of spoils as far as possible from excavations. • Provide enough space to allow for inspection between waste containers to identify any leaks or spills. • Ensure storage areas have impermeable floor and containment. • Dispose of hazardous waste by licensed authorities. 		

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> Fuel tanks and chemical storage areas to be sited on sealed areas and provided with locks to prevent unauthorized entry. Preparation of guidelines and procedures for immediate clean-up actions following any spillages of oil, fuel, or chemicals. Development of a site-specific emergency response plan for soil clean-up and decontamination. Implementation of a training program to familiarize staff and workers with emergency procedures and practices related to contamination events. Training labor for waste disposal in designated areas and use of sanitation facilities. Implement a construction materials inventory management system to minimize over-supply of the construction materials, which may lead to disposal of the surplus materials at the end of the construction period. Proper housekeeping and cleanliness be maintained in the labour camp area. 		
Sediment Quality	<ul style="list-style-type: none"> Impact due to construction of plant and wharf 	<ul style="list-style-type: none"> Ensure powerful suction pumps on the excavators are able to suck up suspended sediment out of the water column; Good practice to minimize sediment suspension and dispersal at the excavation sites; Sediment quality must be ensured by the contractor before starting the any excavation activities in the selected pit locations; Designate one location to store fuel, machinery and other materials; 	Appointed contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> Accidental oil and chemical spillage management plan should be ensured; Provide sufficient number of latrine and bin and aware the workers to use the bins and keep clean the latrine for better health management; Any excavation activities should conduct by trained personnel; Monitoring of sediment quality to minimize the damage to aquatic ecosystems. 		
Terrestrial Flora due to construction of steel plant	<ul style="list-style-type: none"> Hampering plant growth and causing diseases 	<ul style="list-style-type: none"> Controlling the release of airborne dust by applying water in the construction zone. Using tarpaulin sheets to cover materials that produce dust during transportation to the site. Providing workers with fuel for cooking and educating them to avoid using wood as fuel, thereby reducing the impact on vegetation in the vicinity of the project site. 	<p>Contractor</p> <p>Study by 3rd party agency/experts</p>	Project management team and designated HSE team
Terrestrial Fauna due to construction of steel plant	<ul style="list-style-type: none"> Impact on health and behavior of terrestrial fauna through dust, noise, and vibration Impacts on movement and reproduction and migration patterns of 	<ul style="list-style-type: none"> Implementing noise-reduction measures during construction, such as scheduling noisy activities during non-sensitive times. Implement strict waste management protocols, proper disposal of hazardous waste, and regular monitoring to prevent soil contamination. Controlling dust by wetting construction areas and using dust control measures. Monitoring air quality and ensuring compliance with environmental regulations to limit pollutant emissions. Utilizing low-intensity lighting to reduce brightness and minimize glare. Limiting vehicle speed (20 km/hr) to avoid roadkill. 	<p>Contractor</p> <p>Study by 3rd party agency/experts</p>	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	wildlife species	<ul style="list-style-type: none"> Educating and raising awareness among workers to promote wildlife and natural resource conservation. Implementing rescue and relocation efforts for threatened or endangered species if any are found during construction work. 		
Aquatic Ecosystem due to construction of steel plant	<ul style="list-style-type: none"> Increased contamination of adjacent waterbodies by wastewater runoff etc. Impact on movement, growth, and reproduction of aquatic flora and fauna 	<ul style="list-style-type: none"> Keep all dangerous chemicals, oils, greases, solvents, and residues in a secure Place. Provision of barriers/control walls at construction material storage areas to avoid contamination by surface runoff. Hazardous wastes and chemicals to be stored on paved surfaces with secondary containment to prevent potential contamination through surface runoff. A plan for accidental hazardous chemical spillage should be prepared and implemented. Workers should be aware of the importance of natural resources and should not dispose of or discharge into the waterbodies. 	<p>Contractor</p> <p>Study by 3rd party agency/experts</p>	Project management team and designated HSE team
Terrestrial Flora Due to Wharf Construction	<ul style="list-style-type: none"> Hampering plant growth and causing diseases 	<ul style="list-style-type: none"> Controlling the release of airborne dust by applying water in the construction zone. Using tarpaulin sheets to cover materials that produce dust during transportation to the site. Providing workers with fuel for cooking and educating them to avoid using wood as fuel, thereby reducing the impact on vegetation in the vicinity of the project site 	<p>Contractor</p> <p>Study by 3rd party agency/experts</p>	Project management team and designated HSE team
Terrestrial Fauna Due to Wharf Construction	<ul style="list-style-type: none"> Impacts on movements of residential 	<ul style="list-style-type: none"> Water spraying should be done to remove excessive dust. Construction activities which generate noise and dust should be done during daytime and in a phased manner. 	Contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	and migratory birds. <ul style="list-style-type: none"> Impacts on the movement, behavior and reproduction of Herpetofauna Species 	<ul style="list-style-type: none"> Establishing buffer zones around sensitive habitats and employing noise-reducing techniques can help minimize the impact of noise and vibrations on terrestrial fauna. Restrict the speed limit of Vehicles (20 km/hr) to protect wildlife from any accidental issue or road kills 	Study by 3rd party agency/experts	
Aquatic Ecosystem Due to Wharf Construction	<ul style="list-style-type: none"> Impacts on mortality of aquatic organism like fish due to increased turbidity 	<ul style="list-style-type: none"> Implement proper sediment and erosion control measures, such as silt curtains, sediment basins, or sediment traps, to minimize sedimentation in the water bodies. Silt screens should be used during any excavation operations. Implement proper timing restrictions and avoiding sensitive areas during any excavation. Implement proper noise and vibration control measures during piling activities to minimize disturbance to aquatic organisms. Conduct regular inspections of machinery to prevent leaks or spills. Implement sedimentation tanks, settle ponds, or filtration systems to remove suspended solids and contaminants. Develop and enforce spill prevention and response plans to address accidental spills of fuels, lubricants, or other harmful substances from machinery or cargo transportation 	Contractor Study by 3rd party agency/experts	Project management team and designated HSE team
Impact on Katha (Brush Pile) Fishing due to	<ul style="list-style-type: none"> Construction of Wharf will impact three 	<ul style="list-style-type: none"> The katha owners should get access to their fishing areas (Kathas) during the construction phase. 	Plant EHS Team and operations	Designated Team comprising of

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
Construction of Wharf	kathas adjacent to the wharf situated outside the project boundary if they are unable to get the access to their kathas.	<ul style="list-style-type: none"> The SEP and GRM for the project will be applicable to the impacted katha owners. 		representation from EHS and Operations of MRMSL
Transportation	<ul style="list-style-type: none"> Disturbance to existing road users through an increase in road traffic 	<ul style="list-style-type: none"> A Proper Traffic Management Plan (TMP) should be developed by the contractor prior to construction and follow it strictly. In this TMP, the road safety measures such as speed breakers, warning signs/lights, road safety signs, flagman, etc. should be included to ensure uninterrupted traffic. Movement especially at nearby the educational institute (Schools, College, Madrasah, etc.), community infrastructure (mosques, graveyards, playground, etc.), Bazar and health complex should be careful and control the speed and avoid unnecessary horns. In addition, BRTA traffic rules and regulations should be strictly followed. Avoid disturbance and careful during construction vehicle and equipment movement in the project site and approach road. Use of low Sulphur content fuel for vehicles operation; Limit the speed of construction vehicles in the construction site and project approach road, it shall be 20 km/hour; 	Appointed contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> • Use of mobile phone during driving is strictly prohibited in the construction site and approach road; • Maintain vehicles and construction equipment in good working condition including regular servicing; • Instruct the drivers to drive carefully in the project site; • Instruct the drivers to avoid unnecessary horns and engine operation in the construction site and approach road; • Adequate lighting facilities in the construction site; and • Proper indication of accident-prone areas, education, and religious institutes in the project site. 		
Waste Generation and Disposal	<ul style="list-style-type: none"> • Water pollution • Soil Pollution 	<ul style="list-style-type: none"> • A Construction Waste Management Plan should be developed and implemented. • The solid waste should be collected in color-coded bins and disposed of in a particular segregated area as trash. • A proper waste-management plan should be developed by the authorities. • Domestic wastewater generated during construction should be collected in septic tank and soak well. • Chemicals and fuels should be stored in secondary containment. 	Appointed contractor	Project management team and designated HSE team
Wastewater Generation and Discharge	<ul style="list-style-type: none"> • Water pollution • Soil Pollution 	<ul style="list-style-type: none"> • Domestic sewage would be appropriately managed and disposed of. • Establishment of the wastewater management plan at the project construction site; 	Appointed contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> In the Meghna River and its branches, sewage water, chemical waste, etc. which are harmful to aquatic animals cannot be discharged; Any kind of threatening activities for the biodiversity cannot be expedited/operated in the construction site and surroundings; Disposal of wastewater in an open environment is strictly prohibited; Instruct the workers to avoid improper disposal; Sufficient numbers of the bin will be ensured by the contractor; Periodic monitoring will be carried out by the contractor to record generation and discharge of wastewater; and Soil and sediment quality will be monitored by the contractor. 		
Occupational Health and Safety	<ul style="list-style-type: none"> Risks of accidents and fatalities to workers 	<ul style="list-style-type: none"> The Contractor will prepare and implement a Health and Safety Plan prior to commencing work. This plan will include method statements for working methods, construction sequence, and safety arrangements. Competent and adequate resources of subcontractors will be used where construction activities are to be subcontracted. All persons working on site will be provided information about risks on Site and arrangements will be made for workers to discuss health and safety with the Contractor. All workers will be properly informed, consulted, and trained on health and safety issues.; Personal Protective Equipment (PPE) shall be worn at all times on the Site. This shall include appropriate safety shoes, safety eyewear, and hard hats. Non-slip or studded boots will be worn to minimize the risk of slips. 	Appointed contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> • Before starting work all the appropriate safety equipment and the first-aid kit will be assembled and checked as being in working order. The breathing apparatus will be tested at regular intervals in the manner specified by the makers. • All lifting equipment and cranes will be tested and inspected regularly. • Where sound levels cannot be reduced at the source, suitable hearing protection will be provided when noise levels indicate a Leq of more than 90 dB(A). • The Contractor shall provide appropriate safety barriers with hazard warning signs attached around all exposed openings and excavations when the work is in progress. • Workers have to be provided with PPE (high visible vest, hard hat, gum boot, life jacket, goggles, ear plugs etc.) and it has to be ensured that they use PPE properly. • First Aid Box should be readily available at construction sites and labor camps. • Provision of potable water, sanitary toilet facilities and hygienic accommodation for workers at camp sites. All potable water supplies will be tested quarterly. • HSE Policy should be maintained strictly. • Training should be provided about HSE to the labors in a regular interval. • No use of child labor permitted that no workers under the age of 14 may be hired as general labors. 		
Community Health and Safety	<ul style="list-style-type: none"> • Health Impacts due to Changes in 	<ul style="list-style-type: none"> • Project boundary/fencing will ensure to prevent the ingress of persons into the construction site and also to protect the public 	Appointed contractor	Project management team and designated HSE team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	<p>environmental conditions</p> <ul style="list-style-type: none"> Increased prevalence of disease 	<p>from exposure to hazards associated with construction activities.</p> <ul style="list-style-type: none"> Inform the local community before starting the construction activities; Implementation of a vector control program in labor camps and surrounding areas; and Emphasizing safety aspects among drivers, particularly with regard to the speed limit of 20 km/hr that will be enforced. Provisions under the Security Management Plan should be followed. Ensuring that only licensed drivers are employed by the Project. Avoiding peak hours for heavy vehicle movement where possible. Collaboration with local communities and responsible authorities to improve signage (e.g., pedestrian crossings, speed limits, etc.), visibility, and awareness of traffic and pedestrian safety. Screening, surveillance, and treatment of workers, through the provision of medical facilities and, where required, immunization programs. Instruct the workers about the health and safety issues in the construction site before starting the construction activities and ensure a secure working environment; Adequate facilities for the health of construction workers will be provided at the construction camp; Proper traffic monitoring should be done by the contractor and keep the record of accidents; 		

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> Limit the speed of construction vehicles in the construction site and project approach road, it shall be 20 km/hour; Instruct the drivers to drive carefully in the project site and approach road; Use of mobile phone while driving is strictly prohibited in the construction site; Proper indication of accident-prone areas, education, and religious institutes in the project site. Proper Traffic Management Plan (TMP) should be prepared by the contractor during the starting of construction & follow it strictly; In this TMP, road safety measures such as speed breakers, warning signs/lights, road safety signs, flagmen, etc. should be included to ensure uninterrupted traffic. 		
Traffic	<ul style="list-style-type: none"> An increase in traffic volume on the only local road may cause traffic congestion and accidents. 	<ul style="list-style-type: none"> All vehicles would undergo routine repair and maintenance to keep the vehicle in good operating condition. Drivers and operators would be checked for fitness and any driver/operator impaired due to any reason, including but not confined to the influence of drugs and/or alcohol would not be allowed to drive. A speed limit of 20 km/hr. within the site would be followed and the use of mobile phones while driving would be prohibited. Implementation of a safety program (signage, speed restrictions, lights on trucks, truckload restrictions, etc.) within the construction area All drivers shall follow the speed limit, the direction of the signalman, sensitive locations, horn usage restrictions, etc. 	Appointed contractor	Plant Manager, and EHS/OHS Team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> Appoint traffic personnel at the project entrance. 		
Local conflict of interest	<ul style="list-style-type: none"> Construction workers and staff may have conflicts with the community. 	<ul style="list-style-type: none"> Job opportunities should be provided in a fair way. Clear information about the needs of labor (number and qualification) should be provided to local people. Ensure no labor will engage any function and any local argument. Give priority to local people while recruiting employees for the project. Male and Female labor should receive the same wage to avoid conflict among the workers. 	Appointed Contractor	Plant Manager, and EHS/OHS Team
Labor Influx	<ul style="list-style-type: none"> Construction of the project will require nearly 350 skilled, semi-skilled and unskilled labor which will create an influx within the community adjacent to this project. 	<ul style="list-style-type: none"> Prevention of massive movement within the locality for workers; Proper safety protocol should be taken under the labor management plan by EPC; Alert the migrant workers regarding GBV, local harmony and other socio-cultural aspects to avoid any kind of collision between labor and local people; Promoting collaboration with local authorities to enhance access of workers for their basic necessary that can be collected from the locality; Promoting use of local goods and other material to make a balance between workers and local people; Both project authority and EPC should set a management plan and maintain the coordination to minimize any kind of dispute to labor influx. 	Appointed Contractor	Plant Manager, and EHS/OHS Team
Community Property	<ul style="list-style-type: none"> As the project will hinder to access the local people 	<ul style="list-style-type: none"> Project will ensure prayer hall for the labor and staff to avoid gathering on the local one. 	Appointed Contractor	Plant Manager, and

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	in the sea beach during construction period, the issue should be delt properly to mitigate any adverse impacts arise from the local people.	<ul style="list-style-type: none"> • Ensure the communal harmony is kept well while moving within it and with the local people for sharing the property. • Arrangement of available tea stall and center for buying necessary things will ease the chance of conflict for sharing community property. 		EHS/OHS Team
Infectious Disease	<ul style="list-style-type: none"> • As the labor influx will occur during the construction there might be a chance of the spread of infectious diseases. During Construction, in general, a lot of migrant workers flow into the sites, who may have the possibility 	<ul style="list-style-type: none"> • Prevention of illness among workers by undertaking health awareness and education initiatives and by conducting immunization programs for workers; • To provide treatment through standard case management in on-site and community health care facilities as necessary; • Educating project personnel and area residents on risks, prevention, and available treatment; • Promoting collaboration with local authorities to enhance access of worker's families and the community to public health services and promote immunization as necessary; • Promoting use of repellents, clothing, netting, and other barriers to prevent insect bites; • Prevention of larval and adult propagation through sanitary improvements and elimination of breeding habitats close to human settlements; • Elimination of unusable impounded water; 	Appointed Contractor	Plant Manager, and EHS/OHS Team

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	with HIV/AIDS.	<ul style="list-style-type: none"> The Contractor will prepare and implement a Safety Plan related to infectious diseases prior to commencing work. This plan will include method statements for working methods, construction sequence, and safety arrangements. Prepare and disseminate Infectious Diseases related information (flyer/brochure) among the workers for awareness purpose. 		
Gender	<ul style="list-style-type: none"> Community women adjacent to the proposed project site, promote their participation in project planning and activities (if applicable) and ensure safer and healthier living conditions for them. 	<ul style="list-style-type: none"> Project will ensure no gender-based violence will occur due to the project. Women will be heard if any issue raised by them and will be mitigated with high priority. Announce employment opportunities and recruitment notices widely, targeted at women as well as men. Technical training can be provided to the local workforce, especially women for inclusion in the operation and maintenance phase. Ensure basic facilities (separate toilets, clean water, drinking water facilities, resting place) are provided for female as well as male workers at the construction site. Women are to be trained and empowered to be part of household energy solutions – their understanding and knowledge about their household energy need to be translated into defining the way forward on access to clean, affordable, and sustainable energy. 	Appointed Contractor	Plant Manager, and EHS/OHS Team

7.3.2 During Operation Phase

The possible environmental and social impacts during the operation phase have been already identified and assessed in Chapter-6 in this ESIA report. For mitigating the possible environmental impacts, mitigation measures for the operational phase are proposed in Table 7-2.

Table 7-2: Mitigation measures during operation phase

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
Air Quality	<ul style="list-style-type: none"> Dust generation and Exhaust emissions 	<ul style="list-style-type: none"> Adoption of a dust suppression system. Bag filters to be used as particulate control equipment. Sufficient exhaust fans should be provided near the melting hearth to take the heat outside. A simple, linear layout for material handling operations should be designed to reduce the need for multiple transfer points. Modern roads in the plant area should be paved to reduce dust emissions. Emissions from melting phase can be controlled by negative pressure generated from suction hoods. Particulates from finishing operations can be controlled by cyclone separators. Hopper based exhaust system is to be installed for efficient expulsion of heat and fumes. Dust extraction and dust handling systems shall be installed to reduce fugitive dust emissions. The loading and unloading equipment and products shall be used with a minimized height of drop to the stockpile to reduce the generation of fugitive dust. Laying of concrete/blacktopped roads for vehicle movement. Regular sweeping of roads. Vehicles and equipment should not be left idle when not in use to minimize exhaust emissions of NO_x, PM₁₀, and SO₂. Adopting good housekeeping measures at MRSML to reduce dust build-up. Use indoor or covered stockpiles or, when open-air stockpiles are unavoidable, use water spray system, dust suppressants, windbreaks, and other stockpile management techniques. Design a simple, linear layout for material handling operations to reduce the need for multiple transfer points. 	Plant HSE and O&M team	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> • Maximize use of enclosed silos to store bulk powder. • Enclose conveyer transfer points with dust-controls. • Clean return belts in the conveyor belt systems to remove loose dust. • Implement routine plant maintenance and good housekeeping to keep small leaks and spills to a minimum. • Implement correct loading and unloading practices. • Proper PPE will be used by workers for protection from fugitive emission and periodic indoor air quality monitoring will be conducted. • Development of greenbelt all around the plant boundary to arrest the fugitive emissions. • Regular monitoring of the air quality at identified locations. 		
Noise Level	<ul style="list-style-type: none"> • Increase in ambient noise level 	<ul style="list-style-type: none"> • In any case if the noise level during operation goes beyond the recommended level of 85 dB(A), the proponent should ensure a strict use of PPE like ear plugs, earmuffs, etc. • To maintain residential ambience at both the dormitories, noise control measures (such as double layered windows, doors etc.) should be taken. For the dormitory buildings, MRSML will comply with the WHO Guideline value for dwelling indoor for sleep at night-time (LAeq 30dB). • Maintenance of mufflers on engine exhausts and compressor components. • Maintenance of acoustic enclosures for equipment (e.g., compressor) causing radiating noise. • Maintenance of vibration isolation for mechanical equipment; and • Avoid the unnecessary use of alarms, horns, and sirens. • A green belt along the boundary for the factory should be developed. • Regular lubrication and preventive maintenance of machinery is to be done during manufacturing of steels to reduce vibration. 	Plant HSE and O&M team	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> • Comply with the noise emission criteria as per the Noise Pollution (Control) Rules, 2006. • Ensure closed door operation of the noise generating units. • Ensure Receptor's noise control measures such as wall, double-layered windows and doors etc. • Comply with the noise emission criteria as per the Noise Pollution (Control) Rules, 2006. • Monitor ambient noise levels in and around the Project site as per the Environment Monitoring Plan formulated for the project, which will comply with both National Regulatory requirements and WBG General EHS Guidelines. • A noise analysis of all major plant components will be carried out during commissioning of the plant to ensure compliance with the specification and guaranteed performance. 		
Water Resources	<ul style="list-style-type: none"> • Surface water and groundwater contamination 	<ul style="list-style-type: none"> • There should be provision for an adequate volume of septic tanks and dispersion trenches. • The wastewater generated should be treated and neutralized in the collection pit for reuse within the plant premises for green belt development and water sprinkling for dust reduction. • The domestic sewage should be treated in septic tank followed by soak pit. • Using softeners or magnetic hardness remover can reduce scaling in the pipes, and thus the efficiency of the cooling system can be improved. The proponent should take all necessary actions to make the cooling process efficient and resource conversant. • The proponent should avoid discharging wastewater into the surface water resources under all normal circumstances. • To minimize the dependency on groundwater, drawing water from Meghna River and its branches would be a good solution. 	Plant HSE and O&M team	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> Stormwater should be separated from process and sanitary wastewater streams in order to reduce the volume of wastewater to be treated prior to discharge Surface runoff from process areas or potential sources of contamination should be prevented. Where this approach is not practical, runoff from process and storage areas should be segregated from potentially less contaminated runoff. When water quality criteria allow, stormwater should be managed as a resource, either for groundwater recharge or for meeting water needs at the facility. Runoff from areas without potential sources of contamination should be minimized (e.g. by minimizing the area of impermeable surfaces) and the peak discharge rate should be reduced (e.g. by using vegetated swales and retention ponds); 		
Soil Quality	<ul style="list-style-type: none"> Soil contamination 	<ul style="list-style-type: none"> The solid wastage should be kept in an identified secured area within the plant boundary and should not be dumped in arbitrary land adjacent to the project. Materials from the wastage which can be recycled should be sold to a third-party for secondary use. A proper solid wastage management plan should be developed to reduce the dumping of hazardous materials on soil and maximize the utilization of solid wastes through practical ventures. Development of green- belt within the plant boundary to improve the soil quality. 	Plant HSE and O&M team	Designated HSE team of MRSML
Waste Generation and Disposal	<ul style="list-style-type: none"> Water pollution Soil Pollution 	<ul style="list-style-type: none"> All waste produced within the plant will be separated from the source in accordance with internal procedures. They will be classified as either hazardous or non-hazardous, following the best prevailing practices in Hazardous Waste Management and Handling within the industry. Depending on their characteristics, waste will be packaged in drums or jumbo bags and appropriately labeled with details and the date of generation. 	Plant HSE and O&M team	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<p>Following labeling, the waste will be transported to the designated storage location, a covered shed with concrete flooring. Then the waste will be disposed of at a designated dumping site through a DoE authorized vendor.</p> <ul style="list-style-type: none"> • The waste collection and disposal agreement between the authorized vendor and MRSML will be done prior to the construction phase of the project. • Efforts should be made to utilize the solid waste to the maximum extent possible. The furnace slag can be used in cement plant, brick manufacturing, rail ballast, or as road laying material. • Solid dust generated can be used in brick and ceramic industry. • Other types of wastes, e.g. waste bag filter, packages of hazardous materials, oil wastage, lubricant, domestic waste, etc. will be collected by the third-party vendor (waste collector) appointed by the MRSML. • Effluent should be treated in the treatment facility of MSMRL prior to discharge to the local drainage network or sewage network. 		
Terrestrial Flora due to construction of steel plant	<ul style="list-style-type: none"> • Hampering plant growth and causing diseases from fugitive and stack emissions 	<ul style="list-style-type: none"> • Water sprinklers should be deployed along the transport routes if necessary. • Transportation of materials only through covered trucks should be made mandatory. • Dust extraction and dust handling systems along with smoke treatment plants shall be installed to reduce fugitive dust emissions. • It is highly recommended to turn steel waste (steel slag) into eco-friendly construction material as an alternative to bricks and stone chips. • Stack emissions should be monitored on a regular basis and monitoring records should be maintained. • Prepare and implement a greenbelt development plan 	<p>Meghna Re-Rolling Steel Mill Limited</p> <p>Study by 3rd party agency/experts</p>	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
Terrestrial Fauna due to construction of steel plant	<ul style="list-style-type: none"> Disturbance to avifauna due to fugitive dust emission. Impact on health, behavior, and reproduction of terrestrial fauna 	<ul style="list-style-type: none"> Utilize noise barriers and soundproofing measures around plant and generator areas to mitigate noise pollution. Install shields and directional lighting to minimize light emissions, reducing disturbance to migratory bird species. Schedule noisy activities during periods of lower wildlife sensitivity, especially for migratory bird species To prevent any accidental harm to wildlife, it is important to enforce a speed limit of 20 km/hr for vehicles. Establish proper waste disposal protocols to prevent the contamination of water and soil from steel slag, food waste, cardboard, paper, packaging, plastic, etc. 	<p>Meghna Re-Rolling Steel Mill Limited</p> <p>Study by 3rd party agency/experts</p>	Designated HSE team of MRSML
Aquatic Ecosystem due to construction of steel plant	<ul style="list-style-type: none"> Discharge of brine water from desalination plant impacts on salinity increase, decrease of dissolve oxygen thus degrade water quality 	<ul style="list-style-type: none"> Implement strict waste management protocols to prevent improper disposal of steel slag, food waste, cardboard, paper, packaging, plastic, etc. Conduct regular inspections and monitoring of ships and barges to prevent accidental spillage and waste disposal during transportation. Establish emergency response protocols to address and contain any spills or accidents promptly. Collaborate with local authorities and environmental organizations to ensure compliance with regulations and standards for water quality and ecosystem protection. 	<p>Meghna Re-Rolling Steel Mill Limited</p> <p>Study by 3rd party agency/experts</p>	Designated HSE team of MRSML
Terrestrial Flora and Fauna Due to Wharf Operation	<ul style="list-style-type: none"> Impacts on terrestrial fauna like small mammals, herpetofauna, residential and migratory bird species and their migration patterns due to 	<ul style="list-style-type: none"> Implement reduced speed limits (20 km/hr) in the vicinity of the wharf area. Install prominent signage to mark wildlife crossing areas, increasing driver awareness and reducing the risk of accidents. Utilize water spraying techniques to suppress fugitive dust emissions in the wharf area. Implement measures to control leaching of hazardous chemicals into adjacent land. 	<p>Meghna Re-Rolling Steel Mill Limited</p> <p>Study by 3rd party agency/experts</p>	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	<p>excessive dust, noise and vibration.</p> <ul style="list-style-type: none"> Impact on the availability of food and suitable habitats for terrestrial wildlife 	<ul style="list-style-type: none"> Prohibiting the dumping of contaminated waste from trucks and lorries. Install acoustic barriers in areas with high noise levels to mitigate discomfort to terrestrial fauna near the wharf area. 		
Aquatic Ecosystem Due to Wharf Operation	<ul style="list-style-type: none"> Improper disposal of waste (Plastics, oils, chemicals, and other debris) into the aquatic ecosystem which blocks respiration system of aquatic organisms and disrupts their habitats. Leaching of grease and lubricants can introduce toxins into the aquatic environment leads to potential damage of aquatic organisms like fish. 	<ul style="list-style-type: none"> Establish designated waste collection areas and ensure regular waste removal to prevent waste accumulation near the wharf and the potential risk of accidental discharge into the aquatic ecosystem. Install effective spill containment systems, such as booms and barriers, around ships/barges and loading areas to prevent accidental spills from spreading into the water. Utilize containment systems, such as drip trays or secondary containment, to capture and prevent the release of hazardous chemicals into the environment. Conduct regular monitoring of fish mortality and disturbance of fish and aquatic animals during wharf operation phase. Provide education and training to staff and contractors on proper waste handling procedures to minimize the potential for pollution. 	<p>Meghna Re-Rolling Steel Mill Limited</p> <p>Study by 3rd party agency/experts</p>	Designated HSE team of MRSML
Impact on Katha (Brush Pile) fishing due to Operation of Wharf	<ul style="list-style-type: none"> Barge movement for the operation of MSML will not be increased, thus the impact is limited Operation of Wharf will impact three kathas adjacent to the wharf 	<ul style="list-style-type: none"> A one-time compensation plan, including establishment cost and a one-time income from Katha, is proposed to be provided to the affected katha owners prior to the operation phase. Technical support to increase the yield in the other economic activities the PAPs are involved with to balance the loss income of the katha fishing. The SEP and GRM for the project will be applicable to the katha owners. 	Plant HSE and O&M team	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	situated outside the project boundary.			
Traffic and Transportation	<ul style="list-style-type: none"> Disturbance to existing road users through an increase in road and river traffic. Increase in traffic number for this project may add extra traffic pressure that can result in obstruction of traffic near site and around site. The inflow of waste transporting and carrying workers during operation is likely to generate noise and dust emissions. 	<p>The following steps should be taken to minimize the impact due to increasing road and river traffic.</p> <p>Road Traffic:</p> <ul style="list-style-type: none"> A Traffic Management Plan (TMP) should be developed by MRSML prior to project operation and strictly adhered to. Collaboration will be undertaken with local communities and responsible authorities to improve signage (e.g., pedestrian crossings, speed limits, etc.), visibility and awareness of pedestrian safety. The transportation of any kind of waste shall be carried out in the covered condition. A speed limit of 20 km/hr within the site would be followed and use of mobile phones while driving would be prohibited. Adoption of stakeholder measures for avoidance of traffic incidents like display of educational materials and signboards to ensure elderly and children are aware of the increased traffic risk and safety measures. Appoint flagman at the entry point from the highway. Also, engage security guards and flagman in the main point of the road manage the flow of traffic. Proper management of traffic (both road and river) shall be taken to control the congestion and shortage of local transport. Avoiding peak hours for heavy vehicles movement where possible. No overloaded vehicle operation will be ensured. MRSML to ensure the truck weights will be within the limits of local road loads especially the bridge capacity (highway to CuEZ connecting bridge). 	Plant HSE and O&M team	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> Enforcing speed limits. Speed restrictions on vehicles entering and leaving the site. The engines and exhaust systems of all vehicles and equipment used will be maintained as such that exhaust emissions are low and do not breach statutory limits set for the concerned vehicles or equipment type. Vehicles and equipment should not be left idle when not in use to minimize exhaust emissions of NOX, PM10, and SO2. All drivers will be instructed to follow traffic norms strictly. <p>River Traffic:</p> <ul style="list-style-type: none"> Depending upon the tidal activity the movement of scrap carrying vessels would be operated. As a part of River traffic management, it would be ensured that there is proper safety warning signage for river jetty areas, prevent spills or discharges of oil, cargo, sewage, grey water etc. 		
Waste and Wastewater Generation and Disposal	<ul style="list-style-type: none"> Water pollution Soil Pollution 	<ul style="list-style-type: none"> Efforts should be made to utilize the solid waste to the maximum extent possible. The furnace slag can be used in cement plant, brick manufacturing, rail ballast, or as road laying material. In conditions where re-usage of slag is not financially or technically feasible, it should be disposed in a landfill designed in consideration with slag characteristics. Local geological conditions should also be considered when locating such slag heaps. A periodical examination should be conducted to determine the possible impact of such land- filling on the geological and ecological characteristics triggered by such landfilling. In the event any noticeable change is observed, corrective measures shall have to be undertaken to offset any major damage that occurred. Solid dust generated can be used in brick and ceramic industry. 	Plant HSE and O&M team	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> Effluent should be treated in the treatment facility/ CETP of CEZ prior to discharge to the local drainage network or sewage network. 		
Health and Safety	<ul style="list-style-type: none"> Occupational health and safety Accidents or incidents are more likely to be an increase. Physical trouble, Noise, vibration, lighting, electrical, heat and cold, nuisance dust, fire/explosion, machine grinding, working space, Chemical, Gases, dusts, fumes, vapors, liquids are the major hazards that are harmful for worker's health. Road Accidents 	<ul style="list-style-type: none"> An Occupational Health & Safety Plan would be prepared by MRSML/MGI that would cover aspects of health & safety hazards, their prevention and control procedure and identify training needs and frequency. The OHS Manual will be prepared and stringently followed during the operation of the steel plant process. The Project would adopt a total safety control system, which aims to prevent probable accidents such as fire accidents or chemical spills. Firefighting systems, such as sprinklers, portable extinguishers (appropriate to the flammable hazard in the area) and automated fire extinguishers would be provided at strategic locations with clear labelling of the extinguisher type. Plant equipment at hot temperatures that can pose risk to workers would be identified and protected to prevent accidental contact. Training on handling, hazard due to contact with hot surfaces especially in the casting section would be provided; PPEs (gloves, insulated clothing would be used) Constant monitoring of pressure, density and temperature of gas pipeline; installation of pressure safety valves to prevent any explosion. A safety manual for storage and handling of Hazardous chemicals would be prepared and implemented. The staff would be trained in first aid and firefighting procedures. The emergency rescue team would support the first aid and firefighting team. An onsite medical facility and first-aid centre with trained personnel to be made available. 	Plant HSE and O&M team	Designated Team comprising of representation from EHS and Operations of MRMSL

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> • Training and rehearsal of the emergency response procedures by the emergency team members and personnel on site would be completed periodically. • A safe assembly area would be identified, and evacuation of the premises would be practiced regularly through mock drills. • Safe work practices would be developed to provide for the control of hazards during operation and maintenance. • A near miss and accident reporting system would be followed and corrective measures shall be taken to avoid / minimize near miss incidents. • Accident/Incident register to be maintained. • Safety measures in the form of Dos and Don'ts would be displayed at strategic locations. • Safety audits would be conducted periodically as per the regulatory requirements. • Firefighting system would be tested periodically; and • All hydrants monitor and valves would be visually inspected every month. • Fire safety certificate from the Fire Service and Civil Defense must be obtained prior to operation. • Indoor air quality is required to be monitored periodically. • Monitoring of occupational hazards in the working environment designed and implemented by accredited professionals as part of an Occupational health and safety monitoring program. 		
	<ul style="list-style-type: none"> • Community health and safety • This is a possibility to increase the risks of infectious diseases due to influx of workers of the industries and the 	<ul style="list-style-type: none"> • Potential disasters and potential risks from the plant to the local community as well as the plan of action on the emergency protocol in the event of these accidents shall be disclosed. • Disclose and generate Awareness on the Disaster Management Plan as well the measures and protocols prescribed by the same. 	Plant HSE and O&M team	Designated HSE team of MRSML

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	semi-urbanization of the project area and its surroundings area.	<ul style="list-style-type: none"> • Employees and plant personnel shall be trained on health and safety as well as handling and managing disasters and emergency events. • Harmonious relations with the community and creating a feedback system shall be maintained. • Sound labor and management relations shall be maintained to avoid conflict and disruption in operation. • Firefighting systems, such as sprinklers, portable extinguishers (appropriate to the flammable hazard in the area), and automated fire extinguishers shall be provided at strategic locations with clear labeling of the extinguisher type. • The main hydrant shall also be available around the buildings. An automated fire detection system will be in place on all floors. • The machinery and vehicles should be equipped with mufflers, silencers, foam, rubber, and other soundproofing materials necessary to reduce operation noise; the diesel generators should be covered with a canopy. • Only well-maintained equipment will be operated on-site. • Regular maintenance of equipment, such as lubricating moving parts, tightening loose parts, and replacing worn-out components, should be conducted. • Machinery and construction plants that may be in intermittent use (e.g., trucks) shall be shut down or throttled down during non-work periods. • Provisions under the Security Management Plan should be followed. • Low-noise equipment shall be used as far as practicable. • The amount of equipment operating simultaneously shall be reduced as far as practicable. 		

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> Developing a Disaster Management Plan (DMP) to charter proper protocol to be followed in the event of a disaster in order to limit the impact on the local community. Disclose potential disasters and potential risks from the plant to the local community as well as the plan of action on the emergency protocol in the event of these accidents. Disclose and generate awareness on the DMP as well the measures and protocols prescribed by the same. Train employees and plant personnel in health and safety as well as handling and managing disasters and emergency events. Proper combustion along with appropriate air pollution control devices can reduce emissions of these substances to acceptable levels. Appropriate and suitable technological solutions can reduce the impact of gaseous pollution. 		
Infectious Disease such as HIV/AIDS	<ul style="list-style-type: none"> During operation, in general, about 700 people will be involved in the plant operation. Infectious diseases could spread among the community and employees of the plant as well. 	<ul style="list-style-type: none"> Inform workers of the risk of disease and the need for adhering to all preventative and control measures. Recommend a specific medical assessment of workers for histoplasmosis prior to the start of the project. This may include chest x-rays, serologic (blood) tests, and skin tests. Also consider pulmonary function tests, fitness to wear a respirator, and immunization against tetanus. Ensure that hygiene facilities have been installed or are available (for example temporary showers) Ensure workers are aware of the symptoms of heat stress conditions and the importance of maintaining adequate fluid and salt intake when working in hot conditions. Recommend that arrangements for providing cool drinking fluids, in an uncontaminated area, should be made, especially replenishing fluids and electrolytes like Gatorade. 	Plant EHS Team and operations	Designated Team comprising of representation from EHS and Operations of MRMSL

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
		<ul style="list-style-type: none"> • Posting of signs warning of potential health risks • Emergency procedures/key contact person/phone/fax/cell/e-mail 		
Labour Influx	<ul style="list-style-type: none"> • Operation of this project will require nearly 700 people from various department and will create an influx within the locality 	<ul style="list-style-type: none"> • Prevention of massive movement within the locality for workers; • Proper safety protocol should be taken under the labor management plan; • Alert the migrant workers regarding GBV, local harmony and other socio-cultural aspects to avoid any kind of collision between labor and local people; • Promoting collaboration with local authorities to enhance access of workers for their basic necessary that can be collected from the locality; • Promoting use of local goods and other material to make a balance between workers and local people; • Project authority should set a management plan and maintain the coordination to minimize any kind of dispute to labor influx. 	Plant EHS Team and operations	Designated Team comprising of representation from EHS and Operations of MRMSL
Local conflict of interest	<ul style="list-style-type: none"> • Employees and workers may have conflicts with the community. 	<ul style="list-style-type: none"> • Job opportunities should be provided in a fair way. • Clear information about the needs of labor (number and qualification) should be provided to local people. Ensure no labor will engage any function and any local argument. • Give priority of local people while recruiting employees for the project. • Male and Female labor should receive the same wage to avoid conflict among the workers. 	Plant EHS Team and operations	Designated Team comprising of representation from Social Officer and community liaison officer
Community Property	<ul style="list-style-type: none"> • As the project will employ a huge number (700) of employees which may need to share some community property like mosque, growth center, grocery, 	<ul style="list-style-type: none"> • Project will ensure prayer hall for the labor and staff to avoid gathering on the local one. • Ensure the communal harmony is kept well while moving within it and with the local people for sharing the property. 	Plant EHS Team and operations	Designated Team comprising of representation from Social Officer and

Issues/Activities	Potential Environmental and Social Impacts	Proposed Mitigation/Enhancement Measures	Responsibility	
			Implementation	Supervision
	and other common places with people.	<ul style="list-style-type: none"> Arrangement of available tea stall and center for buying necessary things will ease the chance of conflict for sharing community property. 		community liaison officer

7.4 Environmental Monitoring Plan

A monitoring plan has been prepared to ensure compliance with the applicable environmental laws and conditions stipulated in the environmental permits. The monitoring plan also ensures compliance with the recommended safeguards for pollution prevention and abatement and sustainable development of the project. The implementation of a comprehensive impact and compliance monitoring plan at MRSML is of utmost importance. The main objectives of the monitoring plan include:

- Assessing the performance and effectiveness of monitoring activities by comparing monitoring results with the baseline data and/or environmental standards.
- Identifying the extent of environmental impacts predicted in the assessment.
- Determining project compliance with regulatory requirements.
- Adopting remedial action and further mitigation measures if found to be necessary.

7.4.1 During Construction Phase

7.4.1.1 Ambient Air Quality

Ambient Air Quality shall be monitored as per the location suggested based on prevailing micrometeorological conditions of the area like wind direction, wind speed, etc., as per the DoE guidelines. AAQ sampling frequency shall be observed at ambient monitoring stations for ambient 24 -hour PM_{2.5}, PM₁₀, NO_x, SO₂, VOC, Heavy Metal, Pb, HCl, HF Ammonia and CO (8-hour) concentrations.

7.4.1.2 Ambient Noise Levels

Regular ambient noise level monitoring shall be carried out within the project site and in surrounding villages including the baseline monitoring locations. Apart from this, periodic work zone noise levels shall also be monitored to determine the noise exposure to workers. The frequency of noise monitoring will be once a month on the project site.

7.4.1.3 Soil Quality

Periodic soil quality monitoring shall be conducted in the project site and adjacent land resources. This will provide information on the impacts on the soil quality of the area due to project implementation, if any.

7.4.1.4 Water Quality

Surface water and groundwater samples from nearby villages will be collected and analyzed as per the DOE guidelines.

7.4.1.5 Health and Safety

Continuous monitoring shall be conducted in order to determine the application of mitigation measures and health and safety guidelines at the project site. Assessment of community disturbance and potential safety hazards due to road and river traffic shall be ensured. The proper use of PPE shall be checked daily, while monthly checks shall be implemented in order to assess the condition of the installed safety signs, first aid kits, firefighting devices, etc. Provision to control accidents or incidents due to construction activities shall be kept.

7.4.1.6 Physical and Economical Displacement

Three affected katha owners, who will be impacted permanently due to the operation of wharf, need to be compensated for their relocation and displacement purposes. A one-time monitoring shall be conducted to verify the compensation process. The receipt for providing compensation including the signature of both parties will be checked prior to the operation phase. The proposed environmental monitoring program during the construction phase of the project is given in Table 7-3.

Table 7-3: Monitoring plan during construction phase/year

Environmental and Social Indicators	Monitoring Means	Parameters	No of Locations	Location Details	Frequency
General	Visual inspection of all active work areas	General compliance with mitigation measures presented in the EMP	-	Project activity areas and construction workers camp	Daily
Air quality	Measurement/sampling	PM ₁₀ , PM _{2.5} , CO, NO _x , and SO _x	5	Locations based on Table 5-2	Quarterly
Noise	Measurement	Leq (dBA)	10	Nearby sensitive receptors	Monthly
Surface water and groundwater	Sampling	Temperature, pH, suspended solids, electrical conductivity, dissolved oxygen, BOD, COD, nutrients (nitrogen, phosphate, potassium, chloride, sodium)	4	Tube-wells located in the areas surrounding the plant area	Quarterly
		Temperature, pH, DO, BOD, COD, turbidity, total dissolved solids, suspended solids, oil and grease, and heavy metals	4	From the adjacent waterbody	Quarterly
Soil	Sampling	pH, salinity, and nutrients (nitrogen, phosphate, potassium, chloride, sodium), heavy metal content (mercury, lead, chromium, copper, zinc, and cadmium)	2	Disposal site as well as in the adjacent agricultural land	Quarterly
Solid waste	Audits, photographic documentation, and interviews	Generation, storage, recycling, transport, and disposal	-	Construction site	Monthly
Health and safety	Health and safety surveys	Proper use of PPE, presence of safety signs, first aid kit, and firefighting devices, and injury/illness records	-	Construction site and roads linking MRSML with the main road network	Continuously

Environmental and Social Indicators	Monitoring Means	Parameters	No of Locations	Location Details	Frequency
Terrestrial and Aquatic biodiversity	Visual inspection and photographic documentation	General condition of the floral and faunal cover including fishing activity	-	Plant and adjacent area	Annual
Status of the Katha Owners	Observation, Ensuring the access of katha owners	Visual and Consultation	-	3 Kathas adjacent to the wharf area outside the project boundary	During Construction

7.4.2 During Operation Phase

The proposed environmental monitoring program during the operation phase of the project is given in Table 7-4.

Table 7-4: Monitoring plan during operation phase

Environmental and Social Indicators	Monitoring Means	Parameters	No of Locations	Location Details	Frequency
General	Visual inspection of all active work areas	General compliance with mitigation measures presented in the EMP	-	Project activity areas and construction workers camp	Daily
Air quality	Measurement/sampling	PM/PM ₁₀ , temperature	All stacks	All stacks	Continuous
		Particulate Matter, Oil Mist, NO _x , SO ₂ , VOC, PCDD/F, CO. Chromium (Cr), Cadmium (Cd), Lead (Pb), Nickel (Ni), Hydrogen Chloride (HCl), Fluoride, Hydrogen Fluoride (HF), H ₂ S, Ammonia, Benzo(a)pirene, Tar fume	All stacks	Outlet of All stacks	Continuous/monthly
		Particulate Matter, Oil Mist, NO _x , SO ₂ , VOC, PCDD/F, CO. Chromium (Cr), Cadmium (Cd), Lead (Pb), Nickel (Ni),	10	Ambient Air	Quarterly

Environmental and Social Indicators	Monitoring Means	Parameters	No of Locations	Location Details	Frequency
		Hydrogen Chloride (HCl), Fluoride, Hydrogen Fluoride (HF), H ₂ S, Ammonia, Benzo(a)pirene, Tar fume			
		PM/PM ₁₀ , SO _x , temperature, oxygen level, combustion efficiency	-	Combustion sources	Semiannually
		PM/PM ₁₀ , NO _x , SO _x , CO ₂ , and CO	5	Selected receptors	Quarterly
		PM/PM ₁₀ , NO _x , SO _x , CO ₂ , and CO	2	Indoor	Quarterly
Noise and Vibration	Measurement	Leq (dBA)	10	Inside plant, Dormitory area and Slag Treatment Plant Shed	Quarterly
				Sites selected around the perimeter of the plant	Quarterly and upon complaint
Surface water and groundwater	Sampling	Temperature, pH, suspended solids, electrical conductivity, dissolved oxygen, BOD, COD, nutrients (nitrogen, phosphate, potassium, chloride, sodium)	4	Tube-wells located in the areas surrounding the plant area	Quarterly
		Temperature, pH, DO, BOD, COD, turbidity, total dissolved solids, suspended solids, oil and grease, and heavy metals	4	From the adjacent waterbodies	Quarterly
Soil	Sampling	Moisture content, pH, salinity, and nutrients (nitrogen, phosphate, potassium, chloride, sodium)	2	Disposal site as well as in the adjacent agricultural land	Annually

Environmental and Social Indicators	Monitoring Means	Parameters	No of Locations	Location Details	Frequency
		Heavy metal content (mercury, lead, chromium, copper, zinc, and cadmium)	2	Disposal site as well as in the adjacent agricultural land	Every three years
Solid waste	Audits, photographic documentation, and interviews	Generation, storage, recycling, transport, and disposal	-	Plant area	Quarterly
Terrestrial and Aquatic biodiversity	Visual inspection and photographic documentation	General condition of the floral and faunal cover	-	Plant and adjacent area	Annual
Resource use	Meeting	Water and energy consumption	-	Plant area	Continuously
	Audit	Raw material consumption	-	Plant area	Continuously
Health and safety	Health and safety surveys	Proper use of PPE, presence of safety signs, first aid kit, and firefighting devices, and injury/illness records	-	Plant, waterways, and roads linking MRSML with the main road network	Continuously
Operations monitoring	Visual inspection and documentation	Production rate, gas flow rates, counter readings, pressure values, temperatures, abnormal readings, overloads, stoppage, outages	-	All facilities and major equipment at the plant	Daily
Physical and Economical Displacement	Documentation	Receipt of Compensation Payment	-	3 Kathas adjacent to the wharf area outside the project boundary	Once prior to the operation phase

7.5 Budget Plan for Environmental and Social Management

The project cost is inclusive of the cost of implementing the Environmental and Social Management Plan (ESMP) and the installation of pollution control measures.

Cost estimates are prepared for all the mitigation and monitoring measures proposed in the ESMP. The details of the cost estimates and the budget during the construction phase and operation phase for the mitigation and monitoring measures are given in Table 7-5. The cost estimates for mitigation and monitoring measures during the construction and operation phase are given yearly (for one year).

The cost estimates include the budget for environmental enhancement/compensation measures and environmental monitoring, but not include the budget for consultants for ESMP implementation, institutional strengthening, and capacity building of the plant staff.

The total budget for ESMP implementation is estimated to be BDT 62,49,500.

The total yearly environmental monitoring cost for construction and operation phase is estimated to be BDT 3,800,000.

Table 7-5: Summary of costs for environmental management

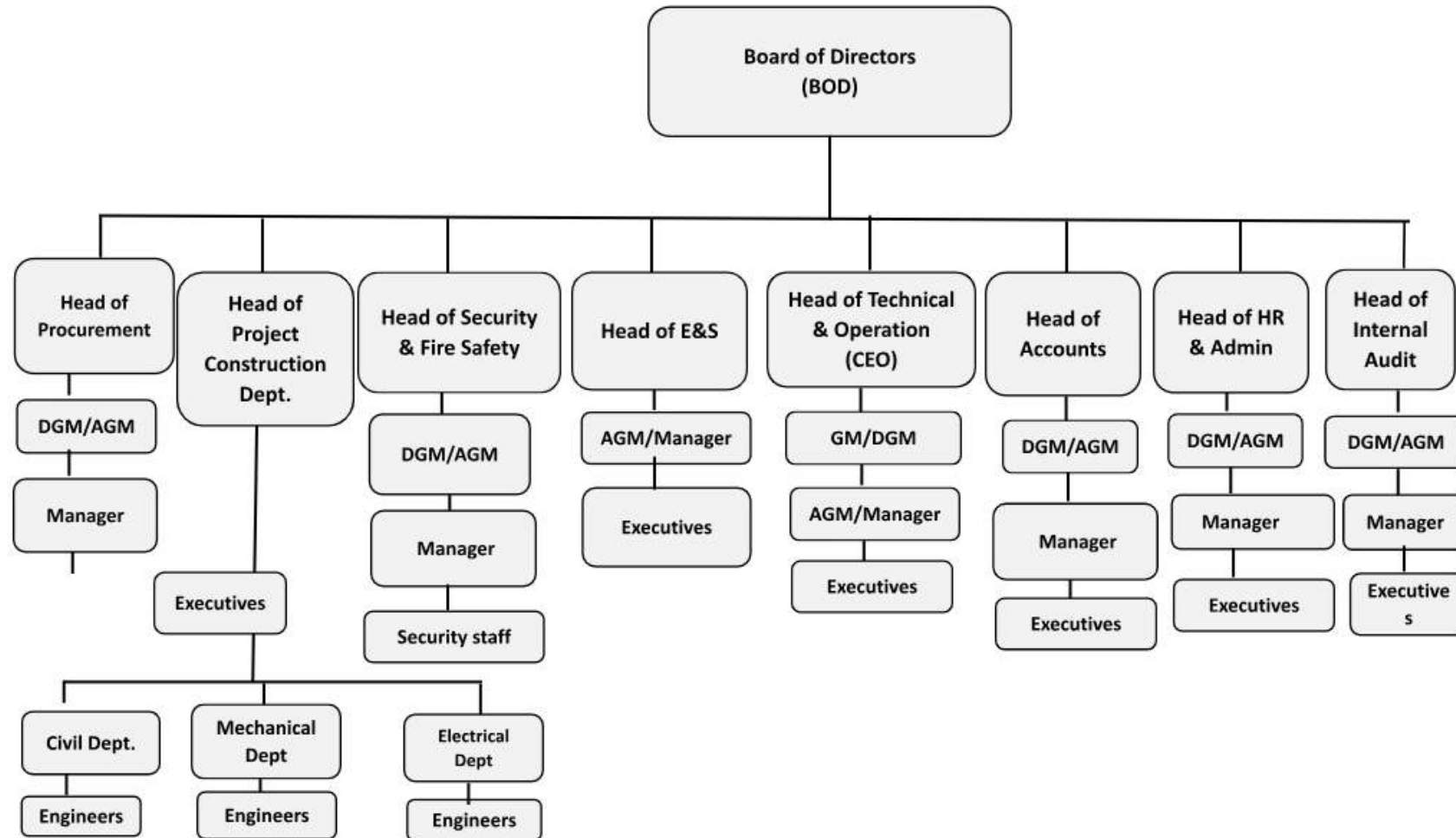
Aspects	Phase	Tentative Cost in BDT		
		Mitigation Measures	Monitoring Measures	Total
Air quality	Construction	50,000	480,000	530,000
	Operation	300,000	480,000	780,000
Noise	Construction	50,000	120,000	170,000
	Operation	100,000	120,000	220,000
Surface water	Construction	50,000	480,000	530,000
	Operation	50,000	480,000	530,000
Groundwater	Construction	50,000	360,000	410,000
	Operation	50,000	360,000	410,000
Soil	Construction	30,000	100,000	130,000
	Operation	30,000	100,000	130,000
Waste minimization control	Construction	50,000	0	50,000
	Operation	50,000	0	50,000
Terrestrial ecosystem	Construction	30,000	160,000	190,000
	Operation	100,000	160,000	260,000
Aquatic ecosystem	Construction	50,000	200,000	250,000
	Operation	100,000	200,000	300,000
Transportation management	Construction	40,000	0	40,000
	Operation	40,000	0	40,000
Occupational health and safety	Construction	75,000	0	75,000

Aspects	Phase	Tentative Cost in BDT		
		Mitigation Measures	Monitoring Measures	Total
	Operation	75,000	0	75,000
Community health and safety	Construction	50,000	0	50,000
	Operation	50,000	0	50,000
Fire emergency	Construction	50,000	0	50,000
	Operation	50,000	0	50,000
Training and Awareness	Construction	0	0	0
	Operation	200,000	0	200,000
Socio-economic condition enhancement	Construction	0	0	0
	Operation	250,000	0	250,000
Physical and Economic Displacement (Katha Fishing)	Prior to Operation	4,29,500	0	4,29,500

7.6 Institutional Arrangements

The effective implementation and operation of the ESMP depends on the regular monitoring of environmental and social components in the proposed project area. During the pre-construction and construction stage, the Environment, Health, and Safety officer of the contractor will be responsible for the implementation of the ESMP and the project developer's staff, specifically the EHS manager, will supervise the implementation of these mitigation measures by the contractors at the site. The flow diagram showing the institutional arrangement for the implementation of the ESMP during the preconstruction and construction period is presented in Figure 7-1.

Figure 7-1: Organogram Meghna Re-rolling & Steel Mills Limited



Source: MGI, 2024

CHAPTER 8

Stakeholder Engagement, Public Consultation and Disclosure

8 STAKEHOLDER ENGAGEMENT, PUBLIC CONSULTATION AND DISCLOSURE

8.1 Introduction

Stakeholder engagement is the continuing and iterative process by which the Borrower identifies, communicates, and facilitates a two-way dialogue with the people affected by its decisions and activities, as well as others with an interest in the implementation and outcomes of its decisions and the project. It considers the different access and communication needs of various groups and individuals, especially those more disadvantaged or vulnerable, including consideration of both communication and physical accessibility challenges.

A stakeholder is defined as “an individual, group, or organization, who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project”. “Stakeholder Analysis” is the process of sorting identified stakeholder groups according to their impact on the project and the impact the project will have on them. This information is then used to assess the manner in which the interests of the stakeholders or projects impact on them should be addressed in the project development plan or its operation.

The importance of stakeholder analysis lies in the assessment and understanding of the socio-political environment surrounding the project. It allows for:

- Identification of the interests, concerns and societal risks surrounding the stakeholders, as well as conflicts of interests (if any);
- Identification of relations between stakeholders that may enable “coalitions” of project sponsorship, ownership, and co-operation as well as the mechanisms which may influence other stakeholders;
- Key groups/ individuals to be identified who need to be informed about the project during the execution phase;
- Identifying stakeholders (those who might have an adverse impact on the project) and taking appropriate measures to mitigate their influence; and;
- Development of a framework for participatory planning and implementation of various project activities including interventions for community development.

This Section of the report describes the stakeholder engagement process undertaken during the ESIA scoping phase to gather baseline information and assess the potential impacts and risks due to the project. The process initiated with the Kick-off Meeting held on 20th January 2024 between Meghna Group of Industries Limited, and EQMS to understand the environmental and social scope.

8.2 Scope and Specific Objectives

The broad objective of the stakeholder engagement and involvement process is to provide authorities, as well as interested and affected stakeholders with the opportunity to identify issues, concerns, and opportunities regarding the proposed Project and to address key stakeholder concerns during the preparation of the ESIA for the Project. Specific objectives for stakeholder consultations are as follows.

- To address relevant issues including those perceived as being important by other sectoral agencies, public bodies, local communities, affected groups, and others.
- To improve information flows between proponents and different stakeholders, improving understanding of a project.
- To identify important environmental, social, and Ecological characteristics or mitigation opportunities.
- To ensure that the magnitude and significance of impacts have been assessed properly.
- Improves the acceptability and quality of the mitigation and monitoring process.

8.3 Approach and Methodology for Stakeholder Mapping and Analysis

The approach adopted for mapping and analyzing involves mapping the key stakeholders (directly and indirectly) and assessing their significance, influence, and impact on the project. The methodology adopted is described below:

The significance of a stakeholder group is categorized considering the magnitude of impact (type, extent, duration, scale, frequency) or degree of influence (power, proximity) of a stakeholder group and urgency/likelihood of the impact/influence associated with the particular stakeholder group in the project context. The magnitude of stakeholder impact/influence is assessed by taking the power/responsibility of the stakeholder group and is categorized as negligible, small, medium, and large. The Urgency or likelihood of the impact on/influence by the stakeholder is assessed on a scale of low, medium, and high. The overall significance of the stakeholder group is assessed as per the matrix provided in Table 8-1.

Table 8-1: Stakeholder mapping matrix

		Sensitivity /Vulnerability / Important Resource / Receptor		
		Low	Medium	High
Magnitude of Impacts	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Urgent
	Large	Moderate	Urgent	Urgent

The following section provides brief profiles of the various stakeholders in the project as discussed in the previous sub-section along with their degree of influence. Following Table 8-2 shows the stakeholder mapping.

Table 8-2 Stakeholder Mapping for the project Table

Stakeholder Group	Key Stakeholders	The magnitude of Impact/ Influence	Stakeholder Category
Institutional Stakeholders	Regulatory Authorities	Impact of Project on Stakeholders: Large Influence of Stakeholder on Project: Medium	Urgent
Project Proponent	Meghna Group of Industries	Impact of Project on Stakeholders: Large Influence of Stakeholder on Project: High	Urgent
Other Groups	EPC contractor & Sub-contractors	Impact of Project on Stakeholder: Medium Influence of Stakeholder on Project: High	Urgent
Project Financing Agencies	Financers and Investors	Impact of Project on Stakeholders: Large Influence of Stakeholder on Project: High	Urgent
Local Administration	Union Parishad	Impact of Project on Stakeholders: Large Influence of Stakeholder on Project: Medium	Urgent
Local Community	Local community residing near the project footprint.	Impact of Project on Stakeholders: Large Influence of Stakeholder on Project: Medium	Urgent

Stakeholder Group	Key Stakeholders	The magnitude of Impact/ Influence	Stakeholder Category
Katha Owners	People using Kathas (Brush Piles) for fish harvesting within 1 km upstream and 1 km downstream from the Wharf area.	Impact of Project on Stakeholders: Large Influence of Stakeholder on Project: Medium	Urgent
Institutional Stakeholders	Bangladesh Economic Zone Authority	Impact of Project on Stakeholder: Medium Influence of Stakeholder on Project: High	Urgent
	Department of Fisheries	Impact of Project on Stakeholder: Medium Influence of Stakeholder on Project: High	Urgent
	Department of Livestock	Impact of Project on Stakeholder: Small Influence of Stakeholder on Project: Medium	Minor
	Department of Agriculture	Impact of Project on Stakeholder: Small Influence of Stakeholder on Project: Medium	Minor
	Department of Education	Impact of Project on Stakeholder: Small Influence of Stakeholder on Project: Medium	Minor
	Roads and Highways Department	Impact of Project on Stakeholders: Small Influence of Stakeholder on Project: Medium	Moderate
	Fire Service and Civil Defense	Impact of Project on Stakeholders: Small Influence of Stakeholder on Project: High	Moderate
	Bangladesh Inland Water Transport Authority (BIWTA)	Impact of Project on Stakeholders: Small Influence of Stakeholder on Project: Medium	Moderate

8.4 Information Disclosure, Consultation, and Participation

A number of consultation exercises were conducted during this phase of ESIA study preparation. The stakeholders consulted include local people, community in the vicinity of the project area, local elected representatives, schoolteacher, religious leader, community influentials and other external stakeholders such as government officials. The details of consultations held with issues raised or discussed and suggestions provided by the respective stakeholders are well noted and incorporated in the ESIA report.

A combination of mixed methods of information disclosure and consultation process was adopted at this stage of E&S study preparation. The method selected for consultation was basically designed keeping in mind the profile of the stakeholders, type of information desired, and level of engagement required. In each consultation session, the consultant introduced themselves and introduced the project and the purpose of engagement with the respective stakeholder.

The methods used in the consultation process were:

- Key Informant Interview (KII)

- Public Consultation Meeting (PCM)
- Focus Group Discussion (FGDs)

The consultation and information disclosure were held in a free and fair environment giving prior information about the same to the stakeholders. On all occasions, the date, time, and venue of the consultation were decided by the stakeholders keeping in view their prior engagement and availability.

8.4.1 Communication Methods

Stakeholder engagement becomes a successful exercise when proper and participatory communicative methods are used. This ensures that the stakeholders are kept engaged and well-informed of the project's development at every stage. A combination of communicative methods is usually used to engage with the stakeholders. To determine which option is best suited to the various stakeholders, a benefits analysis of each option has been carried out. The communicative methods are:

- General Information consisting of the project's various activities, the operation stage, and impacts that might arise shall be made available for stakeholders.
- In addition to this, a host of tools and techniques also be adapted to engage with the stakeholders in a transparent and accountable manner.

8.4.1.1 Key Informant Interview (KII) and Individual Consultation

KII techniques have been used to disclose the information regarding this project during the ESIA exercise. During ESIA preparation, 10 KIIs have been conducted with the project affected and interested stakeholders. Following **Table 8-3** shows the participant details of Key Informants. **Table 8-4** shows the details of consultation with Key Informants.

Table 8-3 Participant Details of Key Informant Interview

Date	Stakeholder (Individual) Details	Details of Participants	Method of Consultation
06/03/2024	Local Govt. Engineering Division (LGED)	Ohidul Islam Sikdar Upazila Engineer, LGED Meghna, Cumilla	KII
06/03/2024	Fire Service & Civil Defense	Md Monir Hossen Leader, Fire Service & Civil Defense, Meghna, Cumilla	KII
15/02/2024	Department of Livestock	Dr. Sakib Hossen Sagor Upazila Livestock Officer Meghna, Cumilla	KII
15/02/2024	Department of Fisheries	Firoz Ahmed Mridha, Senior Upazila Fishery Officer, Meghna, Cumilla	KII
18/02/2024	Department of Agriculture	Md Hafijur Rahman Agriculture Extension Officer, Meghna, Cumilla	KII
18/02/2024	Department of Primary Education	Gazi Md Anwar Hossen, Upazila Primary Education Officer, Meghna, Cumilla	KII
15/02/2024	Head Teacher of School	Alamgir Hossain, Head Teacher,	KII
EQMS Consulting Limited		8-4	Meghna Group of Industries

Date	Stakeholder (Individual) Details	Details of Participants	Method of Consultation
		South Luterchar Govt. Primary School, Meghna, Cumilla	
06/02/2024	UP Secretary	Nadir Alom Secretary, Luterchar Union Parishad, Meghna, Cumilla	KII
18/02/2024	UP Member Female	Sultana Parvin Sathi, Member of Ward-1,2,3 (Reserved) Luterchar Union, Meghna, Cumilla	KII
05/03/2024	Former Member and Local Elites	Mr. Shafikul Islam (Former UP Member) Md. Jashim Uddin (Local Businessman) Mr. Alamgir Hossen (Political Leader)	KII
23/05/2024	Katha owners within 1 km upstream and downstream from the Wharf area outside the project boundary	<ul style="list-style-type: none"> Md Sujon (Owner of Katha Fishing 1 & 2) Rukon (Owner of Katha Fishing 5) Ahsanullah Sarker (Owner of Katha Fishing 1 & 9-B) Khurshid (Owner of Katha Fishing 8) Alamgir (Owner of Katha Fishing 9) Abdul Hafez (Owner of Katha Fishing 10) Shohag Mia (Owner of Katha Fishing 13) Alam (Owner of Katha Fishing 14) 	KII
02/06/2024	Bangladesh Inland Water Transport Authority (BIWTA)	<ul style="list-style-type: none"> A.B.M. Anwar Haider (Dredging Expert) Dr. S.M.A. Rashid (Environmental Specialist) 	KII
09/06/2024	Bangladesh Economic Zone Authority (BEZA)	Senjuti Barua Deputy Director Bangladesh Economic Zone Authority	KII

Table 8-4: Details of Key Informant Interviews and Individual consultations held for the project

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
06/03/2024	Local Govt. Engineering Division (LGED)	Ohidul Islam Sikdar Upazila Engineer, LGED Meghna, Cumilla	<ul style="list-style-type: none"> • Service provided by LGED. • Current condition of local roads • LGED's role on reconstruction/expansion of the existing road • Recommendation 	<ul style="list-style-type: none"> • Formulation of plans for infrastructural development in rural and urban areas with implementation supervision. • Maintenance of rural infrastructure. • Planning, implementation, and monitoring of Growth Center/Hat bazar development. • Rural roads are mostly under the jurisdiction of LGED, unless any municipal or other govt. agency takes over it with mutual transfer of jurisdiction. • Normally all the connecting roads to Upazila center are under Roads and Highways (RHD) jurisdiction, and they maintain construction and supervision on it. • From Vatercahr to Homna (another Upazila of Cumilla adjacent to Meghna) a total of 21km roads will be constructed by RHD. This is the road that crosses through the economic zone with a 24 fit total width of which 18 fits will be pavement and 6 fit shoulders. • Within 2-3 months the construction of the road will be started. • Currently rural road which is the only connecting road from upazila to National Highway (N1) is weakened in many sections, MGI is repairing some parts to maintain smooth routing.

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
				<ul style="list-style-type: none"> This project will create a large employment which will increase the economy from regional to national level. LGED wishes to collaborate with MGI for a better road condition in this locality and MGI can contribute from their ground.
06/03/2024	Fire Service & Civil Defense	Md Monir Hossen Leader, Meghna Fire Service, Meghna, Cumilla	<ul style="list-style-type: none"> Service provided by Fire Service and Civil Defense Current condition of local fire safety Project related information. Opinion & Recommendation 	<ul style="list-style-type: none"> Firefighting, rescue and first aid is the primary service provided by any fire station. Provide NoC of residential/commercial multi-storied buildings for fire safety plan. Provide Fire report (in case of damage exceeding Rs. 2 crores); Provide firefighting training to any team consisting of 40 members based on application from any industry or private organization. Upon completion of 2 days training, an examination will be held to assess the knowledge of participants and those who secure satisfactory marks will be given certificate from Fire Service & Civil Defense. Conduct mock drill on firefighting and rescue. A company must train at least 20% of their employees for firefighting. Due to continuous public engagement, awareness campaigns and other activities the incident of fire in this area has decreased.

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
				<ul style="list-style-type: none"> We wish MGI will maintain all the relevant regulations related to fire safety and hazards. Install adequate fire extinguisher, hydrant, and fire exit as per the plan.
15/02/2024	Department of Livestock	Dr. Sakib Hossen Sagor Upazila Livestock Officer Meghna, Cumilla	<ul style="list-style-type: none"> General information of livestock and grazing Project information sharing Opinion and Suggestions 	<ul style="list-style-type: none"> A major portion of the land of this region is used for cattle grazing. Due to the economic zone, people should move in another area for grazing of their cattle. This project will create employment, if local people have the opportunity to be employed that will boost up local economy. Steel mill operation might have a chance of pollution if the waste is not treated and managed properly. Strongly recommend the proper management of wastewater and solid waste to avoid pollution of local land and water resources. Project authority can take initiative to provide various training on farming and livestock with the help of upazila livestock department. Project authority also can distribute cattle to the marginal families or ultra poor families from their CSR fund to promote poverty elimination.

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
15/02/2024	Department of Fisheries	Firoz Ahmed Mridha, Senior Upazila Fishery Officer, Meghna, Cumilla	<ul style="list-style-type: none"> General information of fishery Project information sharing Opinion and Suggestions 	<ul style="list-style-type: none"> This upazila is behindhand of fish culture and fishing activity, especially the Luterchar area. The entire upazila have 2100 registered fisherman of which 250 plus are in Luterchar union. Most of the fishing activity takes part in the Chalivanga Union. Fish culture is performing in nearly 350 ponds of different sizes. Few fishermen are involved fishing in the nearby channel of river Meghna by creating artificial shelter zone using bamboo and twig. If the wastewater cannot manage centrally and ETP is not installed the river will be polluted and fish catch will be decreased. The river Meghna is also connected with few other upazila in upstream and downstream. Pollution prevention should be ensured in both ways. Govt. should be attentive in river dredging as the river navigability has been decreased in alarming layer. Proper consultation should be taking place with local fisherman as well. Hope the project authority will consider the wastewater issue seriously.

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
18/02/2024	Department of Agriculture	Md Hafijur Rahman Agriculture Extension Officer, Meghna, Cumilla	<ul style="list-style-type: none"> • General Perception of the proposed project • Condition of agriculture in the Upazila • Concerning about security or threatening issues in the project area • Suggestion/recommendation of the project. 	<ul style="list-style-type: none"> • The Upazila has a total of 8017 hector of cultivable land. • A total of 7762 hector land found cultivated in different seasons from the total arable land. • The total of agricultural family in this upazila is 21,143 and sharecroppers are 5285. • Most of the arable land is cultivated in two seasons, which defies that the area is two crops. • Major crops grown in this region are Peddy, Mustard, Chili, vegetables, Corn, Potato etc. • Peddy grows at 4.5 metric ton per hector. • Agricultural land is decreasing day by day due to unplanned urbanization and expansion of industrial areas. • This project will not impact on the agricultural land unless the waste and wastewater are controlled. • Project authority should focus on controlling the generated waste and not release any of it in the surrounding land as well in the natural water source.
18/02/2024	Department of Primary Education	Gazi Md Anwar Hossen, Upazila Primary Education Officer, Meghna, Cumilla	<ul style="list-style-type: none"> • General Perception of the proposed project • Condition of Education (Primary) System of the Upazila 	<ul style="list-style-type: none"> • Meghna upazila has sub divided in two clusters for primary education from the upazila education office. • One cluster has 33 and another has 32 primary schools, of which 42 are from govt.

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
			<ul style="list-style-type: none"> Concerning about security or threatening issues in the project area Any suggestion/recommendation of the project. 	<p>primary, 16 are registered primary and 7 school is from govt. project.</p> <ul style="list-style-type: none"> Due to free education and stipend to the children the present scenario of primary education is very good, and it is improving day by day. Near to the project area the condition of primary education is good. No case of school dropout was reported, and no child labor issue was also reported to the education officials. The proposed project authority should concern about vehicular movement while passing or crossing to any school. If local people get appointed in the project, it will flourish the local economy and parents will emphasize education more if the economy grows. Child labor issues should be delt in properly.
15/02/2024	Head Teacher of School	Alamgir Hossain, Head Teacher, South Luterchar Govt. Primary School, Meghna, Cumilla	<ul style="list-style-type: none"> Brief profile of the area Status of the education General Perception of the proposed project Suggestions 	<ul style="list-style-type: none"> This area is very near to Dhaka and Narayanganj, two of the major industrial areas. People are involved in agriculture, business, overseas employment, and service. Primary education is 95% at school level. Project will not affect any school and education as well.

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
				<ul style="list-style-type: none"> • Lots of youth from the locality are workable and may get employment if the authority considers them. • If the economy grows education will be better.
06/02/2024	UP Secretary	Nadir Alom Secretary, Luterchar Union Parishad, Meghna	<ul style="list-style-type: none"> • Brief profile of the area • Socio-economic condition of people • General Perception of the proposed project • Safety and security • Suggestions 	<ul style="list-style-type: none"> • This area is comprised mainly in agriculture. • Most of the landowners reside adjacent to the project area named Dori Luterchar and Kandargaon. • Union Parishad has given NoC for the project. • Land procurement was started from 2016-2017. • A willing buying and willing selling process were applied during land procurement. • No grievances were raised in terms of land procurement. • Employment opportunity for local people is expected.
18/02/2024	UP Member Female	Sultana Parvin Sathi, Member of Ward-1,2,3 (Reserved) Luterchar Union Meghna, Cumilla	<ul style="list-style-type: none"> • Brief profile of the area • Socio-economic condition of people • General Perception of the proposed project • Safety and security • Suggestions 	<ul style="list-style-type: none"> • This area is mainly an agriculture prone area. • People will benefit from business growth due to this project. • Employment opportunity for the local people is desirable. • The adjacent villages are comprised with mostly farmers, wage labor, small and

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
				<p>medium businessman, and few overseas employers.</p> <ul style="list-style-type: none"> The project is very much appreciated and well desired for the growing economy and betterment of people. Some people used the land that has been acquired for economic zone for cattle grazing land, and agriculture. Proper safety measures for community health and safety and women friendly work are well appreciated. Hope the project authority will consider every aspect in terms of safety of women, children and community people during the project construction and operation phase.
05/03/2024	Former Member and Local Elites	<p>Mr Shafikul Islam (Former UP Member)</p> <p>Md Jashim Uddin (Local Businessman)</p> <p>Mr Alamgir Hossen (Local Political Leader)</p>	<ul style="list-style-type: none"> Education & Economy of this area General Perception of the proposed project Concerning Issue Suggestions 	<ul style="list-style-type: none"> The education rate is very good in this area, and it is increasing with the course of time. Nearby the Higher secondary institute is in Sonargaon and Gazaria Upazila. Besides, this upazila has 2 secondary institutes. People are involved in agriculture, fishing, business, and some overseas employees are also contributing from an economic perspective. Due to rapid industrial growth in this area, people are selling land, and it is now creating great pressure on agricultural land. This project will have a great influence on the local economy. People from the locality

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
				<p>should get priority on job in this project based on their skill and education.</p> <ul style="list-style-type: none"> • The local economy in many aspects will flourish due to this project. • The labor influx and permanent employees due to this project may cause of conflict if the work opportunity is shrunk for the locals. • MGI should focus on local people while recruiting for this project. • A playground for the local people is essential, MGI should look into this. • We wish for the success of this project.
23/05/2024 and 03/06/2024	Katha owners within 1 km upstream and downstream from the Wharf area outside the project boundary	<p>Md Sujon (Owner of Katha Fishing 1 & 2)</p> <p>Rukon (Owner of Katha Fishing 5)</p> <p>Ahsanullah Sarker (Owner of Katha Fishing 1 & 9-B)</p> <p>Khurshid (Owner of Katha Fishing 8)</p> <p>Alamgir (Owner of Katha Fishing 9)</p> <p>Abdul Hafez (Owner of Katha Fishing 10)</p> <p>Shohag Mia (Owner of Katha Fishing 13)</p> <p>Alam (Owner of Katha Fishing 14)</p>	<ul style="list-style-type: none"> • Local Name of this fishing method • Establishment process cost for kathas • Operation procedure • Frequency of catching fish • Types of fishes are mostly available • Annual income from the kathas • Dependency on Katha fishing • Impact of Jetty and barges • Manpower requirements for establishing the Katha <ul style="list-style-type: none"> • Suggestions to enhance their livelihood 	<ul style="list-style-type: none"> • The kathas are locally known as “Chop” • For the establishment of the katha, the owners first buy 200 to 300 bamboo (around 20 feet per piece) and branches of trees which cost around BDT 1,00,000 to 3,00,000. (Depending on the size of the kathas). They usually appoint 5 to 10 laborers during the establishment period (Depending on the size of the kathas). They employ the labors for three to five days and pay around BDT 500 to 1000 per day. These laborers are randomly employed from the local area. • After establishing the area, they provide fish feed themselves. They usually provide fish feed for two months. After feeding two months, they surround the area by “Moshari Net” (Common name known as Seine net). They appoint a total of 5 to 10 laborers for

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
				<p>around 8 to 10 days to surround the kathas with net and collect fish from the kathas (Depending on the size of the kathas).</p> <ul style="list-style-type: none"> • The katha owners usually harvest fish from the kathas once to four times in a year. • Usually Giant River Prawn (<i>Macrobrachium rosenbergii</i>) is the most available fish collected from the kathas. Besides, Sarpunti (<i>Systomus sarana</i>), Shol (<i>Channa striatus</i>), Tengra (<i>Mystus tengara</i>), Rui (<i>Labeo rohita</i>), Catla (<i>Labeo catla</i>) etc fish species are also available in the kathas. • The katha owners have an income around BDT 100000 to 150000 from each katha annually deducting all expenses. The amount of income varies on the basis of the place and size of the kathas. • Usually, the katha owners have different sources of income like agricultural works, fishing activities and daily labor activities. • Construction and operation of the wharf will impact the three kathas (Katha fishing 8, katha fishing 9 and katha fishing 9b) outside the project boundary. Moreover, the other katha owners think, the increase of barge movement will decrease the number of fish in the river. Some kathas are situated at a considerable distance from the wharf. So, these katha owners do not anticipate any impact due to the construction of the wharf and barge movement.

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
02/06/2024	Bangladesh Inland Water Transport Authority (BIWTA)	A.B.M. Anwar Haider (Dredging Expert) Dr. S.M.A. Rashid (Environmental Specialist)	<ul style="list-style-type: none"> • General process of dredging in Bangladesh. • Regulations and other legal requirements. • Types of dredgers used. • Schedule of dredging. • Disposal method of dredged materials. • Testing requirement prior to disposal of dredged materials. • Requirement of specialized assessment such as aquatic biodiversity etc. in a dredging project. 	<ul style="list-style-type: none"> • In Bangladesh, the capital dredging is usually performed by BIWTA in collaboration with Bangladesh Water Development Board (BWDB). • The dredging activities are carried out complying the guidelines of Bangladesh Water Act, 2013 and Bangladesh Water Rules, 2015. • Dredging activities are generally carried out for three (3) purposes: (1) River training works, (2) Navigation and its maintenance and (3) Land Reclamations. • For navigation and maintenance purposes, the hydraulic dredging method is used. Usually, cutter suction dredgers are employed for this purpose, along with excavators depending on the type of sediment load. Trailing suction hopper dredgers are also used for large-scale dredging. • Dredging in the Meghna River branches is generally performed during the dry season, between October and May. • Dredged materials are generally disposed of on non-cultivated land or in landfills, or they are used in other development activities such as river protection work. When these materials are disposed of on private or cultivated land, compensation is provided to the landowners in accordance with government regulations.

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
				<ul style="list-style-type: none"> Parameters for heavy metals and toxic elements are tested periodically prior to the disposal of dredged materials. There are no stipulated standards for dredged materials in Bangladesh, so the Australian standards for sediment quality from 2010 are generally used for comparison. For large-scale dredging projects occurring near ecologically critical areas and dedicated spawning grounds, detailed aquatic biodiversity assessments are conducted, and suggested mitigation measures are adopted by the project authority. These assessments entail a thorough examination of the local ecosystem, including the diversity of species, habitats, and ecological processes present within the affected area. Highly specialized teams, often comprised of environmental scientists, marine biologists, and ecologists, meticulously survey the targeted regions to identify any potential risks or impacts associated with the proposed dredging activities. Furthermore, the findings of these assessments serve as the foundation for the development of tailored mitigation measures designed to minimize any adverse effects on the surrounding environment. These measures may encompass a range of strategies, including the implementation of sediment control measures, the establishment of buffer zones around sensitive habitats, and the adoption of best

Date	Stakeholder Details	Details of Participants	Issues Discussed/Raised	Response/Suggestions Made
				practices to minimize disturbance to aquatic life during dredging operations.
09/06/2024	Bangladesh Economic Zone Authority	Shenjuti Barua Deputy Director Bangladesh Economic Zone Authority	<ul style="list-style-type: none"> • Legal framework for the establishment of private economic zone • Land procurement Process for the establishment of private economic zone • land due-diligence procedure • Issues about CuEZ 	<ul style="list-style-type: none"> • To establish the Private Economic Zone, BEZA follows the BEZA Act 2010 and Private Economic Zone Policy 2015. • As a part of land due diligence of the private economic zone, BEZA undergoes a verification process. • The verification commenced after receiving the license application from the Private Economic Zone. BEZA published a gazette announcing to raise grievance within 21 days for whom are likely to be impacted by the establishment of this private economic zone. • BEZA reviewed and conducted a verification if there are any land related issues, displacement, dispute, settlement etc. • No grievance was raised concerning the land issues of CuEZ • After the cut-off date to raise grievance and other verification processes, BEZA published another gazette on March 20, 2022, announcing the area as a Private Economic Zone named Cumilla Economic Zone. • BEZA provided the Private Economic Zone license to CuEZ on April 10, 2022.

8.4.1.2 Public Consultation Meeting (PCM)

8.4.1.2.1 Consultation

Prior to the notice, EQMS Consulting Limited consulted with the respective Union Chairman and Secretary regarding the consultation meeting and venue. The venue was selected in terms of easy accessibility to local people and invitees as well.

8.4.1.2.2 Invitation

After the confirmation of the date, time, and venue, the EQMS team visited the project area and invited the elected representatives, local people and other influential from the community. Following Table 8-5 presents the details of consultation meeting outcome.

8.4.1.2.3 Consultation Meeting

The meeting has started as per the schedule in 25th of February, at 12.30 pm in hall room of Luterchar Union Parishad as per the schedule and Chaired by the Pannel Chairman and UP Member of WARD-1 Mr. Rokun Uddin Shikdar in absence of Luterchar UP Chairman. Mr. Mehedi Hasan and Mosabbir Hossain from EQMS Consulting Limited welcomed the participants and introduced project proponents with the participants. Mr. Shahedul Islam, AGM, Project, MGI has describe the project details after the inaugural speech from Pannel Chairman. He describes how this project will be implemented, how this will benefit local people to grow their economy and many other socio-economic perspectives. Later on, the floor was declared open for sharing participants' opinion regarding the project. Md. Mazharul Islam, Sr Manager, HSE&S, MGI has responded to all the questions raised by the participants regarding health safety and environmental issue. Table 8-5 illustrates the meeting outcome:

Table 8-5: Details of the Public Consultation Meeting

S/N	Name	Person Details	Comment/suggestions
1	Mr. Shahedul Islam	AGM, Project, MGI	<ul style="list-style-type: none"> Mr. Islam give a brief about the How did they operate the steel mill and how it is going to affect the environment? How MGI will treat environmental threats? They will set central ETP to treat all the wastewater as per the DoE's requirement. He also explained how this project will benefit the locals in various aspects.
2	Banu Begom	UP Member WARD 4,5,6	<ul style="list-style-type: none"> Consider the unemployed youth of Luterchar Union for jobs within this project. Lots of local skilled labor is available within this area, MGI should consider them for the job. Improve the life and livelihood of the local poor.
3	Sultana Parvin	UP Member Ward 1,2,3	<ul style="list-style-type: none"> Make sure that the wastewater is managed properly and does not pollute the surface water. The local roads will be busy due to heavy traffic during the construction period. An additional road or the expansion of the current road is highly recommended.

S/N	Name	Person Details	Comment/suggestions
			<ul style="list-style-type: none"> Water of the Meghna River in this region is polluted by different industries, we recommend MGI to strictly control wastewater and waste to protect the river from pollution.
4	Md. Rasel Mia	Local Leader,	<ul style="list-style-type: none"> We request the authority to hire local people on a priority basis for employment within this project. Include local people in any work on a priority basis. Due to the pollution in the river, fish and other habitats are decreasing. The authorities must consider this issue as a concern thing.
5	Md Mofizur Rahman	Imam, Local Mosque	<ul style="list-style-type: none"> Encourage other industries as well to control pollution and save the local environment. We pray for the successful implementation of this project. Also expect employment will increase for the local people.
6	Md Emdad	Local Youth	<ul style="list-style-type: none"> Is there any preference for the locals in terms of employment? What will happen to the treated waste sludge? How MGI will benefit the local people?
7	Md. Mazharul Islam	Sr. Manager, HSE&S, MGI	<ul style="list-style-type: none"> This industry/MGI will manage waste smartly and will follow national rules and DoE's rules. MGI will install an ETP for wastewater treatment, and solid waste will be managed separately following the national waste management protocol. MGI is controlling dust through water spraying in the road and an independent consulting firm has been appointed to monitor air quality every month. MGI will recruit local people once the full phase operation starts. Currently the construction is ongoing and mostly we require labor which is found uninterested by the local people. MGI will burn the sludge in an incinerator. This project will create many small-scale businesses, housing, and other opportunities for the local which will help

S/N	Name	Person Details	Comment/suggestions
			them to be benefited from financial perspective.

- At the end, Mr. Rokonuddin Sikdar, Pannel Chairman of Luterchar Union concludes the meeting with thanking the participants and the MGI group.

Figure 8-1: Photographs of PCM



8.4.1.3 Focus Group Discussion (FGDs)

FGDs are important when gauging with a group of stakeholders on issues related to the project activities. FGD has been used to understand the needs, perceptions, and concerns of the group. The discussion also gave space for the members to voice their concerns and suggestions. During ESIA

preparation, 9 FGD with various groups including women and projected people those who are going to be affected by the project directly or indirectly was conducted in different location throughout the project adjacent area. In the FGDs, an effort was made to invite a wide range of stakeholders including farmers, businessmen, landowners, house owners and other affected persons. Table 8-6 shows the details of FGD Participants and Table 8-7 findings of the FGD.

Table 8-6 Details of FGD Participants

SL	Date	Place	Target Group	No. of Participant		
				Male	Female	Total
1.	05.03.2024	Luterchar Ansar Camp	Landowners	10	0	10
2.	05.03.2024	Luterchar, Project area	Local community	8	2	10
3.	06.03.2024	Dori Luterchar	Local community	6	0	6
4.	07.03.2024	Luterchar	Women Group	0	10	10
5.	05.03.2024	Luterchar West Para	Local Youth	8	0	8
6.	06.02.2024	Dori Luterchar, North	Local Farmers	6	0	6
7.	15.02.2024	Luterchar River side	Fisherman	5	0	5
8.	05.03.2024	Baushia, Gazaria	Fisherman	6	0	6
9.	07.03.2024	Luterchar Market Area	Fisherman	5	0	5

8.4.1.4 Findings of the FGD**Table 8-7 Details of Focus Group Discussion**

Date	Participant Details	Issue Discussed	Discussion Details
05.03.2024	Landowners	<ul style="list-style-type: none"> • Status of land seller • Perception about the project • Payment status • Potential impact • Grievances • Suggestions 	<ul style="list-style-type: none"> • Most of the land sellers are from the Luterchar Union as the project is situated in Luterchar. • Land sellers have received a reasonable amount for their land as per the selling deed. • Consultees have confirmed that their land was sold based on the mutual agreement between seller and buyer, which is also known as willing buy willing sell. • Some of them have dissatisfaction about the received amount. Basically, the type of land based on its category and position determines the price. Therefore, some of the landowners having low lying land also demand similar price of a high land. But the issue remains on internal gossiping among the people. • Consultees have confirmed that a few disputes still remain among the landowners as they have not

Date	Participant Details	Issue Discussed	Discussion Details
			<p>distributed their land share with the siblings and other shareholders.</p> <ul style="list-style-type: none"> • No grievance has been raised against compensation or anything that was related to land procurement. • Payment was given 100% as per the transaction deeds between seller and buyer. • Project will boost our national economy. • Local economy will also flourish as some of them will get employment and small-scale business will grow; • Communal harmony should be respected by the labors and other officials so that no social chaos will arise; • Project authority should consider local people specially those who sold their land for any available employment within this project; • Contribution for the local poor and other social functions will also be appreciated.
05.03.2024	Local Youth	<ul style="list-style-type: none"> • General Information • Education status • Perception about the project • Concerning issues • Suggestions/Opinion 	<ul style="list-style-type: none"> • This area is consisting of mixed people from socio-economic perspective; • People are mostly from middle income in various sectors like business, agriculture, fishing, overseas employment, driving, machinal work etc. • Education status is improving with the course of time, most of the boys and girls are attaining minimum higher secondary level of education. • We have heard that there will be an economic zone and major industries in this region. • If employment is generated from this project, unemployment status will decline. • We don't have any playground for doing outdoor games, only the playing ground was taken by the project. • If the project authority considers a playing ground for local boys, it will be a very good and generous thing

Date	Participant Details	Issue Discussed	Discussion Details
			<p>from them. As there is no available playing ground in this area.</p> <ul style="list-style-type: none"> We also hope that the project authority will also consider local youth force for available employment.
06.03.2024	Local Farmers	<ul style="list-style-type: none"> Crop Details Cropping Pattern Major Changes in cropping Project Perception Suggestions 	<ul style="list-style-type: none"> This riverine area is mainly formed by siltation of Meghna River and very fertile for cultivation. Due to high water level of rivers and canals we cannot cultivate thrice in a year. Mostly the land is cultivated twice. Available cultivated crops are Paddy, wheat, maze, Pease, vegetables, watermelon, melon, cucumber, green chili, Bitter gourd, Gourd etc. People are investing in business rather than in agriculture. Due to industrial growth farmers are showing less interest in crop cultivation and cultivation has been decreasing with the course of time since the last two decades. Hope this project will create employment opportunities and people from the locality will get preference in the project. Project authority must not pollute surface water from the generated waste and wastewater. River water is our main source of irrigation and if it gets polluted then agriculture will be affected severely. Hope the project authority will consider the waste and wastewater issue seriously. Unemployed and marginal farmers should be considered for employment.
07.03.2024	Women Group	<ul style="list-style-type: none"> General Information Perception about project Concerning Issue GBV cases Recommendations 	<ul style="list-style-type: none"> Mostly women are involved in household chores and other activities that are related to household. Few women also share their labor in agriculture with other family members while harvest time appears. Women will get involved if they have considered for employment.

Date	Participant Details	Issue Discussed	Discussion Details
			<ul style="list-style-type: none"> • Skill development for local women is also encouraged during the consultation. • We heard about the project from our family members. • Labor issue will not bother the local women if the labor does not cross their territory and frequent roam around the villages near the project area. • If the number of laborers is higher number, there might be shortage of local resources if the supply does not maintain accordingly. • Let the local community specially the women informed once the construction activity is started in full scale. • This area's women have not seen or face any issue or cases of GBV. • As the economic zone and other industries require many forms of employment, we suggest considering local women. Local women are eager to work if the opportunity arise.
05.03.2024 06.02.2024	Local community	<ul style="list-style-type: none"> • General Information • Status of land seller • Perception about the project • Payment status • Potential impact • Grievances • Suggestions 	<ul style="list-style-type: none"> • Most of the landowners reside adjacent to the project area. • The economic status of the landowners is mostly middle class. • They have positive perceptions towards the project. • Willing buying willing selling process was applied during the procurement of land. • Landowners have satisfactory remarks in terms of land selling. • People have used the money received against sold land to purchase new land parcel in a suitable area. • Some have invested in business and other family matters. • No grievances were found in terms of land procurement. People have not faced any difficulties in terms of land transfer and receiving cash against their sold land parcel.

Date	Participant Details	Issue Discussed	Discussion Details
			<ul style="list-style-type: none"> Dust issues in the adjacent community of the project area were raised during consultation. Economic enhancement and employment opportunity is expected. Considering the supply gas for local people if possible. People will highly appreciate MGI if they can contribute to distribute the gas pipeline among the people of Luterchar Union.
15.02.2024 05.03.2024 07.03.2024	Fisherman	<ul style="list-style-type: none"> General Information Fish catching methods. Fish Production Current situation of river in this area Possible Impact due to project Expectations & Suggestions 	<ul style="list-style-type: none"> Three different fishermen group were consulted in the Luterchar of Meghna Upazila and Balukandi of Gazaria Upazila. As this area is very near to the river Meghna, people are involved in informal and formal fishing in Meghna and two major branches that have passed through the union. Locally famous fishes like Shing, Tengra, Magor, Koi, Bual, Gozar, Puti, Chingri are found in this river. Around 30-40 families are involved in fishing. Mainly in Luterchar, some other unions also have influence on the fishing in River Meghna. Currently the fish catch has decreased due to the water pollution by the industries to the river upstream and nearby areas. Generally, 10-15 kg fish can be caught during the pick time of fishing by each fisherman per day from traditional fishing net and sold to the local consumer in local market. Famous and most practicing method of fishing in this area is "Jhop" (an area surrounded by bamboos with twig within the demarked area by bamboos). People spend 20/30 thousand per "Jhop" mostly buying bamboo, net, and food for fish. They catch fish from each "jhop" twice or thrice in a year and the sell amount is nearly 3 lakhs to 2 lakhs in per catch.

Date	Participant Details	Issue Discussed	Discussion Details
			<ul style="list-style-type: none"> • River pollution, navigation loss and other factors are responsible for decreasing fish. • If the proposed project hire people from those families who are vulnerable due to the water pollution and involved in fishing, people will greatly benefit and recover from the sufferings. • Hope the project authority/MGI will recruit local people on a priority basis. • We expect the project authority will consider the pollution issue seriously and act accordingly.

8.4.2 Proposed Strategy for Stakeholder Engagement

Stakeholder engagement activities will provide stakeholder groups with relevant information and opportunities to voice their views on issues that matter to them/affect them. Two of the important means that have to be followed include briefing material and the organization of community consultation sessions. The briefing material (all to be prepared in the local language) can be in the form of (a) brochures that can be kept in the offices of local self-government (union parishad office) and project office; (b) posters to be displayed at prominent locations and (c) leaflets that can be distributed in the project areas. Periodic consultation meetings will be organized by MGI to acquaint the communities, target group beneficiaries, and affected persons. Disclosure of information will enhance governance and accountability, specifically with respect to the strengthening of monitoring indicators to help the IFC monitor compliance with the agreements and assess the impact on outcomes. Table 8-8 presents the stakeholder consultation activities that the MGI/Project authority will undertake for their project. The activity types and their frequency are adapted to the three main project stages: project preparation (including design, procurement of contractors and supplies), construction, and operation and maintenance. The methods used would vary according to the target audience and would include:

- Public/community meetings, separate meetings for women and vulnerable groups.
- Face-to-face meetings.
- Focus Group Discussions/Key Informant Interviews.
- Workshop with the Experts.
- Surveys.
- Interviewing stakeholders and relevant organizations.
- Mass/social media communication (as needed).
- Disclosure of written information: brochures, posters, flyers, MGI website.

It also includes the time/frequency and means of verification for checking whether planned stakeholder engagement activities have taken place.

Table 8-8 Proposed Strategy for Stakeholder Engagement

Stage	Targeted Stakeholders	Discussion Points	Engagement Method	Location/Frequency	Responsibilities
Project Preparation	<ul style="list-style-type: none"> Project Affected People People residing in the project area. Vulnerable households Local administration and local leadership Common Property Resources Committee Leadership Press and Media (if required) Workers organization General Public (Job Seekers) DoE from which permissions/clearances are required. Supervision Consultants - Third Party Monitoring 	<ul style="list-style-type: none"> Project scope and rationale ESIA, SEP, LMP Disclosure Project E&S principles Grievance mechanism process including GRC 	<ul style="list-style-type: none"> Public meetings, separate meetings for women and vulnerable Face-to-face meetings Disclosure of written information: brochures, posters, flyers, and Information boards at the project area in Bangla Grievance mechanism MGI website 	<ul style="list-style-type: none"> Project area under CEZ for disclosure of Drafts ESIA, SEP, and LMP Throughout SEP development as needed At a central place convenient for all stakeholders As and when required at different stages of the Property relocation and construction 	Designated officer of MGI/Project
Construction	<ul style="list-style-type: none"> Project Affected People People residing in the project area. Three impacted Katha owners Vulnerable households Local administration and local leadership Common Property Resources Committee Leadership 	<ul style="list-style-type: none"> Grievance mechanism Health and safety impacts (EMF, community H&S, community concerns) Employment opportunities Project status Health safety impacts 	<ul style="list-style-type: none"> Information boards in MGI Notice board(s) at construction sites Face-to-face meetings Public meetings, open houses, training Training/workshops 	<ul style="list-style-type: none"> Quarterly meetings during the construction stage Notice boards are updated weekly Routine interactions Brochures in local offices Daily as needed 	Designated officer of MGI/Project

Stage	Targeted Stakeholders	Discussion Points	Engagement Method	Location/Frequency	Responsibilities
	<ul style="list-style-type: none"> Press and Media (if required) Workers organization General Public (Job Seekers) DoE from which permissions/clearances are required Supervision Consultants - Third Party Monitoring Contractor, subcontractors, service providers, suppliers, and their workers 	<ul style="list-style-type: none"> environmental and social concerns Worker grievance mechanism Issues regarding compensation for impacted Kathas outside the project boundary 	<ul style="list-style-type: none"> Invitations to public/community meetings 		
Operation and Maintenance	<ul style="list-style-type: none"> Project Affected People People residing in the project area Vulnerable households Local administration and local leadership Common Property Resources Committee Leadership Press and Media (if required) Workers organization General Public (Job Seekers) DoE from which permissions/clearances are required Supervision Consultants Contractor, subcontract 	<ul style="list-style-type: none"> Satisfaction with engagement activities and GM GM Process Damage claim process Status and compliance reports 	<ul style="list-style-type: none"> MGI website GM Process MGI newsletter Face-to-face meetings Submission of report as needed 	<ul style="list-style-type: none"> Meetings in Affected area (as needed) Monthly (newsletter as needed) 	Designated officer of MGI/Project

8.5 Grievance Redress Mechanism

Grievance management is an important component of any project's implementation. Over the duration of a project lifecycle, it encounters numerous instances of conflicts, allegations and dissatisfaction within the working and associated human capital and their interactions. Some of the areas of grievances for the project may include issues regarding land procurement, payment of compensation for land or wages to the workers, issues arising due to allotment of alternate land parcels with diminished productivity or higher upfront costs required for making it fit for cultivation, failure to fulfil commitments, poor management of construction activities, accidents due to inappropriate planning of vehicle movement, etc. The salient features of this Grievance Redress Mechanism (GRM) are transparency and strengthening the existing Grievance Mechanism, through establishing a Standard Operating Procedure (SOP) for grievance handling and direction for documentation and reporting. The proposed GRM has been developed in compliance with IFC Performance Standards.

8.5.1 Grievance Redress Mechanism for Workers

8.5.1.1 Objective of the GRM

Grievances can encompass minor concerns as well as serious or long-term issues. The grievances may be felt and expressed by a variety of parties including workers, employees, and communities likely to be affected by the social and environmental impacts of the Project. Hence, its impetus to have a robust and credible mechanism to systematically handle and resolve any complaints to the possible extend feasible depending on the type of grievances. The objective of GRM is to as follow's,

- Provide a forum of stakeholders to voice their concerns, queries and resolving issues in a timely matter especially about environmental, health and safety, community, and security issues.
- Provide the stakeholders with a system or channel through which their queries can be channeled and will ensure timely responses to each query; and
- Provide an accessible and credible mechanism to the employee and any stakeholders having a stake in the project to redress their issues and grievances regarding project functioning.

8.5.1.2 Scope

The GRM will be accessible and applicable for all MRSML staff and contractor's workers. People from the community will also be included in the GRM process. The grievance mechanism will manage grievances from workers where operations of both MRSML might have an impact. This Process is designed to provide a system for managing grievance and all complaints received under this procedure shall be tracked until close out, regardless of the process under which they are handled. The GRM also provides a scope for the stakeholders to appear in the court of law in case of any dissatisfaction.

To maximize the effectiveness of the Grievance Mechanism, MRSML shall uphold the following values during the implementation and operation of the system:

- Commitment to fairness in both process and outcomes.
- Transparency.
- Confidentiality; and
- Accessibility

8.5.1.3 Regulatory Framework and Safeguards

The relevant provisions under the following regulations, guidelines and pertinent standards are applicable towards the implementation of this Procedure.

Reference	Full Title
National Labour Laws	Bangladesh Labour Act 2006
National Labour Rules	Bangladesh Labour Rules 2015
IFC Performance Standards on Environmental and Social Sustainability	Performance Standard 2: Labor and Working Conditions. Performance Standard 4: Community Health, Safety and Security
EBRD Performance Requirement 2 - Labour and working conditions	Employee grievance mechanism Guidance note

8.5.1.4 Roles and Responsibilities

Implementation of the Grievance Mechanism for workers and employees of MRSML facility will be the ultimate responsibility of the EHS Manager who will be supported by other members the roles and responsibilities of whom have been specified below.

EHS Manager

- Lead the implementation of the GRM;
- Make all the employee and workers aware of the grievance mechanism through meetings and engagements;

Implement the Procedure providing guidance on solutions to complaints and grievances in consultation with the relevant departments and ensure consistency of redress for all grievances received in relation to the day-to-day operation of the MRSML.

- Emptying grievance box, maintain grievance register and complaint register. Manage database of grievances, responses, track, analyze, and report grievance updates to management on a monthly basis.
- Get involve in investigation of grievances and overseeing interaction between various project departments, contractors as well as the senior managers as required.
- Informed and update monthly status of the grievance lodged and cases resolved; and
- Maintain impetus and ensure company wide and community commitment to, and understanding of, its implementation and operation of the GRM.

Departmental Heads & Contractor Supervisor

- Informed all their workers and employee of the mechanism;
- Receive and acknowledge any issue, concern, complaint, or grievance from the workers verbally or in writing.
- They will record the issue and report it to the EHS Manager in compliance with the Grievance Redress Management (GRM) procedure; and
- Involved in the investigation of grievances as required depending on the nature and severity of the grievance and as directed by the GRM.

Chief Executive Officer-MRSML/(CEO-MRSML)

- Ensure the GRM is followed and applied across projects and department operations under MRSML.

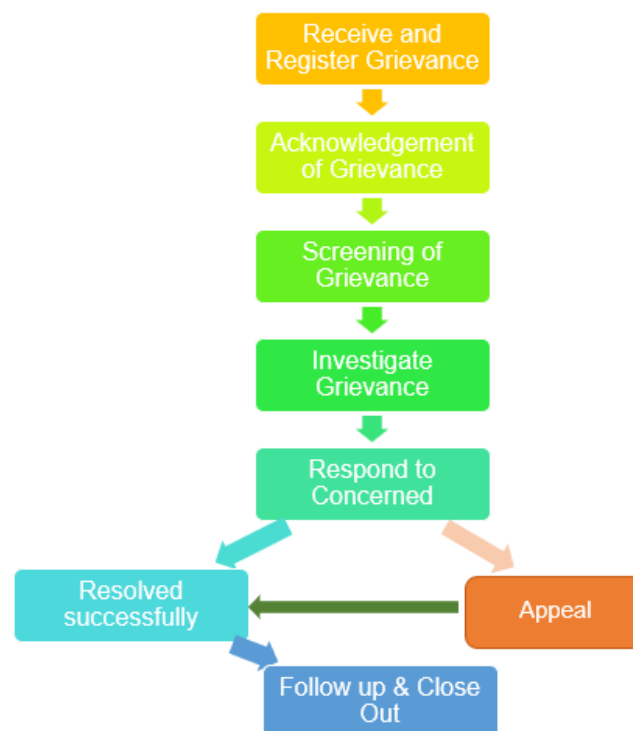
- Involved as key members in the investigation and of grievances and regularly update the cases of grievances lodged to the Factory Management Committee.
- Ensure a dedicated budget allocated for GRM and addressing grievances through financial or in-kind compensation as and when needed.
- Review and endorse grievance resolution, as appropriate and review grievance reports on a regular basis.
- Ensure EHS Manager has appropriate level of training to handle role and responsibilities; and
- Provide regular support process through review, leadership, and approvals.

Factory management Committee:

- Engaged at the discretion of MRSML, as required by the nature of the grievance.
- Provide information and assistance in order to plan for response, respond and close the grievance.
- Provide peer review of grievance process.

8.5.1.5 Grievance Redress Process

To ensure that all people lodging grievances are protected against any inappropriate behaviors or actions, such as retaliation, all information shall be treated with confidentiality. In situations where there may be circumstances and due to the nature of the investigation or disclosure, it will be necessary to disclose the identity of the complainant. In such circumstances, every effort will be made to inform such person(s) before such disclosure is made. Moreover, reasonable steps will be taken to protect the grievance owner from any victimization or detriment because of having made a disclosure. The grievance redress flow chart has been presented below.



8.5.1.5.1 Lodging of Grievances

Stakeholders can submit their grievances through a number of methods, but not limited to the following:

- In Person: To Executive Welfare/Department Head/Site or Contractor Supervisor
- Over telephone using the following number **xxxxxxxxxxxxxx**
- In writing: Through Grievance boxes, currently **2** in total, placed in different strategic locations- MRSML worker rest room and in the main entrance. All grievance boxes will be opened by the EHS Manager once a week.
- Grievance boxes will also be installed (upon consultation with the local elites) in the community at convenient locations for receiving grievances from the community people.

Note: Any worker or community person who prefers not to reveal his /her identity can also lodge grievances anonymously, the same will be recorded by the EHS Manager for the required process.

8.5.1.5.2 Recording and Acknowledging of Grievances

All formal grievances will be logged in to the Grievance Register (Annex A). The EHS Manager shall formally acknowledge the receipt of any grievance as soon as possible and shall be informing the complainant about the timeframe in which a response can be expected except in the case of anonymous grievances. The Grievance shall be bearing a summary of the grievance, which shall be read to and acknowledged by the complainant.

8.5.1.5.3 Screening of Grievances

Grievances will be screened depending on the level of severity in order to determine who the grievance owner will be and how the grievance is approached. The following three levels of screening shall be followed for this purpose.

Category	Description	Grievance Owner (GO)
Level 1	Grievances that pose no risk to the company and can be resolved at the level of a supervisor and the welfare officer. Such grievances require no investigation and can be resolve in no less than 15 days.	Welfare Officer, (Departmental Head/Contractor Supervisor)
Level 2	Grievances that require investigation and may pose minor threat to Company reputation. Such investigation should not be less than 30 days	Chief Executive Officer- MRSML
Level 3	Potentially high risk and need intervention of the chairperson. Such grievances may jeopardize the reputation of the Company and may pose conflicts with the communities and/or workers. The level 3 grievances will be resolved in 45 days	Factory Management Committee

In cases where grievance is considering out-of-scope for the grievance mechanism, the EHS Manager would draft a response for signature by the CEO explaining why it is out-of-scope and providing any guidance of where to go to get the issue addressed (if possible).

8.5.1.5.4 Investigation of Grievances

The grievance owner is responsible for investigating the grievance. The investigation may require the grievance owner to make site visits, consult employees, and complete other activities. Records of meetings, discussions and activities all need to be recorded during the investigation. Proposed GRM for investigating cases is given below.

A three-tier mechanism will be adopted.

Tier 1: The complaints/grievances may be received by the Project head in charge of the concern department/projects or by the Grievance Officer verbally or through written applications. The EHS Manager/ Asst manager will review the complaints and efforts will be made to resolve them in consultation with the complainant. The grievance/complaint should be resolved within 15 days from the date of receipt of the complaint will be made. In case the aggrieved is not satisfied with the solution provided Tier 1 he may escalate it to Tier 2.

Tier 2: Complaints/grievances that cannot be resolved at Level 1 or if the aggrieved is not satisfied with the decision of the Tier 1 can appeal for redress only such cases would be taken up at Tier II. The CEO, Departmental/project heads and EHS Manager will resolve cases under TIER 2. The entire process of investigation would be completed within 30 days of the complaint being referred to Tier II.

Tier 3: The 3rd Level will be the Grievance Redress Committee (GRC) in MRSML operations. The third tier will address high brevity issues, which may pose a threat to the company. Moreover, the committee will also address grievances that cannot be addressed or resolved at Tier 2 may be brought up to the GRC. The CEO of Meghna Re-Rolling and Steel Mills Ltd. will head the GRC, along with the present of existing members of the FMC. The GRC will resolve the matter within a period of 45 days from the date of receipt of the complaint at Tier 3.

Court of Law: If the grievance/complaint is not resolved at GRC Level or the complainant is not satisfied with the solution provided by GRC, the person may approach Court of Law.

Note: In cases of grievances not resolved within the stipulated timeline mentioned above and may stretched up to 6 months or so, in such situation the EHS Manager shall communicate and update the Complainant on the status of the investigation on a weekly basis.

8.5.1.5.5 Action Taken

Following investigation, the grievance owner for all Level 2 and 3 grievances shall discuss the grievance and of grievances cannot be resolved outcome of the investigation in the monthly Factory Management Committee (FMC) meetings. The purpose of this is to identify the actions to be taken for resolving the grievance in consensus with the FMC. Once all actions have been completed and the grievance owner feels the grievance has been resolved, they will then formally advise the complainant via their preferred method of contact.

8.5.1.5.6 Follow Up and Close Out

The grievance owner will make contact with the complainant after the grievance is resolved. If the stakeholder accepts the proposed resolution, the agreed actions are implemented. Such resolutions are recorded in the Grievance Register with supporting documentation. Hence, the resolution of the grievance will be formally closed out. This includes signature and dates from the complainant that will be documented in the Grievance Register. Sample grievance register form is in Annex C.

8.5.1.5.7 Appeal

In cases where a stakeholder is unsatisfied with and/or unwilling to accept the resolution actions proposed, the grievance may be escalated to the FMC for further review and final decision. The FMC Committee reviews the case and determines if further reasonable action is possible. The complainant may also appeal to the court of law in case of any dissatisfaction with the grievance redress process.

8.5.1.5.8 Notification

The procedure will be made aware to all the workers and employees. Notification will include:

- A summary of the procedure and how it can/should be used; and where people can go and whom they can talk to if they have any grievance. This should be mandatorily covered as part of the E&S Induction Program being implemented by MGI.
- Details of the process, such as who is responsible for receiving and responding to grievance.

- When stakeholders can expect a response, safeguards are in place to ensure confidentiality.

All these information will be widely and regularly publicized and communicated in a manner appropriate to the audience through either meetings, trainings, or distribution of fliers/brochure in a format and languages that are readily understandable by stakeholders.

8.5.1.5.9 Monitoring and Reporting

In order to ensure that the procedure is effectively functioning, the EHS Manager shall be performing a monthly review of the following parameters to be featured in the quarterly E&S performance reporting.

- Number of open grievances by grievance level and type.
- Timeframes for closure by grievance level and type; and
- Repeat of grievance from the same stakeholder.

8.5.2 Grievance Redress Mechanism for Community People

8.5.2.1 Objective and Purpose of the GRM

Grievances can encompass minor concerns as well as serious or long-term issues. The grievances may be felt and expressed by the local and fence line communities, local authorities likely to be affected by the social and environmental impacts of the Project. Hence, its impetus to have a robust and credible mechanism to systematically handle and resolve any complaints to the possible extent feasible depending on the type of grievances.

The purpose of GRM is to

- Provide a forum for the community to voice their concerns, queries and resolving issues in a timely matter especially with regard to environmental, health and safety, community and security issues.
- Provide a system or channel through which their queries can be channeled and will ensure timely responses to each query; and
- Provide an accessible and credible mechanism for the communities having a stake in the project to redress their issues and grievances in regard to project functioning.

8.5.2.2 Scope

The GRM will be accessible and applicable for communities including local/nearby communities might have an impact on account of the MRSML operation. This Process is designed to provide a system for managing grievance and all complaints received under this procedure shall be tracked until close out, regardless of the process under which they are handled. The GRM also provides a scope for the stakeholders to appear in the court of law in case of any dissatisfaction.

To maximize the effectiveness of the Grievance Mechanism, MRSML shall uphold the following values during the implementation and operation of the system:

- Commitment to fairness in both process and outcomes.
- Transparency.
- Confidentiality; and
- Accessibility

8.5.2.3 Regulatory Framework and Safeguard

The relevant provisions under the following regulations, guidelines and pertinent standards are applicable towards the implementation of this Procedure.

Reference	Full Title
National Labor Laws	Bangladesh Labor Act 2006
National Labor Rules	Bangladesh Labor Rules 2015
IFC Performance Standards on Environmental and Social Sustainability	Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impact Performance Standard 4: Community Health, Safety and Security
IFC Good Practice Note on Addressing Grievances from Project Affected Communities	Guidance Note for Project and Companies on Designing Grievance Mechanism

8.5.2.4 Roles and Responsibilities

Implementation of the Grievance Mechanism for the affected communities will be the ultimate responsibility of the Welfare Officer who will be supported by other members the roles and responsibilities of whom have been specified below.

Welfare Officer

- Lead the implementation of the GRM;
- Make all the communities and local administration aware of the grievance mechanism through meetings and engagements;
- Implement the Procedure providing guidance on solutions to complaints and grievances ensuring consistency of redress for all grievances received in relation to the day to day operation
- Maintain grievance register and complaint register. Manage database of grievances, responses, track, analyze, and report grievance updates to management;
- Involve in investigation of grievances;
- Informed and update monthly status of the grievance lodged and cases resolved; and
- Maintain impetus and ensure company wide and community commitment to, and understanding of, its implementation and operation.

Chief Executive Officer-MRSML (CEO- MRSML)

- Ensure the GRM for the communities are followed and applied.
- Takes overall responsibility for the appropriate grievance management and addressing the issues in accordance with the mechanism
- Ensure a dedicated budget allocated for GRM and addressing grievances through financial or in-kind compensation as and when needed;
- Ensure Welfare Officer has appropriate level of training to handle role and responsibilities; and
- Provide regular support process through review, leadership, and approvals.

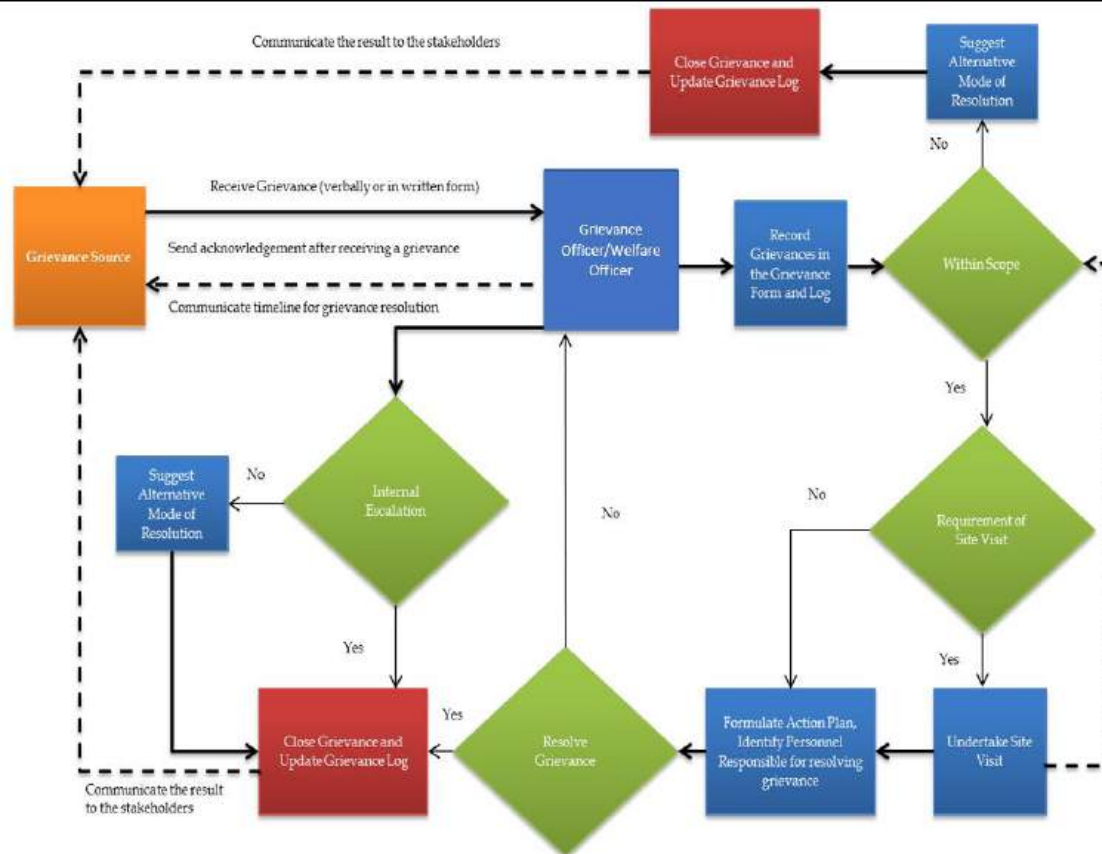
Factory management Committee/CEO:

- Engaged at the discretion of **MRSML**, as required by the nature of the grievance
- Provide information and assistance in order to plan for response, respond and close the grievance
- Provide peer review of grievance process.

8.5.2.5 Community Grievance Redressal Procedure

To ensure that all people lodging grievances are protected against any inappropriate behaviors or actions, such as retaliation, all information shall be treated with confidentiality. In situations where there

may be circumstances and by due to the nature of the investigation or disclosure, it will be necessary to disclose the identity of the complainant. In such circumstances, every effort will be made to inform such person(s) before such disclosure is made. Moreover, reasonable steps will be taken to protect the grievance owner from any victimization or detriment because of having made a disclosure. The grievance redressal flow chart has been presented below.



8.5.2.5.1 Lodging of Grievances

Communities can submit their grievances through a number of methods, but not limited to the following:

- In Person: To Executive Welfare/ CEO- MRSML
- Over telephone using the following number XXXXXXXXXXXX
- In writing: through Grievance boxes, currently located outside the entrance of the factory

8.5.2.5.2 Recording and Acknowledging of Grievances

All formal grievances will be made through the Grievance Register (Appendix D-3). The Welfare Officer shall formally acknowledge the receipt of any grievance as soon as possible and shall be informing the complainant about the timeframe in which a response can be expected except in the case of anonymous grievances. The Grievance shall be bearing a summary of the grievance, which shall be read to and acknowledged by the complainant.

8.5.2.5.3 Screening of Grievances

Grievances will be screened depending on the level of severity in order to determine who the grievance owner will be and how the grievance is approached. The following three levels of screening shall be followed for this purpose.

Category	Description	Grievance Owner (GO)
Level 1	Grievances that pose no risk to the company and community health safety and security; and can be resolved at the level of the welfare officer. Such grievances require no investigation and can be resolved in no less than 15 days.	Welfare Officer,
Level 2	Grievances that require investigation and may pose minor threat to Company reputation and community health, safety and security. Such investigation should not be less than 30 days	Chief Executive Officer- MRSML
Level 3	Potentially high risk and need intervention of the chairperson. Such grievances may jeopardize the reputation of the Company and may pose conflicts with the communities. The level 3 grievances will be resolved in 45 days	CEO/Factory Management Committee

In cases where grievance is considering out-of-scope for the grievance mechanism, the Welfare Officer would draft a response for signature by the CEO- MRSML explaining why it is out-of-scope and providing any guidance of where to go to get the issue addressed (if possible).

8.5.2.5.4 Site Inspection and Investigation of Grievances

Depending upon the sensitivity of the issue, and nature of the complaint, a site inspection may be required, but not in all cases. The purpose of the site inspection will be to check the validity and severity of the grievance. For this purpose, the personnel appointed by the CEO-MRSML may also undertake discussions with the concerned external stakeholder. The inspection will be undertaken within seven working days of receiving the grievance. Post site inspection, the assigned individual will investigate the problem, communicate an update to the concerned complainant, and identify measures to resolve the grievance as appropriate.

Records of meetings, discussions and activities all need to be recorded during the investigation. Proposed GRM for investigating cases is given below.

A three-tier mechanism will be adopted.

Tier 1: The complaints /grievances may be received by the Project head in charge of the concern department/projects or by the Grievance Officer verbally or through written applications. The Grievance Officer/Welfare officer will review the complaints and efforts will be made to resolve them in consultation with the complainant. The grievance/complaint should be resolved within 15 days from the date of receipt of the complaint will be made. In case the aggrieved is not satisfied with the solution provided Tier 1 he may escalate it to Tier 2.

Tier 2: Complaints /grievances that cannot be resolved at Level 1 or if the aggrieved is not satisfied with the decision of the Tier 1 can appeal for redressal only such cases would be taken up at Tier II. The CEO-MRSML, Departmental/project heads and Welfare officer will resolve cases under TIER 2. The entire process of investigation would be completed within 30 days of the complaint being referred to Tier II.

Tier 3: The 3rd Level The third tier will address high brevity issues, which may pose threat to the company that cannot be address or resolved at Tier 2 may be brought up to this tier. The CEO of Meghna Group of Industries will head this stage, along with the present of existing members of the FMC. The entire process at this stage will resolve the matter within a period of 45 days from the date of receipt of the complaint at Tier 3.

Court of Law: If the grievance/ complaint is not resolved at third level or the complainant is not satisfied with the solution, the person may approach Court of Law.

Note: In cases of grievances not resolved within the stipulated timeline mentioned above and may stretched up to 6 months or so, in such situation the Welfare officer shall communicate and update the Complainant on the status of the investigation on a weekly basis.

8.5.2.5.5 Action Taken

Following investigation, the grievance owner for all Level 2 and 3 grievances shall discuss the grievance and of grievances cannot be resolved outcome of the investigation in the monthly Factory Management Committee (FMC) meetings. The purpose of this is to identify the actions to be taken for resolving the grievance in consensus with the FMC. Once all actions have been completed and the grievance owner feels the grievance has been resolved, they will then formally advise the complainant via their preferred method of contact.

8.5.2.5.6 Follow Up and Close Out

The grievance owner will make contact with the complainant after the grievance is resolved. If the complainant accepts the proposed resolution, the agreed actions are implemented. Such resolution are recorded in the Grievance Register with supporting documentation. Hence, the resolution of the grievance will be formally closed out. This includes signature and dates from the complainant that will be documented in the Grievance Register.

8.5.2.5.7 Appeal

In cases the complainant is unsatisfied with and/or unwilling to accept the resolution actions proposed, the grievance may be escalated to the FMC for further review and final decision. The FMC Committee reviews the case and determines if further reasonable action is possible. The complainant may also appeal the court of law in case of any dissatisfaction with the grievance redressal process.

8.5.2.5.8 Communication and Publication of the GRM

For the effective implementation of the GRM procedure, the GRM will be communicated/ disclosed to the local communities and local administration through written and verbal communication. The mediums to be used for this purpose are public meetings, public announcements and other communication channels such as display of GRM provisions in Union Parishad offices, and other key locations which includes:

- a. How it can/should be used; and where people can go and whom they can talk to if they have any grievance.
- b. Details of the process, such as who is responsible for receiving and responding to grievance;
- c. When stakeholders can expect a response, safeguards in place to ensure confidentiality.

All this information will be widely and regularly publicized and communicated in a manner appropriate to the audience in a format and languages that are readily understandable by the community during the initial stage of implementation. A time-to-time engagement with the community will be undertaken to re-orient the community of the GRM.

8.5.2.5.9 Monitoring

In order to ensure that the procedure is effectively functioning, the Welfare Officer shall be performing a monthly review of the following parameters to be featuring in the quarterly E&S performance reporting.

- Number of open grievances by grievance level and type;
- Number of open grievances
- Number of closed grievances
- Number of grievances which exceeded the defined timeline
- Number of grievances in which an alternate route for resolution was suggested
- Repeat of grievance from the same stakeholder

CHAPTER 9

Risk Assessment

9 RISK ASSESSMENT

9.1 Introduction

Safety and environmental protection are paramount concerns in manufacturing industries, including steel plants. Recognizing the importance of a safe working environment, steel plants are increasingly focusing on preventing hazardous events, minimizing production and manpower losses, and mitigating other consequences of industrial accidents. This is achieved through rigorous risk assessment, development of onsite and off-site management plans, and implementation of safety measures. These efforts not only improve employee safety but also enhance operational knowledge, refine technical procedures, ensure accurate process safety information, and boost overall facility productivity.

9.2 Risk Assessment

This chapter provides an overview of the environmental and other risk-prone hazards associated with steel plants, along with their assessment and remedial measures. Additionally, it outlines an approach to emergency planning to be adopted by plant management, emphasizing the importance of proactive measures to mitigate potential risks and ensure the safety and well-being of all stakeholders.

9.2.1 Objectives

The objectives of environmental risk assessment are governed by the following, which excludes natural calamities:

- a) Identifying the potentially hazardous areas so that adequate design safety measures can be adopted to reduce the likelihood of accidental events.
- b) Identifying the stakeholders and evaluating their risk along with proposing adequate control techniques.
- c) Identifying the probable areas of environmental disaster which can be prevented by proper design of the installations and its controlled operation.
- d) Managing an emergency situation or a disastrous event, if any, during the plant operation.

9.2.2 Rational

Risk assessment is a systematic approach for identification, evaluation, mitigation and control of hazards that could occur as a result of failures in process, procedures, or equipment. Increasing industrial accidents, loss of life & property, public scrutiny, statutory requirements and intense industrial processes all contribute to a growing need to ensure that risk management is conducted and implemented.

Managing a disastrous event would require prompt action by the operators and plant emergency staff using all their existing resources like deployment of firefighting equipment, operation of emergency shut off valves, water sprays etc.

Minimizing the immediate consequences of a hazardous event involves implementing measures such as cordoning off affected areas, conducting evacuations, providing medical assistance, and disseminating accurate information to the families of affected individuals and the local public. This helps prevent the spread of rumors and panic, ensuring a coordinated and effective response to the situation.

Finally, an expert committee is necessary to investigate the cause of such an event, even if it's categorized as a "near miss" situation. The committee should document the losses incurred or potentially incurred and recommend remedial measures for implementation. The aim is to prevent the recurrence of similar events in the future by addressing underlying issues and improving safety protocols.

9.2.3 Definition of Risks

Before reviewing risks, it is essential to define the following terms related to environmental risks:

- **Harm:** Damage to person, property or environment.
- **Hazard:** Situation that poses a level of threat to life, health, property, or environment. A hazardous situation that has come to pass is called an incident. Hazard and possibility interact together to create risk. An environmental hazard is thus going to be a set of circumstances, which leads to direct or indirect degradation of the environment and damage to life and property.
- **Risk:** The probability of harm or likelihood of harmful occurrence and its severity. Environmental risk is a measure of the potential threats to the environment, life and property.
- **Consequence:** Effect due to occurrence of the event, which may endanger the environment permanently or temporarily and, or loss of life and property.
- **Disaster:** The consequence can extensively damage any one or all of the four components of the environment, namely, (i) physico-chemical, (ii) biological, (iii) human and (iv) aesthetics.
- **Exposure:** The extent to which humans, property, or the environment come into contact with a hazard. Exposure is influenced by factors such as duration, frequency, and intensity of contact.
- **Vulnerability:** The degree to which a system or entity is susceptible to harm or damage from exposure to a hazard. Vulnerability can be influenced by various factors, including socio-economic conditions, infrastructure, and preparedness.
- **Resilience:** The ability of a system or entity to withstand, recover from, and adapt to adverse events or disturbances. Resilience encompasses the capacity to absorb shocks, maintain functionality, and bounce back to pre-event conditions.

9.2.4 Identification of Hazards

Identifying these hazards is essential for developing effective risk management strategies and ensuring the safety and resilience of project operations. The identification of hazards anticipation for the proposed project activities are presented in Table 9-1.

Table 9-1: Hazard Identification of the Proposed Steel Plant

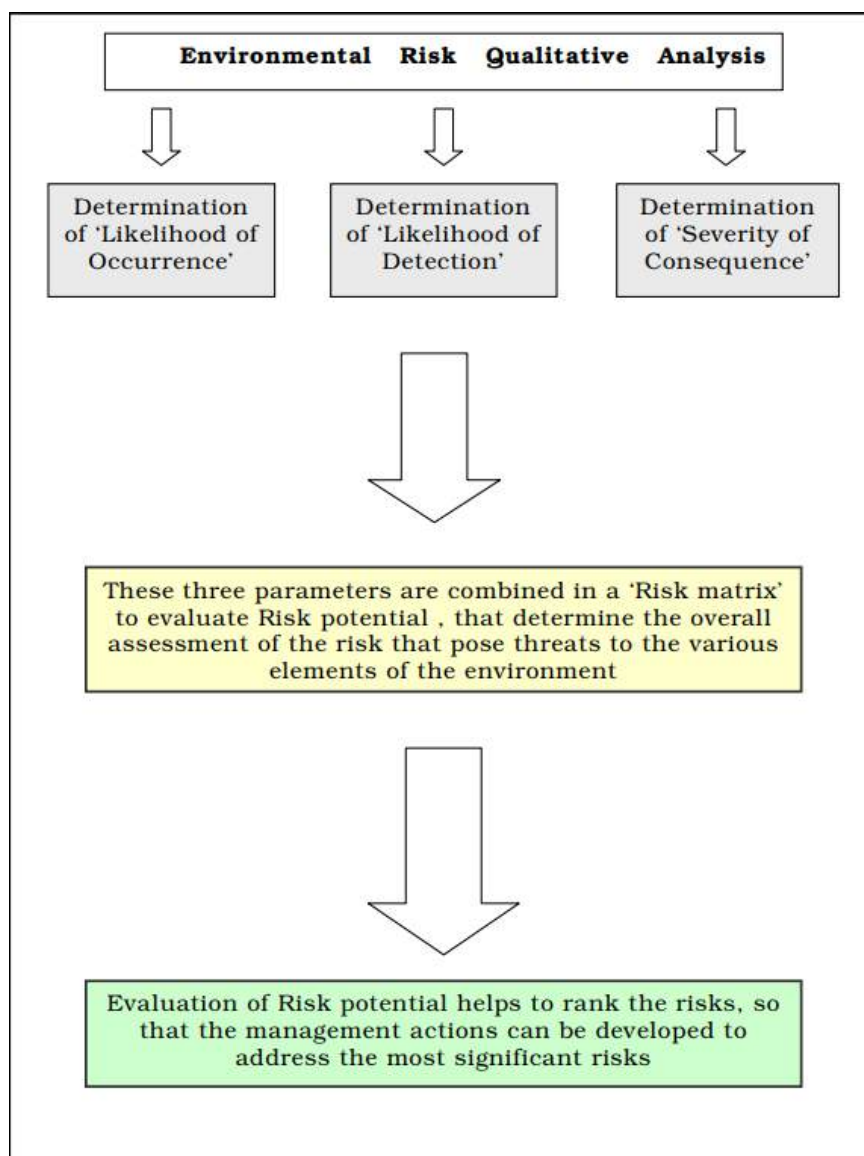
SN	Group	Item	Nature of Hazard	Hazard Potential	Remarks
1.	Raw materials handling	Water treatment chemicals such as acids/alkalis	Toxic	Moderate	Bio-corrosive
		Lube oils/greases	Fire	Moderate	Flammable
2.	Production units -Steel making in -Re-Rolling Mills	EAF handling	Fire	Major	Fire hazard
		Hot liq. Steel & Slag Handling	Heat radiation	Major	Bio-corrosive
		Gas firing	Fire	Major	Fire hazard
3.	Utilities - Fuel gas	Gas leaks	Fire & Toxic	Major	Fire & CO pollution
	Electric Power Supply	Short circuit	Fire	Major	Fire hazard
	Liquid fuel	Fuel handling & storage area	Fire & Toxic	Major	Fire hazard
	Hydraulic oil and lubricants	Accidental discharge of hydraulic oil under pressure	Fire & Toxic	Moderate	Fire & personal injury

From the table, it may be observed that major on-site emergency situation may occur from the fuel gas handling, molten metal and slag handling, acids and alkali storage and handling and electrical short-circuit. The off-site environmental disaster may arise if large-scale fire or explosion occurs, the effect of which extends beyond the plant boundary. The off-site environmental disaster may take place due to significant environmental degradation for a sustained period.

9.2.5 Risk Evaluation

From environmental hazards point of view, risk analysis (RA) acts as a scrutinizing vehicle for establishing the priority in risk management that concerns human health and environmental quality in general. Qualitative Risk Analysis flow chart procedure is explicitly depicted on the next page.

Figure 9-1: Flow-diagram of Quantitative Risk Analysis



Source: EQMS, 2024

As revealed in the chart in the preceding page, raw materials & consumable chemicals, and processing of the same in various production units, along with relative risk potential analysis is made on the following three factors using a P/I (Probability/ Impact) analysis methodology:

- a) likelihood of occurrence
- b) likelihood of detection
- c) severity of consequence

Each of these factors is graded and compiled to determine the risk potential. The factors governing the determination of relative risk potentials are presented in Table 9-2.

Table 9-2: Determination of Risk Potential

(A) Likelihood of occurrence		(B) Likelihood of detection		(C) Severity of consequence	
Criteria	Rank	Criteria	Rank	Criteria	Rank
Very High	5	Very High	1	None	2
High	4	High	2	Minor	4
Moderate	3	Moderate	3	Low	6
Low	5	Low	4	Moderate	8
Very Low	1	Very Low	5	High	10

$$\text{RISK POTENTIAL (RP)} = (A + B) \times C$$

Based on the above-stated criteria for assessing the risk, each probable event has been evaluated by addressing several questions regarding the probability of event occurrence considering the in-built design features, detection response, operational practices, and their likely consequences. A summarized list of environmental risk potential for the likely events is presented in the Table 9-3.

This assessment is based on past experience in the operation of an integrated iron and steel plant and best practicable designs for the proposed project. The present risk potential evaluation is primarily based on human errors, faulty operation, or failure of the control systems.

Table 9-3: Potential Environmental Risk Evaluation

SN	Events	Rank			Risk Potential
		Likelihood of occurrence	Likelihood of detection	Severity of consequence	
i.	Fuel/ gas leaks from the pipeline/valves	High (4)	Low (4)	High (10)	80
ii.	Unsafe disposal of oily wastes of Rolling Mills	High (4)	Low (4)	Moderate (8)	64
iii.	Occurrence of static electricity/ electric spark in the Mill Cellar Room	Very low (1)	Very low (5)	High (10)	60
iv.	Uncontrolled dust emissions/ failure of emission control system	High (4)	Moderate (3)	Moderate (8)	56
v.	Failure of Gas /Fume Extraction System	Moderate (3)	High (2)	High (10)	50
vi.	Oil wastes/oil sludge handling	Low (2)	High (2)	Moderate (8)	32

SN	Events	Rank			Risk Potential
		Likelihood of occurrence	Likelihood of detection	Severity of consequence	
vii.	Splashing of molten metal and slag	Low (2)	Very High (1)	High (10)	30
viii.	Release of untreated wastewater	Very Low (1)	Very high (1)	High (10)	20

From the Table 9-3, it appears that some events carry a risk potential above 50. These would be considered hazardous events, where effective safe design for operation and maintenance is highly essential to reduce the risk.

9.2.6 Safety During Construction

Safety during construction would be an important aspect regarding the risk analysis of the project. The safety protocols during construction would be prescribed as follows:

- Ensure that all employees and contract workers are well versed with the safety guidelines of the organization and well equipped with the personal protective equipment (PPEs) such as safety helmets, safety shoes, goggles, hand gloves, safety jackets, earmuffs, etc.
- Ensure that a construction safety manual elaborating all the safety rules/guidelines is in place and is followed by all concerned directly or indirectly involved in construction.
- Ensure that safety gears like Fall arresters, lifelines etc. are used compulsorily for work at height.
- Ensure that the operating procedures and control management system are in place and carefully followed by all workers.
- Ensure regular safety suit, identify and analyze hazards to reduce risk associated with the particular operation.
- Arrange display signs for material strictly prohibited inside any work premises like inflammable materials, firearms, weapons & ammunitions, etc.
- Arrange display signs for restricted areas.
- Arrange direction signs (night glowing) and speed limit signs along the construction roads.
- Arrange clear demarcation of passage within construction area with proper safety arrangements.
- Developing 'Dos' & 'Don'ts' during various types of work like working at heights, etc.
- Ensure that emergency control mechanisms like switch, valve and emergency lamp are covered with shield, water & shock resistance cover during rain etc. and peddle switch for bigger rotating machinery mixer etc. There should be no temporary cable joints and open-air working switch yard at enriched level.
- Adequate information about emergency numbers should be displayed everywhere. There would be emergency control room, emergency controller, shift emergency controller to take proper control of any unwanted situation and have an overall control.

Ensuring adherence to the above measures would guarantee that safety is strictly followed during all construction activities.

9.2.7 Risk Management Measures

The risk management measures for the proposed project activities necessitate the adoption of best safety practices at the respective construction zones within the works boundary. Additionally, the design and engineering of the proposed facilities will consider proposed protection measures for the air and water environment. The site-specific Emergency Response Plan will be prepared by MRSML at a later

stage based on the outcome of Quantitative Risk Assessment. A generic template of ERP has been provided in Appendix F-5.

9.2.7.1 Electrical Safety

Adequately rated quick-response circuit breakers, aided by reliable, selective digital/microprocessor-based electro-magnetic protective relays would be incorporated in the electrical system design for the proposed Project. The metering instruments would be of proper accuracy class and scale dimensions. Appropriate use of Earth Leakage Circuit Breakers (ELCBs) shall be ensured for all construction related to low voltage work.

9.2.7.2 Fire Prevention

In addition to the fire hydrant system, each individual zone will be equipped with a fire and smoke detection alarm system. The fire detection system will be interlocked with automated water sprinklers.

9.2.7.3 Carbon Monoxide (CO) Detection and Prevention

Carbon Monoxide (CO), a potentially toxic gas, is produced due to incomplete combustion of carbonaceous fuel. Exposure to CO, resulting from leakage and other accidental causes, is associated with symptoms such as headache, dizziness, fatigue, and even death at elevated concentrations. Therefore, it is essential to install carbon monoxide detectors/alarms in the EAF area and pipelines to detect the presence of carbon monoxide (CO) and trigger an alarm to alert personnel in case of CO leakage. This would facilitate immediate probing and management of the scenario. Proper maintenance of the detector system is crucial.

9.2.8 On-Site Emergency Plan

Emergency planning is an integral part of the environment and safety management of a steel manufacturing plant. Emergency may arise due to manmade reasons resulting in heavy leakage, fire, explosion, failure of critical control system, design deficiency, unsafe acts, etc., and natural causes like earthquake, flood, cyclone, excessive rain, etc. It is crucial for effective management of an accident to minimize the losses to the people and property, both in and around the facility, termed as on-site and off-site emergency plan.

The vital aspect in emergency management is to prevent accidents and losses by technical and organizational measures. Emergency planning demonstrates the organizational commitment to the safety of employees and adds to the organization's safety awareness.

The site-specific Emergency Response Plan will be prepared by MRSML at a later stage based on the outcome of Quantitative Risk Assessment. A generic template of ERP has been provided in Appendix F-5.

9.2.9 Disaster Management Plan (DMP)

A disaster is a catastrophic event that causes serious injuries, loss of life & extensive damage to Plant & property. It is a situation which goes beyond the control of the available resources of any authority or organization. A number of factors could trigger accidents leading to a disaster, some of which are as follows: (a) Process and safety system failures - Technical errors - Human errors (b) Natural Calamities: earthquake, Tsunami etc.

The DMP is formulated with an aim of taking precautionary measures to control hazard propagation and to take such action that the damage following a disaster is the minimum.

The objective of the DMP is to make use of the combined resources of the plant and the outside services to achieve the following:

- Effective rescue and medical treatment of casualties
- Safeguard other people

- Minimize damage to property and the environment
- Initially contain and ultimately bring the incident under control
- Identify any dead
- Provide for the needs of relatives
- Provide authoritative information to the news media
- Secure the safe rehabilitation of affected area
- Preserve relevant records and equipment for the subsequent
- inquiry into the cause and circumstances of the emergency.

In effect, DMP helps to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

The following hazards for disaster management have been considered:

- i. Fire
- ii. Explosion & Toxic release
- iii. Oil spillage/liquid metal spillage
- iv. Electrocution
- v. Accident

Elementary disaster management measures to prevent disaster due to the above-mentioned hazards are as follows:

- Design, manufacture, operation and maintenance of all plant machineries/structures as per applicable national and international standards as laid down by statutory authority,
- Intelligent formulation of layout to provide 'Assembly Point' and safe access way for personnel in case of a hazardous event/disaster, as can be inferred from Risk & Consequence modeling.
- Proper emergency (both on site & off-site) preparedness plan, emergency response team, emergency communication, emergency responsibilities, emergency facilities, and emergency actions shall be developed.
- Proper Alarm system and training the personnel for appropriate response during disastrous situation.
- Complete fire protection coverage for the entire plant as per regulatory stipulations.
- Creation and maintenance of Disaster Management cell with adequately trained personnel who can handle all sorts of emergency situation.
- Provision of funds for prevention of disaster, mitigation, capacity-building and preparedness.

MRSML to carry out a detail DMP prior to operation itself to frame a proper scheme for disaster management. However, this would be subjected to subsequent improvements as and when required for safe and efficient operation of the plan.

9.3 Flood Risk Assessment (FRA) of the Project Site

9.3.1 Scope of Works

The following scope of work has been covered for the preparation of the hydrological analysis and flood risk assessment under the ESIA study for the Greenfield Re-Rolling Steel Plant of Meghna Group in Cumilla Economic Zone of Bangladesh.

1. A reconnaissance field survey has been conducted to assess the water resources systems of the study area in Cumilla Economic Zone- and site-specific issues regarding flooding and potential risks.
2. Different types of assessments i.e., hydrological analysis, flood level analysis have been conducted and presented in the report.
3. Hydrological and hydro-meteorological data have been collected like rainfall, water level, discharge from government agencies like BWDB, BMD. As much as available 50 or more than

50-years of historical data have been collected and used in the analysis procedure for this study purpose. Nearest measurement gauge station data have been collected, no direct survey or observed data have been used for the analysis.

4. Maximum flood level analyzed and presented the 2-years (average), 10-year, 20-year, 50-year a 100-years flood return periods.
5. Flood prone areas have been identified from the secondary research data and GIS-based mapping has been done for this flood categorization of the study area.
6. To understand local topography, drainage network (canals /rivers/streams /ponds /wetland), land cover, and other hydrology-related variables based on site visit, satellite imagery, and satellite-based DEM data have been used.
7. Assessing the vulnerability of the site to natural hazards for climate change scenarios including - historical cyclones, floods, earthquakes, salinity etc., using secondary data sources.
8. Riverbank line shifting and erosion and accretion analysis for the study area have been done using the latest Landsat and/or Sentinel-based satellite images/data for the last 20 years.

9.3.2 Approach and Methodology of FRA

The approaches and methodologies of this study have been selected based on water resources engineering and scientific research and approaches and fact are validated through data collection and stakeholder consultation from a technical point of view. Different scientific water resources tools and techniques with appropriate methodologies have been applied to complete this study including field visits and collection of primary and secondary data of meteorological, hydrological and flood related information from the site area and from different sources and technical consultation with MGI stakeholders. For hydrological and flood risk analysis different geo-spatial analysis, hydrological and hydro-dynamic models, calibration, and validation of the model using established statistical rational methods have been used and rectified. Some key information about the hydro-morphological behavior of the study area has also been identified through topographic data collected and geo-satellite image analysis. Meteorological data of the nearest gauge stations and river cross-section data have been collected for the assessment and used for hydrological and flood modeling for this study. In order to comprehend the risk situation and mitigation potential from a site-specific perspective, various scientific and engineering analysis and modeling techniques were used for the hydrological and flood risk assessment of this project which comprises as follows:

- Site area investigation for soil, water and environmental problems and relevant data collection.
- Project area hydrological and flood related information collection and examining the natural water resources systems.
- Collection coordinates of rivers, canals, nals, bridges, culverts and road network condition of the project area and the surrounding areas.
- Natural climatic conditions like rainfall, temperature, humidity, hills, and forests that might affect the hydrological parameters.
- Flood level condition of the project area and the historical flood events of the project surrounding area.
- Natural drainage condition and discharge points/outlets of the project area and the water logging condition of the surrounding geographies.
- Identification of the rainfall gauge station, water level measuring gauge stations and the discharge network of the project area and the surroundings.
- Flood risk and flood prone zoning of the project area and the surroundings.
- Different types of hydrological and flood related data collection from the regional government offices and the data verification for the project site area.
- BWDB and Upazilla level administrative information that will be used in the hydrological calculation, modelling and justification for the project area.
- Using different types of software to evaluate the water resources of the project area and catchment delineation.

- Satellite based image analysis for the river morphological change identification like bank line shifting and riverbank erosion-deposition over the last 20-years.

9.3.3 Environmental Conditions

The project area is mainly flat land with elevated land conditions that have been observed there during the field visit to the project area in Luter Char of Meghna Upazila. MRSML plant is surrounded by land area and river area. At the east side project's main gate and village settlement area, at the west side there is a river branch flow sourced from main Meghna River, at the south side there is open land and river area and at the north of the project surrounded by river branch.

Inside the project area most of the plant area has been under well-constructed and some portions are still under construction. Roads, warehouse and administrative building and infrastructures have almost been constructed and some other structures like 'Wharf' at the west side of the project and other structures have been under construction. There is an important infrastructure around the project area is embankment cum accessible road at the north, south and north-west side of the project area. Some pictures of the project area are shown in the below **Figure 9-2**.

Figure 9-2: MRSML project inside area and outside area from the river location in CuEZ.



Source: EQMS, Feb 2024

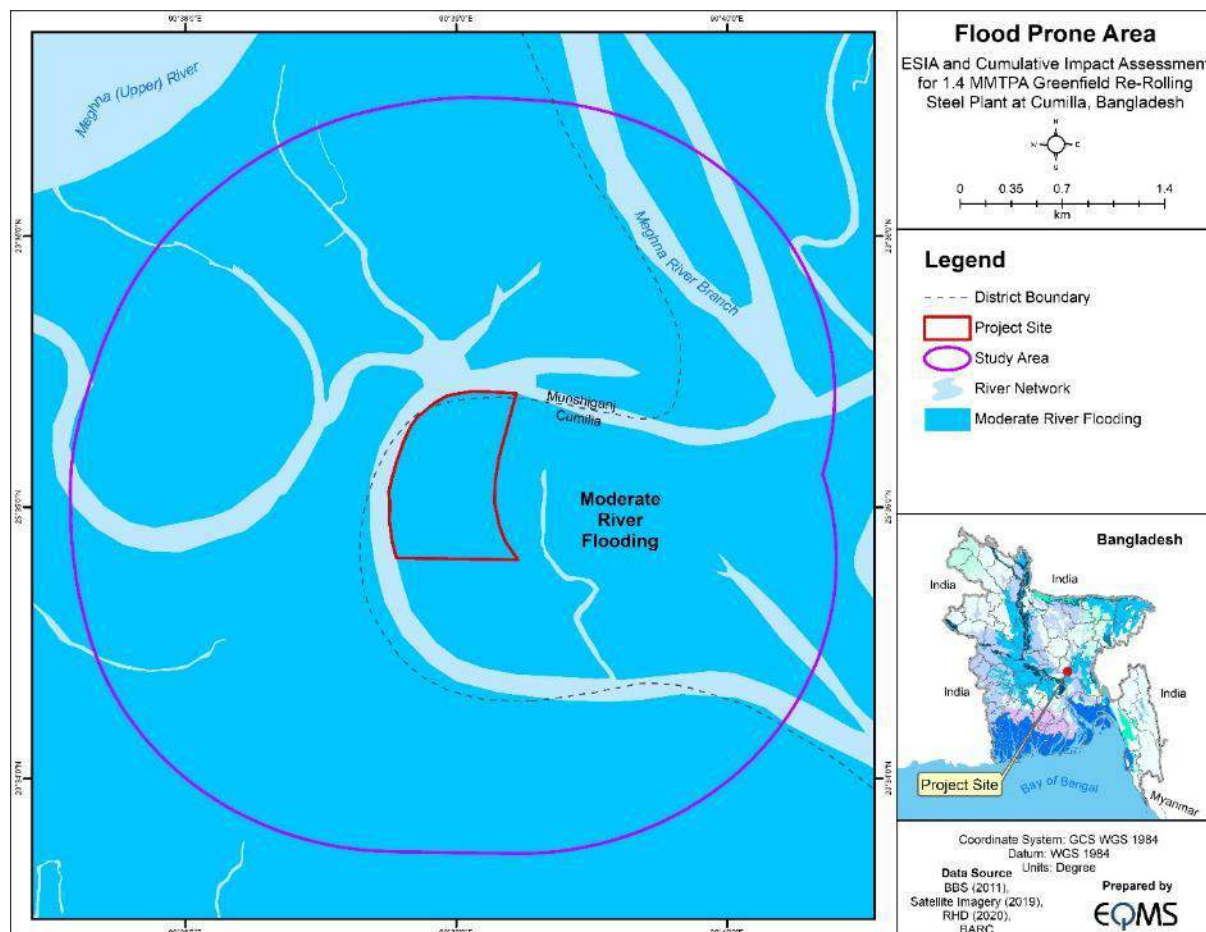
Around the Meghna Upazila there is a river and river branches with different ranges of shallow to medium depths. The main river of this Upazila is Meghna River, which is one of the largest deltaic rivers

among the GBM (Ganges-Brahmaputra-Meghna River) delta. According to the local government administrative information, there are 37 small canals in the Meghna Upazila.

9.3.3.1 Flood Conditions

According to the flood zoning mapping of Bangladesh by the Bangladesh Agricultural Research Council (BARC), the project area has fallen in the “Moderate River Flooding” zone as shown in the below **Figure 9-3**.

Figure 9-3: Flood category mapping of the study area in Cumilla.



Source: Bangladesh Agricultural Research Council (BARC), 2014

Inside the project area is a developed and elevated land area that has had no flooding experience since the commencement of the project development.

Different project site area and flood water marking have been shown in the below **Figure 9-4**.

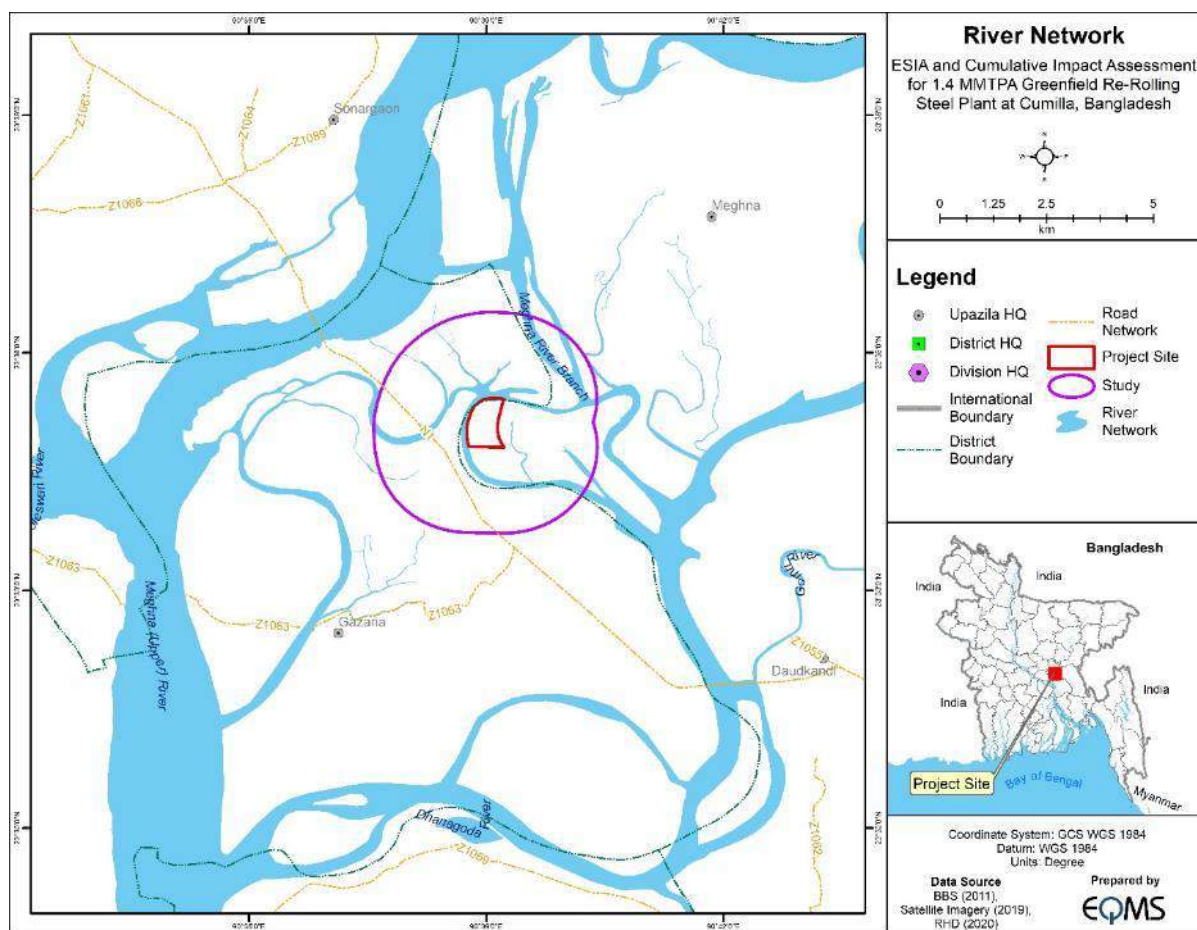
Figure 9-4: Flood Marking area at the Meghna Branch River beside the MRSML project.

 <p>At the Jetty (Wharf) area, No flooding above this mark</p>	 <p>At north-west side near wharf, No flooding above this</p>
 <p>At the west fencing (23.588777°, 90.647513°) No flooding above this marking</p>	 <p>At the opposite of west fencing (23.588, 90.646) Flooded up to 1m during heavy monsoon</p>
 <p>Flood mark at bridge pier near the south boundary of MRSML (23.580210°, 90.645690°). No flooding above this mark and exceed the MRSML project boundary.</p>	 <p>At west side GP School (23.571606°, 90.654936°). No flooding above this mark at the opposite of MRSML.</p>

The project area is surrounded by elevated land area which has no flooding history.

9.3.3.2 Water Resource System

The water resource systems of the project area are mainly comprised of Meghna Branch River and associated small canals as shown in the below **Figure 9-5**. The main Mehna River is located 2.8-3.0km from the MRSML project area.

Figure 9-5: River and canal systems round the MRSML project in Cumilla Economic Zone.

Source: Roads and Highways Department (RHD), 2020

The main riverine system of the project area is a Meghna River Branch that originated from the main Meghna River at the west side of the MRSML project area. Flood level and other hydrological systems have been analyzed based on the Meghna River measuring gauge stations. The main Meghna River is hydrologically connected with the Meghna Branch River adjacent to the MRSML project area at the west side. Though the riverbed level is not sufficient, such river conveyance capacity is enough to carry the moderate riverine flooding during heavy monsoon.

9.3.3.3 Topographic Conditions

The topography of the MRSML project inside area is flat land with different developed infrastructures like pitch black road cum embankment at the outer boundary with fencing and inside roads, building structures like warehouse, administrative building, production house steel structure, and wharf (jetty) area for anchoring small ships for transportation of raw materials. The below figure shows the land condition and different structures inside the MRSML project in Cumilla Economic Zone (CuEZ) in Cumilla.

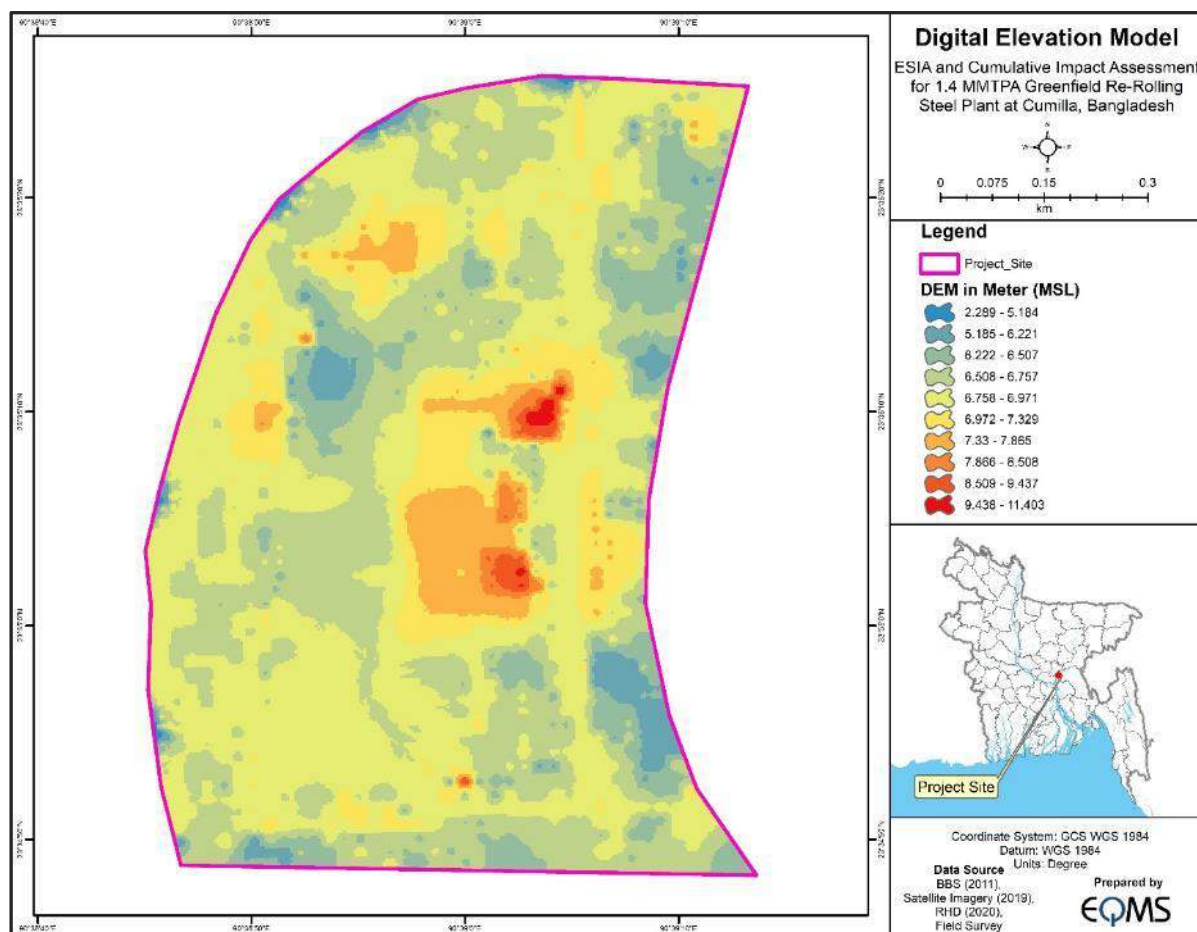
Figure 9-6: Road Elevation of the Project Site

The topographic elevation has been found between 2.289m (MSL) to 11.403m (MSL), which has been surveyed by the MRRSL. The elevation ranges and covered area are presented in the below **Table 9-4**.

Table 9-4: Elevation ranges for the MRSML project area.

S/L	Elevation Ranges (mMSL)	Covered area (Sq. m)	Area %
1.	2.289 - 5.184	1,157	0.16%
2.	5.185 - 6.221	20,077	2.78%
3.	6.222 - 6.507	69,311	9.59%
4.	6.508 - 6.757	226,344	31.32%
5.	6.758 - 6.971	284,621	39.39%
6.	6.972 - 7.329	76,585	10.60%
7.	7.33 - 7.865	33,458	4.63%
8.	7.866 - 8.508	6,083	0.84%
9.	8.509 - 9.437	3,759	0.52%
10.	9.438 - 11.403	1,226	0.17%

The average topographic elevation at the boundary condition ranges between 6.8-7.0m (MSL). Topographic elevations and variations have been shown in the **Figure 9-7**.

Figure 9-7: Digital Elevation Model (DEM) of the MRSML project area in CuEZ, Cumilla.

Source: Roads and Highways Department (RHD), 2020

The surrounding project boundary area is circumference with road cum embankment with high elevation and to protect the flood scenario during the heavy monsoon season from the Meghna River Branch. The topographic elevation in the surrounding road area ranges between 6.770m (MSL) to 7.155m (MSL). The project area is surrounded by road cum embankment at the north, north-west and south side and the elevation features from the Mean Sea Level (MSL) is shown in the below **Figure 9-8**.

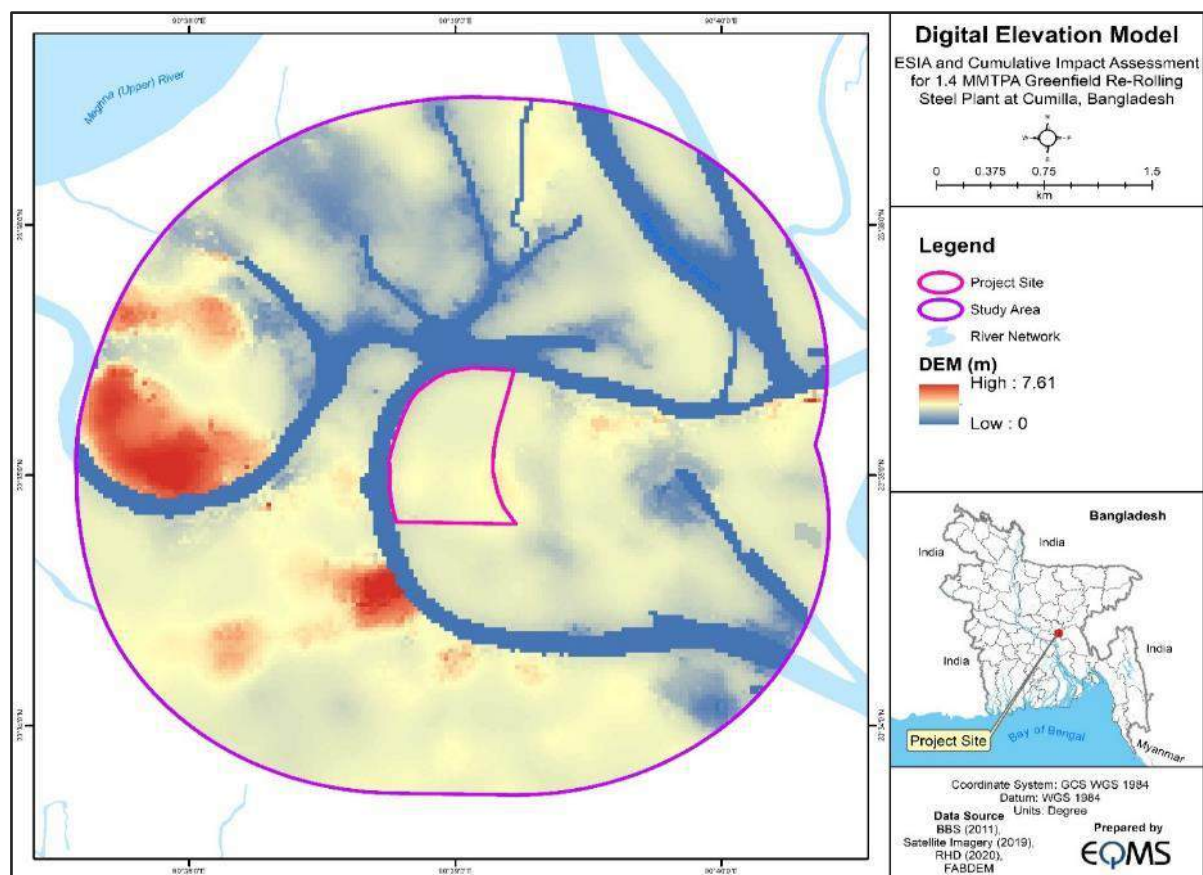
Figure 9-8: MRRSL Project boundary and some elevation points.



The Digital Elevation Model (DEM) of the study area within 2km showing MRSML project area, main Meghna and branch River adjacent to the project and surrounding is appended in **Figure 9-9**.

For the hydrological perspective 2km elevation data can be compared to understand the datum, elevated area near the river and project area in Cumilla. From the below figure, it has been observed that the maximum elevation was 7.61m (MSL).

Figure 9-9: Digital Elevation Model (DEM) map of the 2km study area.

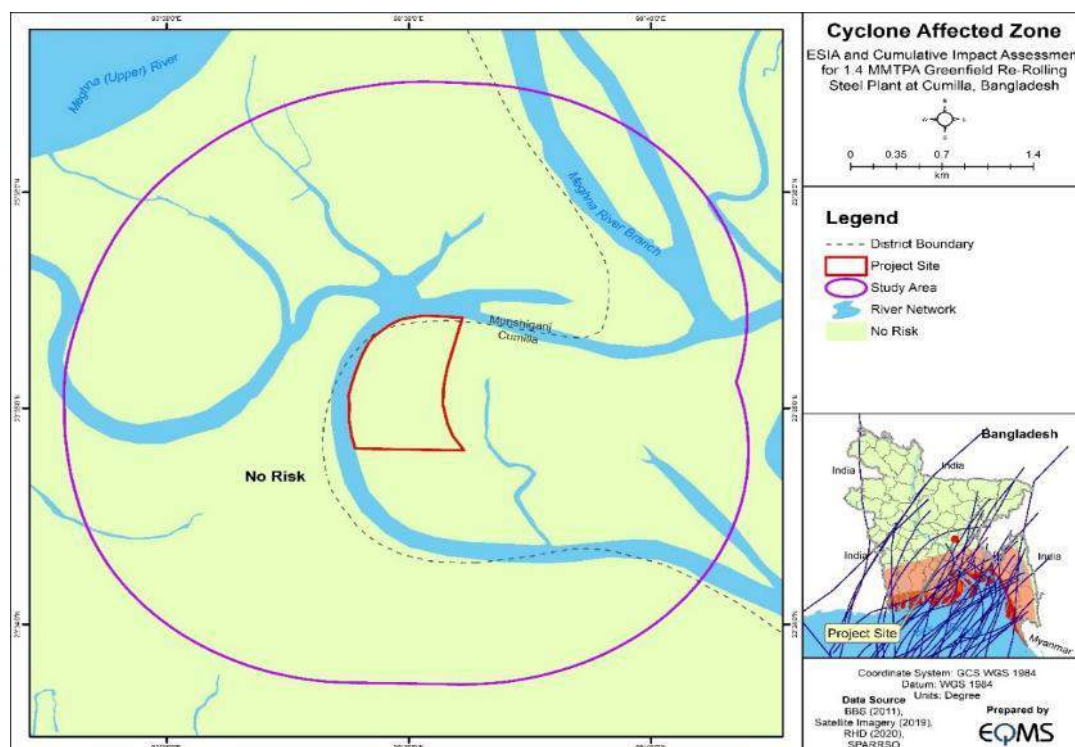


Source: Roads and Highways Department (RHD), 2020

9.3.4 Hydro-Meteorological Condition

9.3.4.1 Climate

The MRSML project area in Cumilla has fallen in the South-central climatic regions of Bangladesh. No such hazardous climatic events like extreme heat, low temperatures and cyclonic events were found for the project area. Rainfall, temperature and evaporation details have been incorporated in the ESIA baseline chapter. The cyclonic historical risk has been shown in the below **Figure 9-10**.

Figure 9-10: Cyclonic risk zone for the MRSML project area in Cumilla.

Source: Roads and Highways Department (RHD), 2020

From the above figure, it has been shown that there were no cyclonic events in the last more than 50 years.

9.3.5 Hydrological Analysis

Hydrological analysis is an important component for the Environmental and Social Impact Assessment (ESIA) studies for the compliance of the foreign funded projects involving water resources, infrastructure development, and land use planning. For the MRSML, different types of hydrological, morphological and flood risk potentiality analysis have been done like historical water level, river discharge and thereby flood frequency for the study area and max flood risk level for the project development. Along with hydrological and flood risk analysis river morphological analysis like riverbank line shifting, bank line erosion-deposition and nearest flood producing river's cross-sectional changes have also been presented in this chapter.

9.3.5.1 River Water Level

Meghna River is located 2.8-3.0 km from the MRSML project area. For the historical river water level of the analysis nearest river water level measuring gauge data station have been collected from the Bangladesh Water Development Board (BWDB). The nearest gauge station is located in the Meghna ferry ghat area in main Meghna River, which data have been used for the hydrological analysis, as no bathymetric and water level measurements have been done near the project site area. The measuring gauge station location and the MRSML project area are shown in the below **Figure 9-11**.

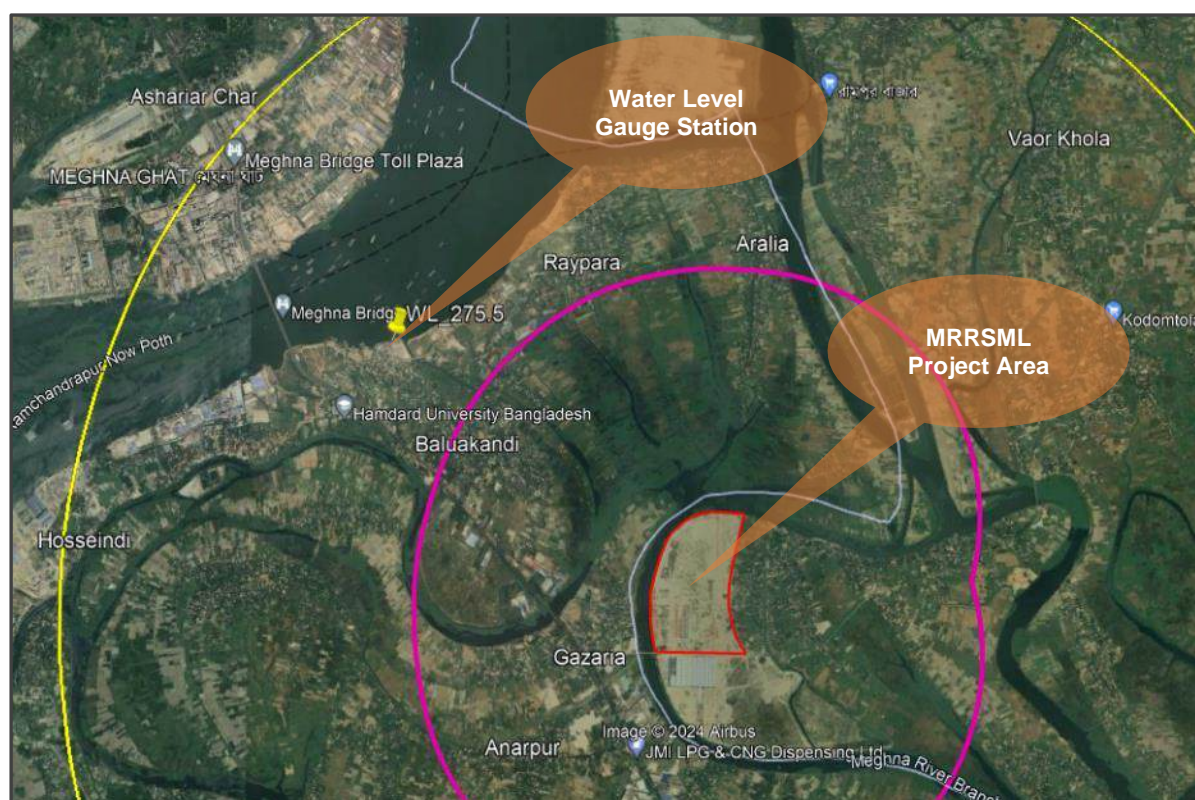


Figure 9-11: Location of Water level gauge station and MRSML project area in Cumilla.

For the historical water level data analysis, the Meghna River Ferry ghat gauge station (ID: SW 275.5) of surface water level data have been collected for last 57-years. From 1968 to Jan 2024 historical water level data have been collected. The historical maximum, minimum and average water level data are shown in the below **Table 9-5**. The water level datum has been compared with the mean sea level (MSL).

Table 9-5: Historical water level data from Jan 1968 to Jan 2024, unit are in meter MSL.

Year	Water Level (mMSL)		
	Max WL	Min WL	Avg. WL
1968	5.22	0.55	2.89
1969	5.17	0.39	2.37
1970	5.41	0.38	2.68
1971	5.30	0.39	2.38
1972	4.65	0.33	2.29
1973	4.98	0.32	2.60
1974	5.73	0.42	2.59
1975	4.83	0.58	2.42
1976	4.86	0.35	2.13
1977	5.13	0.32	2.56
1978	1.51	0.24	0.86
1979	x	x	x

Year	Water Level (mMSL)		
	Max WL	Min WL	Avg. WL
1980	5.36	0.59	2.88
1981	4.93	0.26	2.31
1982	4.73	0.18	2.19
1983	5.10	-0.26	2.50
1984	5.27	0.03	2.54
1985	4.98	0.43	2.51
1986	4.57	0.20	2.32
1987	5.53	0.37	2.56
1988	6.09	0.27	2.71
1989	4.76	0.40	2.47
1990	4.83	0.36	2.55
1991	5.05	0.40	2.62
1992	3.98	0.45	2.09
1993	4.99	0.44	2.57
1994	4.60	0.17	2.27
1995	5.44	0.03	2.51
1996	5.26	0.27	2.57
1997	5.07	0.47	2.30
1998	6.30	0.54	2.89
1999	5.47	0.27	2.74
2000	5.22	0.53	2.57
2001	4.87	0.45	2.48
2002	5.44	0.50	2.50
2003	5.28	0.22	2.52
2004	6.14	0.41	2.68
2005	5.02	0.40	2.53
2006	3.39	0.78	1.90
2007	3.04	0.44	1.42
2008	5.19	0.50	2.12
2009	4.66	1.02	2.63
2010	4.60	1.16	2.65
2011	3.86	0.29	1.85
2012	3.79	0.12	1.78
2013	3.74	0.09	1.88
2014	4.04	0.49	1.97

Year	Water Level (mMSL)		
	Max WL	Min WL	Avg. WL
2015	3.86	0.35	1.87
2016	4.02	0.04	1.88
2017	4.49	0.12	2.15
2018	4.32	0.62	2.23
2019	3.04	-1.18	0.62
2020	3.29	-1.03	1.28
2021	3.46	-0.24	1.34
2022	4.28	-0.11	1.57
2023	4.33	-0.45	1.70
2024* (Jan)	1.80	0.71	1.14
Max	6.30	1.16	2.89
Min	1.51	-1.18	0.62

Source: Bangladesh Water Development Board (BWDB), 2024. x = No data found due to technical issue.

From the above table, it has been observed that the maximum water level was 6.30m (MSL), the minimum water level was -1.18m (MSL) and maximum average water level was 2.89m (MSL). Max water levels have been found in the years 1974, 1988, 1998 and 2004.

The statistical standard parameters have been shown in the below Table 9-6. Statistical parameters have been used in the graphical analysis and distribution method validation process like goodness of fit test.

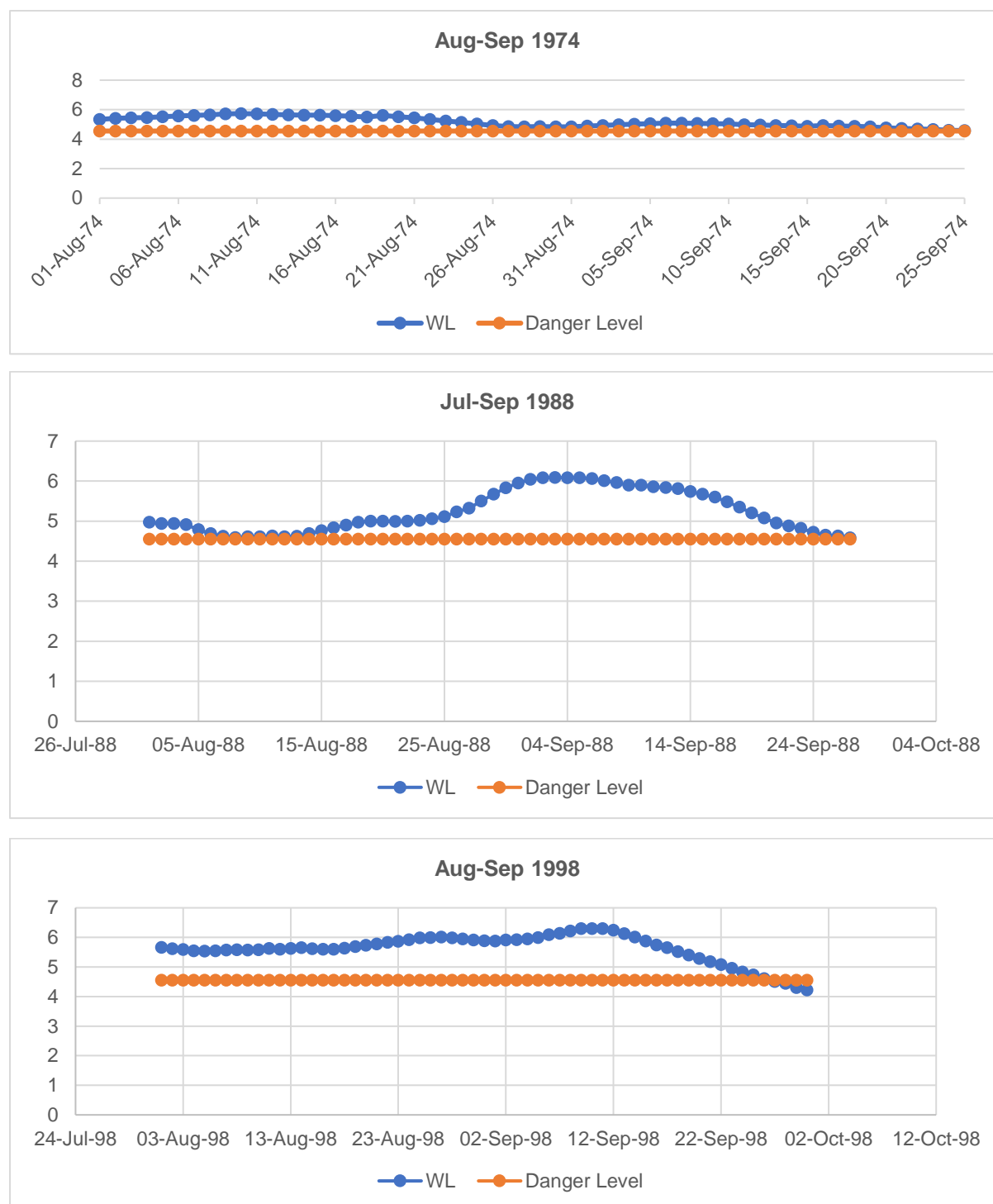
Table 9-6: Statistical parameters for the above annual maximum water level series.

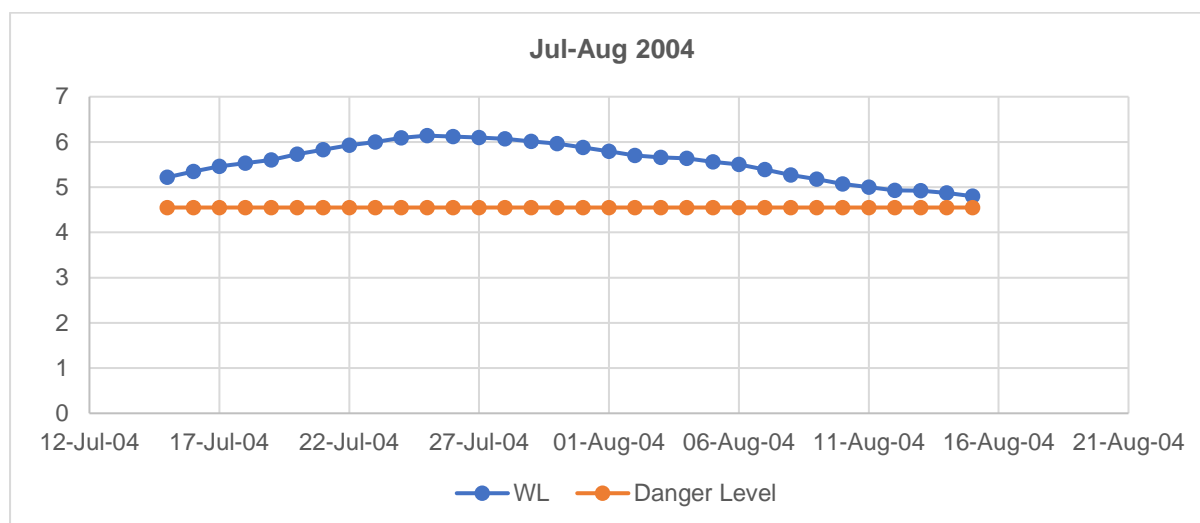
Parameter	Value	Parameter	Value
Mean	4.646732143	Skewness	-1.242416093
Standard Error	0.126081322	Range	4.79
Median	4.865	Minimum	1.51
Mode	3.86	Maximum	6.3
Standard Deviation	0.943506217	Sum	260.217
Sample Variance	0.890203981	Count	56
Kurtosis	2.264237198	Confidence Level (at 95%)	0.252672615

From the above table it is observed that the standard error was 0.12608, standard deviation was 0.943506, sample variance was 0.890203. The confidence interval was 0.252672615 indicating most of the data have been lies in this range and the upper and lower limit of maximum water level varies between 4.4m (MSL) to 4.9m (MSL) from the mean values of the normal distribution of the annual maximum water level series.

Different years flood hydrographs during the heavy flooding season have been shown in the below **Figure 9-12**.

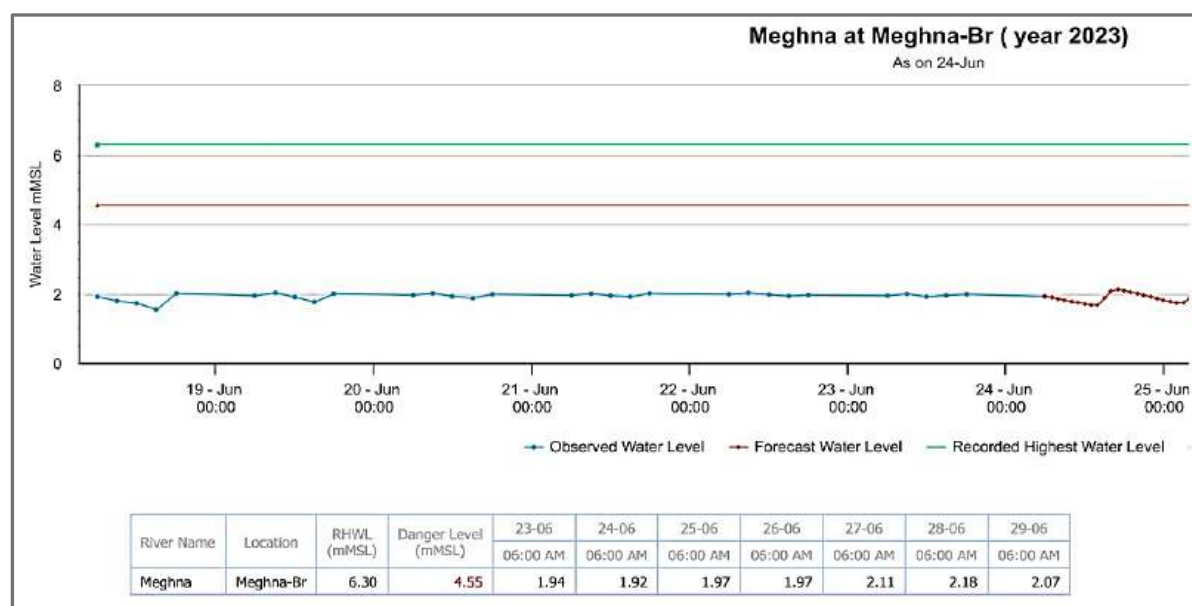
Figure 9-12: Flood hydrographs for the year 1974, 1988, 1998 and 2004.





For the Meghna Ghat area in the main Meghna River the BWDB mentioned danger level for the flood forecasting and warning level is 4.55m (MSL). For the latest water level and danger level measured by the BWDB in the month of June 2023 is shown in the below hydrograph **Figure 9-13**.

Figure 9-13: Water and danger level at Meghna River in June 2023 from BWDB source.



9.3.5.2 Flood Frequency Analysis

Flood frequency Analysis estimates how often the event occurs and to what magnitude. In addition, Flood frequency is the most important statistical technique in understanding the nature of the flood and magnitude of the high discharge in a river. So, the flood frequency analysis is carried out of the Meghna River using Gumbel Extreme Value (GEV) distribution method, which is one of the significant probability distribution methods used to model flood flows in a River. Flood frequency Analysis involves collecting the sample of the annual peak hydrograph or low in case of low flow hydrology, of the measuring gauge near to the project site area or as recorded by the government agencies like BWDB. As there was no direct measurement like bathymetry, water level and discharge adjacent to the project site, nearest BWDB gauge station recorded data have been used for the Gumbel method application.

Scientist Gumbel (1941) introduced the extreme value distribution and is commonly known as Gumbel's distribution. It is widely used in hydrologic extreme analysis for the prediction of flood peaks under

maximum likelihood of occurrence. To define the designed flood level according to the flood frequency, the criterion called return period T is commonly used. The plotting-position formula is termed as,

$$P = m/(N+1)$$

Where, m = order number of the event and N = total number of events in the data. The recurrence interval, T (also called the return period or frequency) is calculated as,

$$T = 1/P$$

Gumbel's equation is,	$X_T = \bar{x} + K \cdot \sigma_n - 1$
-----------------------	--

Where, $\sigma_n - 1$ = standard deviation of sample of size $N = \sqrt{\sum (x - \bar{x})^2 / (N-1)}$

K = frequency factor expressed as

$$K = Y_T - \bar{Y}_n / S_n$$

In which Y_T = reduced variate, a function of T and is given by

$$Y_T = -[In. In. \left(\frac{T}{T-1} \right)]$$

$$\text{Or } Y_T = -[0.834 + 2.303 \log \log \left(\frac{T}{T-1} \right)]$$

\bar{Y}_n = reduced mean, a function of sample size N

And, S_n is the reduced standard deviation, a function of sample size N .

Thus, N and S_n has been estimated by standard given statistical empirical values prescribed in a tabular format.

These are the Gumbel's derivatives or equations used in order to estimate the flood magnitude corresponding to a given return based on a total annual flood series⁴⁶.

Based on the historical maximum flood water level, discharge and considering other empirical parameters the flood frequency of the Meghna River is presented in the below Table 9-7. The flood frequency model is presented as 1-in-5 years, 10 years, 20 years, 50 years and one in a 100-years and average years flood return periods.

According to the statistical parameters and the confidence interval at 95% limit, a goodness of fit test for the Gumbel distribution have been shown in the below **Figure 9-14**, where the curve for the return periods and water level shows 83% coefficient in positive correlation, thus shows the good agreement for the result implication for the flood prediction. The upper and lower boundary of confidence interval have also shown very closely agreement with the annual maximum water level series and thus hold good result.

⁴⁶ Sonowal Gulap and Thakuria Gitika, Flood Frequency Analysis Using Gumbel's Distribution Method: A Lower Downstream of Lohit River (Dangori River), Assam (India). International Journal of Civil Engineering and Technology, 10(11), 2019, pp. 229-234.

Figure 9-14: Flood frequency distribution curve at upper and lower 95% confidence interval.**Table 9-7: Flood frequency analysis for 2, 5, 10, 20, 50 and 100-years flood return periods.**

S/L	Flood Return Periods (Years)	Highest Flood Level (mMSL)
1.	2 (Average years)	4.67
2.	5	5.43
3.	10	6.05
4.	20	6.64
5.	50	7.41
6.	100	7.99

According to the Gumbel distribution mathematical model, flood frequency analysis has been estimated as shown in the above table. From this table, it is observed that the highest flood level for 2 (average), 5, 10, 20, 50 and a 100-years flood levels will be 4.67, 5.43, 6.05, 6.64, 7.41 and 7.99 m (MSL) respectively. This flood level can be used for design formation level of the embankment, land development and flood protection hydraulic structures or upper deck level of the wharf (jetty) for the MRSML plant area in CuEZ of Cumilla.

9.3.5.3 River Morphological Changes

9.3.5.3.1 Riverbank Line Shifting

For the river morphological changes determination like riverbank line shifting different satellite images have been utilized like Landsat-5, Landsat-7 and Landsat-8. Based on the bank line positional vector shifting from the base line condition of each 5-years, change detection results have been generated. The below figures show the bank line shifting for the years between 2004-2024, last 20 years have been used.

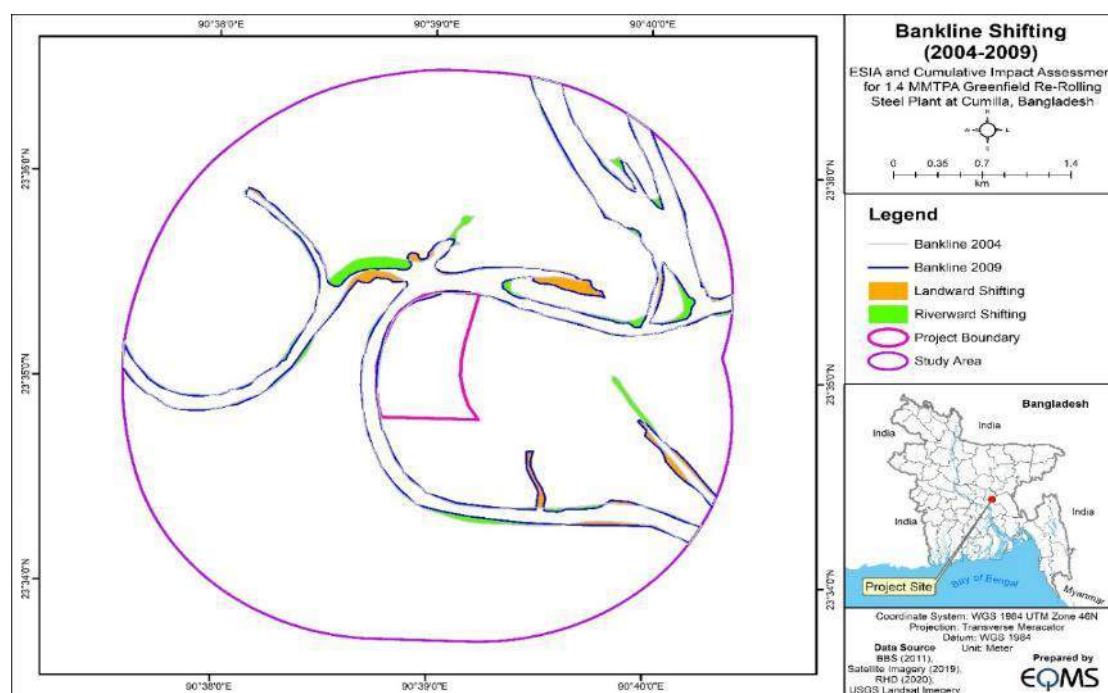
From the imagery analysis, Bankline shifting either landward or riverward have been detected and the amount of acre area have been presented for the overall understanding of the morphological changes as shown in the below table. In this analysis, riverward shifting means transfer of Bankline toward river side and similarly landward shifting means transfer of Bankline towards land (MRSML) side.

Table 9-8: River Bankline shifting analysis results for the year between 2004 and 2024.

Description	Year Interval Area (Acre)				Risk Domain
	2004-2009	2009-2014	2014-2019	2019-2024	
Riverward Shifting	82.79	221.22	22.87	50.94	Riverward dominated. No risk for MRSML
Landward Shifting	68.68	24.66	131.84	87.29	
Shifting Domain	Riverward dominated	Riverward dominated	Landward dominated	Landward dominated	
Total shifting area	210.68 Acre		145.31 Acre		

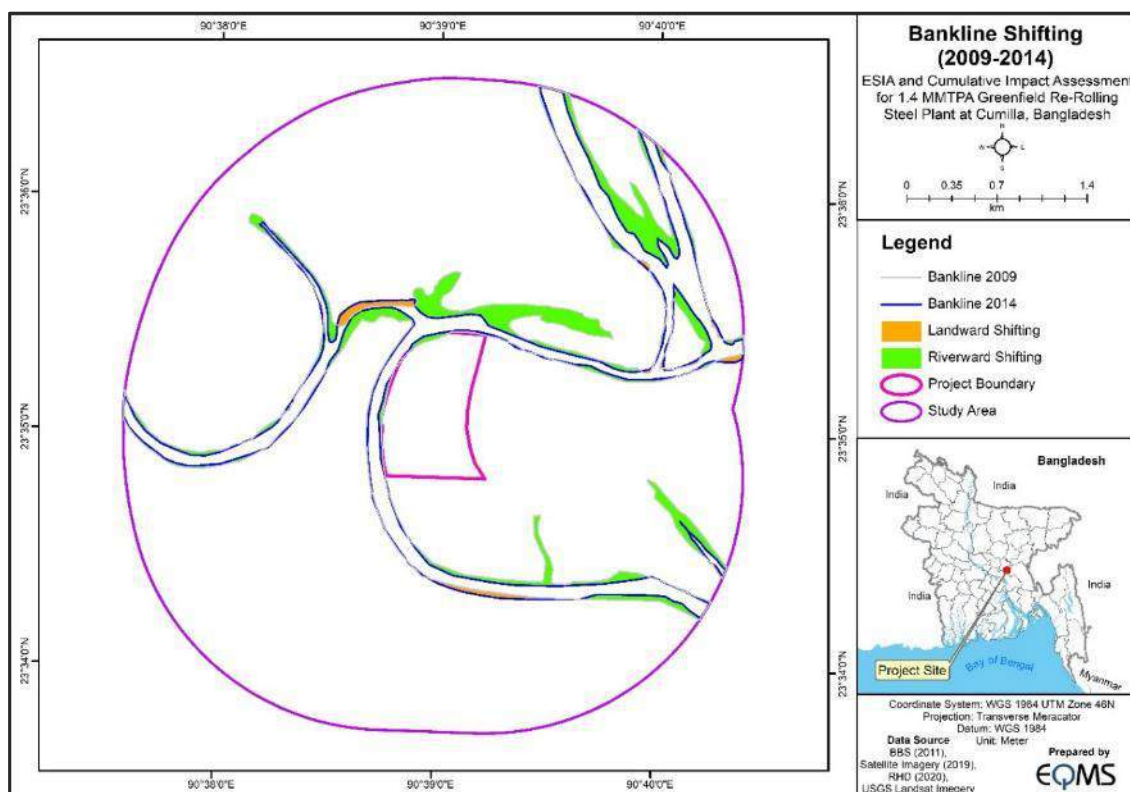
From the above table, it has been observed that the net riverward shifting was dominated over the time and no shifting due to bank erosion to MRSML project was found.

Figure 9-15: River Bankline shifting from the year 2004-2009.



Source: Roads and Highways Department (RHD), 2020

Figure 9-16: River Bankline shifting from the year 2009-2014.



Source: Roads and Highways Department (RHD), 2020

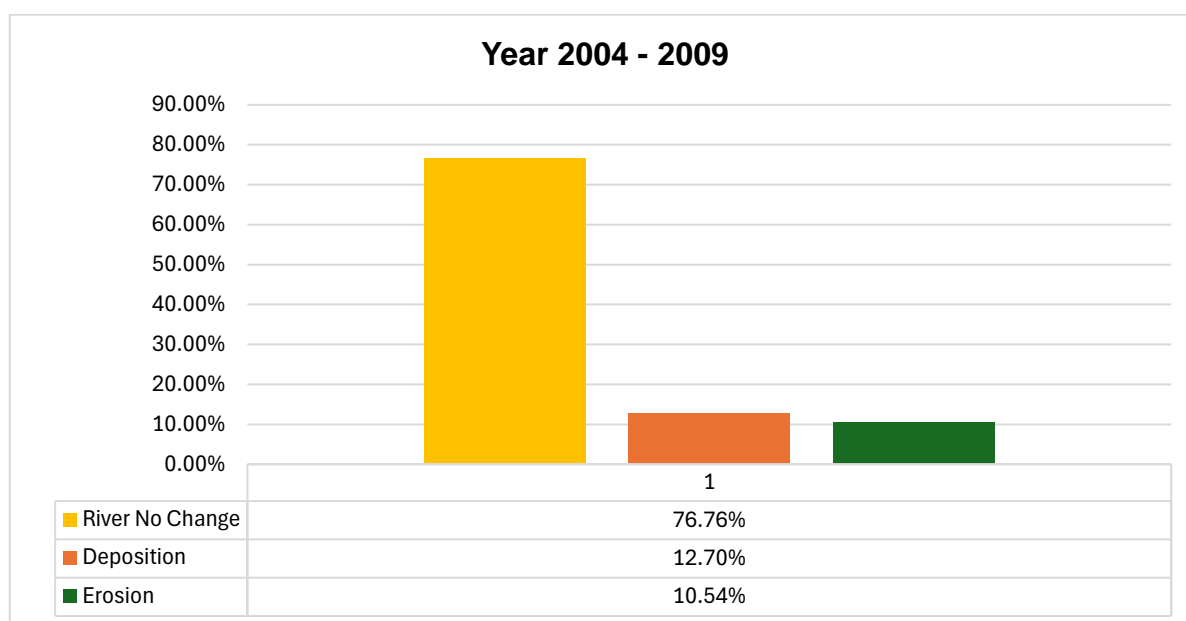
9.3.5.3.2 Riverbank Erosion-Deposition Analysis

Riverbank erosion and deposition analysis have been done also based on the satellite image analysis and net water and land index analysis to identify the overall riverbank erosion and deposition due to sedimentation by nature or man-made. The **Table 9-9** shows the river Bankline erosion and deposition near the MRSML project area and the Meghna River Branch area adjacent to the project.

Erosion-Deposition during the year 2004 – 2009

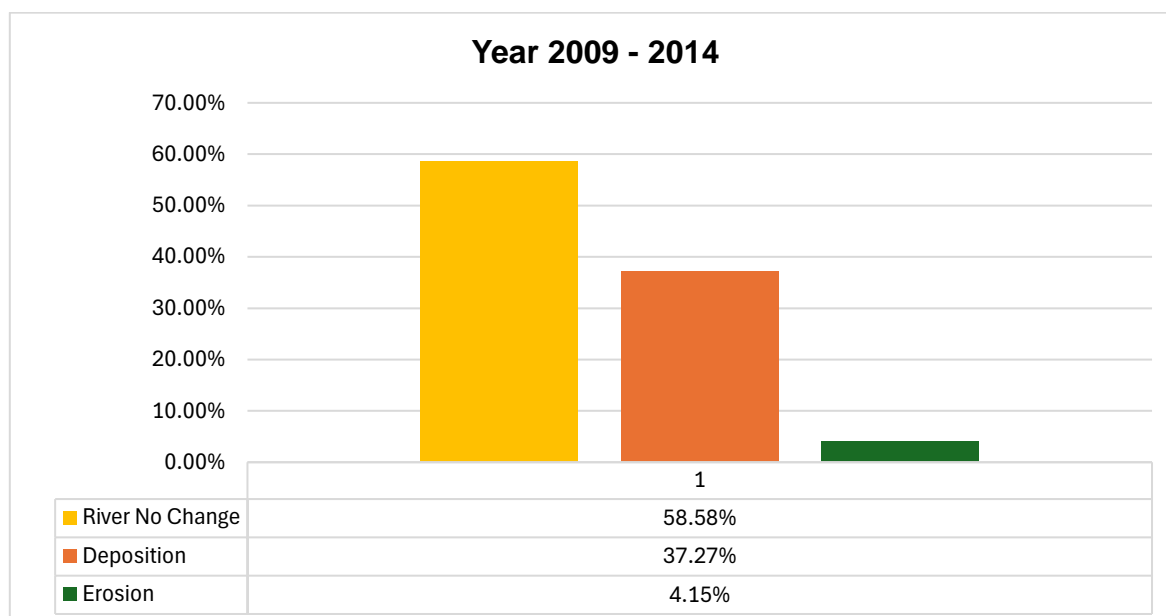
Description	Area (Acre)	Area (%)
River No Change	500.22	76.76%
Deposition	82.79	12.70%
Erosion	68.68	10.54%
Total =	651.69	100%

The graph below shows the erosion-deposition changes over the year.

**Erosion-Deposition during the year 2009 - 2014**

Description	Area (Acre)	Area (%)
River No Change	347.68	58.58%
Deposition	221.22	37.27%
Erosion	24.66	4.15%
Total =	593.56	100%

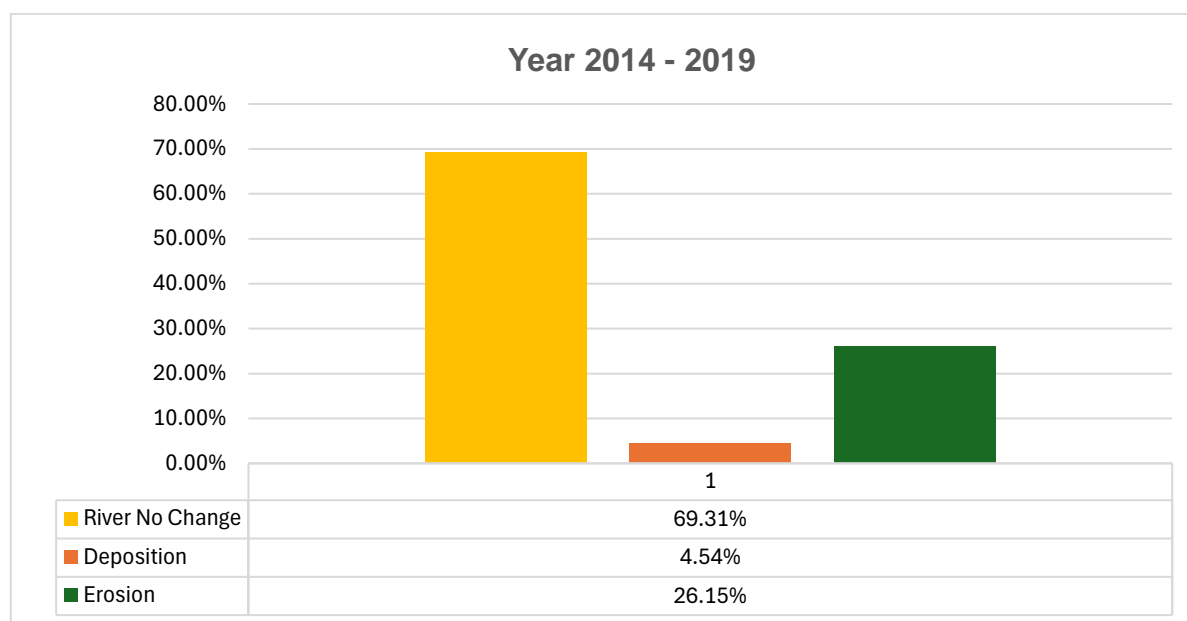
The graph below shows the erosion-deposition changes over the year.



Erosion-Deposition during the year 2014 - 2019

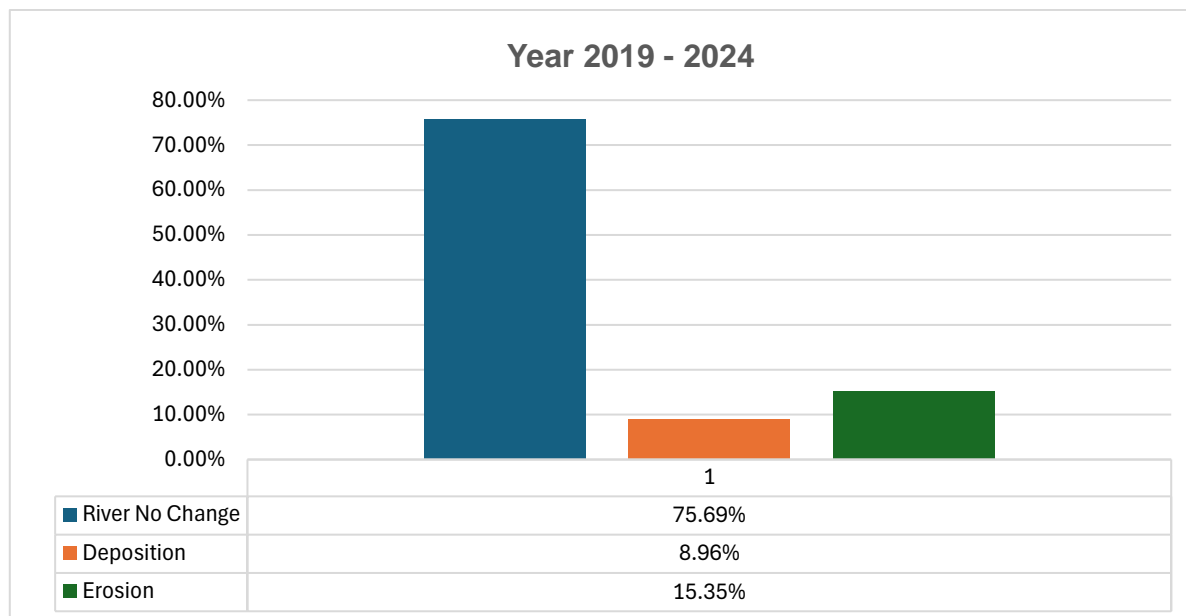
Description	Area (Acre)	Area (%)
River No Change	349.46	69.31%
Deposition	22.87	4.54%
Erosion	131.84	26.15%
Total =	504.18	100%

The graph below shows the erosion-deposition changes over the year.

**Erosion-Deposition during the year 2019 - 2024**

Description	Area (Acre)	Area (%)
River No Change	430.36	75.69%
Deposition	50.94	8.96%
Erosion	87.29	15.35%
Total =	568.59	100%

The graph below shows the erosion-deposition changes over the year.



The net erosion and deposition have been presented in the below **Table 9-9**.

Table 9-9: Riverbank erosion and deposition changes from 2004-2024.

S/L	Years	Change	Acre	Risk Domain
1.	2004 - 2009	River No Change	500.22	River no change dominated
		Deposition	82.79	
		Erosion	68.68	
2.	2009 - 2014	River No Change	347.68	River no change dominated
		Deposition	221.22	
		Erosion	24.66	
3.	2014 - 2019	River No Change	349.46	River no change dominated
		Deposition	22.87	
		Erosion	131.84	
4.	2019 - 2024	River No Change	430.36	River no change dominated
		Deposition	50.94	
		Erosion	87.29	

From the above table it has been observed that river no change condition is dominated. Thus, no risk.

9.3.6 Assumptions and Recommendations

The project area has no flooding history after the construction of MRSML project development area. Also, the drainage system of MRSML is sufficient.

From collected historical daily water level data of the main Meghna River located at the Meghna Ferry Ghat, it has been analyzed and found that the maximum water level was 6.30m (MSL), the minimum water level was -1.18m (MSL) and maximum average water level was 2.89m (MSL). Max water levels have been found in the years 1974, 1988, 1998 and 2004. Also found from the collected data that, BWDB forecasted danger water level was 4.55m (MSL) on that measuring gauge station.

From the Flood Frequency Analysis (FFA) it has been found that the highest flood level for 2 (average), 5, 10, 20, 50 and a 100-years levels will be 4.67, 5.43, 6.05, 6.64, 7.41 and 7.99 m (MSL) respectively, according to Gumbel Extreme value analysis methods of hydro-statistics. This flood level can be used for design formation level of the embankment, land development and flood protection hydraulic structures or upper deck level of the wharf for the MRSML plant area in CuEZ of Cumilla.

From river Bankline shifting analysis, it has been found that the net riverward shifting was dominated during the years between 2004-2024, and no such drastic shifting due to bank erosion or heavy flood flow to MRSML project boundary, thus indicating no risk. Similarly, from the analysis of riverbank erosion-deposition, it was found that “No River Change” condition is dominated. Thus, no risk found.

Following recommendations can be followed to establish a sustainable river management:

- River training or right of way clearance can be taken into consideration once a year to maintain the navigational area between the wharf to main Meghna River and the surrounding Meghna branch river to keep the flood conveyance capacity.
- Drainage pumping system can be operated during heavy monsoon if flood level submerged the drainage outlets at the boundary conditions of the MRSML area.
- Bank slope protection and maintenance can be considered to safeguard the bank failure. Grass turfing can be good and practicable in this regard.
- Water discharge rate through the drainage system around the project boundary can be maintained with pump systems, in case any heavy monsoonal flooding and rainfall-runoff shall not inundate inside the project area.

9.4 Climate Change Risk Assessment

9.4.1 Introduction

Climate change is leading to an increasingly unstable and potentially chaotic global setting for both infrastructure and the communities it supports. As the Earth's average temperature continues to climb, there's a growing prevalence of natural disasters like heightened instances of extreme heat, more frequent and severe extreme weather occurrences, prolonged droughts, recurrent floods and rising sea levels.⁴⁷ Furthermore, changes in policy, market dynamics, and legal frameworks are causing significant disruptions to the products, services, and systems that form the backbone of infrastructure assets, as countries worldwide shift towards a low-carbon economy.

Meghna Re-Rolling and Steel Mills Ltd. (MRSML), a concern of the Meghna Group of Industries (MGI), one of the largest conglomerates in the country, has taken significant strides towards establishing a Greenfield Re-Rolling Steel Plant with a capacity of 1.4 million Metric Tonnes per Annum (MMTPA). The production capacity will be 1.4 million Metric Tonnes per year, along with a billet capacity of 0.9 million Metric Tonnes per year, featuring various grades. The proposed project will be situated at Cumilla Economic Zone (CuEZ), Luterchar, Meghna, Cumilla, under the jurisdiction of the Bangladesh

⁴⁷ Intergovernmental Panel on Climate Change, 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the IPCC, <https://www.ipcc.ch/report/ar5/syr/>

Economic Zones Authority (BEZA) (Latitude: 23°34'59.46"N, Longitude: 90°39'0.58"E), covering a total project area of 71 acres.

The anticipated annual emissions from the steel plant throughout its operational phase have prompted the necessity for conducting a Climate Change Risk Assessment (CCRA), aligning with the stipulations of IFC PS 3.

Regarding the diverse consequences of climate change, there is widespread acknowledgment that ongoing greenhouse gas emissions will result in additional warming of the Earth. It's widely understood that surpassing a global average warming of 2°C above preindustrial levels could result in severe economic and social repercussions. These implications may include substantial regional and local climate alterations. Therefore, infrastructure projects like the proposed one must be engineered to accommodate anticipated climate changes and implement suitable plans and measures to adapt as necessary.

9.4.2 Objectives

This report has been prepared for the Client to assess the climate-related risks and opportunities associated with the construction and operation of the Project. This report has been prepared in accordance with the IFC PS 3 requirements and has considered the following:

- The current and anticipated climate change risks (transition and physical).
- Plans and processes are proposed to manage these risks, i.e., to mitigate or control; and,
- Project's compatibility with Bangladesh's national climate commitments

9.4.3 Scope of Assessment

The physical risk assessment encompasses evaluating potential climate-related risks linked to the construction and operation of the Project. This includes examining how these risks might impact the local community, businesses, and customers, and considering how the Project may exacerbate or mitigate these risks.

The scope of the transition risk and opportunity assessment covers the transition risks and opportunities for the Project, and its supply chain in relation to the low-carbon economy.

9.4.4 Definitions

Physical Risks: Can be event driven (acute) or longer-term shifts (chronic) in climate patterns and may result in direct damage to assets, resources or supply chain impacts, input prices, market impacts, liability due to failure to foresee and mitigate losses from any physical risks:

- Acute Risk: refer to those that are event-driven, including increased severity of extreme weather events, such as cyclones, hurricanes, or floods.
- Chronic Risk: refer to longer-term shifts in climate patterns (e.g., sustained higher temperatures) that may cause chronic heat waves.

Transition risks: Related to the transition to a low-carbon economy, including risks specifically associated with:

- Market and Technology Shifts: Relating to collapse in demand for products due to policy shifts, stranding of assets due to market shifts.
- Policy and Legal Changes: Including increased liability due to failure to foresee and mitigate losses from any transition risks.
- Reputation: Reputational damage resulting from an organization's limited response to mitigation needs.

9.4.5 Physical Climate Context of the Study Area

The project area in Cumilla district is hot and humid during summer while short and mild winters with heavy rain during monsoon season. The area has a tropical wet and dry climate. The period from mid-April to mid-June is the hottest and driest season while monsoon season commences from early mid-May till mid-October. The area also experiences heat stress due to high temperature and flood due to frequent waterlogging which is exacerbated by heavy rainfall during summer monsoon season⁴⁸.

Mean annual temperature and rainfall for the area (Dhaka) is indicated below:

	Annual	Winter (December, January, February)	Spring (March, April, May)	Summer (June, July, August)	Autumn (September, October, November)
Mean temperature (°C) (1991-2020)	25.53	20.9	27.9	29	26.8
Precipitation (mm) (1991-2020)	1900	12.7	144.4	342.9	168.4

9.4.6 Climate Change Policy Context

In line with IFC PS 3, this assessment has considered the Project's compatibility with Bangladesh's national climate commitments. A summary of Bangladesh's climate change policy and is provided below.

9.4.6.1 Bangladesh's Nationality Determined Contribution (NDC)

The Paris Agreement envisioned 196 Parties uniting with the aim of reshaping their development paths, with the goal of constraining global warming to a range of 1.5°C to 2°C above pre-industrial levels. Each Party under the Paris Agreement is obligated to formulate, communicate, and uphold successive Nationally Determined Contributions (NDCs) outlining their intended actions. These NDCs represent the collective efforts of each country to lower national emissions and adapt to the effects of climate change.

Bangladesh's Intended Nationally Determined Contributions (INDC) propose an unconditional reduction of around 5% (equivalent to 12 million tons) in greenhouse gas (GHG) emissions from the Business as Usual (BAU) scenario by 2030. Additionally, there's a conditional reduction target of 10% (equivalent to 24 million tons) in GHG emissions compared to the base year of 2011, contingent upon support from the international community. The Bangladesh National Action Plan for 2030 aims to decrease black carbon emissions by 40% and methane emissions by 17%. Furthermore, there's a target to reduce national primary energy consumption per unit of GDP by 20% by 2030 compared to the 2013 level, with an expected total saving of 113 billion m³ of gas equivalent during this period.

In Bangladesh, the highest contribution to greenhouse gas (GHG) emissions in the energy sector comes from Industry (24.91% of the total), followed by Power (23.24% of the total) and Transport (8.86% of the total)⁴⁹. Mitigation measures, funded through internal resources and contingent upon current local capacity, would be implemented in the unconditional part of the Nationally Determined Contributions

⁴⁸ https://ncc.portal.gov.bd/sites/default/files/files/ncc.portal.gov.bd/page/af95f19d_c59b_4e49_9911_4a8eb9999b53/2021-0121-13-19-0b6388114e1326c32714a6c906747ad5.pdf

⁴⁹ Ministry of Environment, Forest and Climate Change, Government of The People's Republic of Bangladesh, https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Bangladesh%20First/NDC_submission_20210826revised.pdf

(NDC). Conditional emission reduction, reliant on international funding and technological support, would be implemented accordingly. In the unconditional scenario, a reduction of 6.73% of GHG emissions in the respective sectors is targeted by 2030, with 95.4% of the reduction coming from the energy sector, 2.3% from agriculture, and 2.2% from the waste sector. In contrast, the conditional scenario aims for a reduction of 15.12% of GHG emissions in the respective sectors by 2030. Out of this, 96.46% will be from the energy sector, 0.65% from agriculture, and 2.97% from the waste sector, respectively. The conditional mitigation measures would only be implemented if there is external financial or technological support, in addition to the proposed actions outlined in the unconditional scenario.

Bangladesh has made significant strides in promoting renewable energy, with the installation of around 6 million solar-home systems, contributing to the adoption of environmentally friendly technologies like solar energy, bio-gas plants, and Effluent Treatment Plants throughout the country. Additionally, the government has embraced a comprehensive 100-year strategic plan known as the Bangladesh Delta Plan 2100, aimed at fostering sustainable development. Furthermore, the government has formulated the Bangladesh National REDD+ Strategy (BNRS) to curb carbon emissions from the forestry sector. Initiatives such as the planting of 10 million tree saplings by the Bangladesh Forest Department (BFD) and 5.4 million Palm trees by the Ministry of Disaster Management and Relief are underway across Bangladesh, serving as carbon sinks to mitigate emissions.

To address climate change and promote low-carbon economic growth, Bangladesh has established the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) and the National Adaptation Programme of Action (NAPA), initially developed in 2005 and later revised in 2009. Despite contributing less than 0.35% of global emissions, Bangladesh has implemented mitigation measures aligned with the objective of limiting warming to 2 degrees Celsius. The country has committed to a long-term goal of not surpassing the average per capita greenhouse gas (GHG) emissions for developing nations. Bangladesh continues to pursue actions aimed at embracing a low-carbon development pathway.

9.4.6.2 Increasing Steel Demand in Bangladesh

Bangladesh has emerged as the world's third-fastest-growing economy, consistently maintaining a GDP growth rate of over 6% despite facing challenges such as political unrest, structural limitations, pandemics, and global economic fluctuations. According to the Asian Development Outlook (ADO) September 2023 report, Bangladesh's GDP growth is forecasted to reach 6.5% in the fiscal year 2024, compared to 6.03% in the previous fiscal year. This robust economic expansion necessitates extensive infrastructure development, highlighting the critical demand for steel. The steel industry in Bangladesh plays a pivotal role in driving industrial progress and serves as a cornerstone of the economy. Presently valued at BDT 55,000 crore (USD 6.2 billion), the steel industry is witnessing significant growth, with per capita steel consumption projected to rise from 45 KG in 2022 to over 100 KG by 2030⁵⁰. Production capacity is increasing rapidly, with both production and demand growing at an annual rate of 10%. Bangladesh currently hosts 40 modern and 150 traditional steel factories. While the COVID-19 pandemic led to an economic slowdown, causing a slight decrease in per capita steel consumption from 45 KG to 43 KG in 2022, the overall trajectory indicates a strong upward trend in steel demand and production in Bangladesh.

The global iron and steel market had a value of USD 1,599.4 billion in 2022, and it is anticipated to reach USD 1,928.6 billion by 2027, with a compound annual growth rate (CAGR) of 3.8% during the forecast period from 2022 to 2027. This data comes from MarketsandMarkets, a prominent global market research and consulting firm headquartered in India. According to the World Steel Association, world crude steel production totaled 1256.4 million metric tons in the January–August 2023 period, marking a slight growth of 0.2% year over year. In August 2023 alone, world crude steel production reached 152.6 million metric tons, indicating a 2.2% increase compared to August 2022. China retained its position as the leading producer of world crude steel, generating 712.9 million metric tons during the

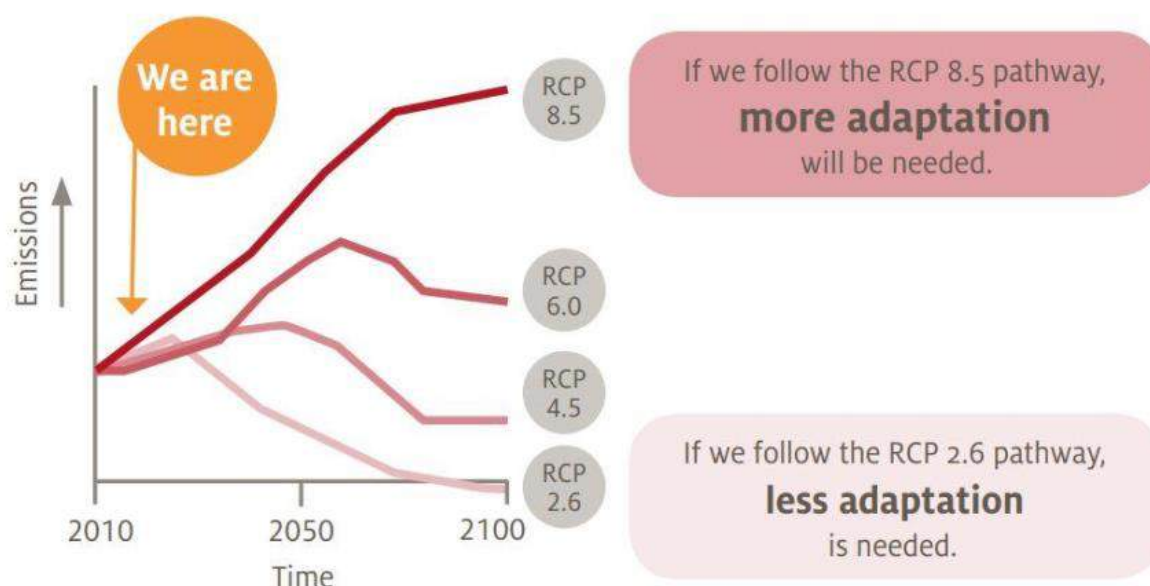
⁵⁰ <https://www.tbsnews.net/supplement/bangladesh-eyes-doubling-steel-production-2030-679418>

January–August 2023 period, representing a 2.6% year-over-year growth and contributing to 56.7% of the global crude steel production during the first six months of 2023. India and Japan maintained the 2nd and 3rd positions, respectively, during the first half of 2023.

9.4.7 Assessment Methodology

In adherence to the requirements outlined in IFC PS 3, this section delineates the methodology employed for conducting the Climate Change Risk Assessment (CCRA). The process began with desk-based research to acquire future climate change projection data specific to the Project location. Subsequently, a staged approach was employed to identify potential physical climate-related risks associated with the Project.

Figure 9-17: Representative Concentration Pathways to predict the Future Climate Impact



Source: National Climate Change Adaptation Research Facility, 2023

Figure 9-17 shows emission trajectories over time in terms of Representative Concentration Pathways (RCPs), developed by the Intergovernmental Panel on Climate Change (IPCC). RCPs present possible physical states of the future climate, where GHG concentration is dependent on the level of mitigation action undertaken between now and then. RCPs are based on global research and existing literature and comprise four scenarios: RCP8.5, RCP6.0, RCP4.5 and RCP2.6 (Intergovernmental Panel on Climate Change (IPCC), 2014), each reflecting a different concentration of global GHG emissions reached by 2100.

- **RCP2.6** – Major GHG mitigation scenario (atmospheric concentration levels of 430 – 480 ppm CO₂-e by 2100).
- **RCP4.5** – Some GHG mitigation, stabilization scenario (atmospheric concentration level of 580-720 ppm CO₂-e by 2100).
- **RCP6.0** – Some GHG mitigation, stabilization scenario (atmospheric concentration levels of 720-1,000 ppm CO₂-e by 2100); and
- **RCP8.5** – Very high GHG emissions scenario, little effort to reduce emissions (atmospheric concentration levels of >1,000 ppm CO₂-e by 2100).

Climate projections for Representative Concentration Pathways (RCPs) 4.5 and 8.5 were evaluated to assess potential impacts and consequences on the construction and operation of the project. RCP8.5 represents a pathway characterized by the highest concentration of emissions, which is likely to result in heightened intensity and severity of extreme weather events. This scenario is indicative of inadequate

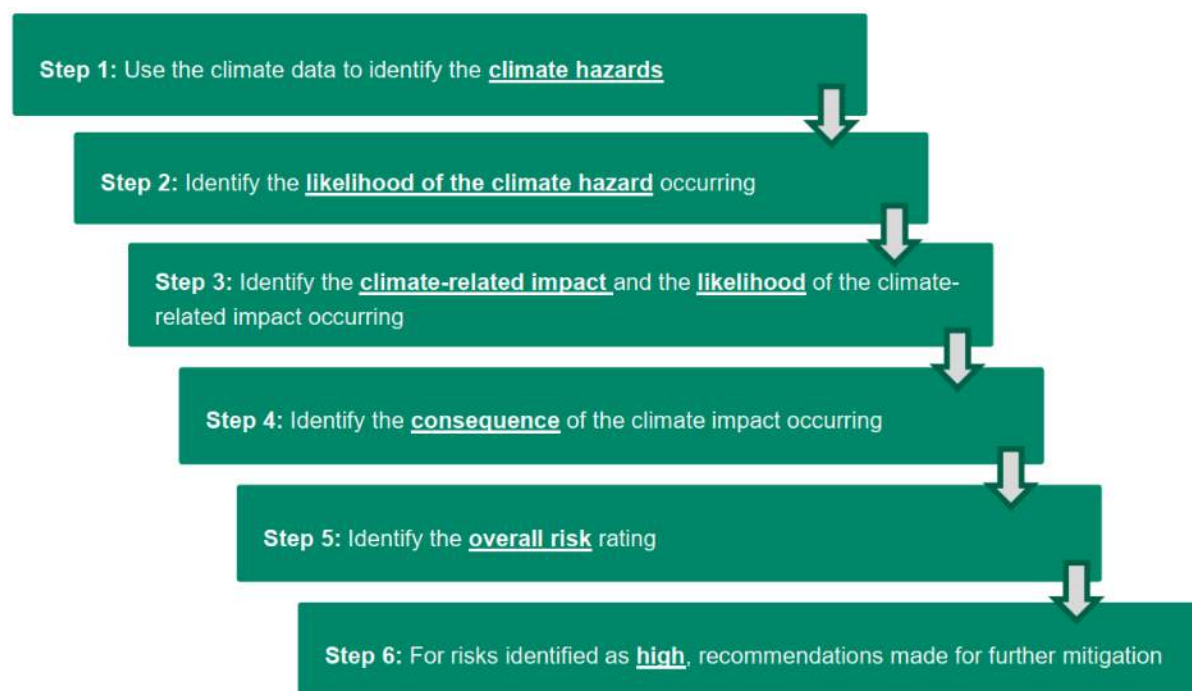
policy responses and an increased risk of physical asset damage. On the other hand, RCP4.5 presents a scenario where some greenhouse gas (GHG) mitigation measures are implemented, leading to potentially less severe impacts compared to RCP8.5.

9.4.7.1 Physical Risk Assessment

Time horizons: Physical climate-related risks during the construction and operation of the Project were considered following time frames as specified in Climate Change Knowledge Portal (CCKP) by World Bank:

- Projections for the next 10-20 years represent a range of averages between 2020-2039 which cover construction, commissioning, and the beginning of the operational design life.
- Projections covering the remainder of the operational design life representing a range of averages up to 2059 to reflect the 40-year operational design life of the project.

Risks were evaluated and prioritized based on their likelihood, which considered factors such as current and projected future climate conditions, and consequence, which incorporated professional expertise, judgment, and available evidence regarding vulnerabilities, thresholds, and criticalities. This assessment aimed to identify priority risks for the project.



9.4.7.1.1 Step 1: Use climate data to identify the climate hazards

Dhaka region data has been used from the World Bank Climate Change Knowledge Portal (CCKP)⁵¹ and ThinkHazard⁵² developed by the Global Facility for Disaster Reduction and Recovery. These are two globally recognized databases for climate data projections. Climate projections data have been obtained from the World Bank CCKP, which uses multi-model ensembles, as they represent the range and distribution of the most plausible projected outcomes when representing expected changes. Climate change variables (e.g., mean temperature, maximum daily temperature, precipitation etc.) have been downloaded from the World Bank CCKP to identify potential hazards, such as:

- Higher mean temperatures

⁵¹ World Bank Group (2020) Climate Change Knowledge Portal

⁵² ThinkHazard is a web-based flagging system for highlighting various environmental hazards in a particular area. It is developed by the Global Facility for Disaster Reduction and Recovery (GFDRR), which is a partnership managed by the World Bank.

- Higher maximum temperatures, more frequent hot days, and more frequent heatwaves
- Changing pattern in rainfall
- More frequent and more intense heavy rain

Due to the uncertainty of climate change projections for wind, data has not been collected for this variable.

9.4.7.1.2 Step 2: Identify the likelihood of the climate hazard occurring

Using the data gathered in Step 1, the likelihood of the climate hazard occurring at the Project for each time period was assessed as high, moderate, low, or negligible, considering the relative change from existing conditions. The description of the level/rating of hazard is shown in Table 9-10.

Table 9-10: Description of the level/rating of hazard

Description	Rating
Without taking measures to mitigate the hazard and risk, high levels of damage can be expected to occur within the Project or human lifetime.	High
Potentially damaging events can be expected to occur within the Project or human lifetime and measures to mitigate the hazard and risk should be considered.	Moderate
Potentially damaging events are less likely to occur within the Project or human lifetime but are still possible. Measures to mitigate the hazard and risk would be prudent at critical locations. Hazard has been classified based on long-term averages, and there is still potential that damaging events could occur in this timeframe.	Low
Available data suggest that potentially damaging effects are unlikely to occur, on average, in the Project or human lifetime. Hazard has been classified based on long-term averages, and there is still potential that damaging events could occur in this timeframe.	Negligible
No dataset covering the chosen location is currently available	No Data Available

9.4.7.1.3 Step 3: Identify the climate-related impact and the likelihood of the climate related impact occurring

The potential impacts associated with climate hazards have then been identified. For example, the impacts associated with higher temperatures, more frequent hot days, and more frequent heatwaves, could include:

- Increased heat stress/ heat exhaustion of workers.
- Increased energy demand due to increased cooling requirement or air conditioning; or
- Equipment / machinery failure.

The likelihood of the impact occurring has then been rated as high, moderate, low or negligible based on knowledge of the Project's operations, existing climate conditions, and the site's vulnerability to the climate hazard. The likelihood of the climate-related impact occurring has been adjusted based on whether the impact being considered is going to occur every time the hazard occurs or not. Vulnerability and exposure to climate hazard have been considered when identifying the likelihood of the climate-related impact, as this could drive / reduce the scale of the impact.

9.4.7.1.4 Step 4: Identify the consequence of the climate-related impact

The potential climate impacts have then been identified, for example, a consequence of heat stress in the workforce might be reduced revenue and higher costs from negative impacts on workforce. The significance of the consequence has been rated as high, moderate, low or negligible based on the following criteria:

- High: Significant disruption to operations, unable to deliver services, resulting in high financial losses.
- Moderate: Disruption to operations and ability to deliver services, resulting in some financial losses/ cost implications.
- Low: Minor disruption to operations but does not significantly impact ability to deliver services.
- Negligible: Negligible disruption to operations does not impact ability to deliver services.

9.4.7.1.5 Step 5: Identify the overall risk rating

The overall risk rating for the short and medium-term time horizons was determined by assessing the combination of the likelihood of the climate-related impact occurring, and the consequence, as per the risk assessment matrix in Table 9-11.

Table 9-11: Overall Physical and Transition Risk Rating

		Likelihood of climate-related impact occurring			
		Negligible	Low	Moderate	High
Consequence	Negligible	N	N	L	L
	Low	N	L	L	M
	Moderate	L	L	M	H
	High	L	M	H	H

9.4.7.1.6 Step 6: Recommendations for further mitigation

For risks identified as high, after taking account of measures incorporated into the Project design to the climate change impact, further recommendations have then been provided to reduce the risk.

9.4.7.2 Transition Risks and Opportunities

An assessment of the key transition risks and opportunities associated with the transition to a low carbon economy for the Project has been undertaken. For this assessment, RCP2.6 and 4.5 were used. According to the 2021 World Energy Outlook published by the International Energy Agency, climate-related disclosures regarding risks and opportunities should encompass at least two scenarios: one reflecting a lower level of warming and another surpassing 2°C. This approach is crucial for gaining a deeper understanding of the potential impacts or implications of climate change on the respective organization.

RCP 2.6 is considered the most appropriate climate scenario for considering transition risks as it assumes drastic action in terms of climate policy, emissions regulation/reduction, and technological growth. It also represents the climate scenario most closely aligned with delivering the Paris Agreement targets related to limiting the level of global temperature change.

RCP4.5 is considered because the projected temperature in this scenario is more than 2°C ranging between ~2.5°C to ~3°C⁵³ unlike other higher emission scenarios emitting more than 3°C, and therefore unrealistic for the study.

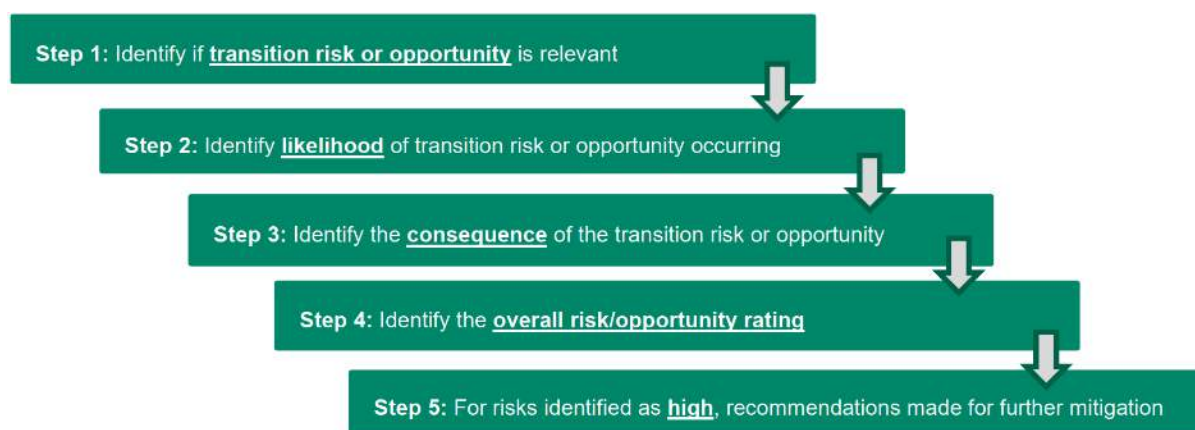
⁵³Pielke, R., Jr, Burgess, M. G., & Ritchie, J. (2021, March 23). Most plausible 2005-2040 emissions scenarios project less than 2.5 degrees C of warming by 2100. <https://doi.org/10.1088/1748-9326/ac4ebf>

The assessment focused on risks and opportunities over the following timeframes:

- 2021-2025
- 2026-2035
- Beyond 2035

Risks and opportunities were ranked and assessed according to Likelihood (based on research into carbon policy, legislation, and pricing) and Consequence (based on professional knowledge and judgement and existing evidence and data on vulnerabilities, thresholds, and criticalities) and to determine priority risks and opportunities.

The stepped approach includes:



9.4.7.2.1 Step 1: Identify if transition risk or opportunity is relevant

A screening of the transition risk and opportunity categories, listed below, was undertaken to determine which are relevant to the Project.

Examples of transition risks:

- Policy & Legal: Carbon reporting obligations. Regulation of existing products
- Technology: Costs for lower emissions technology
- Reputation: Increased stakeholder concern

Examples of transition opportunities:

- Resource Efficiency: More efficient production processes. Increased recycling. Reduced water usage.
- Energy Source: Use of low emissions energy.
- Products & Services: Development of new products.
- Markets: Access to new markets.
- Resilience: Adoption of energy efficiency measures.

9.4.7.2.2 Step 2: Identify the likelihood of the transition risk/opportunity occurring

The likelihood of climate-related transitional risks and opportunities has been evaluated through desk-based research into Bangladesh's carbon policy, legislation, pricing, and updates to the Nationally Determined Contribution. This likelihood will be ranked from high (very likely) to negligible (unlikely) for the duration of the Project.

The likelihood of the transition risk occurring has been based on current Bangladesh policy and it should be noted that any future changes in national policy could influence the future likelihood of the transition risk occurring.

9.4.7.2.3 Step 3: Identify the consequence of the transition risk/opportunity occurring

The consequences of each transition risk and opportunity have then been identified. The consequence is any effect on the Project's operations as a result of the transition risk or opportunity. Consequences have been rated as high, moderate, low or negligible based on the criteria in Table 9-12.

Table 9-12: Consequence Rating Criteria

Consequence	Description
High	<p>i.e., costs to transition to lower emissions technologies likely to require company to make significant capital investment and company likely to end up with stranded assets.</p> <p>i.e., Opportunity to significant diversify or expand product portfolio or business activities or significantly increase profits/turnover due to new markets being available.</p>
Moderate	<p>i.e., cost to transition to lower emission technologies is likely to require company to make some level of capital investment costs. OR transition related operational costs that could be significant at multiple sites/at group/business wide level.</p> <p>i.e., opportunity to expand product portfolio or business activities or increase profits/turnover due to new markets being available.</p>
Low	<p>i.e., costs to transition to lower emissions technologies likely to have any some financial impact on company's operations. OR transition related operational costs resulting in non-significant changes but affecting more than one site.</p> <p>i.e., some potential to expand product portfolio or business activities or increase profits/turnover due to new markets being available.</p>
Negligible	<p>i.e., costs to transition to lower emissions technologies unlikely to have any (or very little financial impact on company's operations. OR minor operational cost change at a single location.</p> <p>i.e., little impact of new markets on business activities.</p>

9.4.7.2.4 Step 4: Identify the overall risk/opportunity rating

The overall rating for the short, medium, and long-term horizons was determined by assessing the combination of the likelihood of the climate-related impact occurring, and the consequence, as per risk assessment matrixes. The matrix is presented in Table 9-13.

Table 9-13: Overall Transition Opportunities Rating

		Likelihood of climate-related impact occurring			
		Negligible	Low	Moderate	High
Consequence	Negligible	N	N	L	L
	Low	N	L	L	M
	Moderate	L	L	M	H
	High	L	M	H	H

9.4.7.2.5 Step 5: Recommendations for further mitigation

For risks identified as high, further recommendations have then been provided to reduce the risk, for example:

- Monitoring of country climate change legislation, national energy policy, guidance on the low-carbon transition, potential grants to finance the installation of lower carbon technologies.
- Monitoring of market signals, and potential reputational risks including stigmatization of the sector and increased stakeholder or investor concern.

9.4.8 Assessment Findings

This section presents a summary of the potential physical and transition risks and opportunities identified as high for the Project.

9.4.8.1 Physical Risk

Climate projections for RCP4.5 and RCP8.5 were assessed to determine potential impacts and consequences to the construction and operation of the project.

Mean temperature, maximum daily temperature, and number of hot days are expected to increase in Dhaka with similar (minute differences/more or less similar) magnitude on average for both Bangladesh as well as Dhaka region under both scenarios. The mean annual temperature in Dhaka is expected to increase by over 0.84°C (2020-2039) and 1.44°C (2040-2059) as per RCP4.5 while it slightly lowers in magnitude during 2020-2039 (0.82°C) but again increases towards the end of the period (2040-2059) as per RCP8.5. However, both the RCP's projected a rise in mean annual temperature as compared to the 1991-2020 baseline.

By mid-century, the number of hot days (over 35° C) is expected to increase by 24.12 days p.a. (RCP4.5) to 36.22 days p.a. (RCP 8.5). Both scenarios indicate significant anomalies of increase in temperatures and hot spells.

Table 9-14: Climate-related data pertaining to temperature for scenario RCP 4.5 and RCP 8.5

RCP 4.5			RCP 8.5	
Mean annual temperature: increase in °C from the 1991-2020 baseline				
	2020-2039	2040-2059	2020-2039	2040-2059
Dhaka	0.84	1.44	0.82	1.83
Country	0.85	1.42	0.85	1.83
Maximum of daily maximum temperatures: increase in °C from the 1991-2020 baseline				
	2020-2039	2040-2059	2020-2039	2040-2059
Dhaka	0.86	1.43	0.77	1.78
Country	0.85	1.45	0.79	1.75
Number of hot days (over 35° C): increase in number of hot days from the 1991-2020 baseline				
	2020-2039	2040-2059	2020-2039	2040-2059
Dhaka	15.58	24.12	15.36	36.22
Country	14.51	24.39	15.01	34.63

In Dhaka, mean annual precipitation is expected to increase in both RCP's as compared to the baseline (1991- 2020) though the magnitude of precipitation in RCP8.5 is lower than RCP4.5. The projected precipitation is slightly higher for Dhaka region than the entire country except in 2020-2039 period (RCP8.5), where it is slightly lower over Dhaka region than the whole country.

The number of consecutive wet days is expected to increase in RCP4.5 whereas decreases in RCP8.5 as compared to the baseline. However, when seen between both RCP's, it is expected to decrease by mid-century in RCP4.5 whereas it is expected to increase in RCP8.5 though the magnitude of

precipitation is much lower in RCP8.5 than RCP4.5. The number of consecutive dry days is projected to decrease by mid-century in both RCP's though it decreases in RCP4.5 and increases in RCP8.5 when compared to the baseline. Number of wet days (>50 mm) is expected to decrease in RCP4.5 while increases in RCP8.5 by mid-century.

Table 9-15: Climate-related data pertaining to precipitation for scenario RCP 4.5 and RCP 8.5

RCP 4.5			RCP 8.5	
Mean annual precipitation (mm): increase in mm from the 1991-2020 baseline				
	2020-2039	2040-2059	2020-2039	2040-2059
Dhaka	129.97	149.66	18.86	95.52
Country	127.3	146.7	20.17	83.19
Consecutive wet days (mm): increase in the number of wet days from the 1991-2020 baseline				
	2020-2039	2040-2059	2020-2039	2040-2059
Dhaka	5.34	4.82	-0.94	-0.43
Country	4.62	5.04	-0.53	-1.18
Consecutive dry days (mm): increase in the number of dry days from the 1991-2020 baseline				
	2020-2039	2040-2059	2020-2039	2040-2059
Dhaka	-14.31	-16.49	4.73	1.92
Country	-8.28	-10.1	4.92	2.88
Number of wet days with >50mm rain (mm)				
	2020-2039	2040-2059	2020-2039	2040-2059
Dhaka	0.44	0.38	-0.13	0.23
Country	0.56	0.59	-0.01	0.43

By the end of the planned project life, which is around 2055, the following changes to the climate in the area are expected:

- Temperatures will increase along with the number of very hot days.
- Precipitation will increase by mid-century, with longer wet spells and shorter dry spells, but little change in the number of wet days with >50mm rainfall insignificantly.
- Furthermore, according to ThinkHazard (Dhaka region but also cover project location), there is greater than a 50% chance of encountering weather that could support a significant wildfire that is likely to result in both life and property loss in any given year. Prolonged exposure to extreme heat, resulting in heat stress, is expected to occur at least once in the next five years. Potentially damaging and life-threatening urban, river floods are expected to occur at least once in the next 10 years. Potentially damaging waves are expected to flood the coast at least once in the next 10 years. The frequency and intensity of these hazards is expected to increase because of climate change.

Physical climate-related risks were assessed separately for construction and commissioning and the operational design life of the project. As the construction period is scheduled to be ±36 months, physical risks associated with climate change are limited to the short-term time horizon.

Risk ratings take planned mitigation measures to reduce, control and respond to risks, into account. No risks were identified as high for the construction and commissioning phase, although the following moderate risks are noted:

- The potential for heat stress and heat exhaustion of construction workers due to increased temperatures and hot days over 35°C;
- The potential for damage to assets and construction equipment resulting from the increased risk of heatwaves; and
- The potential for flooding and waterlogging hampering the construction equipment and gas pipeline due to frequent and more intense heaviness.

No risks were identified as high for the operational design life of the Project, although the following moderate risks are noted:

- Increases in air temperature causing reduced generation efficiency and output, and an increase in operational cost.
- Reduced carrying capacity of lines and increased losses in lines/transformers due to higher annual average and daily maximum temperatures and more hot days >35°C.
- The potential for heat stress and heat exhaustion of workers due to increased temperatures and hot days over 35°C.
- Heavy rainfall events contributing to moderate infrastructure damage and loss of service.
- The potential for increased risk of disease transmission (e.g., malaria and dengue fever, improved growing conditions for algae and potentially harmful micro-organisms in water courses) due to both increased temperatures and more intense and frequent heavy precipitation.
- Potential contamination from substations and transformers entering the surrounding environment due to more occurrence of heavy precipitation.
- Loss or damage to the plant equipment and impacts on human health caused by more frequent and severe heatwaves.
- Damage to on-ground assets as a result of an increase in frequency and severity of flooding and siltation; and
- Damage to gas pipeline due to more intense and frequent heavy precipitation and severe flooding.
- Extreme weather events, such as stronger and/ or more frequent floods and precipitation causing reduction in the supply and potentially the quality of gas, damage generation and infrastructure, reduce output, and affect security of supply.

Where potential physical climate impacts may cause damage to, or inundate MRSML assets, or result in an unforeseen shut down, such impacts could result in impacts on community, customers, or businesses, as follows:

- Flooding resulting from heavy localized precipitation, could damage the electrical wires and associated structures, which could result in shut down and lack of power supply to customers and businesses⁵⁴.
- Extra forces of heavy river water flow, due to flooding, imposing stress on the pipeline and other unseen implications due to waterborne debris damaging the pipeline.
- In the event that extremely hot weather damages equipment or causes a fire in heat-sensitive equipment, this would pose a safety risk to local communities and wildlife, as well as causing an unforeseen shutdown to the power supply resulting the disruption in steel production.
- Where extreme heat may result in sagging of the electric wires, this could present a risk of electrocution, or fire, to any person in close proximity to the line.

The combined impacts of climate change and the project on the community, business, or customers could therefore be severe, however the impacts would not likely affect if MRSML prepare appropriate mitigation measures to reduce the risk and severity of the impacts.

⁵⁴ Though the project location is far from the cyclone prone area, as per ThinkHazard, the area is expected to be high in cyclone flooding.

9.4.8.2 Transition Risks and Opportunities

In transition risk under RCP2.6 scenario, increased cost of raw materials is identified as high from the year 2026 onwards due to increase in input prices such as electricity, water and natural gas. Whereas increased pricing of GHG emissions, enhanced emissions-reporting obligations, mandates on and regulation of existing products and services, substitution of existing products and services with lower emissions, unsuccessful investment in new technologies, cost to transition to lower emissions technology, transition to lower emissions technologies changes transport/logistics options/cost, changing customer behavior, increased cost of raw materials and stigmatization of sector are identified as moderate risk beyond 2035 which could have implications for increased operating costs due to higher compliance requirements.

No transition opportunities under RCP2.6 scenario were identified as high, although the following opportunities are noted as moderate:

- Use of new technologies to improve reliability through investments.
- Development and / or expansion of low emission services because of additional infrastructure required to support increasing demand for low carbon electricity.
- Access to new markets as demand for new transmission assets to connect renewable resources with demand centres increases and the associated electrification of end-users.
- Resource substitutes / diversification through the use of lower carbon materials during construction and maintenance.

Under RCP4.5 scenario, no transition risk and opportunity are identified as high, although in transition risk, changing customer behavior due to reduced demand for goods and services, uncertainty in market signals, stigmatization of sector and increased stakeholder concern are identified as moderate risk.

9.4.9 Assumptions and Recommendations

This section summarizes the main conclusions from the climate change risk assessment, the project's compatibility with Bangladesh's national climate commitments and a number of recommendations to further mitigate and control the physical risks identified as high/moderate.

9.4.9.1 Assumptions

Considering climate change projections for both RCP4.5 and RCP8.5 scenarios, no physical climate-related risks have been identified as high for construction and commissioning. During the operational design life, the following climate-related risk have been identified as high:

- Heat expansion and sagging of electric wires.
- Frequent heatwaves disrupting the operations, loss of assets and reconstruction costs, etc.
- Flooding due to increase in precipitation near the project area and damage to on ground infrastructure, sub-surface gas pipeline and equipment including substations.

The combined impacts of climate change and the project on the community, business, or customers could be severe, however the impacts would not likely affect the license to operate if MRSML prepare appropriate mitigation measures to reduce the risk and severity of the impacts.

In transition risk under RCP2.6 scenario, increased cost of raw materials is identified as high from the year 2026 onwards due to increase in input prices such as electricity, water and natural gas. Whereas increased pricing of GHG emissions, enhanced emissions-reporting obligations, mandates on and regulation of existing products and services, substitution of existing products and services with lower emissions, unsuccessful investment in new technologies, cost to transition to lower emissions technology, transition to lower emissions technologies changes transport/logistics options/cost, changing customer behavior, increased cost of raw materials and stigmatization of sector are identified as moderate risk beyond 2035 which could have implications for increased operating costs due to higher compliance requirements.

In transition opportunity under RCP2.6 scenario, although no risk is identified as high, following risk such as use of new technology, development or expansion of low emission services, access to new markets, resource substitutes through the use of lower carbon materials are identified as moderate.

Under RCP4.5 scenario, no transition risk and opportunity are identified as high, although in transition risk, changing customer behavior, uncertainty in market signals, stigmatization of sector and increased stakeholder concern are identified as moderate risk.

9.4.9.2 Recommendations

A number of measures have been incorporated into the project design and included in operational plans and processes to mitigate and control the risks identified. For the physical risks that remain identified as moderate particularly those around extreme weather risks, ensuring regular monitoring of weather forecasts as well as testing and trialing the emergency response plans will be key for increasing resilience of the infrastructure.

Although overall recommendations such as project planning decisions, project design, construction and emergency response planning methods should consider the high level of the hazards and extreme events. A few of these general recommendations are listed:

- Focused studies on the impacts of climate change on extreme heatwaves should be considered, before deciding whether to design projects to withstand fire of greater intensity than those previously experienced in this region.
- Impacts of flooding due to increase in precipitation caused by climate change should be studied for operation phase of the project. Peripheral drainage systems should be adequately designed and maintained to avoid any sort of inundation caused by heavy precipitation.
- Management measures like preparation of emergency response plans and early warning systems to account for higher frequency of intense precipitation and floods, operational measures like riparian buffer plantations for strengthening resilience and emergency response system.

Although no transition risks have been identified as high, as the likelihood of these risks occurring, as well as opportunities are based on current policy in Bangladesh and market signals, it is recommended that Bangladesh's climate change legislation and national energy policy, as well as changes in market demand are monitored on a regular basis. Energy efficiency improvement measures should be undertaken in offices and the project site through use of solar power, energy saving gadgets, energy audits, etc. Climate-related disclosures in terms of GHG emissions should be more aligned with interest of long-term investors towards more sustainable path to avoid any shift that could be expected from investors' end.

CHAPTER 10

Conclusion and Recommendations

10 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

This Environmental and Social Impact Assessment (ESIA) report has been prepared for MRSML in accordance with but not limited to the IFC Performance Standards and guidelines published by the DoE. The Environmental and Social Impact Assessment (ESIA) report determines that although the proposed project may cause several negative environmental and social impacts, these can be lessened by implementing efficient mitigation measures. The project's blueprint complies with the country's environmental laws and standards, specifically concerning airborne emissions, overall air quality, wastewater release, and noise disturbance. Additionally, the project will produce slag as a secondary product and is expected to bolster the local economy by providing employment opportunities for locals, encouraging nearby market expansion, and boosting economic endeavors.

Multiple data collection techniques have been used in conducting the ESIA study which included document review, direct observation, discussion with plant manager and associated others. The ESIA is prepared through identifying the potential impacts, assessing them, and recommending possible mitigation measures against each impact. Emergency response plan and hazard and disaster risk assessment also has been done in construction, operation, and decommissioning stage of the plant.

After reviewing the detailed project documents on steel plant, auxiliary and associated facilities, conducting site visits and carrying out detailed baseline survey, and consulting with both the project proponent and the local community, no critical or red flag issues that warrant immediate concern have been identified. No major adverse environmental and social impact is to be associated during construction, operation, and decommissioning phase of the proposed plant. However, appropriate mitigating measures would be undertaken that would reduce the small to moderate impacts to an acceptable level as prescribed in the Environmental Quality Standards of Bangladesh and WBG EHS Guidelines. All these mitigating measures have been discussed in detail in this report.

The project also has a positive impact in terms of employment both its construction and operational and decommissioning phase. The most significant positive impacts of the project would be reduced pressure to meet domestic and industrial demand of steels of the country and to contribute largely to save foreign currency in establishing this industry.

Based on the findings of the ESIA study, it can be concluded that:

- As part of the review of environmental and social risks, impacts, and magnitude of the proposed project, it is envisaged that the project is categorized as Category B project.
- For both environment and social perspective, the project can be categorized as B as the project is expected to have potential limited adverse environmental impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
- Based on the air dispersion modelling of the steel plant, predicted maximum concentrations of pollutants are well within the standard level. Also, concentration of all pollutants at 5 km distance was found to be negligible.
- The "Fume Treatment Plant" aims to decrease air pollution, while the production process generates hazardous solid waste, known as slag. This waste will be managed by a "Slag Treatment Plant" for recovery and recycling.
- There is no wastewater discharge from the process. The cooling tower will be closed-loop and the blow-down from the tower will be connected to CETP of the CuEZ. A Central Sewage Treatment Plant (CSTP) to be installed under the CuEZ to treat the domestic sewage generated from the office building and labor accommodation. Zero discharge system will be adopted, and the treated water will be utilized in toilet flushing, vehicle washing and gardening purposes. Since the CETP and CSTP are shared facilities under the economic zone, the CuEZ will ensure that the other industries within the economic zone meet national and international compliance requirements.

- There are no ecologically critical areas, protected areas, national parks, world heritage sites, important bird and biodiversity areas, etc. in the project site and within a 10 km radius of the project site. Therefore, it is expected that the project will not impact ecologically sensitive areas.
- A land lease agreement was conducted between CuEZ and The MRSML for 10 years with a provision renewable for a further period of 10 years by mutual agreement.
- In terms of socio-economic environment, no direct effects on local households are anticipated by the project proponent as the proposed steel plant project is going to be established inside the Cumilla Economic Zone (CuEZ). During the site visit and interactions with landowners and project authority, it was identified that no physical and economical displacement had taken place.
- It was also confirmed that the procurement of land was based on a “willing buyer/willing seller,” process wherein the households had voluntarily sold their property and assets.
- Existing access roads will be used, and no physical relocation will be necessary for the implementation of the Project.
- There may be some risk of communicable and sexually transmitted diseases due to the possible labor influx during the construction and operation phase of the project. However, awareness and training will be carried out to mitigate the impact. Fishing activities in the river especially near the wharf construction and operation site, water intake point, and WTP outlet point may be impacted during the operation of the project. No impact on the indigenous people and cultural heritage is expected due to project intervention.
- A detailed flood risk assessment for a proposed project is conducted to evaluate the potential impact of flooding on the project site and its surroundings. As per the assessment it was found that the project area has no flooding history after the construction of MRSML project development area. Also, the drainage system of MRSML is sufficient. The topographic elevations inside the MRSML area have been found between 2.289m (MSL) to 11.403m (MSL). From the Flood Frequency Analysis (FFA) it has been found that the highest flood level for 2 (average), 5, 10, 20, 50 and a 100-years levels will be 4.67, 5.43, 6.05, 6.64, 7.41 and 7.99 m (MSL) respectively, according to Gumbel Extreme value analysis methods of hydro-statistics. From river Bankline shifting analysis, it has been found that the net riverward shifting was dominated during the years between 2004-2024, and no such drastic shifting due to bank erosion or heavy flood flow to MRSML project boundary, thus indicating no risk. Similarly, from the analysis of riverbank erosion-deposition, it was found that “No River Change” condition is dominated. Thus, no risk found.
- Cumulative impacts are expected from the proposed project, e.g., from the laying of the gas supply pipeline, substation and transmission line, strengthening of access roads and internal roads, wharf construction and operation, water intake from the river, discharge of water from WTP, existing other projects in the CuEZ and surrounding area, etc. However, as per the industry mapping most of the heavy industries are situated on the edge of the 5 km radius of MRSML and situated on the other side of the Meghna River. As per preliminary assessment of VESCs, cumulative impacts on physical, biological and socio-economic environmental conditions will be limited and largely reversible and can be minimized by implementing mitigation measures.

The implementation of Meghna Re-Rolling and Steel Mills Ltd. within the Cumilla Economic Zone, with the adoption of mitigation measures, is expected to exert negligible influence on both the physical and socio-economic aspects of the microenvironment and macro-environment in the project area.

10.2 Recommendations

In order to mitigate the estimated adverse environmental and social impacts, especially in the operational phase of the plant, the recommendations provided in the ESMP should be followed with due diligence. Additionally, some of important actions required are:

- The stack emission monitoring, considering the parameters HF, HCl, PAH, dioxin, and furans (PCDD/F), is recommended to be conducted during the operational phase of the plant. If any

of these parameters are found at that time, MRSML will assess the impact using air dispersion modeling and adopt mitigation measures.

- MRSML is recommended to conduct periodic indoor air quality monitoring during the operational phase to identify the risks associated with occupational health.
- MRSML is recommended to carry out site-specific emergency response plan including disaster management plan prior to operation phase.
- Training of employees in occupational safety and health administration including available sewage facilities, sanitation, etc.
- Activation of grievance redress committee and prompt response to public as well as employee complaints.
- Installation of rainwater harvesting system.
- Allocation of adequate resources for implementation of ESMP.
- Ensure quarterly monitoring of environmental parameters and updating the ESMP, as required.
- Monitoring the generation and disposal of waste. River training or right of way clearance can be taken into consideration once a year to maintain the navigational area between the wharf to main Meghna River and the surrounding Meghna branch river to keep the flood conveyance capacity.
- Drainage pumping system can be operated during heavy monsoon if flood level submerged the drainage outlets at the boundary conditions of the MRSML area.
- Bank slope protection and maintenance can be considered to safeguard the bank failure. Grass turfing can be good and practicable in this regard.
- Water discharge rate through the drainage system around the project boundary can be maintained with pump systems, in case any heavy monsoonal flooding and rainfall-runoff shall not inundate inside the project area.
- Construction and operation phase E&S verification audits to evaluate the environmental and social impacts from the project and compare those with the ESIA.

CHAPTER 11

Appendix

11 APPENDIX

Appendix A: References

1. Ahmed, K.K. and J.B. Hambrey. 1999. Brush shelter: A recently introduced fishing method in the Kaptai reservoir fisheries in Bangladesh. NAGA, The ICLARM Quarterly 22(4): 20-23.
2. Banglapedia. (2022, March 18). *Physiography*.
<https://en.banglapedia.org/index.php/physiography>
3. Banglapedia. (2015). "Seismic Zone". Web: [http://en.banglapedia.org/index.php?title= Seismic Zone](http://en.banglapedia.org/index.php?title=Seismic_Zone), access date: 21 October 2017.
4. BBS. (2011). "Population and Housing Census 2011, Zila Report Cumilla". Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, Government of Bangladesh.
5. BBS. (2012). "Population and Housing Census 2011, Community Report Meghna". Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, Government of Bangladesh.
6. BirdLife International. (2023, July 23). Country Profile: Bangladesh.
[http://www.birdlife.org/datazone/country/ Bangladesh](http://www.birdlife.org/datazone/country/Bangladesh)
7. Brammer, H. (1996). "The Geography of the Soils of Bangladesh". University Press Limited (UPL), Dhaka.
8. Bu, R., Ye, Z., and Shi, H. (2023). Habitat Selection and Home Range of Reeves' Turtle (*Mauremys reevesii*) in Qichun County, Hubei Province, China. *Animals (Basel)*: 13(9): 1514.
9. DDM (Department of Disaster Management), 2010. "National Plan for Disaster Management 2010-2015". Government of the People's Republic of Bangladesh.
10. ECA. (1995). "The Environment Conservation Act-1995". Department of Environment (DoE), Ministry of Environment, Forest and Climate Change (MoEFCC), Government of The People's Republic of Bangladesh. Website: www.doe.gov.bd.
11. ECR. (2023). "The Environment Conservation Rules-2023". Department of Environment (DoE), Ministry of Environment, Forest and Climate Change (MoEFCC), Government of The People's Republic of Bangladesh. Website: www.doe.gov.bd.
12. FAO-UNDP. (1988). Land Resources Appraisal of Bangladesh for Agricultural Development Report 2: Agroecological Regions of Bangladesh.
13. Feeroz, M.M., Hasan, M.K., & Hossain, M.K. (2012). "Biodiversity of Protected Areas of Bangladesh". Volume II. Arannayk Foundation, Dhaka, Bangladesh.
14. Freitas, E.V.D., M.D.M. Veloso, and W.S. Araújo. 2020. Urbanization alters the composition, but not the diversity and structure of Neotropical savanna woody plant communities. *Folia Geobotanica* 55: 95–108.
15. Ghulam Kibria, M., & Ahmed, K. K. U. (2005). Diversity of selective and non-selective fishing gear and their impact on inland fisheries in Bangladesh
16. Guarino, F. (2002). Spatial ecology of a large carnivorous lizard, *Varanus varius* (Squamata: Varanidae). *J. Zool., Lond.* (2002): 258, 449-457.
17. <https://www.globalsecurity.org/military/world/bangladesh/maps.htm>
18. IFC. (2013). Good Practice Handbook - Cumulative Impact Assessment and Management: Guidance for Private Sector in Emerging Markets. International Finance Corporation.
19. Intergovernmental Panel on Climate Change, 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the IPCC, <https://www.ipcc.ch/report/ar5/syr/>
20. IFC (2012). Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation (IFC), Washington DC, USA.
21. IFC (2019). Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation (IFC), Washington DC, USA.
22. IUCN (2024). The IUCN Red List of Threatened Species. Version 2024-3.1. <https://www.iucnredlist.org>.

23. IUCN Bangladesh. (2015). Red List of Bangladesh Volume 2: Mammals. IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh, , pp. xvi+232.
24. IUCN Bangladesh. (2015). Red List of Bangladesh Volume 3: Birds. IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh, pp. xvi+676.
25. IUCN Bangladesh. (2015). Red List of Bangladesh Volume 4: Reptiles and Amphibians. IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh, pp. xvi+320.
26. IUCN Bangladesh. (2015). Red List of Bangladesh Volume 5: Freshwater Fishes. IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh, pp xvi+360.
27. IUCN Bangladesh. (2015). Red List of Bangladesh Volume 6: Crustaceans. IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh. pp. xvi+256
28. IUCN Bangladesh. (2015). "Red List of Bangladesh: A Brief on Assessment Result 2015". IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh.
29. IUCN. (2002). "Bio-ecological Zones of Bangladesh". International Union for Conservation of Nature. Dhaka: publication NID: 8177, IUCN Bangladesh.
30. Khan, M., & Monirul, H. (2008). "Protected Areas of Bangladesh: A Guide to Wildlife". Dhaka, Bangladesh: Nishorgo Program, Wildlife Management, and Nature Conservation Circle, Bangladesh Forest Department.
31. Ministry of Environment, Forest, and Climate Change. (2006). Noise Pollution (Control) Rules, 2006 (S.R.O. No. 212-Law/2006). The People's Republic of Bangladesh.
32. Ministry of Environment, Forest and Climate Change, Government of The People's Republic of Bangladesh,
https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Bangladesh%20First/NDC_submission_20210826revised.pdf
33. MoL, (2011). "Land Zoning Report: Meghna Upazila, Cumilla District". Ministry of Land, Government of the People's Republic of Bangladesh.
34. Nishat, A., Huq, S.M. Imamul, Barua, Shuvashis P., Reza, Ali A.H.M., Khan, & Moniruzzaman A.S. (eds). (2002). "Bio-ecological Zones of Bangladesh". IUCN Bangladesh Country Office, Dhaka, Bangladesh.
35. https://ncc.portal.gov.bd/sites/default/files/files/ncc.portal.gov.bd/page/af95f19d_c59b_4e49_9911_4a8eb9999b53/2021-0121-13-19-0b6388114e1326c32714a6c906747ad5.pdf
36. Pielke, R., Jr, Burgess, M. G., & Ritchie, J. (2021, March 23). Most plausible 2005-2040 emissions scenarios project less than 2.5 degrees C of warming by 2100. <https://doi.org/10.1088/1748-9326/ac4ebf>
37. Population and Housing Census Preliminary Report, August 2022
38. Rashid, H. E. (1991). "Geography of Bangladesh". University Press Limited, Dhaka
39. Sonowal Gulap and Thakuria Gitika, Flood Frequency Analysis Using Gumbel's Distribution Method: A Lower Downstream of Lohit River (Dangori River), Assam (India). International Journal of Civil Engineering and Technology, 10(11), 2019, pp. 229-234.
40. Steele, M. L. (2017). Where in the World are Pallas's Fish Eagles? Migration and Ecology of *Haliaeetus leucoryphus* in Asia. Graduate Theses and Dissertations Retrieved from <https://scholarworks.uark.edu/etd/2015>
41. Swinton, J. and W. Gomez 2009. "Platanista gangetica" (On-line), Animal Diversity Web. Accessed May 30, 2024 at https://animaldiversity.org/accounts/Platanista_gangetica/
42. <https://www.tbsnews.net/supplement/bangladesh-eyes-doubling-steel-production-2030-679418>
43. Wahab, M.A., and M.G. Kibria. 1994. Katha and kua fisheries—unusual fishing methods in Bangladesh. Aquaculture News, No 18. Institute of Aquaculture, University of Stirling, Scotland.
44. World Bank Group (2020) Climate Change Knowledge Portal

Appendix B: Checklist of Flora and Fauna Species**Appendix B-1: Tree Species Recorded from the AOI**

SI No	Local Name	Common name	Scientific name	Family	Uses	Local Status*
1.	Aam	Mango	<i>Mangifera indica</i>	Anacardiaceae	Fruit	VC
2.	Akashmoni	Acacia	<i>Acacia auriculiformis</i>	Fabaceae	Timber	C
3.	Amra	Hog Palm	<i>Spondias mombin</i>	Anacardiaceae	Fruit	UC
4.	Arjun	Arjun tree	<i>Terminalia arjuna</i>	Combretaceae	Medicinal	UC
5.	Ashwath	Sacred fig, Bodhi tree	<i>Ficus religiosa</i>	Moraceae	Fruit	C
6.	Ata	Wild sweetsop	<i>Annona reticulata</i>	Annonaceae	Fruit	UC
7.	Bael	Indian Bael	<i>Aegle marmelos</i>	Rutaceae	Fruit	VC
8.	Bahera	Bastard myrobalan	<i>Terminalia bellirica</i>	Combretaceae	Medicinal	R
9.	Barun	Temple plant	<i>Crateva religiosa</i>	Capparaceae	Aesthetic	R
10.	Boroi	Indian Jujube	<i>Zizyphus mauritiana</i>	Rhamnaceae	Fruit	VC
11.	Bot	Ficus	<i>Ficus benghalensis</i>	Moraceae	Fruit	VC
12.	Chalta	Elephant apple	<i>Dillenia indica</i>	Dilleniaceae	Fruit	C
13.	Dumur	Cluster fig	<i>Ficus hispida</i>	Moraceae	Fruit	C
14.	Eucalyptus	Eucalyptus	<i>Eucalyptus camaldulensis</i>	Myrtaceae	Timber	C
15.	Gab	Velvet apple	<i>Diospyros blancoi</i>	Ebenaceae	Fruit	R
16.	Kath badam	Indian Almond	<i>Terminalia catappa</i>	Combretaceae	Aesthetic	C
17.	Jam	Java Plum	<i>Syzygium cumini</i>	Myrtaceae	Fruit	VC
18.	Jambura	Pomelo	<i>Citrus maxima</i>	Rutaceae	Fruit	R
19.	Jarul	Giant crepe-myrtle	<i>Lagerstroemia speciosa</i>	Lythraceae	Aesthetic	R
20.	Jhao	Australian pine tree	<i>Casuarina equisetifolia</i>	Casuarinaceae	Timber	R
21.	Jiga	Indian ash tree	<i>Lannea coromandelica</i>	Anacardiaceae	Timber	C
22.	Jolpai	Indian Olive	<i>Elaeocarpus floribundus</i>	Elaeocarpaceae	Fruit	R
23.	Kala Koroi	Shirish	<i>Albizia lebbek</i>	Fabaceae	Timber	C
24.	Kamranga	Carambola	<i>Averrhoa carambola</i>	Oxalidaceae	Fruit	C
25.	Kathal	Jackfruit	<i>Artocarpus heterophyllus</i>	Moraceae	Fruit	C
26.	Khejur	Date palm	<i>Phoenix dactylifera</i>	Arecaceae	Fruit	VC
27.	Kodom	Bur flower Tree	<i>Neolamarckia cadamba</i>	Rubiaceae	Aesthetic	C
28.	Koromcha	Bengal currant	<i>Carissa carandas</i>	Apocynaceae	Fruit	R
29.	Krishno chura	Dwarf poinciana	<i>Caesalpinia pulcherrima</i>	Fabaceae	Aesthetic	UC
30.	Lichu	Lychee	<i>Litchi chinensis</i>	Sapindaceae	Fruit	C
31.	Mahogony	Mahogoni	<i>Swietenia mahagoni</i>	Meliaceae	Timber	VC

SI No	Local Name	Common name	Scientific name	Family	Uses	Local Status*
32.	Narikel	Coconut	<i>Cocos nucifera</i>	Arecaceae	Fruit	VC
33.	Neem	Neem	<i>Azadirachta indica</i>	Meliaceae	Medicinal	C
34.	Peyara	Guava	<i>Psidium guajava</i>	Myrtaceae	Fruit	VC
35.	Pitali	False White Teak	<i>Trewia nudiflora</i>	Euphorbiaceae	Timber	VC
36.	Pithraj	Pithraj	<i>Aphanamixis polystachya</i>	Meliaceae	Medicinal	R
37.	Raintree	Raintree	<i>Samanea saman</i>	Fabaceae	Timber	VC
38.	Sada Koroi	White Siris	<i>Albizia procera</i>	Fabaceae	Timber	C
39.	Sajna tree	Drumstick tree	<i>Moringa oleifera</i>	Moringaceae	Fruit	C
40.	Shimul	Cotton tree	<i>Bombax ceiba</i>	Malvaceae	Fruit	C
41.	Shupari	Areca palm	<i>Areca catechu</i>	Arecaceae	Fruit	C
42.	Sishu	Indian Rosewood	<i>Dalbergia sissoo</i>	Fabaceae	Timber	UC
43.	Sonalu	Golden rain tree	<i>Cassia fistula</i>	Fabaceae	Aesthetic	UC
44.	Taal	Palm	<i>Borassus flabellifer</i>	Arecaceae	Fruit	C
45.	Tetul	Tamarind tree	<i>Tamarindus indica</i>	Fabaceae	Fruit	VC
46.	Zambura	Pomelo fruit	<i>Citrus maxima</i>	Rutaceae	Fruit	R

Source: EQMS Field Survey, February 2024

* VC = Very Common, C= Common, UC= Uncommon, R= Rare

Appendix B-2: Herb and Shrub Species Recorded from the AOI

SI No	Local Name	Common Name	Scientific name	Family	Type
1.	Bansh	Bamboo	<i>Bambusa sp.</i>	Poaceae	Herb
2.	Berela	Cuban jute	<i>Sida rhombifolia</i>	Malvaceae	Herb
3.	Dheki Shak	Vegetable fern	<i>Diplazium esculentum</i>	Athyriaceae	Herb
4.	Durba	Bermuda Grass	<i>Cynodon dactylon</i>	Poaceae	Herb
5.	Joba	China Rose	<i>Hibiscus rosa-sinensis</i>	Malvaceae	Shrub
6.	Kashful	Wild Sugarcane	<i>Saccharum spontaneum</i>	Poaceae	Herb
7.	Khurakata	Spiny amaranth	<i>Amaranthus spinosus</i>	Amaranthaceae	Herb
8.	Kochu	Taro	<i>Colocasia esculenta</i>	Araceae	Herb
9.	Kola	Banana	<i>Musa sapientum</i>	Musaceae	Herb
10.	Kontikari	Sticky Nightshade	<i>Solanum sisymbriifolium</i>	Solanaceae	Shrub
11.	Lebu	Lemon	<i>Citrus spp.</i>	Rutaceae	Shrub
12.	Lonthon ful	Sage	<i>Lantana camara</i>	Verbenaceae	Shrub
13.	Mati Konduri	Sessile Joy weed	<i>Alternanthera sessilis</i>	Amaranthaceae	Herb
14.	Mukta Juri	Indian Nettle	<i>Acalypha indica</i>	Euphorbiaceae	Herb
15.	Mutha	Java Grass	<i>Cyperus rotundus</i>	Cyperaceae	Herb
16.	Nol khagra	Tall Reed	<i>Phragmites karka</i>	Poaceae	Herb
17.	Opango ful	Prickly Chaff Flower	<i>Achyranthes aspera</i>	Amaranthaceae	Herb
18.	Pepe	Papaya	<i>Carica papaya</i>	Caricaceae	Shrub
19.	Rabon lata	American rope	<i>Mikania micrantha</i>	Asteraceae	Herb
20.	Thankuni	Indian pennywort	<i>Centella asiatica</i>	Mackinlayaceae	Herb
21.	Venna	Castor oil plant	<i>Ricinus communis</i>	Euphorbiaceae	Shrub

Source: EQMS Field Survey, February 2024

Appendix B-3: Checklist of All Recorded Avifauna Species

SL. No.	Common Name	Local Name	Scientific name	Family	IUCN Red List of Bangladesh, 2015*	IUCN Red List Version 2023-1**	Migratory Status***
1.	Asian Green Bee-eater	Shobuj Shuichora	<i>Merops orientalis</i>	Meropidae	LC	LC	C/R
2.	Asian Koel	Kokil, koel	<i>Eudynamys scolopacea</i>	Cuculidae	LC	LC	C/R
3.	Asian Openbill	Eshio Shamkhol	<i>Anastomus oscitans</i>	Ciconidae	LC	LC	C/R
4.	Asian palm swift	Ashio Talbatashi	<i>Cypsiurus balasiensis</i>	Apodidae	LC	LC	C/R
5.	Asian pied Starling	Pakra shalik	<i>Sturnus contra</i>	Sturnidae	LC	LC	C/R
6.	Baya weaver	Babui Pakhi	<i>Ploceus philippinus</i>	Ploceidae	LC	LC	C/R
7.	Black-winged Kite	Katua Chil	<i>Elanus caeruleus</i>	Accipitridae	LC	LC	C/R
8.	Brown shrike	Khoira Latora	<i>Lanius cristatus</i>	Laniidae	LC	LC	C/Wm
9.	Black Drongo	Kala Fingey	<i>Dicrurus macrocercus</i>	Dicruridae	LC	LC	C/R
10.	Black-hooded oriole	Kalamatha Benebou	<i>Oriolus xanthornus</i>	Oriolidae	LC	LC	C/R
11.	Black-rumped flameback	Sonali kaththokra	<i>Dinopium benghalense</i>	Picidae	LC	LC	C/R
12.	Blue rock pigeon	Jalali Kabutor	<i>Columba livia</i>	Columbidae	LC	LC	C/R
13.	Bronze-winged jacana	Jol Pipi	<i>Metopidius indicus</i>	Jacanidae	LC	LC	C/R
14.	Brahminy Kite	Shonkho Cheel	<i>Haliastur indus</i>	Accipitridae	LC	LC	C/R
15.	Cattle Egret	Go Boga	<i>Bubulcus ibis</i>	Ardeidae	LC	LC	C/R
16.	Citrine Wagtail	Sitrin Khonjon	<i>Motacilla citreola</i>	Motacillidae	LC	LC	C/Wm
17.	Chestnut-tailed starling	Khoiralej Kathshalik	<i>Sturnia malabarica</i>	Ciconiidae	LC	LC	C/R
18.	Common sandpiper	Pati batan	<i>Actitis hypoleucos</i>	Scolopacidae	LC	LC	C/Wm
19.	Common lora	Fotikjol	<i>Aegithina tiphia</i>	Aegithinidae	LC	LC	C/R
20.	Common kingfisher	Chhoto Maachranga	<i>Alcedo atthis</i>	Alcedinidae	LC	LC	C/R
21.	Common myna	Bhat Salik	<i>Acridotheres tristis</i>	Sturnidae	LC	LC	C/R
22.	Common tailor bird	Tuntuni	<i>Orthotomus sutorius</i>	Sylviidae	LC	LC	C/R
23.	Eastern Spotted Dove	Tila Ghughu	<i>Spilopelia chinensis</i>	Columbidae	LC	LC	C/R
24.	Eurasian Collared Dove	Eureshio Konthighughu	<i>Streptopelia decaocto</i>	Columbidae	LC	LC	C/R

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

SL. No.	Common Name	Local Name	Scientific name	Family	IUCN Red List of Bangladesh, 2015*	IUCN Red List Version 2023-1**	Migratory Status***
25.	Grey-headed Lawping	Metematha Titi	<i>Vanellus cinereus</i>	Charadriidae	LC	LC	C/Wm
26.	Greater Coucal	Boro Kubio	<i>Centropus sinensis</i>	Cuculidae	LC	LC	C/R
27.	Great Egret	Boro Boga	<i>Casmerodius albus</i>	Ardeidae	LC	LC	C/R
28.	House crow	Pati Kak	<i>Corvus splendens</i>	Corvidae	LC	LC	C/R
29.	House sparrow	Pati choro	<i>Passer domesticus</i>	Passeridae	LC	LC	C/R
30.	Indian pond heron	Kani Bok	<i>Ardeola grayii</i>	Ardidae	LC	LC	C/R
31.	Indian silverbill	Indian silverbill	<i>Lonchura malabarica</i>	Estrildidae	LC	LC	C/R
32.	Jungle Babbler	Bon Cchatarey	<i>Turdoides striata</i>	Timalidae	LC	LC	C/R
33.	Jungle crow	Dar kak	<i>Corvus macrorhynchos</i>	Corvidae	LC	LC	C/R
34.	Jungle Myna	Jhuti Shalik	<i>Acridotheres fuscus</i>	Sturnidae	LC	LC	C/R
35.	Little cormorant	Choto Pankowri	<i>Microcarbo niger</i>	Phalacrocoracidae	LC	LC	C/R
36.	Little egret	Choto boga	<i>Egretta garzetta</i>	Ardeidae	LC	LC	C/R
37.	Lesser Whistling Duck	Pati Shorali	<i>Dendrocygna javanica</i>	Dendrocygnidae	LC	LC	C/R
38.	Long-legged Buzzard	Lombapa Tishabaaj	<i>Buteo rufinus</i>	Accipitridae	LC	LC	C/Wm
39.	Long-tailed shrike	Lenja Latora	<i>Lanius schach</i>	Laniidae	LC	LC	C/R
40.	Medium egret	Majhari Bok	<i>Ardea intermedia</i>	Ardeidae	LC	LC	C/R
41.	Oriental magpie robin	Doel	<i>Copsychus saularis</i>	Muscicapidae	LC	LC	C/R
42.	Paddyfield Pipit	Dhani Tulika	<i>Anthus rufulus</i>	Motacillidae	LC	LC	C/R
43.	Plain Prinia	Nirol Prina	<i>Prinia inornata</i>	Cisticolidae	LC	LC	C/R
44.	Purple Heron	Lalche Bok	<i>Ardea purpurea</i>	Ardidae	LC	LC	C/R
45.	Purple sunbird	Niltuni	<i>Cinnyris asiaticus</i>	Nectarinidae	LC	LC	C/R
46.	Red Turtle Dove	Lal Ghughu	<i>Streptopelia tranquebarica</i>	Columbidae	LC	LC	C/R
47.	Red-vented bulbul	Bangla bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae	LC	LC	C/R
48.	Red-wattled Lapwing	Hot Titi	<i>Vanellus indicus</i>	Charadriidae	LC	LC	C/R
49.	Rufous treepie	Khoira Harichacha	<i>Dendrocitta vagabunda</i>	Corvidae	LC	LC	C/R
50.	Common Stonechat	Pati Shilafidda	<i>Saxicola maurus</i>	Muscicapidae	LC	LC	C/Wm

SL. No.	Common Name	Local Name	Scientific name	Family	IUCN Red List of Bangladesh, 2015*	IUCN Red List Version 2023-1**	Migratory Status***
51.	Spotted dove	Tila Ghughu	<i>Streptopelia chinensis</i>	Rallidae	LC	LC	C/R
52.	White wagtail	Dhola Khonjon	<i>Motacilla alba</i>	Motacillidae	LC	LC	C/Wm
53.	White-breasted Waterhen	Dahuk	<i>Amauornis phoenicurus</i>	Rallidae	LC	LC	C/R
54.	White-breasted Kingfisher	Dhola gola Machranga	<i>Halcyon smyrnensis</i>	Alcedinidae	LC	LC	C/R
55.	White-browed wagtail	Sada-vuru Khanjan	<i>Motacilla maderaspatensis</i>	Motacillidae	LC	LC	C/R
56.	Wood Sandpiper	Bon Batan	<i>Tringa glareola</i>	Scolopacidae	LC	LC	C/Wm
57.	Yellow-footed Green Pigeon	Horiyal	<i>Treron phoenicopterus</i>	Columbidae	LC	LC	C/R

Source: EQMS Field Survey; February 2024

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 3: Birds; LC=Least Concern, NE=Not Evaluated

**IUCN 2024. The IUCN Red List of Threatened Species. Version 2023-1. (<https://www.iucnredlist.org/>)

*** C/R=Common Resident; C/Wm=Common Winter Migrant

Appendix B-4: A Checklist of Recorded Migratory Avifauna Species in the AOI

SL. No.	Common Name	Local Name	Scientific name	Family	IUCN Red List of Bangladesh, 2015*	IUCN Red List Version 2023-1**	Migratory Status***
1.	Brown shrike	Khoira Latora	<i>Lanius cristatus</i>	Laniidae	LC	LC	C/Wm
2.	Citrine Wagtail	Sitrin Khonjon	<i>Motacilla citreola</i>	Motacillidae	LC	LC	C/Wm
3.	Common sandpiper	Pati batan	<i>Actitis hypoleucos</i>	Scolopacidae	LC	LC	C/Wm
4.	Grey-headed Lawping	Metematha Titi	<i>Vanellus cinereus</i>	Charadriidae	LC	LC	C/Wm
5.	Long-legged Buzzard	Lombapa Tishabaaj	<i>Buteo rufinus</i>	Accipitridae	LC	LC	C/Wm
6.	Common Stonechat	Pati Shilafidda	<i>Saxicola maurus</i>	Muscicapidae	LC	LC	C/Wm
7.	White wagtail	Dhola Khonjon	<i>Motacilla alba</i>	Motacillidae	LC	LC	C/Wm
8.	Wood Sandpiper	Bon Batan	<i>Tringa glareola</i>	Scolopacidae	LC	LC	C/Wm

Source: EQMS Field Survey; February 2024

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 3: Birds; LC=Least Concern

**IUCN 2024. The IUCN Red List of Threatened Species. Version 2023-1. (<https://www.iucnredlist.org/>)

***C/Wm=Common Winter Migrant

Appendix B-5: Checklist of Herpetofauna Species in the AOI

SI No	Family	Common Name	Local Name	Scientific Name	IUCN Red List of Bangladesh, 2015*	IUCN Red List Version 2023-1**	Wildlife conservation and security Act, 2012
Amphibians							
1.	Bufonidae	Common Asian toad	Kuno bang	<i>Duttaphrynus melanostictus</i>	LC	LC	Schedule II
2.	Dicroglossidae	Indian Bull frog	Kola bang	<i>Hoplobatrachus tigerinus</i>	LC	LC	Schedule II
3.		Indian skipper frog	Kotkoti bang	<i>Euphlyctis cyanophlyctis</i>	LC	LC	Schedule II
4.		Bombay Wart Frog	Jhi-Jhi Bang	<i>Fejervarya syhadrensis</i>	LC	LC	Schedule II
5.	Microhylidae	Ornate Narrow-mouthed Frog	China bang	<i>Microhyla ornata</i>	LC	LC	Schedule II
6.	Rhacophoridae	Common Tree Frog	Dorakata Gecho bang	<i>Polypedates leucomystax</i>	LC	LC	Schedule II
Reptiles							
1.	Varanidae	Bengal monitor	Gui shap	<i>Varanus bengalensis</i>	NT	NT	Schedule II
2.	Gekkonidae	House gecko	Tiktiki	<i>Hemidactylus frenatus</i>	LC	LC	Schedule II
3.	Agamidae	Common Garden lizard	Roktochosa	<i>Calotes versicolor</i>	LC	LC	Schedule II
4.	Scincidae	Indian Mabuya	Achil	<i>Eutropis carinata</i>	LC	LC	Schedule II
5.		Bronze Grass Skink	Tamatey Anjon	<i>Eutropis macularia</i>	LC	LC	Schedule II
6.	Colubridae	Checkered keel back	Dora shaap	<i>Xenochrophis piscator</i>	LC	NE	Schedule I
7.		Striped Keelback	Dora Shap	<i>Amphiesma stolatum</i>	LC	LC	Schedule I
8.		Indian Rat Snake	Darash Shap	<i>Ptyas mucosa</i>	LC	LC	Schedule I
9.	Elapidae	Banded Krait	Shangkhini	<i>Bungarus fasciatus</i>	LC	LC	Schedule II
10.	Homalopsidae	Common smooth water snake	Painna Shap	<i>Enhydryis enhydryis</i>	LC	LC	Schedule I

Source: EQMS Field Survey, July 2023

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 4: Reptiles and Amphibians; LC=Least Concern, NT=Near Threatened

**IUCN 2024. The IUCN Red List of Threatened Species. Version 2023-1. (<https://www.iucnredlist.org/>).

Appendix B-6: Checklist of Terrestrial Mammals Species in the AOI

SI No	Common Name	Local Name	Scientific Name	Family	IUCN Red List of Bangladesh , 2015*	Global IUCN Red List Version 2023-1**	Wildlife Conservation and Security Act, 2012
1.	Common Indian Field Mouse	Metho Idur	<i>Mus booduga</i>	Muridae	LC	LC	Schedule III
2.	Common House Rat	Idur	<i>Rattus rattus</i>		LC	LC	Schedule III
3.	House Mouse	Nengti Idur	<i>Mus musculus</i>		LC	LC	Schedule III
4.	Lesser Mole Rat	Khet Idur	<i>Bandicota bengalensis</i>		LC	LC	Schedule III
5.	Small Indian Mongoose	Choto beji	<i>Urva auropunctata</i>	Herpestidae	LC	LC	Schedule I
6.	Indian Flying Fox	Badur	<i>Pteropus giganteus</i>	Pteropodidae	LC	LC	Schedule I
7.	Irrawaddy Squirrel	Kathbirali	<i>Callosciurus pygerythrus</i>	Sciuridae	LC	LC	Schedule I
8.	House shrew	Chika	<i>Suncus murinus</i>	Soricidae	LC	LC	-
9.	Golden Jackal	Pati-Siyal	<i>Canis aureus</i>	Canidae	LC	LC	Schedule I

Source: EQMS Field Survey, February 2024

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 2: Mammals; LC=Least Concern

**IUCN 2024. The IUCN Red List of Threatened Species. Version 2023-1. (<https://www.iucnredlist.org/>)

Appendix B-7: A Checklist of Recorded Fish Species in the Study area (Fish Market Survey)

Sl. No.	Family	Local Name	English Name	Scientific Name	IUCN Red List of Bangladesh, 2015*	Global IUCN Red List Version 2023-1**
1	Bagridae	Bajari Tengra	Tengra Catfish	<i>Mystus tengara</i>	LC	LC
2	Cyprinidae	Bata	Bata Labeo	<i>Labeo bata</i>	LC	LC
3	Gobiidae	Bele	Tank Goby	<i>Glossogobius giuris</i>	LC	LC
4	Cyprinidae	Bhanga	Reba	<i>Cirrhinus reba</i>	NT	LC
5	Bagridae	Boal	Freshwater shark	<i>Wallago attu</i>	VU	VU
6	Cyprinidae	Catla	Catla	<i>Catla catla</i>	LC	LC
7	Sisoridae	Cenia	Indian gagata	<i>Gagata cenia</i>	LC	LC
8	Cyprinidae	Chala Punti	Swamp Barb	<i>Puntius chola</i>	LC	LC
9	Engraulidae	Chapila	Indian River Shad	<i>Gudusia chapra</i>	VU	LC
10	Cyprinidae	Chela	Silver razorbelly minnow	<i>Salmostoma acinaces</i>	LC	LC
11	Notopteridae	Chital	Clown Knife Fish	<i>Chitala chitala</i>	EN	NT
12	Cyprinidae	Darkina	Flying Barb	<i>Esomus danrica</i>	LC	LC
13	Notopteridae	Foli	Bronge Feather-back	<i>Notopterus notopterus</i>	VU	LC
14	Channidae	Gajar	Great Snakehead	<i>Channa marulius</i>	EN	LC
15	Ambassidae	Gol Chanda	Indian Glassy Fish	<i>Parambassis ranga</i>	LC	LC
16	Cyprinidae	Gonia	Kuria labeo	<i>Labeo gonius</i>	NT	LC
17	Mastacembelidae	Guchi Baim	Barred Spiny Eel	<i>Macrognathus pancalus</i>	LC	LC
18	Bagridae	Gulsha Tengra	Day's Mystus	<i>Mystus bleekeri</i>	LC	LC
19	Mastacembelidae	Gutum	Guntea loach	<i>Lepidocephalichthys guntea</i>	LC	LC
20	Cyprinidae	Jat punti	Spotfin swamp barb	<i>Puntius sophore</i>	LC	LC
21	Clupeidae	Kachki	Ganges River Sprat	<i>Corica soborna</i>	LC	LC
22	Belonidae	Kakila	Freshwater Garfish	<i>Xenentodon cancila</i>	LC	LC
23	Schilbeidae	Kajuli	Gangetic Ailia	<i>Ailia coila</i>	LC	NT
24	Cyprinidae	Kalibaus	Orange Fin Labeo	<i>Labeo calbasu</i>	LC	LC
25	Siluridae	Kani Pabda	Butter Catfish	<i>Ompok bimaculatus</i>	EN	NT
26	Adrianichthyidae	Kanpona	Estuarine Ricefish	<i>Oryzias melastigma</i>	LC	LC

Sl. No.	Family	Local Name	English Name	Scientific Name	IUCN Red List of Bangladesh, 2015*	Global IUCN Red List Version 2023-1**
27	Anabantidae	Koi	Climbing Perch	<i>Anabas testudineus</i>	LC	LC
28	Ambassidae	Lal Chanda	Highfin Glassy Perchlet	<i>Parambassis lala</i>	LC	NT
29	Nandidae	Meni	Mottled Nandus	<i>Nandus nandus</i>	NT	LC
30	Cyprinidae	Mola	Mola carplet	<i>Amblypharyngodon mola</i>	LC	LC
31	Cyprinidae	Mrigal	White Carp	<i>Cirrhinus cirrhosus</i>	LC	VU
32	Ambassidae	Nama Chanda	Elongate Glass-perchlet	<i>Chanda nama</i>	LC	LC
33	Pristolepidae	Naptey Koi	Badis	<i>Badis badis</i>	NT	LC
34	Cyprinidae	Phutani punti	Dwarf barb	<i>Pethia phutunio</i>	LC	LC
35	Cyprinidae	Rui	Rohu Carp	<i>Labeo rohita</i>	LC	LC
36	Cyprinidae	Sar Punti	Olive Barb	<i>Systemus sarana</i>	NT	LC
37	Heteropneustidae	Shing	Stinging Catfish	<i>Heteropneustes fossilis</i>	LC	LC
38	Channidae	Shol	Snakehead Murrel	<i>Channa striatus</i>	LC	LC
39	Channidae	Taki	Spotted Snakehead	<i>Channa punctata</i>	LC	LC
40	Mastacembelidae	Tara Baim	Lesser Spiny Eel	<i>Macrognathus aculeatus</i>	NT	NE
41	Cyprinidae	Tit punti	Two-spot Barb	<i>Pethia ticto</i>	VU	LC

Source: EQMS Field Survey, February 2024

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 5: Freshwater Fishes; LC=Least Concern, NT=Near Threatened; VU=Vulnerable, EN= Endangered; NE=Not Evaluated, DD=Data Deficient

**IUCN 2024. The IUCN Red List of Threatened Species. Version 2023-1. (<https://www.iucnredlist.org/>)

Appendix B-8: Checklist of Crustacean Species Recorded in the AOI

Sl. No.	Local Name	Common name	Scientific Name	Family	IUCN Red List of Bangladesh, 2015**	IUCN Red List Version 2023-1
1.	Dimua Icha	Dimua River Prawn	<i>Macrobrachium villosimanus</i>	Palaemonidae	LC	LC
2.	Golda chingri	Giant river prawn	<i>Macrobrachium rosenbergii</i>		LC	LC
3.	Gura Chingri	Kuncho River Prawn	<i>Macrobrachium lamarrei</i>		LC	LC

Source: EQMS Field Survey, February 2024

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 6: Crustaceans; LC=Least Concern

** IUCN 2024. The IUCN Red List of Threatened Species. Version 2023-1. (<https://www.iucnredlist.org/>)

Appendix B-9: IUCN Red List of Threatened Species – CR & EN Screened through IBAT



Priority Species

Habitat of significant importance to priority species will trigger Critical Habitat status (See PS6: para 16). IBAT provides a preliminary list of priority species that could occur within the 50km buffer. This list is drawn from the IUCN Red List of Threatened Species (IUCN RL). This list should be used to guide any further assessment, with the aim of confirming known or likely occurrence of these species within the project area. It is also possible that further assessment may confirm occurrence of additional priority species not listed here. It is strongly encouraged that any new species information collected by the project be shared with species experts and/or IUCN wherever possible in order to improve IUCN datasets.

IUCN Red List of Threatened Species - CR & EN

The following species are potentially found within 50km of the area of interest.
For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Nilssonina nigricans</i>	Black Softshell Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	REPTILIA	CR	Decreasing	Terrestrial, Marine
<i>Batagur dhongoka</i>	Three-striped Roofed Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark	CHONDRICHTHYES	CR	Decreasing	Marine
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CHONDRICHTHYES	CR	Decreasing	Marine
<i>Sphyrna mokarran</i>	Great Hammerhead	CHONDRICHTHYES	CR	Decreasing	Marine
<i>Sonneratia griffithii</i>		MAGNOLIOPSIDA	CR	Decreasing	Terrestrial, Marine
<i>Aythya baeri</i>	Baer's Pochard	AVES	CR	Decreasing	Freshwater



Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Houbaropsis bengalensis	Bengal Florican	AVES	CR	Decreasing	Terrestrial
Batagur baska	Northern River Terrapin	REPTILIA	CR	Decreasing	Terrestrial, Marine, Freshwater
Pelochelys cantorii	Asian Giant Softshell Turtle	REPTILIA	CR	Decreasing	Terrestrial, Marine, Freshwater
Balaenoptera musculus	Blue Whale	MAMMALIA	EN	Increasing	Marine
Geoclemys hamiltonii	Spotted Pond Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Hardella thurjii	Crowned River Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Morenia petersi	Indian Eyed Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Orcaella brevirostris	Irrawaddy Dolphin	MAMMALIA	EN	Decreasing	Marine, Freshwater
Panthera tigris	Tiger	MAMMALIA	EN	Decreasing	Terrestrial
Rhincodon typus	Whale Shark	CHONDRICHTHYES	EN	Decreasing	Marine
Varanus flavescens	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
Isurus oxyrinchus	Shortfin Mako	CHONDRICHTHYES	EN	Decreasing	Marine
Nilssonia gangetica	Indian Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater



**KNOW YOUR
ENVIRONMENT**





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Nilssononia hurum</i>	Indian Peacock Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Nycticebus bengalensis</i>	Bengal Slow Loris	MAMMALIA	EN	Decreasing	Terrestrial
<i>Hoolock hoolock</i>	Western Hoolock Gibbon	MAMMALIA	EN	Decreasing	Terrestrial
<i>Platanista gangetica</i>	Ganges River Dolphin	MAMMALIA	EN	Decreasing	Freshwater
<i>Eusphyra blochii</i>	Winghead Shark	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Mobula eregoodoo</i>	Longhorned Pygmy Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Stegostoma tigrinum</i>	Zebra Shark	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Mobula tarapacana</i>	Sicklefin Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Mobula thurstoni</i>	Bentfin Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Isurus paucus</i>	Longfin Mako	CHONDRICHTHYES	EN	Decreasing	Marine
<i>Acropora rudis</i>		ANTHOZOA	EN	Decreasing	Marine
<i>Trachypithecus phayrei</i> ssp. <i>phayrei</i>		MAMMALIA	EN	Decreasing	Terrestrial
<i>Alopias pelagicus</i>	Pelagic Thresher	CHONDRICHTHYES	EN	Decreasing	Marine





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Heritiera fomes		MAGNOLIOPSIDA	EN	Decreasing	Terrestrial, Marine, Freshwater
Holothuria scabra	Golden Sandfish	HOLOTHUROIDEA	EN	Decreasing	Marine
Holothuria lessoni	Golden Sandfish	HOLOTHUROIDEA	EN	Decreasing	Marine
Thelenota ananas	Pineapple Sea Cucumber	HOLOTHUROIDEA	EN	Decreasing	Marine
Urogymnus polylepis	Giant Freshwater Whipray	CHONDRICHTHYES	EN	Decreasing	Marine, Freshwater
Mobula birostris	Oceanic Manta Ray	CHONDRICHTHYES	EN	Decreasing	Marine
Rynchops albicollis	Indian Skimmer	AVES	EN	Decreasing	Terrestrial, Freshwater
Sterna acuticauda	Black-bellied Tern	AVES	EN	Decreasing	Terrestrial, Freshwater
Haliaeetus leucoryphus	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
Leptoptilos dubius	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater
Laticilla cinerascens	Swamp Grass-babbler	AVES	EN	Decreasing	Terrestrial, Freshwater
Mobula mobular	Spinetail Devil Ray	CHONDRICHTHYES	EN	Decreasing	Marine



KNOW YOUR ENVIRONMENT



CONSERVATION INTERNATIONAL



UN WCMC
environmental programs



Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Trachypithecus phayrei	Phayre's Leaf-monkey	MAMMALIA	EN	Decreasing	Terrestrial
Trachypithecus pileatus ssp. pileatus	Blond-bellied Langur	MAMMALIA	EN	Decreasing	Terrestrial

Restricted Range Species

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Ophisternon bengalense	Bengal Mud Eel	ACTINOPTERYGII	LC OR LR/LC	Stable	Marine, Freshwater
Bengala elanga	Bengala Barb	ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Xenentodon cancila		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Batasio batasio		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Oreichthys cosuatis		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Oryzias dancena	Indian Ricefish	ACTINOPTERYGII	LC OR LR/LC	Stable	Marine, Freshwater
Pseudosphromenus cupanus	Spiketail Paradise Fish	ACTINOPTERYGII	LC OR LR/LC	Stable	Freshwater
Oryzias camaticus	Spotted Ricefish	ACTINOPTERYGII	LC OR LR/LC	Unknown	Marine, Freshwater
Macrobrachium scabriculum		MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater



**KNOW YOUR
ENVIRONMENT**



CONSERVATION
INTERNATIONAL



UN WCMC
WORLD CONSERVATION
MONITORING PROGRAM

Appendix C: Photo Plate of Flora and Fauna Species

Appendix C-1: Photographs of Tree Species Recorded from the AOI

	
Mangium (<i>Acacia mangium</i>)	Kath badam (<i>Terminalia catappa</i>)
	
Bot (<i>Ficus benghalensis</i>)	Akashmoni (<i>Acacia auriculiformis</i>)
	
Kathal (<i>Artocarpus heterophyllus</i>)	Aam (<i>Mangifera indica</i>)



Peyara (*Psidium guajava*)



Dumur (*Ficus hispida*)

Source: EQMS Field Survey, February 2024

Appendix C-2: Photographs of Observed Avian Species Recorded from the AOI



Little egret (*Egretta garzetta*)



Indian pond heron (*Ardeola grayii*)



White-breasted Kingfisher (*Halcyon smyrnensis*)



Brahminy Kite (*Haliastur indus*)



Asian Openbill (*Anastomus oscitans*)



Long-legged Buzzard (*Buteo rufinus*)



Black Drongo (*Dicrurus macrocercus*)



Lesser Whistling Duck (*Dendrocygna javanica*)



Grey-headed Lapwing (*Vanellus cinereus*)



Purple Heron (*Ardea purpurea*)



White-browed wagtail (*Motacilla maderaspatensis*)



Black Kite (*Milvus migrans*)



Cattle Egret (*Bubulcus ibis*)



Common Myna (*Acridotheres tristis*)



House Sparrow (*Passer domesticus*)



White Wagtail (*Motacilla alba*)



Asian Green Bee-eater (*Merops orientalis*)



Indian silverbill (*Euodice malabarica*)



Common tailor bird (*Orthotomus sutorius*)



Red-wattled Lapwing (*Vanellus indicus*)



Plain Prinia (*Prinia inornata*)



Red-vented Bulbul (*Pycnonotus cafer*)



Oriental Magpie-robin (*Copsychus saularis*)



Black-hooded Oriole (*Oriolus xanthornus*)



Eastern Spotted Dove (*Spilopelia chinensis*)







House Crow (*Corvus splendens*)



Asian Pied Starling (*Sturnus contra*)














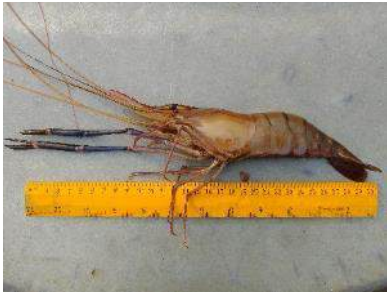
Little Cormorant (*Microcarbo niger*)

	
Intermediate Egret (<i>Ardea intermedia</i>)	Bronze-winged Jacana (<i>Metopidius indicus</i>)
	
Wood Sandpiper (<i>Tringa glareola</i>)	Common Stonechat (<i>Saxicola maurus</i>)

Source: EQMS Field Survey; February 2024

Appendix C-3: Photographs of Observed Fish Species Recorded from the Fisheries Survey




		
Grey Featherback (<i>Notopterus notopterus</i>)	Olive barb (<i>Systemus sarana</i>)	Rohu Carp (<i>Labeo rohita</i>)

		
Kuria labeo (<i>Labeo gonius</i>)	Blue perch (<i>Badis badis</i>)	Stripped Spinyeel (<i>Macragnathus pancalus</i>)
		
Scribbled Goby (<i>Awaous grammepomus</i>)	Dwarf barb (<i>Pethia phutunio</i>)	Highfin Glassy Perchlet (<i>Pseudambassis lala</i>)
		
Tank Goby (<i>Glossogobius giuris</i>)	Dwarf gourami (<i>Trichogaster lalius</i>)	Giant River Prawn (<i>Macrobrachium rosenbergii</i>)

Source: EQMS Field Survey; February 2024

Appendix C-4: A Photoplate of Plankton Sample Collection

		
Dragging of Planktonic net for sample collection		Collection of samples in a sample bottle

		
Addition of preservatives (3% Formalin)	Addition of Glycerin	Identification of Plankton in Laboratory

Source: EQMS Field Survey; March 2024

Appendix C-5: A Photoplate of Macrobenthos Sample Collection

		
Collection of Sample by Ekman Grab Sampler	Sample taken in Plastic Bucket	Sieving by 0.5 mm mesh-sized sieve
		
Collection of sieved samples in Sample Jar	Addition of preservative (10% buffered formalin)	Identification and assessment of Macrobenthos in lab

Source: EQMS Field Survey; March 2024

Appendix D: Photographs of KII & FGD

Appendix D-1: Photographs of the KII and Focus Group Discussion



Fire service Official of Meghna Upazila, Cumilla



Upazila LGED Engineer, Meghna, Cumilla



Upazila Education Officer, Meghna, Cumilla



Upazila Agriculture Extension Officer, Meghna



UP Member of 1,2,3 WARD, Luterchar



Head Teacher of Luterchar Primary School

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh



Upazila Livestock Officer, Meghna, Cumilla



Upazila Senior Fisheries Officer, Meghna



Imam of Local Mosque from Luterchar



Former UP Member and Local Elites



Artisanal Fishermen Group of Luterchar



Youth group of Luterchar



Farmer community of Luterchar



Landowner Group from the locality



General people from Luterchar



Female group of Luterchar



Artisanal Fishermen Group of Luterchar



Artisanal Fishermen Group Near to Jetty



Consultation with the Experts of Bangladesh Inland Water Transport Authority

Appendix D-2: Photographs of Socio-economic Survey



Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh



Appendix D-3: Grievance Register

Stakeholder Name	Date Received	Contact Officer	Grievance Description	Action Taken	Accepted/Not Accepted	Stakeholder Sign	Date

Appendix D-4: Household Survey Questionnaire for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh

Household Survey Questionnaire for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh

Document code*				
Area Code *				
Form No.*				

Enumerator's Name	Code	Signature	Mobile No	Survey Date (DD/MM/YYYY)

A. BASIC INFORMATION

Respondent/HH's Mobile No.*											
-----------------------------	--	--	--	--	--	--	--	--	--	--	--

Name of the Respondent	:			
Name of Head of Household	:			
Number of Family Members	:	Total:	Male:	Female:

Village/Area Name	:			
Union	:			
Upazlia	:			
District Name	:			

Religious Views	:	1. Muslim	2. Christian	3. Buddhist	4. Hindu	5. Other
Name of Ethnicity (if available)	:					

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Household Survey Questionnaire for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh

B. HOUSEHOLD DETAILS

Full Name (Starting with Household Head)*	Relation with HOH	Sex	Age	Marital Status	Educational Qualification	Disability Type	Main Occupation	Secondary Occupation	Any exiting skill set/training	Total Monthly Income

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Household Survey Questionnaire for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh

****Please use code only where applicable. Code is given below**

Relation with Household Head

Self (Household Head)	1	Son-in-law	10
Father	2	Daughter-in-law	11
Mother	3	Grandson	12
Wife	4	Grand-daughter	13
Husband	5	Brother-in-law	14
Daughter	6	Sister-in-law	15
Son	7	Niece	16
Brother	8	Nephew	17
Sister	9	Others (Specify)	

Sex

Female	1
Male	2
Transgender	3

Marital Status

Married	1
Unmarried	2
Separated	3
Widow/Widower	4
Divorced	5

Educational Qualification

Primary	1	Child (Not school going age)	6
Secondary	2	No education	7
Bachelors	3	Others (Specify)	8
Post-Graduation	4		
Vocational Training	5		

Disability Types

No disability or incurable diseases	1	Disability	2
Others (specify)			

Main/Secondary Occupation

Farming (Crop and Livestock)	1
Agricultural Labour	2
Daily Labour	3
Unpaid Family Work/Housewife	4
Service	5
Unemployed Seeking Employment	7
Commercial business, shops etc.	8
Driving	9
Welding	10
Tailor	12
Carpentry	13
Mechanics	14
Technicians	15
Student	16
None	17
Others Specify	

Skill Set

Carpenter	1	Plumber	7
Electrician	2	Welding	8
Mechanic	3	Tailoring	9
Agro-based Training	4	Mason	10
Cattle Rearing	5	None	11
Driving	6	Others (Specify)	

Household Survey Questionnaire for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh

C. QUALITY OF LIFE**a. Electricity Facility**

Access to Electricity	1. Yes		2. No	
Electricity Source	1. Grid Electricity	2. Solar	3. Generator	4. Battery
	5. Kerosene		6. Others (Specify):	
Monthly Cost for Electricity				

b. Sanitation Facility

Toilet Facility	1. Sanitary (Water sealed) 3. Non-Sanitary 2. Sanitary (Non-Water sealed) 4. Open
-----------------	--

c. Cooking Facility

Fuel for cooking	1. Supply Gas	2. LPG	3. Firewood	4. Kerosene	5. Biogas
	6. Dried Cow dung with straw, leaf's			7. Others (Specify):	
Monthly cost for fuel purchase					

d. Access to Water

From where you get safe drinking and household water?	1. Tap water	4. River/Canal	7. Others (specify)
	2. Tube well	5. Rain	
	3. Deep tube well	6. Pond/Ring well	
Drinking water source (specifically for Tap/tube well/Deep tube well water)	1. Owned	2. Shared	

e. Access to Market services

Market Facility	1. For daily needs and selling products	
i. Location	1. Same village/town	2. Nearby village/town
iii. Distance		

f. Access to Education

Education	Primary	Secondary/High School	College
Distance			

Household Survey Questionnaire for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh

g. Access to Healthcare Service

Health Facility	1. Dispensary	2. Community Health Care	3. Pvt. Hospital	4. Govt. Hospital
Distance (in Km)				

J. GENDER ANALYSIS

Who is the owner of Household land?	1. Male	2. Female	3. Both
Who is the decision maker of your HHS?	1. Male	2. Female	3. Both
Who have the stake of financial decisions of your HHS?	1. Male	2. Female	3. Both
Are you aware of the different forms of gender-based violence? (Physical, emotional, sexual, economic, etc.)	1. Yes 2. No		
Do you believe that gender-based violence is a common issue in your community?	1. Yes 2. No		
Are there community initiatives or organizations addressing gender-based violence?	1. Yes 2. No		

K. Only for the Land Sellers to Meghna Group (Luterchar Union)

Only for the Land Owners to Meghna Group (Lateral Union)

How have you spent money from the compensation received against your sold land? *Can be Multiple answer.	1. Buying New land. 2. Invest in Business. 3. Home repair/Built. 4. Buying Necessary Materials 5. Fixed Deposit in Bank/Post Office 6. Others		
Do you receive a satisfactory amount against your land?	1. Yes	2. No	
What is the usage of your land before sold to the Meghna?	1. Cultivation	2. No Use	
Is there any Bargadar or Leaseholder in your sold Land?	1. Yes	2. No	
If yes, what amount do you receive yearly against the land?			
How many Bargadar or Lease Holder was in your land			
What is the current status of that Bargadar/Leaseholder?	1. Move to another land	2. Left Cultivation	3. Do not know
Was there any structure in your land?	1. Yes	2. No	

L. Project Perception

Do you have any information regarding the proposed project?	1. Yes, I know about the project	2. Yes, somewhat
	3. No	4. No response

Household Survey Questionnaire for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh

If yes, from where did you hear about the project?		
What about your perception regarding this proposed project?	1. Positive	2. Negative
If positive, what is your expectation from the project?		
If negative, what type of negative impact will be there?		

M. CURRENT SOCIAL PROBLEMS IN THE PROJECT AREA

SL	Problem	Extent			
		High	Moderate	Low	No Problem
1.	Security				
2.	Road				
3.	Accident				
4.	Health				
5.	Others				

N. CURRENT ENVIRONMENTAL PROBLEMS IN THE PROJECT AREA

SL	Problem	Extent			
		High	Moderate	Low	No Problem
1.	Water Pollution				
2.	Sound Pollution				
3.	Air Pollution				
4.	Industrial Pollution				
5.	Overpopulation				
6.	Deforestation				
7.	Water Logging/ Drainage Management				
8.	Others				

O. AVAILABLE SOURCES/OPPORTUNITIES FOR EMPLOYMENT IN YOUR LOCALITY

1. Agriculture	2. Motor mechanics	3. Livestock
4. Auto Rickshaw Pulling	5. Rickshaw /van pulling	6. Fisheries
7. Horticulture	8. Small business	9. Poultry rearing

Household Survey Questionnaire for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh

10. CNG Auto Driving	11. Transport Working	12. Others
----------------------	-----------------------	------------

P. Need Assessment

Subject	Extent Code	Subject	Extent Code
Water and Sanitation		Technical Skill Development	
Road Repairment		Agricultural Development	

Appendix D-5: Consultation Checklist for ESIA of Greenfield Re-Rolling Steel Plant of MGI at Cumilla, Bangladesh

Focus Group Discussion Checklist for MRMSL

1 LANDOWNERS

- 1) Landowners general living information i.e. village, union etc.
- 2) Project perception
- 3) Land selling information i.e. mood, payment status, any litigation
- 4) Grievances or dissatisfaction
- 5) Reason for dissatisfaction and disputes.
- 6) Project outcome from the local perspective
- 7) Any concerning issue that project authority should consider
- 8) Opinion/suggestions

2 LOCAL COMMUNITY

- 1) General Information regarding the land sellers and their economic conditions
- 2) Land selling mood
- 3) Any dissatisfaction among the land sellers regarding payment issues?
- 4) Anticipated impacts due to this project intervention
- 5) Any idea regarding the spent of land selling money?
- 6) Any grievance or Concerning issues that has been raised during the procurement?
- 7) Expectations from the project in terms of local context
- 8) Suggestions and recommendations.

3 LOCAL WOMEN

- 1) General Information about the women in the village
- 2) Perception about project among the women
- 3) Concerning Issues that has been comes to their mind
- 4) GBV cases that needs to be delt carefully or
- 5) Project related expectations to the authority
- 6) Recommendations and suggestions

4 FISHERMAN

- 1) General Information regarding the fisherman and fishing activities
- 2) Fish catching methods and common fishes that found
- 3) Fish catch as per their catch amount during different season
- 4) Fish selling areas in that region
- 5) Current situation of river in this area in terms of fishing

Focus Group Discussion Checklist for MRMSL

- 6) Possible Impact due to project as seen from the fisherman points of view
- 7) Concern issue regarding the project
- 8) Expectations & Suggestions

5 LOCAL FARMERS

- 1) Details of cropping pattern in that region
- 2) Major crops that cultivated
- 3) Changes that noticed in the crop production
- 4) General perception about the project
- 5) Concerning issue that can be created from the project
- 6) Suggestions and Recommendations.

6 LOCAL YOUTH

- 1) General profile of the village people in terms of socio-economic condition
- 2) Education and employment status of the village
- 3) Perception about the project among local youth
- 4) Any concerning issue regarding the project
- 5) Expectations from project
- 6) Suggestions and Recommendations.

Appendix D-6: The Protection and Conservation of Fish Act, 1950

রেজিস্টার্ড নং ডি এ-১

বাংলাদেশ



গেজেট

অতিরিক্ত সংখ্যা
কর্তৃপক্ষ কর্তৃক প্রকাশিত

বুধবার, সেপ্টেম্বর ১১, ২০১৩

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
আইন, বিচার ও সংসদ বিষয়ক মন্ত্রণালয়
লেজিসলেটিভ ও সংসদ বিষয়ক বিভাগ

প্রজ্ঞাপন

তারিখ, ০৫ সেপ্টেম্বর ২০১৩

নং ১৬(আঃম)(লেঃস)(মুঃপ্রঃ)-আইন-অনুবাদ-২০১৩—সরকারি কার্যবিধিমালা, ১৯৯৬ এর প্রথম তফসিল (বিভিন্ন মন্ত্রণালয় এবং বিভাগের মধ্যে কার্যবন্টন) এর আইটেম ২৯(খ) এর ক্রমিক ৫ এবং মন্ত্রিপরিষদ বিভাগের বিগত ০৩-০৭-২০০০ইং তারিখের সভায় গৃহীত সিদ্ধান্ত বাস্তবায়নের নিমিত্ত “The Protection and Conservation of Fish Act, 1950”এর বাংলা অনুবাদ সর্বসাধারণের জ্ঞাতার্থে প্রকাশ করিল।

মোঃ দেলোয়ার হোসেন
সহকারী সচিব (চঃদাঃ)।

(৭৬৯৭)

মূল্য : টাকা ৮.০০

৭৬৯৮

বাংলাদেশ গেজেট, অতিরিক্ত, সেপ্টেম্বর ১১, ২০১৩

[ইংরেজিতে প্রণীত এবং জানুয়ারি ২০০৭ পর্যন্ত সংশোধিত আইনের অনূদিত পাঠ]

বাংলাদেশ মৎস্য সুরক্ষা ও সংরক্ষণ আইন, ১৯৫০

১৯৫০ সনের ১৮ নং আইন

[১৮ মে. ১৯৫০]

১[বাংলাদেশে] মৎস্য সুরক্ষা ও সংরক্ষণের জন্য প্রণীত আইন।

যেহেতু ২[বাংলাদেশে] মৎস্য সুরক্ষা ও সংরক্ষণের জন্য বিধান করা সমীচীন;

সেহেতু নিম্নরূপ আইন প্রণয়ন করা হইল:—

১। সংক্ষিপ্ত শিরোনাম, ব্যাপ্তি ও প্রবর্তন।—(১) এই আইন ৩[***] মৎস্য সুরক্ষা ও সংরক্ষণ আইন, ১৯৫০ নামে অভিহিত হইবে।

(২) ইহা সমগ্র ৪[বাংলাদেশে] প্রযোজ্য হইবে।

(৩) ৫[***] সরকার, সরকারি গেজেটে প্রজ্ঞাপন দ্বারা, যে তারিখ নির্ধারণ করিবে সেই তারিখ হইতে ইহা বলবৎ হইবে।

৬[২। সংজ্ঞা।—বিষয় বা প্রসঙ্গের পরিপন্থী কোন কিছু না থাকিলে, এই আইনে,—

(১) “কারেন্ট জাল” অর্থ এক আংশবিশিষ্ট সিনথেটিক নাইলন সূতার তৈরি বিভিন্ন সরু আকৃতির মৎস্য ধরিবার জাল;

(২) “মৎস্য” অর্থ সকল প্রকারের কোমল অস্থি ও কঠিন অস্থিবিশিষ্ট মাছ, স্বাদু পানির চিংড়ি, সামুদ্রিক চিংড়ি, উভচর প্রাণি, স্বাদু পানির কচ্ছপ, সামুদ্রিক কচ্ছপ, খোলস বিশিষ্ট কাঁকড়া জাতীয় প্রাণি, শামুক-কিনুক জাতীয় কোমলাঙ্গ প্রাণি, একিনোডার্মস (echinoderms) এবং ব্যাঙের জীবনচক্রের সকল ধাপ;

(৩) “মৎস্য খামার (Fishery)” অর্থ কৃত্রিম বা প্রাকৃতিক, উন্মুক্ত বা বদ্ধ, প্রবহমান বা বদ্ধ, যে কোন জলাশয় (যেমন নদী, হাওর, বাওড়, বিল, প্লাবনভূমি, খাল ইত্যাদি) যেখানে মৎস্য বা অনুরূপ প্রাণির উৎপাদন, অথবা মৎস্য সংরক্ষণ, উন্নয়ন, প্রদর্শন, প্রজনন, ব্যবহার বা বিক্রয় কার্যক্রম গ্রহণ করা হয়, তবে সৌন্দর্যবর্ধক বস্ত্ত হিসাবে ব্যবহৃত মৎস্যের কৃত্রিম মৎস্যধার, পুকুর বা ট্যাংক ইহার অন্তর্ভুক্ত হইবে না;

(৪) “মৎস্য কর্মকর্তা (Fishery officer)” অর্থ সরকার বা সরকারের নিকট হইতে এতদুদ্দেশ্যে ক্ষমতাপ্রাপ্ত কোন কর্মকর্তা কর্তৃক নিয়োগপ্রাপ্ত কোন ব্যক্তি যিনি এই আইনের সকল বা যে কোন উদ্দেশ্য বাস্তবায়ন বা এই আইন বা উহার অধীন প্রণীত কোন বিধি অনুসারে কার্য করিবার জন্য নিয়োগপ্রাপ্ত;

তবে শর্ত থাকে যে, কোন পুলিশ কর্মকর্তা এইরূপ ক্ষমতাপ্রাপ্ত হইবেন না।

১। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সালের ৫৫ নং অধ্যাদেশ) এর ধারা ২ দ্বারা “পূর্ব পাকিস্তান” শব্দের স্থলে “বাংলাদেশ” শব্দটি প্রতিস্থাপিত।

২। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সালের ৫৫ নং অধ্যাদেশ) এর ধারা ২ দ্বারা “পূর্ব পাকিস্তান” শব্দের স্থলে “বাংলাদেশ” শব্দটি প্রতিস্থাপিত।

৩। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সালের ৫৫ নং অধ্যাদেশ) এর ধারা ৩ দ্বারা “পূর্ব বঙ্গ” শব্দটি বিলুপ্ত।

৪। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সালের ৫৫ নং অধ্যাদেশ) এর ধারা ৩ দ্বারা “পূর্ব পাকিস্তান” শব্দের স্থলে “বাংলাদেশ” শব্দটি প্রতিস্থাপিত।

৫। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সালের ৫৫ নং অধ্যাদেশ) এর ধারা ৩ দ্বারা “প্রভিসিয়াল” শব্দটি বিলুপ্ত।

৬। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ২০০২ (২০০২ সনের ২০ নং আইন) এর ধারা ২ দ্বারা ধারা (২) প্রতিস্থাপিত।

বাংলাদেশ গেজেট, অতিরিক্ত, সেপ্টেম্বর ১১, ২০১৩

৭৬৯৯

(৫) “মৎস্য ধরিবার জাল” অর্থ জলাশয় হইতে বিভিন্ন প্রজাতির মৎস্য ধরিবার জাল, এবং কারেন্ট জাল ব্যতীত, সিনথেটিক সূতাসহ বিভিন্ন সরু আকৃতির বিভিন্ন প্রকারের সূতায় তৈরি মৎস্য ধরিবার জন্য ব্যবহৃত এক ধরনের যন্ত্র। জাল পাকা করার সাধারণ উপকরণ হইতেছে গাব ফল (*Diospyros embryopteris*), গোরান বৃক্ষের বাকল (*Ceripos roxburgliana*) এবং আলকাতরা;

(৬) “ফিল্ড ইঞ্জিন” অর্থ মৎস্য ধরিবার জন্য মাটিতে প্রোথিত বা অন্য কোন উপায়ে স্থিরীকৃত কোন জাল, খাঁচা, ফাঁদ বা অন্য কোন কৌশল।]

৩। বিধিমালা প্রণয়নের ক্ষমতা।—(১) অতঃপর এই ধারায় বর্ণিত উদ্দেশ্য পূরণকল্পে, ^১[***] সরকার বিধিমালা প্রণয়ন করিতে পারিবে।

^২[(২) সরকার, প্রজ্ঞাপন দ্বারা, যে কোন জলাশয় বা জলাশয়সমূহের ক্ষেত্রে অনুরূপ বিধিমালা বা যে কোন বিধি প্রয়োগ করিতে পারিবে।]

(৩) উক্ত বিধিমালা দ্বারা—

(ক) নিম্নবর্ণিত সকল বা যে কোন কিছু নিষিদ্ধ বা নিয়ন্ত্রণ করা যাইবে, যথা,—

(অ) ফিল্ড ইঞ্জিনের স্থাপন এবং ব্যবহার;

(আ) মৎস্য ধরিবার জন্য বেড়া, জলাধার, বাঁধ, বেড়িবাঁধ এবং অন্যান্য কাঠামোর স্থায়ী বা অস্থায়ী নির্মাণ;

(ই) যে কোন ধরনের ^৩[মৎস্য ধরিবার জালের] ব্যবহার বা প্রয়োগ পদ্ধতি এবং ^৪[মৎস্য ধরিবার জালের] সরুত্বের আকার;

^৫[(ঈ) বিধিমালায় বর্ণিত মৎস্য ধরিবার জাল, ফাঁদ, যন্ত্র এবং অন্য কোন কৌশলের উৎপাদন, আমদানি, বাজারজাতকরণ, বহন, পরিবহন বা দখল।]

(খ) অভ্যন্তরীণ জলাশয় বা উপকূলীয় জলসীমায় বিস্ফোরক, বন্দুক এবং তির-ধনুক দ্বারা মৎস্য নিধন বা নিধন করিবার যে কোন উদ্যোগ নিষিদ্ধ করা যাইবে;

(গ) পানিতে বিষ প্রয়োগ, পানি দূষিতকরণ, কলকারখানার বর্জ্য পদার্থ নিক্ষেপ বা অন্য কোনভাবে মৎস্য বা মৎস্য খামার ধ্বংস বা ধ্বংস করিবার উদ্যোগ নিষিদ্ধ করা যাইবে;

- ১। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ৫ দ্বারা “প্রভিসিয়াল” শব্দটি বিলুপ্ত।
- ২। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ৫ দ্বারা উপ-ধারা ২ প্রতিস্থাপিত।
- ৩। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ১৯৯৫ (১৯৯৫ সনের ৯ নং আইন) এর ধারা ৩ দ্বারা ‘জাল’ শব্দটির স্থলে ‘মৎস্য ধরিবার জাল’ শব্দগুলি প্রতিস্থাপিত।
- ৪। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ১৯৯৫ (১৯৯৫ সনের ৯ নং আইন) এর ধারা ৩ দ্বারা ‘জাল’ শব্দটির স্থলে ‘মৎস্য ধরিবার জাল’ শব্দগুলি প্রতিস্থাপিত।
- ৫। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ১৯৯৫ (১৯৯৫ সনের ৯ নং আইন) এর ধারা ৩ দ্বারা উপ-দফা (ঈ) সন্নিবেশিত।

- (ঘ) যে মৌসুমে নির্ধারিত প্রজাতির মৎস্য মারা বা ধরা নিষিদ্ধ থাকিবে, এইরূপ মৌসুম নির্ধারণ করা যাইবে;
- (ঙ) কোন নির্ধারিত প্রজাতির মৎস্যের সর্বনিম্ন আকার নির্ধারণ করা যাইবে যাহার কম দৈর্ঘ্যের মৎস্য মারা বা বিক্রয় নিষিদ্ধ; ^১[***]
- (চ) সকল জলাশয়ে অথবা নির্ধারিত জলাশয়ে নির্ধারিত সময়ের মধ্যে মৎস্য ধরা নিষিদ্ধ করা যাইবে ^২;
- (ছ) কোন মৎস্য খামার শুষ্ক করিয়া বা পানি শূন্য করিয়া মৎস্য নিধন বা নিধন করিবার প্রচেষ্টা নিষিদ্ধ করা যাইবে;

তবে শর্ত থাকে যে, ^৩[***] সরকার মৎস্য চাষের (pisciculture) উদ্দেশ্যে, মৎস্যের উপর জীববিজ্ঞান সংক্রান্ত উপাত্ত সংগ্রহ এবং বৈজ্ঞানিক গবেষণার জন্য, এতদুদ্দেশ্যে ইস্যুকৃত লাইসেন্সের শর্ত সাপেক্ষে, নিষিদ্ধ মৌসুমে বা নিষিদ্ধ জলাশয়ে বা নির্ধারিত সর্বনিম্ন আকারের কম দৈর্ঘ্যের মৎস্য ধরিবার এবং উহা নিষ্পত্তি করিবার অনুমতি প্রদান করিতে পারিবে।

- ^৪[(৪) এই ধারার অধীন কোন বিধি প্রণয়নকালে সরকার নিম্নবর্ণিত বিষয়ে বিধান করিতে পারিবে—

- (ক) মৎস্য ধরিবার জন্য বিধিমালা লঙ্ঘনপূর্বক স্থাপিত বা ব্যবহৃত ফিল্ড ইঞ্জিন, ^৫[মৎস্য ধরিবার জাল বা কারেন্ট জাল] বা অন্য কোন স্থাপিত কৌশল আটক, অপসারণ এবং বাজেয়াপ্তকরণ;

- (খ) উক্তরূপ ফিল্ড ইঞ্জিন, ^৬[মৎস্য ধরিবার জাল বা কারেন্ট জাল] বা অন্য কোন কৌশল দ্বারা ধৃত মৎস্য বাজেয়াপ্তকরণ;

- ^৭[(গ) বাজেয়াপ্ত ফিল্ড ইঞ্জিন, মৎস্য ধরিবার জাল, ^৮[কারেন্ট জাল] অথবা অন্য কোন কৌশল অথবা বাজেয়াপ্ত মৎস্য নিষ্পত্তিকরণের পদ্ধতি প্রবর্তন।]

(৫) বিধিমালা প্রণয়নের ক্ষমতা প্রাক-প্রকাশ সাপেক্ষ হইবে; এবং ^৯[জেনারেল ক্লজেস অ্যাক্ট, ১৮৯৭ এর ধারা ২৩] এর দফা (৩) এর বিধান অধীন প্রস্তাবিত খসড়া বিধিমালার প্রাক-প্রকাশের তারিখের পর হইতে অন্যান্য দুই মাসের মধ্যে তারিখ নির্ধারিত হইবে।

(৬) এইরূপ বিধিমালা সরকারি গেজেটে প্রকাশিত হইবে এবং, পরবর্তী কোন তারিখ নির্ধারণ করা না হইলে, অনুরূপ প্রকাশের তারিখ হইতে বলবৎ হইবে।

- ১। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ১৯৯৫ (১৯৯৫ সনের ৯ নং আইন) এর ধারা ৩ দ্বারা 'এবং' শব্দটি বিলুপ্ত।
- ২। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ১৯৯৫ (১৯৯৫ সনের ৯ নং আইন) এর ধারা ৩ দ্বারা কোলন (:) শব্দের স্থলে সেমিকোলন (;) প্রতিস্থাপিত এবং দফা (ছ) সন্নিবেশিত।
- ৩। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ৫ দ্বারা "প্রভিসিয়াল" শব্দটি বিলুপ্ত।
- ৪। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ৪ দ্বারা উপ-ধারা (৪) প্রতিস্থাপিত।
- ৫। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ২০০২ (২০০২ সনের ২০ নং আইন) এর ধারা ৩ দ্বারা "মৎস্য ধরিবার জাল, কারেন্ট জাল," কমা এবং শব্দগুলি সন্নিবেশিত।
- ৬। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ২০০২ (২০০২ সনের ২০ নং আইন) এর ধারা ৩ দ্বারা "মৎস্য ধরিবার জাল, কারেন্ট জাল," কমা এবং শব্দগুলি সন্নিবেশিত।
- ৭। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ১৯৯৫ (১৯৯৫ সনের ৯ নং আইন) এর ধারা ৩ দ্বারা দফা (গ) প্রতিস্থাপিত।
- ৮। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ২০০২ (২০০২ সনের ২০ নং আইন) এর ধারা ৩ দ্বারা কমা (,) এবং কারেন্ট জাল শব্দ সন্নিবেশিত।
- ৯। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ৫ দ্বারা "বেঙ্গল জেনারেল ক্লজেস অ্যাক্ট ১৮৯৭ এর ধারা ২৪," শব্দ, সংখ্যা এবং কমা স্থলে "জেনারেল ক্লজেস অ্যাক্ট ১৮৯৭ এর ধারা ২৩," শব্দ, সংখ্যা এবং কমা প্রতিস্থাপিত।

৪। মৎস্য বিক্রয় নিষিদ্ধকরণ ক্ষমতা।—^১[***] সরকার, প্রজ্ঞাপন দ্বারা, ^২[বাংলাদেশের] সর্বত্র বা কোন অংশে সুনির্দিষ্ট কোন সময়ের জন্য নির্ধারিত প্রজাতির নির্ধারিত আকারের কম দৈর্ঘ্যের মৎস্য বিক্রয় বা বিনিময়ের জন্য ^৩[ধরা, বহন, পরিবহন, বিক্রয়ের প্রস্তাব, প্রদর্শন, বা দখল] নিষিদ্ধ করিতে পারিবে।

^৪[৪ক। কারেন্ট জাল নিষিদ্ধকরণ।—(১) কোন ব্যক্তি কারেন্ট জাল তৈরী, বুনন, আমদানি, বাজারজাত, মজুদ, বহন, পরিবহন, অধিকার, দখল বা ব্যবহার করিতে পারিবেন না।

(২) কোন ব্যক্তির দখলে কোন কারেন্ট জাল থাকিলে তিনি এই বিধান বলবৎ হইবার ৪৫ (পঁয়তাল্লিশ) দিনের মধ্যে নিকটতম থানায়, মৎস্য কর্মকর্তার কার্যালয়ে অথবা উপজেলা নির্বাহী কর্মকর্তার কার্যালয়ে উক্ত কারেন্ট জাল সমর্পণ (surrender) করিবেন এবং এইরূপ মেয়াদের মধ্যে কোন ব্যক্তির দখলে কোন কারেন্ট জাল থাকিলে উহা অপরাধ বলিয়া গণ্য হইবে না।]

^৫[৫। দণ্ড।—(১) ধারা ৩ এর অধীন প্রণীত কোন বিধি অথবা ধারা ৪ এর অধীন প্রজ্ঞাপিত কোন নিষেধাজ্ঞার লঙ্ঘন অনূন্য এক বৎসর এবং অনধিক দুই বৎসরের সশ্রম কারাদণ্ড, অথবা অনধিক পাঁচ হাজার টাকার অর্থদণ্ড, অথবা উভয় দণ্ডে দণ্ডনীয় অপরাধ হইবে।

(২) ধারা ৪ক এ বর্ণিত কোন নিষেধাজ্ঞা লঙ্ঘনের ক্ষেত্রে—

(ক) কোন ব্যক্তি কারেন্ট জাল তৈরী, বুনন, আমদানি, বাজারজাত বা মজুদ করিলে, তিনি অনূন্য তিন বৎসর এবং অনধিক পাঁচ বৎসরের সশ্রম কারাদণ্ডে, এবং তদুপরি অনধিক দশ হাজার টাকার অর্থদণ্ডে দণ্ডিত হইবেন; এবং

(খ) কোন ব্যক্তি কারেন্ট জাল বহন, পরিবহন, অধিকার, দখল বা ব্যবহার করিলে, তিনি অনূন্য এক বৎসর এবং অনধিক তিন বৎসরের সশ্রম কারাদণ্ডে, অথবা অনধিক পাঁচ হাজার টাকার অর্থদণ্ডে, অথবা উভয় দণ্ডে দণ্ডিত হইবেন।]

^৬[৬ক। বাজেয়াপ্ত করিবার ক্ষমতা।—কোন ব্যক্তি এই আইনের অধীন বা এই আইনের অধীন প্রণীত বিধিমালার অধীন শাস্তিযোগ্য কোন অপরাধে দোষী সাব্যস্ত হইলে উক্তরূপ দোষী সাব্যস্তকারী আদালত উক্ত অপরাধ সংঘটনের জন্য উক্ত ব্যক্তি যে সকল দ্রব্য বা জিনিস ব্যবহার করিয়াছেন বা ব্যবহারের অভিপ্রায় রহিয়াছে সেই সকল দ্রব্য বা জিনিস বাজেয়াপ্ত করিবার নির্দেশ প্রদান করিবে।]

১। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ৬ দ্বারা “প্রভিন্সিয়াল” শব্দটি বিলুপ্ত।

২। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ৬ দ্বারা “দি প্রভিন্স অব ইস্ট পাকিস্তান” শব্দের স্থলে “বাংলাদেশ” শব্দটি প্রতিস্থাপিত।

৩। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ৬ দ্বারা “প্রস্তাব বা প্রদর্শন বা দখল” শব্দগুলির স্থলে “ধরা, বহন, পরিবহন, প্রস্তাব, প্রদর্শন বা দখল” শব্দগুলি প্রতিস্থাপিত।

৪। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ২০০২ (২০০২ সনের ২০ নং আইন) এর ধারা ৪ দ্বারা ধারা ৪ক সন্নিবেশিত।

৫। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ২০০২ (২০০২ সনের ২০ নং আইন) এর ধারা ৫ দ্বারা ধারা (৫) প্রতিস্থাপিত।

৬। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ২০০২ (২০০২ সনের ২০ নং আইন) এর ধারা ৬ দ্বারা ধারা (৬ক) সন্নিবেশিত।

৭৭০২

বাংলাদেশ গেজেট, অতিরিক্ত, সেপ্টেম্বর ১১, ২০১৩

৬। এই আইনের অধীন কৃত অপরাধের জন্য বিনা পরোয়ানায় গ্রেফতার।—(১) ^১[***] সরকার হইতে এতদুদ্দেশ্যে বিশেষভাবে ক্ষমতাপ্রাপ্ত ব্যক্তি, ধারা ৩ এর অধীন প্রণীত কোন বিধির লঙ্ঘন বা ^২[যথাক্রমে ধারা ৪ এবং ৪ক] এর অধীন প্রজ্ঞাপিত নিষেধ লঙ্ঘনের জন্য কোন ব্যক্তিকে বিনা পরোয়ানায় গ্রেফতার করিতে পারিবেন যদি—

(ক) উক্ত ব্যক্তির নাম এবং ঠিকানা তাহার অজানা থাকে; এবং

(খ) উক্ত ব্যক্তি তাহার নাম এবং ঠিকানা প্রদানে সম্মত না হন অথবা, উহা প্রদান করা হইলেও, উহার যথার্থতা সম্পর্কে সন্দেহের যুক্তিসংগত কারণ থাকে।

(২) এই ধারা অনুসারে গ্রেফতারকৃত কোন ব্যক্তিকে যতক্ষণ না তাহার নাম এবং ঠিকানা সঠিকভাবে নিরূপণ করা যায় ততক্ষণ পর্যন্ত আটক রাখা যাইতে পারে :

তবে শর্ত থাকে যে, ফৌজদারী কার্যবিধি, ১৮৯৮ (১৮৯৮ সনের ৫নং আইন) এর বিধান অনুসারে ম্যাজিস্ট্রেটের সম্মুখে বা নিকটস্থ থানায় উপস্থিত করিবার জন্য যে সময় প্রয়োজন হয় উহার অধিক সময় অনুরূপ গ্রেফতারকৃত ব্যক্তিকে আটক রাখা যাইবে না।

(৩) ফৌজদারী কার্যবিধি, ১৮৯৮ (১৮৯৮ সনের ৫নং আইন) এ যাহাই থাকুক না কেন, পূর্ববর্তী উপ-ধারা অনুসারে থানার ভারপ্রাপ্ত কর্মকর্তার নিকট উপস্থাপিত কোন ব্যক্তিকে তাহার পক্ষে ম্যাজিস্ট্রেটের নিকট উপস্থাপন করা পর্যন্ত আটক রাখা আইনানুগ হইবে।

^৩(৪) এই আইনের অধীন সংঘটিত কোন অপরাধের ক্ষেত্রে তল্লাশি, জব্দ এবং তদন্ত করিবার জন্য সাব-ইন্সপেক্টর পদমর্যাদার কোন পুলিশ কর্মকর্তার যেরূপ ক্ষমতা রহিয়াছে সরকারের নিকট হইতে ক্ষমতাপ্রাপ্ত সকল মৎস্য কর্মকর্তার সেইরূপ ক্ষমতা থাকিবে; এবং এই আইনের অধীন কোন মৎস্য কর্মকর্তা বা কোন পুলিশ কর্মকর্তা কর্তৃক জব্দকৃত কোন কারেন্ট জাল ৩০ দিন অতিক্রান্ত হইবার পর ধ্বংস করিতে হইবে, যদি না ইতোমধ্যে কোন ব্যক্তি উহা দাবি করিয়া থাকে অথবা উক্ত জাল সম্পর্কে কাহারও আইনগত দাবি সম্পর্কিত কোন প্রকার কার্যধারা অন্য কোনভাবে গ্রহণ করা হইয়া থাকে।]

^৪[৭। অপরাধসমূহের আমলযোগ্যতা, বিচার ইত্যাদি।— ফৌজদারী কার্যবিধি, ১৮৯৮ (১৮৯৮ সনের ৫নং আইন) এ যাহা কিছুই থাকুক না কেন,—

(ক) এই আইনের অধীন সংঘটিত কোন অপরাধ উক্ত কার্যবিধির সংজ্ঞা অনুসারে আমলযোগ্য অপরাধ হইবে;

(খ) কোন আদালত, মৎস্য কর্মকর্তা বা পুলিশের উপ-পরিদর্শক পদমর্যাদার নিম্নে নহেন এইরূপ কোন পুলিশ কর্মকর্তা কর্তৃক অভিযোগ দায়ের অথবা প্রতিবেদন ব্যতীত, কোন অপরাধ আমলে গ্রহণ করিবে না;

১। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ৮ দ্বারা “প্রভিন্সিয়াল” শব্দটি বিলুপ্ত।

২। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ২০০২ (২০০২ সনের ২০ নং আইন) এর ধারা ৭ দ্বারা “ধারা ৪ এর অধীন” শব্দের স্থলে “যথাক্রমে ধারা ৪ এবং ৪ক এর অধীন” শব্দগুলি এবং সংখ্যা প্রতিস্থাপিত।

৩। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ২০০২ (২০০২ সনের ২০ নং আইন) এর ধারা ৭ দ্বারা উপ-ধারা (৪) প্রতিস্থাপিত।

৪। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) আইন, ১৯৯৫ (১৯৯৫ সনের ৯নং আইন) এর ধারা ৫ দ্বারা ধারা ৭ প্রতিস্থাপিত।

বাংলাদেশ গেজেট, অতিরিক্ত, সেপ্টেম্বর ১১, ২০১৩

৭৭০৩

৭।(গ) মেট্রোপলিটন ম্যাজিস্ট্রেট কিংবা প্রথম শ্রেণির ম্যাজিস্ট্রেট আদালত ব্যতীত, অন্য কোন আদালত এই আইনের অধীন সংঘটিত কোন অপরাধের বিচার করিবে না; এবং

(ঘ) এই আইনের ধারা ৫ এর উপ-ধারা (২) এর দফা (ক) এর অধীন সংঘটিত অপরাধ ব্যতীত, কোন অপরাধের বিচারকারী আদালত সংক্ষিপ্ত বিচারের জন্য উক্ত কার্যবিধিতে বর্ণিত পদ্ধতি অনুসারে সংক্ষিপ্তভাবে উক্ত অপরাধের বিচার করিতে পারিবে।]]

৮। কর্মকর্তাগণ সরকারি কর্মচারী হিসাবে গণ্য হইবেন।—এই আইনের অধীন দায়িত্ব পালনের জন্য ক্ষমতাপ্রাপ্ত সকল ব্যক্তি ৭[***] দণ্ডবিধির ধারা ২১ এর সংজ্ঞা অনুসারে সরকারি কর্মচারী হিসাবে গণ্য হইবেন।

৯। দায়মুক্তি।—এই আইনের অধীন দায়িত্ব পালনের জন্য ক্ষমতাপ্রাপ্ত কোন ব্যক্তি কর্তৃক এই আইন অনুসারে সরল বিশ্বাসে কোন কার্য করিবার বা করিবার অভিপ্রায়ে কারণে তাহার বিরুদ্ধে কোন দেওয়ানি, ফৌজদারি বা অন্য কোন আইনগত কার্যধারা গ্রহণ করা যাইবে না।

১০। [বাতিল।—মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫ নং অধ্যাদেশ) এর ধারা ১১ দ্বারা বিলুপ্ত।]

- ১। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ২০০২ (২০০২ সনের ২০ নং অধ্যাদেশ) এর ধারা ৮ দ্বারা দফা (গ) এবং (ঘ) প্রতিস্থাপিত।
- ২। মৎস্য সুরক্ষা ও সংরক্ষণ (সংশোধন) অধ্যাদেশ, ১৯৮২ (১৯৮২ সনের ৫৫নং অধ্যাদেশ) এর ধারা ১০ দ্বারা “পাকিস্তান” শব্দটি বিলুপ্ত।

মোঃ নজরুল ইসলাম (উপসচিব), উপপরিচালক, বাংলাদেশ সরকারি মুদ্রণালয়, তেজগাঁও, ঢাকা কর্তৃক মুদ্রিত।
আবদুর রশিদ (উপসচিব), উপপরিচালক, বাংলাদেশ ফরম ও প্রকাশনা অফিস,
তেজগাঁও, ঢাকা কর্তৃক প্রকাশিত। web site: www.bgpress.gov.bd

Appendix D-7: The Protection and Conservation of Fish Act, 1950, Amendment 2013

রেজিস্টার্ড নং ডি এ-১

বাংলাদেশ



গেজেট

অতিরিক্ত সংখ্যা

কর্তৃপক্ষ কর্তৃক প্রকাশিত

রবিবার, এপ্রিল ৭, ২০১৩

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

মৎস্য ও প্রাণিসম্পদ মন্ত্রণালয়

মৎস্য-২ (আইন) অধিশাখা

প্রজ্ঞাপন

তারিখ, ২৪ চৈত্র ১৪১৯ বঙ্গাব্দ/৭ এপ্রিল ২০১৩ খ্রিস্টাব্দ

এস, আর, ও নং ৯৩-আইন/২০১৩।—The Protection and Conservation of Fish Act, 1950 (E. B. Act XVIII of 1950) এর Section 3 এর sub-section (3) এর clause (iii), Protection and Conservation of Fish Rules, 1985 এর Rule-12 এর সহিত পঠিতব্য, এ প্রদত্ত ক্ষমতাবলে সরকার উহার ১৭ কার্তিক, ১৪১৮ বঙ্গাব্দ মোতাবেক ০১ নভেম্বর, ২০১১ খ্রিস্টাব্দ তারিখের প্রজ্ঞাপন এস, আর, ও নং ৩৩৭-আইন/২০১১ এতদদ্বারা রহিতক্রমে, মৎস্য চাষের আওতায় ব্যবহার ব্যতীত, মাছ ধরবার ক্ষেত্রে নিম্নবর্ণিত সুতা (Cotton), নাইলন (Nylone) বা অন্য কোন সিনথেটিক (Synthetic) সুতার তৈরী—

(ক) সর্বোচ্চ ১ (এক) সেন্টিমিটার পর্যন্ত ব্যাস বা দৈর্ঘ্যের যে কোনো আকার বা আকৃতির মেস সাইজ (Mesh Size) বিশিষ্ট নিম্নবর্ণিত জালের ব্যবহার উহার পার্শ্বে উল্লিখিত সময়ের জন্য নিষিদ্ধ করিল, যথাঃ—

জালের প্রকার	প্রচলিত নাম	স্থানীয় নাম	ব্যবহার নিষিদ্ধ সময়
টানা জাল; কাঠি জাল	মশারী জাল; চট জাল	কাঁথা জাল, বেড় জাল; জগৎ বেড় জাল; ভীম জাল	প্রতি বৎসর ফাল্গুন মাস থেকে শ্রাবণ মাস পর্যন্ত

(২১০৭)

মূল্য : টাকা ৪.০০

২১০৮

বাংলাদেশ গেজেট, অতিরিক্ত, এপ্রিল ৭, ২০১৩

(খ) যে কোনো আকার, প্রকার, ধরন, ফাঁস বা মেশ সাইজ (Mesh Size) বিশিষ্ট নিম্নবর্ণিত জালের ব্যবহার দেশের সকল স্বাদু বা মিঠা পানির জলাশয়ে এবং সর্বোচ্চ জোয়ারে ১০(দশ) মিটার গভীরতা পর্যন্ত উপকূলীয় জলসীমায় বর্ণিত জালের পার্শ্বে উল্লিখিত সময়ের জন্য নিষিদ্ধ করিল, যথা :-

জালের প্রকার	প্রচলিত নাম	স্থানীয় নাম	ব্যবহার নিষিদ্ধ সময়
স্থিরকৃত জাল (Fixed Net);	উপকূলীয় বেহন্দি জাল (Estuarine Set Bag Net-ESBN);	বাঁধা জাল; পেকুয়া জাল; বিঙ্গি জাল, গাড়া জাল; চিংড়ি পোনা ধরা জাল; খুটি/খোটা জাল; টং জাল; বিন্দি জাল;	সারা বৎসর

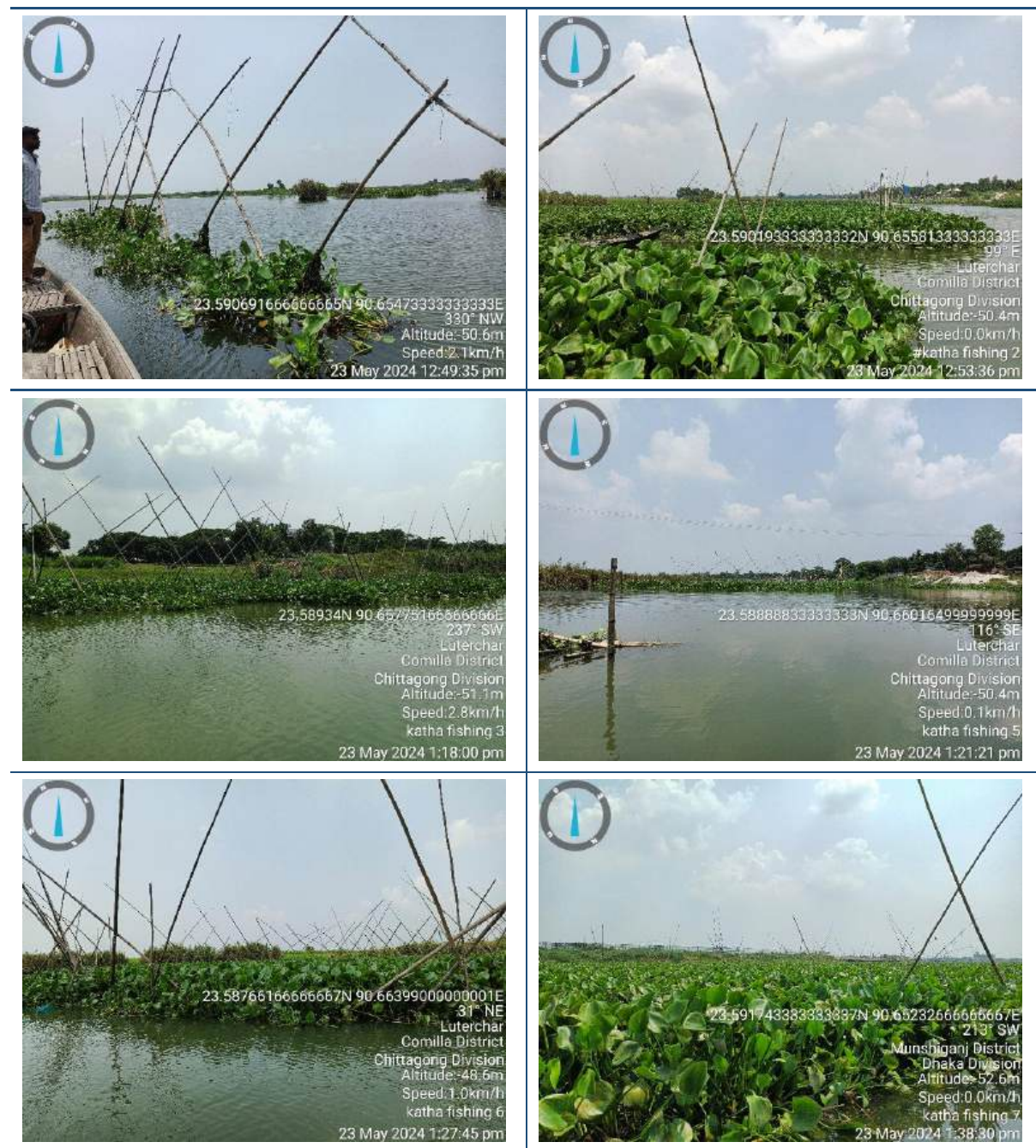
রাষ্ট্রপতির আদেশক্রমে

মোঃ খায়রুল আলম সেখ

উপ-সচিব।

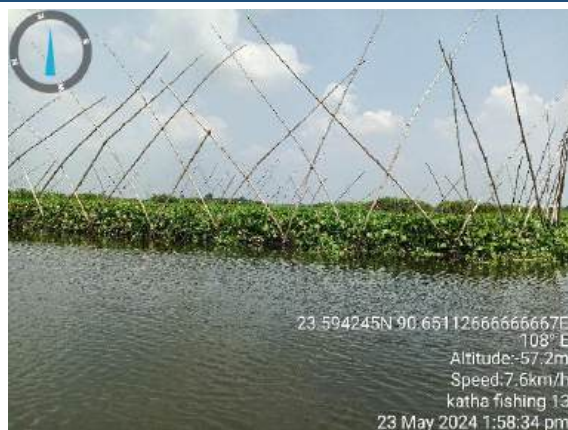
ড. মোঃ আলী আকবর (উপ সচিব), উপ পরিচালক, বাংলাদেশ সরকারি মুদ্রণালয়, তেজগাঁও, ঢাকা কর্তৃক মুদ্রিত।
আবদুর রশিদ (উপ সচিব), উপ পরিচালক, বাংলাদেশ ফরম ও প্রকাশনা অফিস,
তেজগাঁও, ঢাকা কর্তৃক প্রকাশিত। website : www.bgpress.gov.bd

Appendix D-8: Photographs of Kathas



Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh



Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh



Appendix D-9: Consultation Notes

Consultation 1

SI No	Discussed Issues	Responses
1.	Location Code	Katha Fishing 1 & 2
2.	Details of owner	Name – Md. Sujon Address – Luterchar Contact Number – 01857705548
3.	Size of Katha	The owners own a total of 8 kani/ 240 decimals of land. Both of his Kathas are around 4 kani each. (1 kani = 30 decimals)
4.	The name of this fishing method?	“Chop”
5.	Establishment cost for Katha	He spent a total of BDT 7,00,000 for the establishment of the two kathas.
6.	Establishment of the Katha	He established the Kathas in 2019.
7.	Establishment Procedure with costs	For each kathas, the owner bought 250 to 300 bamboos (around 20 feet per piece) and branches of trees which cost around BDT 3,00,000. He appointed 15 to 20 laborers during the establishment period. He employed them for two days and BDT 500 per person per day.
8.	Operational Procedure with costs	After establishing the area, he provides fish feed himself. He usually provides a total of around 200 kg of fish feed in two months. Moreover, he himself guards the area regularly at night during this period. Sometimes, the bamboo poles got broken due to different issues such as collision with boats (especially at night) and strong wind/storm. The owner himself repaired the issues. After feeding two months, he surrounds the area by “ <i>Moshari Net</i> ” (Common name known as Seine net). He appointed a total of 10 to 15 labors for around 10 days to surround the kathas with net and collect fish from the kathas.
9.	For how many years do they perform this procedure?	5 years
10.	Do they have other kathas in any other places?	No.
11.	Frequency of catching fish.	Once in a year.
12.	Types of fishes are mostly available and its market price	Last year he captured approximately 240 kg of prawn whose market price was around BDT 300000. Moreover, <i>Gura, puti, nola, shol, taki, gojar</i> etc fishes were also captured whose market price was around BDT 150,000. He earned a total of average BDT 3,00,000 from his two kathas after all expenses.

SI No	Discussed Issues	Responses
13.	Dependency on Katha fishing	Usually, he is involved in katha fishing activities for three months in a year (including renovating, feeding and capturing), involves in normal fish capturing activities and agricultural activities in the remaining nine months in the river. He has a monthly income of BDT 30000 from different sources such as fish capturing and agricultural activities.
14.	Impact of Jetty and Barges	If the proposed project discharges wastewater into the river, then the water will be polluted, and the number of fish will decrease.

Consultation 2

SI No	Issues will be Discussed	Responses
1.	Location Code	Katha Fishing - 5
2.	Details of owner	Name – Rukon Address – Luterchar Contact Number – 01868662994
3.	Size of Katha	4 Kani / 120 decimals (1 kani = 30 decimals).
4.	The name of this fishing method?	“Chop”
5.	Establishment cost for Katha fishing	1,00,000 BDT
6.	When did he establish the katha fishing	For first time – 2022 Latest renovation – 2024
7.	Establishment Procedure with costs	During establishment, the owner bought 220 bamboos (around 30 feet per piece) and branches of trees which cost around BDT 80,000. He appointed 7 laborers during the establishment period. He employed them for four days and BDT 700 per person per day.
8.	Operational Procedure with costs	After establishing the area, he provides fish feed himself. He usually provides fish feed for two months. The total cost of this feed is around BDT 17000 to 20000. After feeding two months, he surrounds the area by Net. He appointed a total of 5 to 7 laborers for around 10 days to surround the kathas with net and collect fish from the kathas.
9.	For how many years have you perform this procedure?	2 years
10.	Do you have other katha fishing areas in any other places?	No
11.	Frequency of catching fish.	Once in a year.

SI No	Issues will be Discussed	Responses
12.	Types of fishes are mostly available	The most available fish they catch from the katha is prawn. Moreover, <i>Gura, puti, nola, shol, taki, gojar</i> are also found during the fish capturing period.
13.	Dependency –	The katha owner only captures fish from his katha once a year. The rest of the time, he is involved in fish capturing from the river and agricultural activities. He has a monthly income of BDT 30000 from these sources.
14.	Impact of Jetty and Barges	The increased movement of barges may pose challenges for katha fishing. If the barges collide with the kathas, the structures could be damaged, requiring repairs that cost around BDT 5000 to 6000. Moreover, increase the movement of Barge will decrease the number of fishes in the river channel.

Consultation 3

SI No	Issues will be Discussed	Responses
1.	Location Code	Katha Fishing 7 & 9 (b)
2.	Details of owner	Name – Ahsanullah Sarker Address – Aralia Contact Number – 01827-805522
3.	Size of Katha	He owns approximately 4 kani/ 120 decimals (Approximately 2 kani/ 50 decimals each)
4.	The name of this fishing method?	Chop
5.	Establishment cost for Katha fishing	BDT 2,00,000 (around 100000 for each)
6.	When did he establish the katha fishing	He got one katha (Katha Fishing 7) from his father and bought another one (Katha Fishing 9 b) in 2020.
7.	Establishment Procedure with costs	For the establishment of each of the kathas, the owner bought 200 bamboos (around 40 feet per piece) and branches of trees which cost around BDT 80,000. He appointed 5 laborers during the establishment period for 5 to 7 days (each person BDT 500 per day).
8.	Operational Procedure with costs	After establishing the area, he provides fish feed himself. He usually provides fish feed which BDT costs BDT 20,000 in two months for each kathas. After feeding, he surrounds the area with a net. He owns a net (“ <i>Moshari net</i> ”) for surrounding and fish capturing purposes from the kathas. He appoints 5 to 6 laborers for surrounding net and capturing fish. They labors are hired for 1 week and they are paid BDT 500 per day.
9.	For how many years do they perform this procedure?	More than 20 years.

SI No	Issues will be Discussed	Responses
10.	Do they have other kathas in any other places?	Yes. He has a total of 13 kathas. He has 5 brothers, and they look after the other areas.
11.	Frequency of catching fish.	He collects fish from both kathas once in every 2 months excluding the rainy season.
12.	Types of fishes are mostly available	Different types of local fish such as <i>puti, tengra, nola, aier, gojar, prawn, shol</i> etc. are available in this area.
13.	Dependency – Do they or their family fully depend on the income from this? Or do they have other sources of income?	The owner is not only dependent on this fishing procedure, but also involved in agricultural activities. Moreover, his son is working on a private farm. He has a monthly income of around BDT 22000, and he earns around BDT 400000 from his kathas yearly. But he needs to spend around BDT 150000 to 200000 per year for the renovation, repairing, labor costs and operational costs of the each kathas.
14.	Impact of Jetty and Barges	Construction of Jetty will impact his katha (9 b) and his katha might be demolished.
15.	The fishermen – permanent or Seasonal?	Seasonal (Collects fish once in two months excluding the rainy season)
16.	How did they use the river land? Did they follow lease or other method to use that area?	One of the kathas he got from his father, and he bought the other one.
17.	What do they do during dry season and rainy season?	Agricultural work and normal fishing.

Consultation 4

SI No	Issues will be Discussed	Responses
1.	Location Code	Katha Fishing 8
2.	Details of owner	Name – Khurshid Address – Aralia Contact Number – 01605-272642
3.	Size of Katha	1.5 kani/ 45 decimals
4.	The name of this fishing method?	“Chop”
5.	Establishment cost for Katha	1,12,000 BDT
6.	When did he establish the katha fishing	For first time – 2019 Latest renovation – 2024

SI No	Issues will be Discussed	Responses
7.	Establishment Procedure with costs	During establishment, the owner bought around 200 bamboos (around 20 feet per piece) and branches of trees which cost around BDT 90,000. He appointed 4 to 5 laborers during the establishment period.
8.	Operational Procedure with costs	After establishing the area, he provides fish feed himself. He usually provides fish feed which BDT costs 20000 for two months. After feeding, he surrounds the area with a net. He appointed a total of 4 to 5 labors for around 8 to 10 days to surround the kathas with net and collect fish from the kathas.
9.	For how many years do they perform this procedure?	5 years
10.	Do they have other katha fishing areas in any other places?	Yes
11.	Frequency of catching fish.	Three to Four times in a year.
12.	Types of fishes are mostly available	Prawn is the most available fish for the katha whereas <i>shol</i> , <i>taki</i> , <i>gojar</i> , <i>ru</i> i, <i>katla</i> etc are also found during capturing.
13.	Dependency –	The owner is not only dependent on this fishing procedure, but also involved in normal fishing and agricultural activities. He has a monthly income of around BDT 25000, and he earns around BDT 300000 from his kathas yearly.
14.	Impact of Jetty and Barges	Construction of Jetty will impact his katha and his katha might be demolished.
15.	The fishermen – permanent or Seasonal?	Seasonal
16.	How did they use the river land? Did they follow lease or other method to use that area?	He bought the Katha fishing land from another katha owner.
17.	What does he do during dry season and rainy season?	Fish capturing and agricultural works.

Consultation 5

SI No	Issues will be Discussed	Responses
1.	Location Code	Katha Fishing - 9
2.	Details of owner	Name – Alamgir Address – Aralia Contact Number – 01845-585047

SI No	Issues will be Discussed	Responses
3.	Size of Katha	1.5 kani/ 45 decimals
4.	The name of this fishing method?	“Chop”
5.	Establishment cost for Katha	1,00,000 BDT
6.	When did he establish the katha fishing	For first time – 2012 Latest renovation – 2024
7.	Establishment Procedure with costs	During establishment, the owner bought around 200 bamboos (around 20 feet per piece) and branches of trees which cost around BDT 90,000. He appointed 4 to 5 laborers during the establishment period.
8.	Operational Procedure with costs	After establishing the area, he provides fish feed himself. He usually provides fish feed, which BDT costs 20000 for two months. After feeding, he surrounds the area with a net. He appoints 5 to 6 labors for surrounding net and capture fishes. He pays BDT 1000 per labor daily and they work for 5 to 6 days
9.	For how many years do they perform this procedure?	12 years
10.	Do they have other katha fishing areas in any other places?	No
11.	Frequency of catching fish.	Three times in a year.
12.	Types of fishes are mostly available	Prawn is the most available fish for the katha whereas <i>shol</i> , <i>taki</i> , <i>gojar</i> , <i>ru</i> , <i>katla</i> etc are also found during capturing.
13.	Dependency –	The owner is not only dependent on this fishing procedure, but also involved in normal fishing and agricultural activities. He has a monthly income of around BDT 35000, and he earns around BDT 120000 from his kathas yearly after all expenses.
14.	Impact of Jetty and Barges	Construction of Jetty will impact his katha and his katha might be demolished.
15.	The fishermen – permanent or Seasonal?	Seasonal
16.	How did they use the river land? Did they follow lease or other method to use that area?	He bought the Katha fishing land from another katha owner.
17.	What do they do during dry season and rainy season?	Fish capturing and agricultural works.

Consultation - 6

SI No	Issues will be Discussed	Responses
1.	Location Code	Katha Fishing - 10
2.	Details of owner	Name – Abdul Hafez Address – Aralia Contact Number – 01779468710
3.	Size	3 kani / 90 Decimals
4.	The name of this fishing method?	“Chop”
5.	Establishment cost for Katha fishing	2,00,000 BDT
6.	When did he establish the katha fishing	For first time – 2021 Latest renovation – 2024
7.	Establishment Procedure with costs	During establishment, the owner bought 250 to 300 bamboos (around 20 feet per piece) and branches of trees which cost around BDT 90,000. He appointed 10 to 15 laborers during the establishment period.
8.	Operational Procedure with costs	After establishing the area, he provides fish feed himself. He usually provides fish feed which BDT costs 45000 to 50000 in two or three months. After feeding, he surrounds the area with a net. He appointed a total of 5 to 7 labors for around 10 days to surround the kathas with net and collect fish from the kathas.
9.	For how many years do they perform this procedure?	3 years
10.	Do they have other katha fishing areas in any other places?	No
11.	Frequency of catching fish.	Once in a year.
12.	Types of fishes are mostly available and their market price	Last year they captured 100 kg of prawn whose market price was BDT 150000. Moreover, <i>Gojar</i> , <i>Shol</i> , <i>puti</i> etc fishes are also captured from the katha fishing area. As per the owner, he faced financial loss in doing this katha fishing due to lack of fishes, damages of bamboo due to storm and excessive repair cost.
13.	Dependency – Do they or their family fully depend on the income from this? Or they have other sources of income? Details of other	Usually, he is involved in katha fishing activities for three to four months in a year (including renovating, feeding and capturing), involves in agricultural activities and capturing fish from river.

SI No	Issues will be Discussed	Responses
	sources of income if available.	
14.	Impact of Jetty and Barges	The wharf is at a considerable distance from the katha. No impacts resulting is foreseen from the construction of the wharf.
15.	The fishermen – permanent or Seasonal?	Seasonal
16.	How did they use the river land? Did they follow lease or other method to use that area?	He bought the Katha fishing land from another katha owner. He spent BDT 30,000 for his 3 kani (90 decimals) land.
17.	What do they do during dry season and rainy season?	Fish capturing and agricultural works.

Consultation 7

SI No	Issues will be Discussed	Responses
1.	Location Code	Katha Fishing - 13
2.	Details of owner	Name – Shohag Mia Address – Aralia Contact Number – 01835-040566
3.	Size of Kathas	Approximately 7 kani/ 240 decimals (1 kani = 30 decimals)
4.	The name of this fishing method?	Chop
5.	When did he establish the katha	They got the fishing land and total process from his father.
6.	Establishment Procedure with costs	During establishment, the owner bought 250 to 300 bamboos (around 20 feet per piece) and branches of trees which cost around BDT 100,000. He appointed 15 to 20 laborers during the establishment period.
7.	Operational Procedure with costs	After establishing the area, he provides fish feed himself. He usually provides fish feed which BDT costs approximately 50000 in two months. After feeding, he surrounds the area with a net. He appointed a total of 8 to 10 labors for around 10 days to surround the kathas with net and collect fish from the kathas.
8.	Do they have other katha fishing areas in any other places?	No
9.	Frequency of catching fish.	Twice a year. (Before Rainy Season and after rainy season)

SI No	Issues will be Discussed	Responses
10.	Dependency – Do they or their family fully depend on the income from this? Or do they have other sources of income?	The owner is not only dependent on this fishing procedure, but also involved in normal fishing in the river.
11.	Impact of Jetty and Barges	Increase the movement of Barge will decrease the number of fishes in the river channel.
12.	The fishermen – permanent or Seasonal?	Seasonal
13.	How did they use the river land? Did they follow lease or other method to use that area?	He got the katha fishing land from his father.
14.	What do they do during dry season and rainy season?	Normal fishing.

Consultation 8

SI No	Issues will be Discussed	Responses
1.	Location Code	Katha Fishing - 14
2.	Details of owner	Name – Alam Address – Aralia Contact Number – 01889-686296
3.	Size of Kathas	Approximately 10 <i>kani</i> / 300 <i>decimals</i> (1 <i>kani</i> = 30 <i>decimals</i>)
4.	The name of this fishing method?	Chop
5.	When did he establish the katha	February, 2024
6.	For how many years do they perform this procedure?	Starting from this year.
7.	Do they have other katha fishing areas in any other places?	No
8.	Frequency of catching fish.	Not started yet.
9.	Dependency –	No information

SI No	Issues will be Discussed	Responses
	Do they or their family fully depend on the income from this? Or do they have other sources of income?	
10.	Impact of Jetty and Barges	Increasing the movement of Barge will decrease the number of fishes in the river channel.
11.	The fishermen – permanent or Seasonal?	Seasonal
12.	How did they use the river land? Did they follow lease or other method to use that area?	He bought the katha fishing land.
13.	What do they do during dry season and rainy season?	Normal fishing.

Appendix D-10: Photographs of Consultations with Katha owners



Appendix E: Applicable Standards of DOE, WHO and IFC**Appendix E-1: Air Quality Standards/Guidelines**

Air Pollutant	Unit	Average Time	Bangladesh Standards	WHO Guidelines
Carbon Monoxide (CO)	mg/m ³	24-hour	-	4
	mg/m ³	8-hour	5	10
	mg/m ³	1-hour	20	35
Lead (Pb)	µg/m ³	Annual	0.25	-
	µg/m ³	24-hour	0.50	-
Nitrogen Dioxide (NO ₂)	µg/m ³	Annual	40	10
	µg/m ³	24-hour	80	25
Coarse Particulates (PM ₁₀)	µg/m ³	Annual	50	15
	µg/m ³	24-hour	150	45
Fine Particulates (PM _{2.5})	µg/m ³	Annual	35	5
	µg/m ³	24-hour	65	15
Ozone (O ₃)	µg/m ³	8-hour	100	100
	µg/m ³	1-hour	180	-
Sulfur Dioxide (SO ₂)	µg/m ³	24-hour	80	40
	µg/m ³	1-hour	250	-
Ammonia (NH ₃)	µg/m ³	Annual	100	-
	µg/m ³	24-hour	400	-

Source: Air Pollution (Control) Rules, 2022 and WHO global air quality guidelines, 2021

Appendix E-2: Standards for Odor in Bangladesh

S/N	Parameter	Unit	Standard Limit
1	Acetaldehyde (C ₂ H ₄ O)	ppm	0.5 - 5.0
2	Ammonia (NH ₃)	ppm	1 - 5
3	Hydrogen Sulfide (H ₂ S)	ppm	0.02 - 0.20
4	Methyl Disulfide (C ₂ H ₆ S ₂)	ppm	0.009 - 0.10
5	Methyl Mercaptan (CH ₄ S)	ppm	0.02 - 0.20
6	Methyl Sulfide (C ₂ H ₆ S)	ppm	0.01 - 0.20
7	Styrene (C ₈ H ₈)	ppm	0.4 - 2.0
8	Trimethylamine (C ₃ H ₉ N)	ppm	0.005 - 0.07

Source: Air Pollution (Control) Rules, 2022

Appendix E-3: Noise Level Standards/Guidelines**Appendix E-3.1: WHO Ambient Noise Level Standards**

Category of Area/Receptor	IFC-WHO ⁵⁵	
	Day dB(A)	Night dB(A)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Source: Guidelines for Community Noise, World Health Organization, 1999

Note: As per IFC EHS noise level guidelines, Noise impacts should not exceed the levels presented in the above table or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Appendix E-3.2: Standards for Sound in Bangladesh

S/N	Category of Area/Zone	Limit in dB(A) Leq*	
		Day-time	Night-time
1	Silent zone	50	40
2	Residential area	55	45
3	Mixed area	60	50
4	Commercial area	70	60
5	Industrial area	75	70

Notes:

1. The time from 6 am to 9 pm is counted as day-time.
2. The time from 9 pm to 6 am is counted as night-time.

* The time-weighted average of sounds related to the human ear for a certain period is expressed by dB(A) Leq which is indicated in dB(A) scale.

Source: Noise Pollution (Control) Rules, 2006

⁵⁵ Guidelines values are for noise levels measured out of doors.

Appendix E-4: Standards for Water Quality**Appendix E-4.1: Standards for Inland Surface Water in Bangladesh**

S/N	Best Practice-Based Classification	Parameters											
		pH	DO	BOD	NO ₃ -N	NH ₄ -N	PO ₄ -P	Total Cr	Pb	Hg	Total Coliform	TDS	COD
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 mL	mg/L	mg/L
1	Source of drinking water for supply only after disinfecting	6.5 - 8.5	≥ 6	≤ 2	7.0	0.1	0.1	0.02	0.03	0.001	≤ 100	1000	10
2	Water usable for recreational activity	6.5 - 8.5	≥ 5	≤ 3	7.0	0.3	0.5	0.2	0.05	0.001	≤ 50	1000	10
3	Source of drinking water for supply after conventional treatment	6.0 - 9.0	≥ 5	≤ 3	7.0	0.3	0.5	0.02	0.03	0.001	≤ 5000	1000	25
4	Water usable by fisheries	6.0 - 9.0	≥ 5	≤ 6	7.0	0.3	0.5	0.05	0.1	0.004	≤ 5000	1000	50
5	Water usable by various process and cooling industries	6.5 - 8.5	≥ 1	12	-	2.7	-	0.1	0.1	0.05	-	1000	100
6	Water usable for irrigation	6.5 - 8.5	-	≤ 12	5.0	1.5	2.0	0.1	0.1	0.002	≤ 50000	1000	100

Notes:

1. In water used for irrigation water, electrical conductivity is 2250 µS/cm (at a temperature of 25°C); Sodium is less than 26%; boron is less than 0.2%.

Source: The Environment Conservation Rules, 2023 (Schedule-2)

Appendix E-4.2: Standards for Drinking Water

S/N	Parameters	Unit	Bangladesh Standards	WHO Guideline
1	Aldrin and Dieldrin	µg/L	0.03	0.03
2	Aluminum (Al)	mg/L	0.20	-
3	Ammonia (NH ₃)	mg/L	1.50	-
4	Anionic Detergent	mg/L	0.20	-
5	Arsenic (As)	mg/L	0.05	0.01
6	Barium (Ba)	mg/L	0.70	1.3
7	Benzene (C ₆ H ₆)	mg/L	0.01	0.01
8	Boron (B)	mg/L	1.0	2.4
9	Cadmium (Cd)	mg/L	0.003	0.003
10	Calcium (Ca)	mg/L	75	-
11	Chloride	mg/L	250 ^a	-
	Chlorinated Alkanes			
12	Carbon Tetrachloride (CCl ₄)	mg/L	0.005	0.004
13	1,1 Dichloroethane (1,1 C ₂ H ₄ Cl ₂)	mg/L	0.03	-
14	1,2 Dichloroethane (1,1 C ₂ H ₄ Cl ₂)	mg/L	0.03	0.03
15	Tetrachloroethane (C ₂ H ₂ Cl ₂)	mg/L	0.04	0.04
16	Trichloroethane (C ₂ H ₃ Cl ₃)	mg/L	0.02	0.02
	Chlorinated Phenols			
17	Pentachlorophenol	mg/L	0.009	0.009
18	2,4,6 Trichlorophenol	mg/L	0.20	0.2
19	Chlorine (Free Residual)	mg/L	0.20	5
20	Chloroform (CHCl ₃)	mg/L	0.09	0.3
21	Chromium (Total Cr)	mg/L	0.05	0.05
22	Coliform (Fecal)	CFU/100 mL	0	-
23	Coliform (Total)	CFU/100 mL	0	-
24	Color	Hazen unit	15	-
25	Copper (Cu)	mg/L	1.5	2.0
26	Cyanide (CN)	mg/L	0.05	0.0006
27	Fluoride	mg/L	1.0	1.5
28	Hardness (as CaCO ₃)	mg/L	500	-
29	Iron (Fe)	mg/L	0.3–1.0	-
30	Kjeldhl Nitrogen (Total)	mg/L	1.0	-

S/N	Parameters	Unit	Bangladesh Standards	WHO Guideline
31	Lead (Pb)	mg/L	0.01	0.01
32	Magnesium (Mg)	mg/L	30–35	-
33	Manganese (Mn)	mg/L	0.40	-
34	Mercury (Hg)	mg/L	0.001	0.006
35	Nickel (Ni)	mg/L	0.05	0.07
36	Nitrate (NO ₃ ⁻)	mg/L	45	50
37	Nitrite (NO ₂ ⁻)	mg/L	1.0	3.0
38	Odor	-	Odorless	-
39	Oil and Grease	mg/L	0.01	-
40	pH	-	6.5 - 8.5	6.5 - 8.5
41	Phenolic Compounds (Phenols)	mg/L	0.002	-
42	Potassium (K)	mg/L	12	-
43	Radioactive Materials (Gross Alpha Activity)	Bq/L	0.1	-
44	Radioactive Materials (Gross Beta Activity)	Bq/L	1.0	-
45	Selenium (Se)	mg/L	0.01	0.04
46	Silver (Ag)	mg/L	0.02	-
47	Sodium (Na)	mg/L	200	50
48	Suspended Particulate Matters	mg/L	10	-
49	Sulfide as Hydrogen Sulfide (Sulfide as H ₂ S)	mg/L	0.05	-
50	Sulfate (SO ₄ ⁻²)	mg/L	250	-
51	Total Dissolved Solids (TDS)	mg/L	1,000	-
52	Temperature	°C	20 - 30	-
53	Tin (Sn)	mg/L	2.0	-
54	Turbidity	NTU	5.0	-
55	Zinc (Zn)	mg/L	5.0	-

Note:

- a. In coastal areas, the standard for chlorine is 1000 mg/L.

Source: The Environment Conservation Rules, 2023 (Schedule-2) and WHO Guidelines for Drinking-water Quality, 2017

Appendix E-5: Standards for Sewage Discharge in Bangladesh

S/N	Parameter	Unit	Standard Limit
1	Temperature	°C	30
2	pH	-	6.0 - 9.0
3	BOD ₅ at 20°C	mg/L	30

S/N	Parameter	Unit	Standard Limit
4	COD	mg/L	125
5	Suspended Solids (SS)	mg/L	100
6	Oil and Grease	mg/L	10
7	Nitrate (NO ₃)	mg/L	50
8	Phosphate	mg/L	15
9	Total Coliform	CFU/100 mg/L	1000

Source: The Environment Conservation Rules, 2023 (Schedule-3)

Appendix E-6: Standards for Waste from Industrial Units or Projects

S/N	Parameter	Unit	Guideline Values		
			National Standards		
			Place 1 ⁵⁶	Place 2 ⁵⁷	Place 3 ⁵⁸
1.	Ammoniacal Nitrogen (as elementary N)	mg/L	50	50	50
2.	Ammonia (as free ammonia)	mg/L	5	5	5
3.	Arsenic (as As)	mg/L	0.2	0.2	0.2
4.	BOD ₅ at 20°C	mg/L	30	250	100
5.	Boron (B)	mg/L	2.0	2.0	4.0
6.	Cadmium (as Cd)	mg/L	2.0	1.0	2.0
7.	Chloride (Cl ⁻)	mg/L	600	600	-
8.	Chromium (as total Cr)	mg/L	0.5	1.0	1.0
9.	COD	mg/L	200	400	250
10.	Chromium (as hexavalent Cr)	mg/L	0.1	2.0	1.0
11.	Copper (as Cu)	mg/L	3.0	3.0	3.0
12.	Fluoride (as F)	mg/L	2	15	10
13.	Sulfide (as S)	mg/L	1	-	5
14.	Iron (as Fe)	mg/L	3	3	3
15.	Total Kjeldahl Nitrogen (as N)	mg/L	100	-	100
16.	Lead (as Pb)	mg/L	0.1	1.0	2.0
17.	Manganese (as Mn)	mg/L	2.0	2.0	2.0
18.	Mercury (as Hg)	mg/L	0.01	0.01	0.01
19.	Nickel (as Ni)	mg/L	1.0	2.0	5.0

⁵⁶ Inland surface water.

⁵⁷ Public sewerage system connected to treatment at second stage.

⁵⁸ Coastal areas.

S/N	Parameter	Unit	Guideline Values		
			National Standards		
			Place 1 ⁵⁶	Place 2 ⁵⁷	Place 3 ⁵⁸
20.	Nitrate (as elementary N)	mg/L	10.0	-	20.0
21.	Oil and Grease	mg/L	10	20	20
22.	Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	1.0	5.0	5.0
23.	Dissolved Phosphorus (as P)	mg/L	5.0	-	-
24.	Radioactive substance a. Alpha particle radiation b. Beta particle adiation	μCi/L	To be specified by Bangladesh Atomic Energy Commission		
25.	pH	-	6-9	6-9	6-9
26.	Selenium (as Se)	mg/L	0.05	0.05	0.05
27.	Zinc (as Zn)	mg/L	5	15	15
28.	Temperature	°C	Not more than 5°C of waterbody temperature	-	Not more than 5°C of waterbody temperature
29.	Suspended Solids (SS)	mg/L	100	500	100
30.	Cyanide (as Cn)	mg/L	0.1	2.0	0.2
31.	Total Residual Chlorine	mg/L	1.0	-	1.2
32.	Bioassay test ⁵⁹	-	90% of fisheries can survive in treated wastewater even after 96 hours		

Source: The Environment Conservation Rules, 2023 (Schedule-4)

⁵⁹ Only applicable for pesticide and pharmaceutical industries.

Appendix E-7: Australian Standards for Sediment Quality

www.esdat.net

Esdat Environmental Database Management Software

+61 2 9232 8080

TABLE 2. ASSESSMENT LEVELS FOR SEDIMENTS¹

Parameter	ISQG-Low ² (Trigger value)	ISQG-High ³
Metals/Metalloids (mg/kg dry wt)		
Antimony, Sb	2	25
Arsenic, As	20	70
Cadmium, Cd	1.5	10
Chromium, Cr	80	370
Copper, Cu	65	270
Lead, Pb	50	220
Mercury, Hg	0.15	1
Nickel, Ni	21	52
Silver, Ag	1.0	3.7
Zinc, Zn	200	410
Organometallics (µg/kg dry wt)⁴		
Tributyltin (as Sn)	5	70
Organics (µg/kg dry wt)⁴		
Acenaphthene	16	500
Acenaphthalene	44	640
Anthracene	85	1100
Fluorene	19	540
Naphthalene	160	2100
Phenanthrene	240	1500
Low Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) ⁵	552	3160
Benzo(a)anthracene	261	1600
Benzo(a)pyrene	430	1600
Dibenzo(a,h)anthracene	63	260
Chrysene	384	2800
Fluoranthene	600	5100
Pyrene	665	2600
High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) ⁶	1700	9600
Total Polycyclic Aromatic Hydrocarbons (PAHs)	4000	45000
Total DDT	1.6	46
P,p'-DDE	2.2	27
o,p'- + p,p'-DDD	2	20
Chlordane	0.5	6
Dieldrin	0.02	8
Endrin	0.02	8
Lindane	0.32	1.0
Total Polychlorinated Biphenyls (PCBs)	23	-

Assessment levels for soil, sediment and water – 27

Appendix F: Standalone Environmental and Social Management Plans

Appendix F-1: Construction Stage EHS Plan

Introduction

This plan has been produced in order to outline the health and safety standards that shall be required by MGI during the construction of the Meghna Re-Rolling and Steel Mills Limited construction project. Furthermore, the manual has been developed to give guidance and assistance to the Contractors in the development of their Site Safety Plans, to satisfy requirement of health and safety standards establish by OH&S Manual & the Employer's Requirements. This manual represents the minimum standards required and each Contractor is encouraged to expand and improve upon it. MRSML EHS plan for undertaking the construction work; however, MRSML will prefer that a project specific EHS Plan aligned with MRSML's requirement (Refer to the subsequent sections of this document for the requirements) are complied with. The EHS Plan at minimum has to comply with the regulatory requirement of Bangladesh as well as the best practices associated with the sector.

MRSML is committed to:

- Conduct and undertake its projects and investment in companies in compliance with IFC Performance Standards (principally The World Bank Group Environmental, Health and Safety Guidelines);
- Develop overall management organogram of the project Health and Safety implementation;
- Ensure provision of necessary assistance, facilities and training to carry out the functions of a health and safety representatives;
- Plan and perform an integrated task with concern for the safety and security of the staff and labor;
- Conduct HSE Audits on regular basis & advice management for necessary action;
- Manage and administration of medical services, supplies, nurse activities and patient records implement of site health plans and preventive medicine activities including first aid training of employees and workers;
- Undertake regular health and hygiene inspections;
- Offered full cooperation and assistance to the Employer and the Engineer, statutory authorities and local communities;
- Practice safe working procedure construction and operation of a steel plant project involves job hazards and its identification, elimination or minimization;
- A plan of safe work procedures, including the use of any personal protective equipment or clothing and the undertaking of periodic "toolbox talks" or inductions before undertaking hazardous work, to mitigate, reduce or control the risks and hazards; and
- Establish and maintain procedures for controlling and review all relevant Health and Safety documents and data;
- The section below presents an overview of the potential health and safety risks including the potential disasters on the proposed project. It defines the various risks involved during the construction and operation phase of the project. The health, safety and environment plan (HSEP) will address the following:
 - Evaluation and Identification of hazards;
 - Elimination and removal of hazards;
 - Control of Hazards which cannot be eliminated; and
 - Recovery from accidents.

Purpose and Scope

This health, safety and environment plan is provided as a guidance document for identifying the potential risks involved during construction and operation phase of the proposed project. This plan provides guidance with respect to occupational risks and disasters which aims to achieve the following:

- Identification of hazards, associated risks and control measures for each activity;
- Defining responsibilities to ensure effective implementation of health and safety (H&S) risk control measures;
- Avoid and/or minimize the impacts on workers and local communities' health due to various project activities;
- Provide and maintain safe working procedures and operations for workers; and
- Reduce human injury and damage to property and environment in case of an emergency.

Definitions

Competent Person: any person having the knowledge, training and experience specific to the work or task being performed.

Confined Space: "Confined space" means a compartment of small size and limited access which by its small size and confined nature can readily create or aggravate a hazardous exposure.

Emergency: An unforeseen occurrence, a sudden and urgent occasion for action

First Aider: A person who has received training and who holds a current first aid certificate from an organization or employer whose training and qualification for first aiders are approved by authority.

Hazard: A source, situation or act with a potential for harm in terms of:

- Ill Health
- Damage to property, plant, ships etc.
- Production losses or increased liabilities

Hazardous Substance: The term "hazardous substance" means a substance which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritant, or otherwise harmful is likely to cause injury.

Health and Safety Plan: A documented plan which addresses hazards identified and includes safe work procedures to mitigate, reduce or control the hazards identified.

Hot Work: The term "hot work" means welding, burning or other fire or spark producing operations.

Incident: An event or occurrence occurring at work or arising out of or in connection with the activities of persons at work, or in connection with the use of plant or machinery.

Risk: the probability that injury or damage will occur

Safe: Free from any hazard.

Legislation and Documents

This Policy is based on the following documents to ensure the conformance with requirements and procedures of:

National Standards/Rules/Laws:

- Bangladesh Labor Act, 2006 and Rules 2015;
- Public Procurement Rule, 2008;
- Water Supply and Sewerage Authority Act, 1996;
- National Safe Drinking Water Supply and Sanitation Policy, 1998;

- Labor Relations under Labor Laws, 1996 (Revisions to scattered Acts and Ordinances to formulate a unified code);
- Public Health Emergency Provisions Ordinance, 1994;
- Bangladesh Factory Act, 1979;
- The Employees State Insurance Act, 1948;
- The Employer's Liability Act, 1938;

International Standards/Rules/Laws:

- IFC Performance Standard 2 (PS2): Labor and Working Conditions (2012).
- For any business, its workforce is its most valuable asset. A sound worker-management relationship is key to the success of any enterprise. PS2 asks that companies treat their workers fairly, provide safe and healthy working conditions, avoid the use of child or forced labor, and identify risks in their primary supply chain.
- IFC Environmental, Health, and Safety General Guidelines, 2007.
- IFC EHS Guidelines for Integrated Steel Mills, 2007.

Roles and Responsibilities

EHS Manager, MRSML

- Shall develop and manage a Project EHS Monitoring Plan, or approve a plan developed by consultants, contractors and subcontractors. Moreover, the plan will identify all EHS requirements that need to be implemented to ensure, at a minimum, compliance with applicable regulatory requirements and EPC programs.
- Advise and assist in preparing an Audit schedule for the project, and ensure appropriately trained persons, with the knowledge and experience required to identify compliance issues, carry out audits. Ensure all audits are documented, and the report and any required corrective actions are clearly communicated to all those required to take action.
- Advise and assist in the investigation of serious accidents and dangerous occurrences. Where required, assist in the reporting of all such cases to regulatory agencies.
- Identify EHS training required by people involved in the project execution and provide assistance in organizing such training. Coordinate with Project Manager and, where appropriate, advise on training to improve the existing knowledge of personnel on Environmental, Health, and Safety matters.
- Liaise with the representatives of enforcement agencies.
- Liaise with EPC's EHS staff, to ensure that they meet their EHS expectations for the project, and quickly addresses and responds to any EHS concerns they raise.
- Provide EHS support to the Project Manager, Manager, Grievance Mechanism and Site EHS Representative, and other project staff as required.
- Approve suitably qualified Site EHS representatives. Manage and mentor the site EHS representatives. Ensure all required internal and external EHS reporting is completed on time.

Site EHS Officer

- Shall coordinate the monitor, manage and ensure site EHS programs and assist the Head of EHS in implementing the Site EHS Plan, including Environmental and Emergency Preparedness sections.
- Conduct and monitor frequent and regularly or weekly scheduled EHS inspections of EPC Contractors and Subcontractor's construction activities to monitor compliance with their own EHS program, applicable regulations and the EHS Plan.
- Update and develop as required, the EHS Plan including Environmental and Emergency Preparedness sections. Ensure all revisions and updates are reviewed and approved by the Head of EHS responsible for the project.

- Issue a work stoppage directive where conditions exist which are Immediately Dangerous to Life or Health (IDLH) or damaging to the environment. The work stoppage will remain in effect until the condition has been corrected. In conjunction with a work stoppage, refer as appropriate to the Hazard Identification/Notification Process.
- Be responsible for the management of incident reporting, investigation system including mitigation measures taken.
- Advise the management of appropriate Project Proponent's EHS Head and Chairman of the EHS Committee, Head of EHS of EPC Contractor/Subcontractor of unsafe acts/conditions observed on the project site for prompt corrective action to eliminate the unsafe act/condition.
- Either conduct EHS orientations or assist the EPC Contractor/Subcontractor's EHS representative with conducting EHS orientations for all construction personnel and visitors reporting to the project site. Ensure no one is allowed on site unaccompanied unless they understand the site's Emergency Response Plan.
- Attend a sample of Proponent's or EPC Contractor/Subcontractor's weekly EHS meetings and "toolbox" safety talks and verify that personnel signature sheets are properly completed for later reference.
- Either conduct, or assist in conducting accident investigations, analyzing causes, and formulating recommendations for corrective/preventative actions.
- Liaise with EPC Contractors/Subcontractors, local medical services, local fire and police departments, and local regulatory agencies such as Department of Environment (DoE), Noakhali on EHS related matters.
- Assist the EHS Head during conduction of the EHS portion of the weekly coordination and EHS meetings. Verify that local regulatory agency's required posters are posted and kept current by EPC Contractor/Subcontractor.
- Verify that EPC Contractor/Subcontractor is providing adequate and proper record keeping as required by local regulatory agencies and maintaining documentation of EHS training, EHS audits and inspections and occupational safety and health monitoring activities. Maintain recordkeeping for this and as required by the plan.

Grievance Officer

The Grievance Officer will be the chief designated person for project sites for receiving and acknowledging the grievances. A site level approach will be proposed to be developed for redressing of all cases of grievances by a grievance redress committee (GRC). All grievances are to be redressed at this stage. The grievance officer shall provide support to affected communities on problems arising from environmental or social impacts, record grievances of the affected community by categorizing and prioritizing them and provide solutions within a stipulated time period; and report to the aggrieved parties, developments regarding their grievances and decisions of the GRC. The Nominated Grievance Officer shall register the grievances, initiate the process of registering and take action; thereon for the resolution of the grievance and the timeline required in each step. The contact details of the Grievance Officer shall be maintained and updated in a format which will displayed at prominent places available to public and the project area.

Safety Officer(s)

- MRSML shall ensure appointment of safety officer(s) for employees and workers working at site, to:
- Review the effectiveness of health and safety measures;
- Identify potential hazards and potential major incidents;
- In collaboration with his employer, examine the causes of incidents;
- Investigate complaints by any employee /workers relating to that their health or safety on the site;
- Inspect the site with a view to, the health and safety of employees, at regular intervals;

- Participate in consultations with inspectors at the workplace and accompany inspectors on inspections of the workplace; and
- Participate in any internal health or safety audit.

MRSML shall ensure provision of necessary assistance, facilities and training to carry out the functions of a health and safety representatives established above.

First Aider

- Initial emergency response rescue citation and stabilization of critically ill or injured personnel;
- First Aid of non-emergency medical conditions;
- Management and administration of medical services, supplies, nurse activities and patient records.
- Implementation of site health plans and preventive medicine activities including first aid training of employees and workers; and
- Undertake regular health and hygiene inspections.

Employees/Workers

- Use the correct tools and equipment for the job; use Safety equipment and protective equipment/clothing supplied, e.g. Safety helmets, shoes, harness, goggles, etc.; and
- Report all defects in equipment to health and safety representatives.

Mitigation Measures

Construction Phase:

- The Contractor will prepare and implement a Health and Safety Plan prior to commencing work. This plan will include method statements for working methods, construction sequence, and safety arrangements.
- Competent and adequate resources of subcontractors will be used where construction activities are to be subcontracted.
- All persons working on site will be provided information about risks on Site and arrangements will be made for workers to discuss health and safety with the Contractor.
- All workers will be properly informed, consulted, and trained on health and safety issues.;
- Personal Protective Equipment (PPE) shall be worn at all times on the Site. This shall include appropriate safety shoes, safety eyewear, and hard hats. Non-slip or studded boots will be worn to minimize the risk of slips.
- Before starting work all the appropriate safety equipment and the first-aid kit will be assembled and checked as being in working order. The breathing apparatus will be tested at regular intervals in the manner specified by the makers.
- All lifting equipment and cranes will be tested and inspected regularly.
- Where sound levels cannot be reduced at the source, suitable hearing protection will be provided when noise levels indicate a Leq of more than 90 dB(A).
- The Contractor shall provide appropriate safety barriers with hazard warning signs attached around all exposed openings and excavations when the work is in progress.
- Workers have to be provided with PPE (high visible vest, hard hat, gum boot, life jacket, goggles, ear plugs etc.) and it has to be ensured that they use PPE properly.
- First Aid Box should be readily available at construction sites and labor camps.
- Provision of potable water, sanitary toilet facilities and hygienic accommodation for workers at camp sites. All potable water supplies will be tested quarterly.
- HSE Policy should be maintained strictly.
- Training should be provided about HSE to the labors in a regular interval.
- No use of child labor permitted that no workers under the age of 14 may be hired as general labors.

- Project boundary/fencing will ensure to prevent the ingress of persons into the construction site and also to protect the public from exposure to hazards associated with construction activities.
- Inform the local community before starting the construction activities;
- Implementation of a vector control program in labor camps and surrounding areas; and
- Emphasizing safety aspects among drivers, particularly with regard to the speed limit of 20 km/hr that will be enforced.
- Ensuring that only licensed drivers are employed by the Project.
- Avoiding peak hours for heavy vehicle movement where possible.
- Collaboration with local communities and responsible authorities to improve signage (e.g., pedestrian crossings, speed limits, etc.), visibility, and awareness of traffic and pedestrian safety.
- Screening, surveillance, and treatment of workers, through the provision of medical facilities and, where required, immunization programs.
- Instruct the workers about the health and safety issues in the construction site before starting the construction activities and ensure a secure working environment;
- Adequate facilities for the health of construction workers will be provided at the construction camp;
- Proper traffic monitoring should be done by the contractor and keep the record of accidents;
- Limit the speed of construction vehicles in the construction site and project approach road, it shall be 20 km/hour;
- Instruct the drivers to drive carefully in the project site and approach road;
- Use of mobile phone while driving is strictly prohibited in the construction site;
- Proper indication of accident-prone areas, education, and religious institutes in the project site.
- Proper Traffic Management Plan (TMP) should be prepared by the contractor during the starting of construction & follow it strictly;
- In this TMP, road safety measures such as speed breakers, warning signs/lights, road safety signs, flagmen, etc. should be included to ensure uninterrupted traffic.

Operation Phase:

- Provide OHS training program and information of basic site rules of work, basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures.
- Provide adequate lavatory facilities for the number of people expected to work in the facility.
- Adequate preventive measures from negative factors such as fire precautions, lighting, safe access, work environment temperature, area signage, labeling of equipment, communication Hazard codes, and electrical.
- Potential disasters and potential risks from the plant to the local community as well as the plan of action on the emergency protocol in the event of these accidents shall be disclosed.
- Disclose and generate Awareness on the Disaster Management Plan as well the measures and protocols prescribed by the same.
- Employees and plant personnel shall be trained on health and safety as well as handling and managing disasters and emergency events.
- Harmonious relations with the community and creating a feedback system shall be maintained.
- Sound labor and management relations shall be maintained to avoid conflict and disruption in operation.

Creating and maintaining a safe and healthy work environment

MRSML shall with respect to the site and the construction works that are contemplated:

- cause a preliminary hazard identification to be performed by a competent person before commencing any physical construction activity.
- evaluate the risks associated with such work constituting a hazard to the health and safety of such employees and the steps that need to be taken; and

- As far as is practicable, prevent the exposure of such employees to the hazards concerned or, where prevention is not reasonably practicable, and minimize such exposure.

MRSML shall ensure that:

- All practicable steps are taken to prevent the uncontrolled collapse of any new or existing structure or any part thereof, which may become unstable or is in a temporary state of weakness or instability due to the carrying out of construction work; and
- No structure or part of a structure is loaded in a manner which would render it unsafe.

MRSML shall carry out regular inspections and audits to ensure that the work is being performed in accordance with the requirements of this specification.

Training

- Site EHS Officer/Site Supervisor of MRSML shall ensure that every employee/worker (direct or contractual) is aware of the EHS risks associated with the work being carried out at the site and is trained and competent in the relevant work practices and maintenance procedures.
- MRSML should establish procedures to identify training needs and provide adequate safety training for all levels of employees including contractors.
- The safety training should provide staff with the knowledge and skills necessary for organizing and managing occupational safety and health programmes; team leaders with leadership skills and knowledge to lead, implement and apply occupational safety and health activities; and workers with the knowledge, skills and right attitudes to enable them to work safely.

Table 11-1: Sample Training Plan

Sl.	Training	Frequency	Description	Responsibility
1	Induction Training on Health and Safety covering the following: <ul style="list-style-type: none"> • HSE policy. • Hazards and risks associated with construction and operation and workplace; and workplace; • Control measure to eliminate or minimize HSE risks, including safe working systems and procedures; use of personal protective equipment; action to be carried out during emergency; • Emergency response procedures, such as firefighting and evacuation procedure 	-	All staff and contractor workers at the time of joining/engagement	EHS Manager of the MRSML
2.	Toolbox Training or pre-task briefings, highlighting hazards and the method of dealing with them	Daily	Held at each work location by head of contractor to discuss day's activities and specific hazards	EHS Officer of Contractor
3.	Worker Safety Training	Fortnightly	Review safety performance for week Discuss safety for upcoming operations	EHS Officer of Contractor
4.	Group Training	Monthly	Presentation of significant safety issues	EHS Manager

Sl.	Training	Frequency	Description	Responsibility
5.	Special Job Hazard Training including entry into confined space and other hazardous environment	Half Yearly	Training about safety measures to be incorporated related to specific jobs	EHS Manager
6.	Safety Bulletins	Weekly	Specific issues Visible through jobsite for constant awareness	EHS Manager
7.	Fire Safety	Half Yearly	Presentation of fire safety measures	EHS Manager
8.	Emergency Response	Half Yearly	For emergency preparedness	EHS Manager
9.	First Aid	Half Yearly	For emergency preparedness	EHS Manager
10.	Use of Personal Protective Equipment	Half Yearly	For workplace safety	EHS Manager and EHS Officer of Contractor

Documentation and Record Keeping

Site Supervisor of MRSML should maintain data and records concerning the identification of hazards, assessment and control of risks of the ongoing activities. The document should establish and maintain procedures for controlling all relevant EHS documents and data. Such documents can include but not limited to:

- EHS Policy;
- Hazard Identification Records;
- Risk Register;
- Legal Register;
- Licenses, Certificates, Permits;
- Control Methods including process control and machine design, safe work procedures, in housework rules;
- Design Drawings;
- Organization Structure;
- HSE group meeting records;
- Training Records;
- Drill Reports;
- Inspection and Audit Records; and
- Medical and Health Surveillance Records

Communication and Information Dissemination

MRSML should communicate and inform any persons affected by the risks about:

- The nature of the risks involved; and
- The control measures or safe work procedures to be taken to address the risks involved.

Review

The risk assessment should be reviewed and revised upon the occurrence of any injuries to any person as a result of exposure to a hazard in the workplace; or where there is a significant change in work practices or procedures.

Appendix F-2: Biodiversity Management Plan

Introduction

Ecology is the scientific analysis and study of interactions among organisms and their environment. Ecosystem diversity deals with the variations in ecosystems within a geographical location. It is the variation in the ecosystems found in a region or the variation in ecosystems over the whole planet. Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems. The biodiversity component of the study, focused on a few groups of biological components comprising of flora (tree, herbs, shrubs & climbers) and fauna (birds, reptiles, amphibians, mammals, butterflies, Fish) as well as the surrounding ecosystems.

Legal Framework and Standards

National Applicable Laws and Regulations

- Bangladesh Wildlife (Preservation) Act, 1974
- The Forest Act, 1927 and subsequent amendments in 1982 and 1989
- National Environmental Policy, 1992
- National Environmental Management Action Plan, 1995
- The National Forest Policy, 1994
- The National Water Policy, 1999
- Draft Wetland Policy, 1998
- National Fisheries Policy, 1998
- The Environment Conservation Act, 1995 (subsequent amendments in 2000, 2002 and 2010)
- National Water Bodies Protection Act, 2000
- National Biodiversity Strategy and Action Plan (2004)
- Ecologically Critical Areas (ECAs) Management Rules, 2016
- Biodiversity Act, 2017
- Forests Act, 1927 and its amendment in 1982, 1989, 2000 and 2018
- Wildlife (Conservation and Security) Act, 2012
- Protected Area Management Rules, 2017

International Standards

- Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971) ("Ramsar Convention").
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973.) ("CITES Convention")
- Convention on Biological Diversity, (Rio De Janeiro, 1992.)

Purpose

The purpose of biodiversity management plan is to minimize construction footprint and operation and establish a sustainable environment in the project area of influence. The purposes are:

- Minimize construction routes on the site and retain existing vegetation wherever possible.
- Fire prevention.
- Control of weeds and alien invasive species.
- Prohibit night driving, except in cases of security and emergencies.
- Ensure that waste from sites are cleared and workers are informed of the requirement to not hunt or injure local wildlife such as raptors.

- Establish procedures for the occasion any species are found on the construction site including procedures for reporting, identification and potential relocation.
- Re-vegetate areas, as soon as they are permanently cleared of the temporary lay down.

Roles and Responsibilities

An integrated approach to biodiversity management involves a range of stakeholders, including the MRSML, the Contractors (and subcontractors), local authorities, regulatory agencies and the general public. Such a system therefore requires robust processes regarding information dissemination, training, and designation of responsibility, management actions, monitoring, control, and corrective actions. Generic roles and responsibilities for MRSML are detailed below.

Responsible persons	Activities
Project Manager	<ul style="list-style-type: none"> • Approves Biodiversity Management Plan and the resources for implementation
EHS Manager	<ul style="list-style-type: none"> • Ensures the Project compliance with the Plan requirements. • Has overall responsibility for implementation of this Plan, including main contractors. • Ensure that the plan is available to all employees and key contractors. • Develops, revises and monitors the Plan.
EHS Officer	<ul style="list-style-type: none"> • Provide necessary support for main contractors to ensure compliance with the requirements of the Biodiversity Management Plan. • Performs audits and regular inspections of the main contractors for monitoring performance compared to the requirements of this Management Plan. • Report all hazards, incidents and non-conformities. • Prepares an annual environmental report that includes details on biodiversity issues.

Present Scenario

Flora and fauna in a particular bio-geographic region or zone tend to have shared characteristics in terms of broader climatic & geographical feature preferences/requirements. Therefore, IUCN has classified Bangladesh into 25 Bio-ecological Zones⁶⁰ in the context of physiographic and biological diversity. The study area, which encompasses both terrestrial and aquatic ecosystems. The study area falls under one bio-ecological zones, namely, 11: Major Rivers (IUCN, 2002). The detailed baseline scenario is depicted in Section 5.6.

Project Approach to Biodiversity Management

Project construction activities have the potential to generate a wide range of environmental impacts on ecologically valuable receptors including sensitive habitats and protected species.

The Project seeks to proactively address such impacts and proposes to use an adaptive management approach (plan-do-check-act-replan) to reduce their potential severity, based around the use of management plan to clear the route prior to removal of any vegetation. The following measures to be undertaken by MRSML for construction and operation phase respectively:

Construction Phase:

⁶⁰ Nishat, A., S.M.I. Huq, S.P. Barua, A.H.M.A. Reza, and A.S.M. Khan. 2002. Bio-ecological Zones of Bangladesh. The World Conservation Union (IUCN), Dhaka, Bangladesh. 141 pp

Issues/Activities	Potential Environmental Impacts	Proposed Mitigation/ Enhancement Measures
Terrestrial Flora due to construction of steel plant	<ul style="list-style-type: none"> Hampering plant growth and causing diseases 	<ul style="list-style-type: none"> Controlling the release of airborne dust by applying water in the construction zone. Using tarpaulin sheets to cover materials that produce dust during transportation to the site. Providing workers with fuel for cooking and educating them to avoid using wood as fuel, thereby reducing the impact on vegetation in the vicinity of the project site.
Terrestrial Fauna due to construction of steel plant	<ul style="list-style-type: none"> Impact on health and behavior of terrestrial fauna through dust, noise, and vibration Impacts on movement and reproduction and migration patterns of wildlife species 	<ul style="list-style-type: none"> Implementing noise-reduction measures during construction, such as scheduling noisy activities during non-sensitive times. Implement strict waste management protocols, proper disposal of hazardous waste, and regular monitoring to prevent soil contamination. Controlling dust by wetting construction areas and using dust control measures. Monitoring air quality and ensuring compliance with environmental regulations to limit pollutant emissions. Utilizing low-intensity lighting to reduce brightness and minimize glare. Limiting vehicle speed (20 km/hr) to avoid roadkill. Educating and raising awareness among workers to promote wildlife and natural resource conservation. Implementing rescue and relocation efforts for threatened or endangered species if any are found during construction work.
Aquatic Ecosystem due to construction of steel plant	<ul style="list-style-type: none"> Increased contamination of adjacent waterbodies by wastewater runoff etc. Impact on movement, growth, and reproduction of aquatic flora and fauna 	<ul style="list-style-type: none"> Keep all dangerous chemicals, oils, greases, solvents, and residues in a secure Place. Provision of barriers/control walls at construction material storage areas to avoid contamination by surface runoff. Hazardous wastes and chemicals to be stored on paved surfaces with secondary containment to prevent potential contamination through surface runoff. A plan for accidental hazardous chemical spillage should be prepared and implemented. Workers should be aware of the importance of natural resources and should not dispose of or discharge into the waterbodies.
Terrestrial Flora Due to Wharf Construction	<ul style="list-style-type: none"> Hampering plant growth and causing diseases 	<ul style="list-style-type: none"> Controlling the release of airborne dust by applying water in the construction zone. Using tarpaulin sheets to cover materials that produce dust during transportation to the site. Providing workers with fuel for cooking and educating them to avoid using wood as fuel, thereby reducing the impact on vegetation in the vicinity of the project site
Terrestrial Fauna Due to Wharf Construction	<ul style="list-style-type: none"> Impacts on movements of residential and migratory birds. Impacts on the movement, behavior and reproduction of 	<ul style="list-style-type: none"> Water spraying should be done to remove excessive dust. Construction activities which generate noise and dust should be done during daytime and in a phased manner. Establishing buffer zones around sensitive habitats and employing noise-reducing techniques can help minimize the impact of noise and vibrations on terrestrial fauna.

Issues/Activities	Potential Environmental Impacts	Proposed Mitigation/ Enhancement Measures
	Herpetofauna Species	<ul style="list-style-type: none"> • Restrict the speed limit of Vehicles (20 km/hr) to protect wildlife from any accidental issue or road kills
Aquatic Ecosystem Due to Wharf Construction	<ul style="list-style-type: none"> • Impacts on mortality of aquatic organism like fish due to increased turbidity 	<ul style="list-style-type: none"> • Implement proper sediment and erosion control measures, such as silt curtains, sediment basins, or sediment traps, to minimize sedimentation in the water bodies. • Silt screens should be used during any excavation operations. • Implement proper timing restrictions and avoiding sensitive areas during any excavation. • Implement proper noise and vibration control measures during piling activities to minimize disturbance to aquatic organisms. • Conduct regular inspections of machinery to prevent leaks or spills. • Implement sedimentation tanks, settle ponds, or filtration systems to remove suspended solids and contaminants. • Develop and enforce spill prevention and response plans to address accidental spills of fuels, lubricants, or other harmful substances from machinery or cargo transportation

Operation Phase

Issues/Activities	Potential Environmental Impacts	Proposed Mitigation/ Enhancement Measures
Terrestrial Flora due to construction of steel plant	<ul style="list-style-type: none"> • Hampering plant growth and causing diseases from fugitive and stack emissions 	<ul style="list-style-type: none"> • Water sprinklers should be deployed along the transport routes if necessary. • Transportation of materials only through covered trucks should be made mandatory. • Dust extraction and dust handling systems along with smoke treatment plants shall be installed to reduce fugitive dust emissions. • It is highly recommended to turn steel waste (steel slag) into eco-friendly construction material as an alternative to bricks and stone chips. • Stack emissions should be monitored on a regular basis and monitoring records should be maintained. • Prepare and implement a greenbelt development plan
Terrestrial Fauna due to construction of steel plant	<ul style="list-style-type: none"> • Disturbance to avifauna due to fugitive dust emission. • Impact on health, behavior, and reproduction of terrestrial fauna 	<ul style="list-style-type: none"> • Utilize noise barriers and soundproofing measures around plant and generator areas to mitigate noise pollution. • Install shields and directional lighting to minimize light emissions, reducing disturbance to migratory bird species. • Schedule noisy activities during periods of lower wildlife sensitivity, especially for migratory bird species • To prevent any accidental harm to wildlife, it is important to enforce a speed limit of 20 km/hr for vehicles. • Establish proper waste disposal protocols to prevent the contamination of water and soil from steel slag, food waste, cardboard, paper, packaging, plastic, etc.
Aquatic Ecosystem due to construction of steel plant	<ul style="list-style-type: none"> • Discharge of brine water from desalination plant impacts on salinity increase, decrease of dissolve oxygen 	<ul style="list-style-type: none"> • Implement strict waste management protocols to prevent improper disposal of steel slag, food waste, cardboard, paper, packaging, plastic, etc. • Conduct regular inspections and monitoring of ships and barges to prevent accidental spillage and waste disposal during transportation.

	thus degrade water quality	<ul style="list-style-type: none"> Establish emergency response protocols to address and contain any spills or accidents promptly. Collaborate with local authorities and environmental organizations to ensure compliance with regulations and standards for water quality and ecosystem protection.
Terrestrial Flora and Fauna Due to Wharf Operation	<ul style="list-style-type: none"> Impacts on terrestrial fauna like small mammals, herpetofauna, residential and migratory bird species and their migration patterns due to excessive dust, noise and vibration. Impact on the availability of food and suitable habitats for terrestrial wildlife 	<ul style="list-style-type: none"> Implement reduced speed limits (20 km/hr) in the vicinity of the wharf area. Install prominent signage to mark wildlife crossing areas, increasing driver awareness and reducing the risk of accidents. Utilize water spraying techniques to suppress fugitive dust emissions in the wharf area. Implement measures to control leaching of hazardous chemicals into adjacent land. Prohibiting the dumping of contaminated waste from trucks and lorries. Install acoustic barriers in areas with high noise levels to mitigate discomfort to terrestrial fauna near the wharf area.
Aquatic Ecosystem Due to Wharf Operation	<ul style="list-style-type: none"> Improper disposal of waste (Plastics, oils, chemicals, and other debris) into the aquatic ecosystem which blocks respiration system of aquatic organisms and disrupts their habitats. Leaching of grease and lubricants can introduce toxins into the aquatic environment leads to potential damage of aquatic organisms like fish. 	<ul style="list-style-type: none"> Establish designated waste collection areas and ensure regular waste removal to prevent waste accumulation near the wharf and the potential risk of accidental discharge into the aquatic ecosystem. Install effective spill containment systems, such as booms and barriers, around ships/barges and loading areas to prevent accidental spills from spreading into the water. Utilize containment systems, such as drip trays or secondary containment, to capture and prevent the release of hazardous chemicals into the environment. Conduct regular monitoring of fish mortality and disturbance of fish and aquatic animals during wharf operation phase. Provide education and training to staff and contractors on proper waste handling procedures to minimize the potential for pollution.

Appendix F-3: Labour Management Plan

Introduction

The Labor Management Plan (LMP) is designed to oversee labor-related risks throughout the MRSML project's construction and operational stages. It aims to pinpoint and address potential impacts and hazards related to labor and working conditions. This plan outlines the labor needs in compliance with relevant laws, as well as international standards and guidelines. The LMP is applicable to all project personnel, including full-time, part-time, temporary, seasonal, and migrant workers.

Purpose and Objective of the Plan

The purpose of the LMP is to provide a clear set of actions and responsibilities for the control of impacts linked to projects, primarily within the area of influence and surrounding areas. The scope of the LMP includes all direct and third-party workers and their amenities that are put in place by MRSML, their lead contractors and any subcontractors.

The objectives of this LMP are as follows:

- To promote safety and health at work
- To promote the fair treatment and non-discrimination
- To monitor the scale of project-induced influx into project area and any specific migration “hotspots”
- To avoid unplanned and unmanaged influx into the area; and
- To mitigate and manage any adverse impacts and enhance any beneficial ones, especially impacts that may strengthen the local economy.

This LMP should be read in the context of the Environmental and Social Management Plan of the ESIA and will be implemented in conjunction with Grievance Redress Mechanism, Stakeholder Engagement Plan and Labour Accommodation Plan.

Overview of the Labour Use in the Project

The Labour Management Plan (LMP) applies to project workers including full-time, part-time, temporary, migrant workers etc. The LMP is applicable to the project in the following manner:

- Direct Workers: people employed or engaged directly by the Contractor (including the project proponent and the project implementing agencies) to work specifically in relation to the project.
- Contracted Workers: people employed or engaged through third parties to perform work related to the core of the project, regardless of location.

During peak construction period approximately 350 manpower would be required whereas average manpower requirement during construction is 300. Approximately 700 skilled and semi-skilled manpower would be involved during operation phase of the proposed steel plant. Unskilled and semiskilled manpower would be preferably hired from local area.

Applicable Legal Requirements

- The Bangladesh Labour Act, 2006 (Bangladesh Labour Rules) and Subsequent Amendment 2013.
- International Labour Organization (ILO) Principles
- IFC Performance Standard 2- Labour and Working Conditions
- IFC PS 4 Community Health and Safety
- IFC and EBRD Guidelines on Worker Accommodation.

Risks related to Labour Issues

Workers Impacts/Risk	Project Impacts/Risk
Unfair and indistinct recruitment/employment and selection practices	This could discriminate against women, vulnerable groups etc.
Payment of workers may be based on discrimination for e.g. male may be paid higher than women even for the same type of job	This could cause conflicts amongst workers and create a bad reputation for the company. This may also attract local NGOs and legal action against the project
Labour Influx	The influx of workers may cause impacts to public health, especially an increase in prevalence of diseases. Influx of migrant labours during construction can cause mixing of the migrant workforce with the local people. This mixing of the groups may cause some adverse impacts to public health in the neighboring villages with the potential for the spread of infectious diseases like AIDS and COVID-19. Improper sanitation facilities and disposal of municipal solid waste in the construction labour camps can also trigger vector borne diseases.
	Increased price inflation and economic vulnerability due to the arrival of migrants into the project area, which may result in additional demand for goods and services causing an increase in the cost of basic goods;
	Increased demand for potable water due to increased population sizes and proliferation of informal settlements in certain hotspots;
	The presence of migrants can lead to a large increase in the quantities of solid waste with impacts on environmental health conditions.
Unsafe and unhealthy work environment	Workers may be overworked, under compensated, loss time injury, incidents, accidents
Poor work safety culture such as lack of provisions of PPEs, absence of hazard analysis and HSE training	Increased accidents during project execution, bad reputation and legal action against the project
Child Labour and Forced Labour	Abuse of human rights and poor working conditions.
Sexual Harassment (SH), Sexual Exploitation and Abuse (SEA), Gender-Based Violence (GBV)	Workplace harassment, Abuse of human rights and legal action
Rights of Association and Collective Bargaining	Workers may not have the right to freely form, join or not join a trade union for the promotion and protection of the economic interest of that worker.
Contractor Management Non-compliance to provisions of this LMP	Unfair treatment of workers, Reprisal, and legal action

Workers Impacts/Risk	Project Impacts/Risk
and other national Labour requirements, especially by international migrant workers	
Discipline and Termination of Employment	Unfair dismissal from work, abuse of human rights grievances and legal action against the project

Labour Influx and Gender Based Violence

The project would lead to an influx of migrant labour due to the non-availability of skilled labour from within the area/district. MRSML will put in place measures to mitigate potential labour influx related risks such as workers' sexual relations with minors, presence of sex workers, the spread of HIV/AIDS, sexual harassment, child labour and abuse, poor labour practice, and lack of road safety. These risks require careful consideration to improve social and environmental sustainability, resilience and social cohesion.

Workers must address the risk of gender-based violence, through:

- Mandatory training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women. Training may be repeated.
- Informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted.
- Adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence; Developing a system to capture gender-based violence, sexual exploitation and workplace sexual harassment related complaints/issues.

This process will be under the portfolio of the Social Safeguard Officer who shall identify and engage the relevant stakeholders on GBV and HIV and Aids issues.

Roles and Responsibility

The institutional set up proposed management plan lies with the Deputy Manager EHS and Human Resources (HR) and Administration Department of MRSML. The Labour Welfare Officer at the site will coordinate with the Contractors' administration representatives and the Deputy Manager EHS and Social Community Development to monitor the implementation of the plan.

This core team will require support from representatives across civil engineering and utilities, and the Security Department to coordinate and implement measures identified for managing labour at site and for liaison with the government agencies.

Monitoring

In order to verify the management measures, MRSML will require several monitoring systems as part of its overall ESMS, which will include (but not be limited to) the following:

- Local employment and local procurement repository and vendor details.
- Labour Accommodation Monitoring: implementation of the labour accommodation plan
- Stakeholder Engagement Database – this will be used to track and record the dates, minutes and attendance at engagement activities.
- Community Feedback and Grievance Mechanism –all grievances, issues and concerns raised to be recorded. The system will also include areas to record information on measures to address issues, timeframes, personnel responsible and any subsequent feedback that is required.
- Implementation of safety and occupational measures.

Appendix F-4: Security Management Plan

Introduction

MGI is one of the largest conglomerates in the country, having more than fifty installations across the country employing about 35,000 people. The aspect of Security Management is of paramount importance to ensure a safe and secure working environment in all our facilities. For this a thorough threat analysis followed by an appropriate plan and its meticulous execution on the ground to meet the security challenges is a must.

Aim

The aim of this paper is to lay down a general guideline to deal with the security threats by judicious employment of resources to ensure uninterrupted production and routine activity in all MGI facilities.

Threat Assessment

The nature of threat will vary in locations depending on the following factors:

- Local law and order situation
- Habitation and living standard and general activity of people around production facilities
- Presence of law enforcing agencies in the proximity
- Connectivity, road and waterway
- Poverty and employment opportunity in the vicinity
- Types of products and waste generated

Major Security Concerns

- Theft of produced items, raw material and assets of MGI facilities
- Safety of man and material
- Obstruction in local roads
- Attempts of hijacking and snatching away of products while being transported
- Extortion from drivers coming into MGI facilities
- Labor unrest and agitation in the factories
- Arson and sabotage
- Fire incidents
- Attempts of intrusion through river route

Physical Protective Measures

This will include the following:

- Perimeter wall or net fencing with barbed wire or razor blade coil fencing on top
- Defined entry and exit gates having provision of checking pedestrians and vehicles
- CCTV coverage of vulnerable locations

Screening process to select security personnel:

- Review applications to ensure candidates meet basic qualifications.
- Conduct interviews and administer written or physical tests to assess suitability for the role.
- Verify the training records and certifications.
- Make final hiring decisions, offer positions, and onboard new employees.

Deployment of Security Persons

- Static security posts will be selected based on ground study
- Day and night posts may vary basing on requirements to guard specific areas

- Armed guards will be posted in vulnerable locations such as cash transaction point, Jetty area and entry gates
- Patrolling on foot and vehicles during both day and night will be conducted to cover entire area of facilities to observe, monitor, prevent intrusion and deal with suspicious movements.
- Vehicle mounted patrolling on roads connecting highway will be undertaken as and when required to prevent theft, extortion attempts and hooliganism
- Patrolling along waterway will be undertaken basing on threat pattern whenever required

Code of conduct for security personnel to guide their interaction with the public and employees:

- a) Professionalism and Respect:
 - Treat everyone with courtesy and dignity.
 - Maintain a calm and professional demeanor.
 - Avoid discrimination and harassment.
- b) Integrity and Honesty:
 - Perform duties honestly and ethically.
 - Report any misconduct.
 - Avoid conflicts of interest and accepting bribes.
- c) Confidentiality:
 - Protect sensitive information.
 - Share information only with authorized personnel.
 - Follow data protection policies.
- d) Use of Force:
 - Use force only when necessary and proportionate.
 - Follow guidelines and legal requirements.
 - Prioritize de-escalation.
- e) Adherence to Policies:
 - Follow all policies and procedures.
 - Stay updated with training.
 - Report incidents accurately and promptly.

Additional Vigilance

- Vigilance and monitoring will be done by security persons (if need be, in plain cloth) to keep an eye on workers to detect any untoward movement of insiders having potential to grow into unrest and disorder. Feedback will be given to factory management if any such movement or activity is detected to take preemptive measures to foil any evil design.
- CCTV monitoring through the central control room will be done round the clock.
- CCTV findings and observations will be shared with management for corrective and punitive measures.

Special Measures for VIPs and Dignitaries

- Plans for any such visit will be shared with CLO and GM Security in respective Sites who in turn will formulate appropriate plans to ensure safety and security throughout such visits.
- Required security persons will be positioned in selected spots.
- Armed escorts in vehicles will be employed whenever required.
- Reserved manpower will be kept addressing any impromptu requirement.

Helipad and Helicopter Security

- Helipads will be kept ready on getting specific information from MGI Aviation or any other authentic MGI source.
- Adequate fire safety precaution will be taken posting required number of fireman and gadgets.

- Helipads lights will be checked and maintained with the help of concerned technical persons.
- If required armed security persons will be posted to guard against intruders and unwanted elements.

Entry and Exit Gates

- Security people will be organized to ensure proper checking of pedestrians and vehicles at the gates.
- Armed persons will be posted at gates for vigilance and deterrence.
- All individuals must display proper ID documents for entry.
- Persons going out will be checked thoroughly to ensure no MGI property is taken out unauthorizedly.
- Vehicles seeking entry will be allowed to enter on presentation of relevant paper such as Delivery Order.
- Visitors will be dealt with proper respect; their identity and purpose of visit will be enquired into and will be directed to concerned factory or individual.
- Labors or temporary workers employed under contractors or factory management will be stopped, organized into groups and let enter factory premises under supervision of contractors or their representatives.

Disposal of Industrial Waste having Resale Value

There are various types of industrial waste starting from packing material to scrap items which are sold off to contractors. This is a major source of pilferage if not properly supervised. This is done by the Accounts Department MGI. Security will closely monitor the packing of such items and ensure that these are taken out following laid down procedure and with proper documents only.

Fire and Safety

Fire and Safety will be dealt with according to a separate SOP formulated for this purpose.

Use of Whistles and Buttons

- Security people will be trained to carry whistles while on duty and make good use of it as a deterrent and to draw the attention of concerned persons.
- At night people on vigilance duty must make use of whistles to keep guards attentive in all posts.
- Batons primarily will be used as a deterrent in particular for traffic and crowd control.
- Use of batons on individuals is strictly prohibited and punishable.

Natural Calamity

- Security people will organize special monitoring to minimize damage to life and property during and after calamities such as flood due to heavy rain, storms, earthquake etc.
- Any observation regarding likely chances of damage of property such as improper storage of commodities will be brought to the notice of the factory management for rectification.
- Damage reports will be prepared and furnished at such events.
- Rescue of men and material will be organized with the help and guidance from factory management.

Precautions for Watercrafts

MGI has a number of speedboats and a yacht to be used for various purposes for conveyance of own and outside visitors. For safety while on such watercrafts following will be maintained:

- Speedboats will be operated only by qualified operators.
- Based on the situation armed escorts will be employed.

- Persons providing security must remain vigilant while on board to deter any threat.
- Weapons carried must have safety floats to cater for accidental drowning.
- Persons on board will be requested to put on life jacket as a safety measure.
- Speedboats will not be operating at night unless in emergency security drives.

Crowd Control

- Crowd control will form an important part of the duty of security personnel. This has to be planned by a responsible officer who will observe the situation keenly and organize security people to deal with a situation.
- Use of megaphone, identification of troublemakers, segregation from the crowd and managing the crowd and dispersing it will have to be executed in cool brain in a gradual and systematic manner.
- The management must be kept informed regarding the situation and measures being taken at all times.
- If the situation so demands, assistance of local law enforcement authority and in particular Industrial Police may be sought after.
- Sensitive situation must be controlled by an officer who will judiciously employ his subordinates to stop any kind of agitation and restore order.

Liaison with Local Law Enforcing Agencies

This is important for managing situations that may crop up. This particular aspect is looked after by Company Affairs of MGI. The security department works in close harmony with Company Affairs to ensure their involvement and assistance when needed.

Employment of Ansar

- To augment own security measures MGI employs a fairly large number of Ansar (600 as of Oct 2023) who are deployed in various installations in addition to own Security elements. This is done under an agreement with the organization who are controlled by the Ansar Headquarters under the Ministry of Home affairs of Bangladesh. They have weapons and ammunition which is used as per SOP.
- Security responsibilities are distributed among Ansar and own security elements who work in close coordination.
- Ansar and own security personnel carryout joint patrolling whenever feasible.

Training and Motivation

MGI Security persons are trained under supervision of qualified instructors who are retired Army personnel.

- Their training includes the following aspects:
 - Initial orientation
 - Drill – standing at attention, marching, saluting
 - Dressing up
 - Duty at posts - do's and don'ts
 - Checking at gates
 - Detection and reporting of fire source
 - Dealing with drivers, workers and officers
 - Traffic control duty
 - Sanitation and hygiene
 - Crowd control
 - Emergency response

- Motivation
- Awareness about human rights and use of force

Regular motivation is organized by officers to keep them physically fit, alert and dedicated to performing duties assigned to them. A written oath taking is administered once a week to keep them focused on performance of their duty.

Conclusion

This is a guideline to be followed in administering aspects of security in MGI. This needs revision from time to time to update to keep it relevant in tackling security challenges in MGI installations.

Appendix F-5: Emergency Preparedness and Response Plan

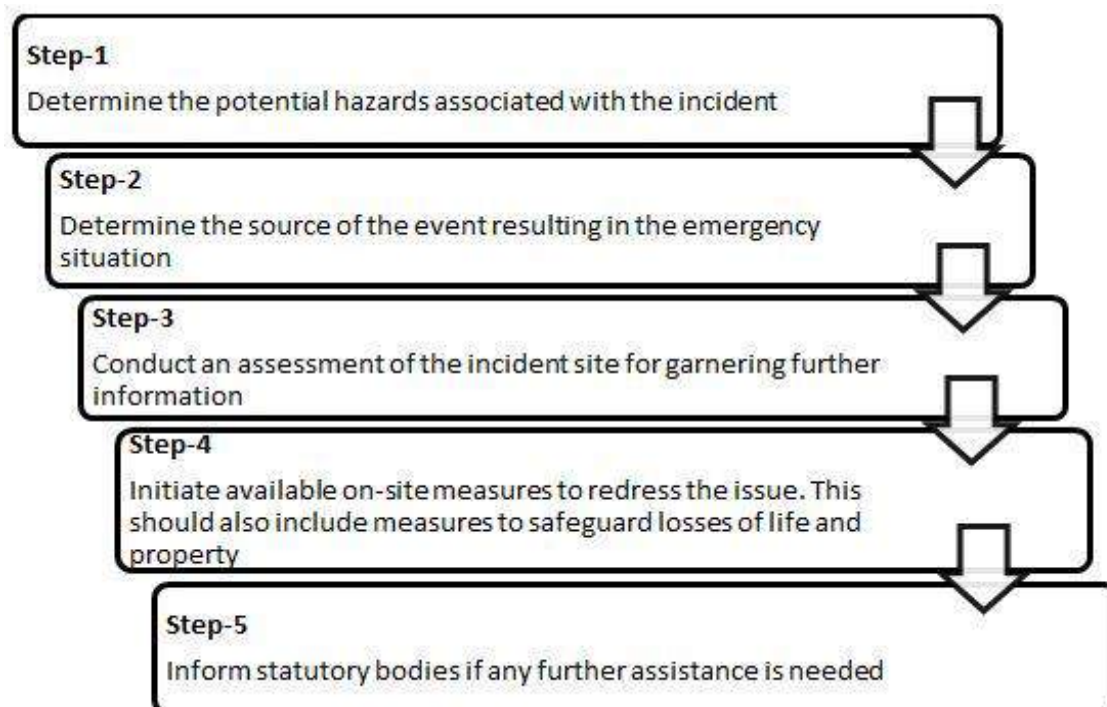
Industrial incidents lead to significant individual and economic harm. In the present context, all industries, including petroleum refineries, are focused on handling these unforeseen dangers. This is crucial, as actual or even perceived mishaps can rapidly put a company's financial stability at risk. Numerous facilities engage in diverse production procedures that carry the risk of accidents, which could have disastrous effects on the facility itself, its employees, the surroundings, or the general public.

An Emergency Response Plan (ERP) is a written document which is required for an organization according to occupational health safety standards and must be displayed at every job site with a certain number of employees (usually five to ten). It is a detailed step-by-step procedure to follow in emergencies situation such as fire or a major accident. An emergency response plan also includes information such as whom to notify, who should do what, and location of emergency stock. The Emergency Response Plan includes any measures that should be in place at all facilities to combat an accident resulting from fire, explosion or due to any natural calamities (e.g., Earthquake, cyclones, fire).

The primary objective of an emergency response plan is to recognize potential accident triggers, dangers, and other calamities, and to outline a range of efficient steps and operational strategies that the relevant governing body can execute if such situations arise. This plan assigns specific duties to factory staff members and equips them with predefined processes and instructions, enabling them to react swiftly. These emergency interventions should prioritize the safety of individuals, assets, and the surroundings. By utilizing a well-designed emergency response plan, the impact of a disruptive incident can be lessened, resulting in reduced recovery durations and expenses.

Steps in Emergency Response

In order to minimize the possibility of injury, it is important that emergency responders follow a specific sequence of actions. The below figure identifies such actions which can be taken during any emergency by the responders.

General steps during emergency**Emergency Situations**

Regarding the project, it is essential to establish an emergency response plan that factor in the potential risks. This segment outlines the various events that could occur within the factory premises while its operations are ongoing. Depending on the characteristics and types of scenarios, these potential risks can be organized into the following categories:

Emergency	Natural disaster	External factors
<ul style="list-style-type: none"> • Fire and explosion • Molten metal spillage • Oil spillage • Toxic gas and chemical release • Electrocution 	<ul style="list-style-type: none"> • Flood • Cyclone • Storm • Earthquake 	Aggression/ sabotage of the plant

Areas of the plant where the above-mentioned hazards may occur are identified below:

Areas of potential hazards

Potential hazards	Areas of the plant
Explosion	Furnace area, Chemical storage
Pool fire and fire Oil/molten metal spillage	Oil storage, Chemical storage, Ladle refining furnace (LRF), Continuous casting machine (CCM), Mold area
Fire and vapor cloud explosion	Liquefied petroleum gas (LPG) storage
Fire and electrocution	Electrical rooms, Transformer area, panel rooms, Crucible room
Toxic gas and chemical release	LRF, CCM, Store

Identification of Most Credible Sources of Hazardous Scenarios

The entire anticipated hazard scenarios associated with the plant have been critically analyzed and the followings are considered as the most credible scenarios:

Credible Scenario A - Leakage of Fuel from Storage Tank

Fuel is a highly flammable gas which results in fire and explosion, in case it leaks during the unloading or loading process, and from the storage container. However, the chance of leakage of Fuel from the storage tank is very remote. If this happens and is not attended in time, there is a high probability of vapor cloud explosion.

Credible Scenario B - Fire and Explosion in Furnace and Mold Area

Fire and explosion in furnace and mold area can be considered as a credible hazardous scenario if safe working procedure is not followed. However, this can be controlled by taking proper fire protection measures as well as following proper standard operating procedure (SOP).

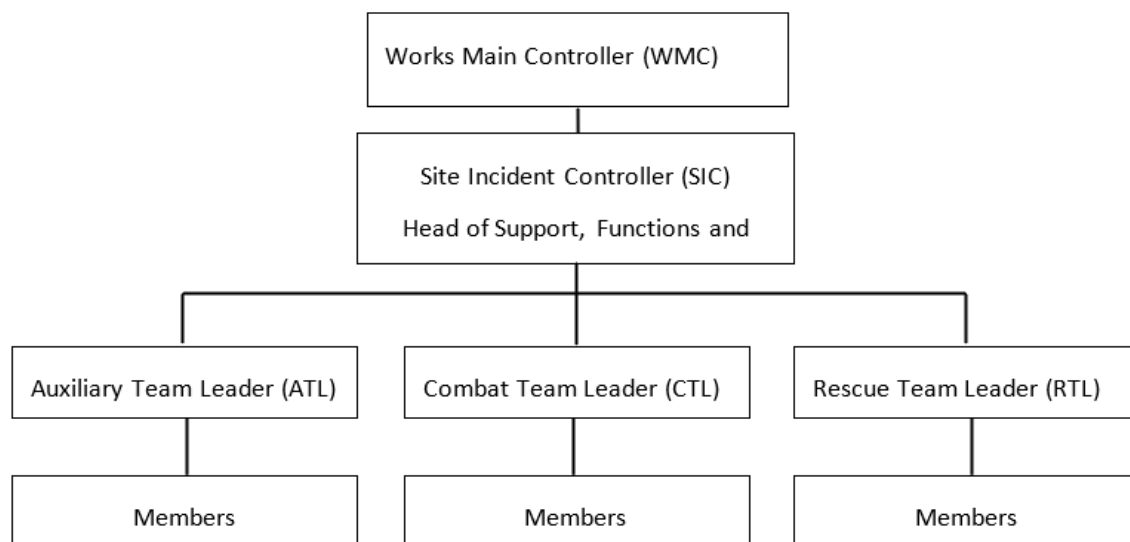
Credible Scenario C- Break out of Molten Metal and Slag

The breakout of molten metal and slag may take place from weak portions of furnace. Spillage of hot metal or slag can cause severe burn injuries and fires. Explosions may occur when hot metal or slag falls in a pool of water. This will result in injuries due to flying hot splinters and splashing of hot metal or slag. The spillage of hot metal can also be caused due to mold breakage. By adopting good engineering design and quality equipment, along with undertaking regular maintenance, risks due to such incidents can be minimized.

Emergency Command Structure

To control and coordinate emergency responses, the plant will have the following command structure:

Figure: Emergency command structure



Role of Key Persons during Emergency:

Works Main Controller (WMC)

WMC is the plant head and generally available in the plant (except on tour). During any emergency, responsibilities of WMC include:

- Decide if emergency is to be declared and advise Site Incident Controller (SIC) accordingly.
- Advise Rescue Team Leader (RTL) to blow the siren with appropriate code of declaring emergency (two minutes with a pause of five seconds for 3 times for fire hazard).

- Advise Auxiliary Team Leader (ATL) to communicate with statutory authorities and ask for mutual aid if required.
- Declare normalcy at the termination of the operation and advise Rescue Team Leader (RTL) to blow “all clear siren”.
- Ensure record keeping of emergency operations chronologically.

Site Incident Controller (SIC)

In the absence of WMC, Head of Support, Functions and HSE shall take up his charge of actions. But other than this, the person in this position should take the responsibilities of SIC during emergencies. This includes:

- Inform WMC regarding the situation.
- Provide guidance to Combat Team Leader (CTL), RTL, and ATL to mitigate emergencies.
- Examine for major emergency shutdown operation activities, decide safe escape route, and announce for evacuation to assembly point.
- Inform WMC about the status of the situation at regular intervals.

Auxiliary Team Leader (ATL)

ATL is the communication manager for crisis management. During an emergency ATL should proceed to emergency control room (ECR) and fulfill the following responsibilities:

- Inform the statutory authorities and district administration about the emergency.
- Communicate with mutual aid partners, fire service stations, and district hospitals for rendering services.
- Send the casualties to hospital if required and inform their relatives.
- Manage authorities' visit to the emergency site.
- Give feedback to WMC about the status with respect to his areas of activities.

Combat Team Leader (CTL)

CTL is the leader to attend to any emergency as soon as possible. During any emergency, CTL should immediately proceed to the site and fulfill the following responsibilities:

- Inform SIC about the incident.
- Instruct RTL for arranging firefighting and medical assistance.
- Shutdown the concerned equipment and, if necessary, the plant.
- Take necessary action to evacuate the incident site.
- Update the SIC about the situation.

Rescue Team Leader (RTL)

During any emergency, RTL conducts rescue operations. RTL should immediately proceed to the site and fulfill the following responsibilities:

- Arrange safe escape for entrapped persons.
- Send affected persons for medical attention through medical officer.
- Search for missing persons based on the list prepared by ATL.
- Inform SIC about the development of the situation.

During an emergency situation, supervisors, managers, employees and workers will be responsible for the following tasks:

Supervisors and Managers

Duties of supervisors and managers during any emergency are described below:

- Notify the employees and workers quickly.

- Inform all concerned and take actions to control the situation.
- Consult with senior authorities and based on that assemble non-required employees to the assembly points or send them out of the plant.
- Inform the workers about emergency exits.
- Assist the emergency team in mitigating the situation.

Employees and Workers

The employees, workers and public in general are advised to take the following actions:

- Inform supervisors/managers about any abnormal situation in the plant.
- Follow directions provided by supervisors/managers and move to the assembly point or out of the plant.

Assembly Points and Gates

The plant should have designated assembly points and gates, which are not endangered by the fall of window glass or other debris, and structurally assures a guaranteed safety of employees and workers.

Initial Assembly Points: All department heads will identify at least two initial assembly points in two opposite directions of their unit, where everyone in case of emergency should assemble. The assembly points should be marked with signboards. The employees and workers will assemble there and wait for the respective Heads to give their future course of action. The courses of action might be to go and assemble directly at the emergency assembly points, or to move out of the plant through a particular gate. These initial assembly points are only for fire or at the initial stage of any toxic release, but not for major disasters like huge toxic release.

Emergency Assembly Points: The plant will have three emergency assembly points identified and marked. People will have to assemble here in case of extreme emergencies like huge leakage of toxic gas. Among the three, the main emergency assembly point will be considered as the emergency control point and availability of the following things should be ensured there:

- Copy of emergency plan
- Site layout
- First aid box
- Emergency breathing apparatus
- Land phone and mobile phone
- Hand mike
- List of employees and their relatives' contact
- Emergency torch light
- Other emergency equipment is required.

Gates: The plant will have sufficient gates, which can be easily opened in case of any emergency. The gate will facilitate people to move out in different directions. It will be necessary to make the workers and employees aware of the assembly points and gates through occasional training and drills. Additional assembly points and gates might be provided in the plant if it is deemed necessary by the authorities.

Emergency Action Plan

The following actions have been noted in MRSML's standard operating procedure (SOP) in case of hazardous situations.

When fire is discovered

- To activate the nearest alarm.
- To fight fire if it's small and not spreading to other areas beyond the factory site.
- To use fire extinguisher under the guidance of available trained firefighting team members.

- To turn off unnecessary electrical equipment and appliances.
- To follow the safe exit routes.
- To assemble in the designated area.
- To follow the emergency evacuation procedure.
- To call the firefighting civil defense team.

In the event of a cyclone

- To place the crane in a safe position and ensure that the magnets are on the floor.
- To shut down the machinery and equipment and secure their loose parts.
- To park all available vehicles in safe places, so that they are not damaged by flying objects.
- To put protective cover on any material which might be affected by water.
- To take special care of the electric substation.
- To take shelter in a safe place and stay away from walls and windows.

In the event of an earthquake

- To stay calm as possible
- To stay away from furniture, windows, lamps, power polls, etc.
- To evacuate and assemble in emergency assembly point.
- To assist people with disabilities in finding a safe place.

Facilities Capacity to Combat Emergencies

- **Fire Hydrant System:** For firefighting purposes, fire hydrant systems will be located at different locations of the plant. In case of power failure, the fire pumps in the fire hydrant systems will be run through diesel generator.
- **Fire Extinguishers:** To control small fire incidents, fire extinguishers will be available at required locations of the plant.
- **Fire Buckets:** Fire buckets filled with dry sand will be provided in different locations of the plant.
- **Siren/Fire Alarm:** During any emergency, sirens of different tone with distinctive signals will be used in the plant to notify in-house firefighting team, company emergency response team (CERT) and all other employees and for evacuation and to gather everyone at the emergency assembly point.
- **Communication:** To communicate with fire service providers and hospitals in emergency situations, the plant will have a public address system, mobile phones, EPABX telephone and telephone directory.
- **Ambulance:** Ambulances with all facility will be available around the clock through nearby hospitals.
- **Rescue and First Aid Team:** The plant will have an organized and trained first aid and rescue team who will arrive at the site in any emergency to offer timely assistance and preliminary medical care.
- **Firefighting Team:** The plant will have a trained firefighting team that will arrive at the site in any emergency to offer timely assistance.
- **Evacuation Route Maps:** Evacuation route maps will be posted in each work area of the plant. Those maps will include emergency exit routes, primary and secondary evacuation routes, location of fire extinguishers, fire alarm pull stations' locations, and location of assembly points.

- **Safety Officers:** The plant will have qualified, trained and experienced safety officers who will be responsible for ensuring adherence to safety regulations and assessing unsafe situations or hazards.
- **Security officers:** There will be security officers in the plant around the clock who will assist in handling any emergency.
- **Transport:** Numbers of different types of vehicles and cranes with operators will be available in the plant.

Appendix G: Environmental Quality Monitoring Results (Lab Sheet)

EQMS

Ref: EQMS/ Water Quality/202403180345

EQMS WET LABORATORY
Results of Ground Water Quality

Project Name : Environmental and Social Impact Assessment (ESIA) for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Description of Sample : Groundwater Quality

Sample Collector : Collected by EQMS Personnel

Sampling Location : GW1- Project site, Meghna-Homna Road, Luter Char, Meghna, Cumilla
GW2- Hasan Basri Madrasha, Vaterchar, Gazaria, Munshiganj
GW3-Vitikandi Uttor Para Mosjid, Vitikandi, Gazaria, Munshiganj

Sampling Date : 20.02.2024

Date of Analysis : 07.03.2024

Description of Analysis

Parameter	Unit	Analysis Method	GW-1	GW-2	GW-3	Bangladesh Standard
Electric Conductivity (EC)	μS/cm	Salinity Meter	457	628	520	-
Temperature	°C	Thermometer	24.5	23.4	23.8	20-30
Odor			Odorless	Odorless	Odorless	Odorless
pH		Ion electrode method	6.82	6.50	6.64	6.5 – 8.5
TDS	mg/L	Ion electrode method	350	342	420	1000
Hardness	mg/L	Colorimetric Method	162	160	125	500
Chloride	mg/L	thiocyanate Method	2.3	3.1	2.6	250
Iron	mg/L	Phenanthroline Method	0.02	0.05	0.03	0.3 – 1.0
Magnesium	mg/L	Calmagite Method	23.5	17.2	18.4	30 – 35
Arsenic	mg/L	Modified Gutzeit method	<0.01	<0.01	<0.01	0.05
Chromium	mg/L	Colorimetric Method	<0.01	<0.01	<0.01	0.05
Calcium	mg/L	Colorimetric Method	35	56	43	75
Fluoride	mg/L	Cadmium Reduction	<0.01	<0.01	<0.01	1.0
Potassium	mg/L	Turbidimetric Method	4.7	5.2	6.4	12
Total Coliform	C.F.U/100	Membrane Filtration Method	0	0	0	0
Fecal Coliform	C.F.U/100	Membrane Filtration Method	0	0	0	0

**The Environment Conservation Rules, 2023 [Schedule 2 (B)]*

Collected By:

M. Rahman

Muzahid Rahman
Consultant
EQMS Consulting Limited

Analyzed By:



Armed Jubaer

Armed Jubaer
Chemist
EQMS Consulting Limited

Checked By:

Md. Jahidul Islam


Md. Jahidul Islam
Quality Manager
EQMS Consulting Limited

Head Office: H # 53, R # 04, B # C, Banani, Dhaka -1213, Bangladesh

Lab Office: Flat # F1, House # Ta-134/A, Boishakhi Sarani, Gulshan-Badda Link Road, Dhaka – 1212

Toronto Office: 7 Arnot Street, Scarborough Ontario, M1K4B5 Canada



Ref: EQMS/Air Quality/202403180343

EQMS ENVIRONMENTAL LABORATORY**Test Results of Ambient Air Quality**

Project Name : Environmental and Social Impact Assessment (ESIA) for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Description of Activities : Ambient Air Quality

Monitoring by : EQMS Personnel

Monitoring Location : AAQ-1: Faruqe Khondokar's House, Vaterchar, Gazaria, Munshiganj
AAQ-2: Jamia Faruqia Raujatul Ulum Madrasah, Gazaria, Munshiganj
AAQ-3: Vitikandi Government Primary School, Gazaria, Munshiganj
AAQ-4: Project Site, CEZ, Meghna-Homna Road, Meghna, Cumilla
AAQ-5: Joshim Uddin's House, 9no word Abdullahpur, Meghna, Cumilla
AAQ-6: Amin's house, Jastitola, Imampur, Gazaria, Munshiganj

Monitoring Date : 03-08.03.2024

Date of Analysis : 12.03.2024

Description of Analysis:

Location	Dates	Ambient Air Pollutants Concentration in $\mu\text{g}/\text{m}^3$				CO ppm
		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	
AAQ-1	03.03.24	24.45	16.58	14.17	16.41	0.4
AAQ-2	07.03.24	35.47	22.82	12.76	25.74	0.5
AAQ-3	04.03.24	31.74	18.68	17.49	27.49	0.3
AAQ-4	06.03.24	47.84	32.73	25.42	36.72	0.6
AAQ-5	05.03.24	25.85	18.84	11.94	14.89	0.5
AAQ-6	08.03.24	15.69	10.89	6.68	8.47	0.4
Standard Duration (hour)		24	24	24	24	8
Method of Analysis Instrument Use: Haz-Scanner™ HIM 6000		Light Scattering Nephelometer	Light Scattering Nephelometer	High Sensitivity Electrochemical	High Sensitivity Electrochemical	High Sensitivity Electrochemical

Legend: PM₁₀ -Particulate Matter of a diameter of 10 micron or less. PM_{2.5} -Particulate Matter of a diameter of 2.5 micron or less, SO₂ -Sulphur Dioxide; NO₂ -Nitrogen Dioxide; CO -Carbon Monoxide

Collected By:

M. Rahman

Muzahid Rahman
Consultant

EQMS Consulting Limited

Analyzed By:

Shihabuddin Ahmed

Technical Manager
EQMS Consulting Limited

EQMS Consulting Limited

Checked By:

Md. Jahidul Islam

Quality Manager
EQMS Consulting Limited

EQMS Consulting Limited

Head Office: H # 53, R # 04, B # C, Banani, Dhaka -1213, Bangladesh

Lab Office: Flat # F1, House # Ta-134/A, Boishakhi Sarani, Gulshan-Badda Link Road, Dhaka - 1212

Toronto Office: 7 Arnot Street, Scarborough Ontario, M1K4B5 Canada



Ref: EQMS/Noise Level/202403180344

EQMS ENVIRONMENTAL LABORATORY**Test Results of Noise Level Measurement**

Project Name : Environmental and Social Impact Assessment (ESIA) for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Description of Sample : Noise Level Measurement

Sample Collector : Collected by EQMS Personnel

Sampling Date : 10-13.02.2024

Date of Analysis : 19.02.2024

Description of Analysis:

Sampling Locations	Location Setting (IFC/DOE)	Time	Noise Level		
			Leq	L _{max}	L _{min}
ANL-1	In-front of New Food Village, Vaterchar, Gazaria, Munshiganj	Day	65.0	81.4	45.7
		Night	67.2	80.2	48.5
ANL-2	North side of JMI Industrial Park, Vitikandi, Gazaria, Munshiganj	Day	50.2	55.9	38.4
		Night	35.4	37.8	30.8
ANL-3	56 No. Vitikandi Government Primary School, Gazaria, Munshiganj	Day	53.2	58.5	43.2
		Night	45.4	50.6	37.1
ANL-4	In-front of Shafiq member's house, Hariluter Char, Meghna, Cumilla	Day	61.7	80.9	30.8
		Night	49.0	61.5	30.8
ANL-5	71No. Abdullahpur Government Primary School, Gazaria, Munshiganj	Day	50.3	55.9	38.4
		Night	45.5	50.8	37.2
ANL-6	Kandargaon Madrasha Masjid, Luter Char, Meghna, Cumilla	Day	51.7	55.8	40.7
		Night	48.5	61.5	30.8
ANL-7	In-front of YS Fashion, Meghna-Homna Road, Meghna, Cumilla	Day	51.5	55.8	39.2
		Night	45.5	50.6	37.1
ANL-8	In-front of Yasin ali's House, 71No. Abdullahpur, Gazaria, Munshiganj	Day	35.6	41.9	30.8
		Night	45.5	50.7	37.1
ANL-9	Luterchar Mofizur Islam High School, Luter Char, Meghna, Cumilla	Day	53.4	58.7	43.3
		Night	47.8	58.9	30.8
ANL-10	Luterchar Pashim Para Jame Mashjid, Luter Char, Meghna, Cumilla	Day	52.5	58.5	40.5
		Night	45.5	50.8	36.5

Note: Regular Checkup and calibration of equipment are done by the manufacturers and EQMS personnel to avoid any error.

Received By:

M. Rahman

Muzahid Rahman
Consultant
EQMS Consulting Limited

Analyzed By:

Shihabuddin Ahmed

Technical Manager
EQMS Consulting Limited

Checked By:

Md. Jahidul Islam

Quality Manager
EQMS Consulting Limited



Head Office: H # 53, R # 04, B # C, Banani, Dhaka -1213, Bangladesh

Lab Office: Flat # F1, House # Ta-134/A, Boishakhi Sarani, Gulshan-Badda Link Road, Dhaka - 1212

Toronto Office: 7 Arnot Street, Scarborough Ontario, M1K4B5 Canada



Ref: EQMS/Soil Quality/202403180347

EQMS WET LABORATORY**Test Results of Soil Quality**

Project Name : Environmental and Social Impact Assessment (ESIA) for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Description of Sample : Soil Quality

Sample Collector : EQMS Personnel

Sampling Location : SQ1-Agricultural land, 71No. Abdullapur, Gazaria, Munshiganj
SQ2- Meghna-Homna Road, Luter Char, Meghna, Cumilla
SQ3-North side of JMI Industrial Park, Gazaria, Munshiganj

Sampling Date : 20-02-2024

Date of Analysis : 05-03-2024

Description of Analysis

Parameter	Unit	SQ1	SQ2	SQ3	Methods of Analysis
Soil Texture	--	Clay silt	Clay silt	Clay silt	Hydrometer method
pH	--	5.60	6.45	6.15	pH meter
Electric conductivity	dSm-1	2.65	3.50	3.65	EC meter
Nitrogen (Total)	%	0.07	0.02	0.05	Micro Kjeldahl method
Organic Matter	%	0.56	0.84	0.62	ASTM D 2974
Moisture	%	12.0	16.0	17.0	Gravimetric method
Potassium	me/100 g	30.1	90.7	85.5	Ammonium acetate Extraction
Calcium	me/100 g	12.85	13.64	14.15	AAS
Magnesium	me/100 g	3.32	3.55	3.35	AAS
Sodium	me/100 g	0.12	0.16	0.15	AAS
Phosphorus	µg/g	2.10	3.20	3.20	Ascorbic acid Blue Color method
Sulphur	µg/g	33.8	27.54	30.41	Jackson Turbidimetric method
Boron	µg/g	1.90	1.35	1.10	AAS
Copper	µg/g	1.30	2.90	2.50	AAS
Iron	µg/g	85	100	104	AAS
Zinc	µg/g	0.66	0.35	0.72	AAS
Manganese	µg/g	5.00	5.32	5.80	AAS
Mercury	ppm	BDL	BDL	BDL	AAS
Cadmium	ppm	0.9	BDL	0.3	AAS

Collected By:

M. Rahman

Muzahid Rahman
Consultant
EQMS Consulting Limited

Analyzed By:

Ahmed Jubaer
Chemist
EQMS Consulting Limited

Checked By:

Md. Jahidul Islam
Quality Manager
EQMS Consulting Limited

Head Office: H # 53, R # 04, B # C, Banani, Dhaka -1213, Bangladesh

Lab Office: Flat # F1, House # Ta-134/A, Boishakhi Sarani, Gulshan-Badda Link Road, Dhaka - 1212

Toronto Office: 7 Arnot Street, Scarborough Ontario, M1K4B5 Canada



Ref: EQMS/Sediment Quality/202403180348

EQMS WET LABORATORY**Test Results of Sediment Quality**

Project Name : Environmental and Social Impact Assessment (ESIA) for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Description of Sample : Sediment Quality

Sample Collector : EQMS Personnel

Sampling Location : SedQ1-Upstream, Meghna River Branch
SedQ2-Upstream near Proposed project outlet, Meghna River Branch
SedQ3-Vater Char-Luterchar Bridge, Meghna River Branch
SedQ4-Downstream near JMI outlet, Meghna River Branch
SedQ5-Downstream, Meghna River Branch

Sampling Date : 28-02-2024

Date of Analysis : 07-03-2024

Description of Analysis

Parameter	Unit	SedQ1	SedQ2	SedQ3	SedQ4	SedQ5	Methods of Analysis
Sediment Type	-	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	-
pH	-	7.6	6.75	6.82	6.95	6.78	pH meter
Organic Carbon	%	0.3	0.6	1.1	1.6	0.7	Ammonium acetate extraction
Copper	ppm	4.67	5.34	12.32	15.35	6.25	Ammonium acetate extraction
Zinc	ppm	0.81	0.23	2.15	3.63	0.42	Ammonium acetate extraction
Lead	ppm	5.5	8.3	14.2	26.6	6.2	Ascorbic acid blue color method
Iron	ppm	3.2	4.5	8.3	9.1	3.5	Jackson turbidimetric method
Nickel	ppm	3.67	5.32	12.23	15.52	6.27	Jackson turbidimetric method
Cadmium	ppm	BDL	BDL	BDL	BDL	BDL	Atomic Absorption Spectrophotometer
Manganese	ppm	5.6	6.3	14.6	17.2	6.4	Atomic Absorption Spectrophotometer
Chromium (Cr)	ppm	6.73	4.63	17.42	21.58	8.31	Atomic Absorption Spectrophotometer

*BDL: Below Detection Level

Received By:

M. Rahman

Muzahid Rahman
Consultant
EQMS Consulting Limited

Analyzed By:

Ahmed Jubaer
Chemist

EQMS Consulting Limited

Checked By:

Md. Jahidul Islam
Quality Manager

EQMS Consulting Limited

Head Office: H # 53, R # 04, B # C, Banani, Dhaka -1213, Bangladesh

Lab Office: Flat # F1, House # Ta-134/A, Boishakhi Sarani, Gulshan-Badda Link Road, Dhaka - 1212

Toronto Office: 7 Arnot Street, Scarborough Ontario, M1K4B5 Canada



Ref: EQMS/Water Quality/ 202403180346

EQMS WET LABORATORY**Test Results of Surface Water Quality**

Project Name : Environmental and Social Impact Assessment (ESIA) for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Description of Sample : Surface Water Quality

Sample Collector : EQMS Personnel

Sampling Location : SW-1: Upstream of Meghna River Branch
SW-2: Downstream of Meghna River Branch

Sampling Date : 28-02-2024

Date of Analysis : 05-03-2024

Description of Analysis

Parameter	Unit	Analysis Method	SW-1	SW-2	Bangladesh Standards*
Temperature	°C	Thermometer	23.0	23.1	-
pH	--	Ion electrode method	6.88	6.43	6.0 - 9.0
Dissolved Oxygen (DO)	mg/L	Ion electrode method	5.8	6.7	≥ 5
Biological Oxygen Demand (BOD)	mg/L	Ion electrode method	2.8	2.1	≤ 6
Chemical Oxygen Demand (COD)	mg/L	USEPA 410.4	21	27	50
Electrical Conductivity (EC)	μS/cm	Ion electrode method	280	240	-
Total Dissolved Solid (TDS)	mg/L	Ion electrode method	140	120	1000
Total Suspended Solids (TSS)	mg/L	Drying and Filtration	17	13	-
Turbidity	NTU	Ion electrode method	1.8	1.4	-
Salinity	ppt	Salinity Meter	0.12	0.10	-
Alkalinity	mg/L	Colorimetric Method	94	80	-
Chloride	mg/L	thiocyanate Method	3	1.8	-
Sulfate	mg/L	Turbidimetric Method	5	8	-
Nitrate	mg/L	Cadmium Reduction	1.4	10.5	-
Nitrite	mg/L	Cadmium Reduction	<0.01	1.0	-
Potassium (K)	mg/L	Turbidimetric Method	21	26	-
Calcium (Ca)	mg/L	Colorimetric Method	47	52	-
Magnesium (Mg)	mg/L	Calmagite Method	24	28	-
Oil and Grease	mg/L	USEPA I Hexane Extractable Gravimetric	1.71	1.41	-

* The Environment Conservation Rules, 2023 [Schedule 2 (A): Water usable by fisheries]

Collected By:

M. Rahman

Muzahid Rahman

Consultant

EQMS Consulting Limited

Analyzed By:

Ahmed Jubaer

Chemist

EQMS Consulting Limited

Checked By:

Md. Jahidul Islam

Quality Manager

EQMS Consulting Limited



Head Office: H # 53, R # 04, B # C, Banani, Dhaka -1213, Bangladesh

Lab Office: Flat # F1, House # Ta-134/A, Boishakhi Sarani, Gulshan-Badda Link Road, Dhaka - 1212

Toronto Office: 7 Arnot Street, Scarborough Ontario, M1K4B5 Canada



Ref: EQMS/Air Quality/202403180340

EQMS ENVIRONMENTAL LABORATORY**Test Results of Ambient Air Quality**

Project Name : Environmental and Social Impact Assessment (ESIA) for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Description of Activities : Ambient Air Quality

Monitoring by : EQMS Personnel

Monitoring Location : AAQ-1: Faruqe Khondokar's House, Vaterchar, Gazaria, Munshiganj
AAQ-2: Jamia Faruqia Raujatul Ulum Madrasah, Gazaria, Munshiganj
AAQ-3: Vitikandi Government Primary School, Gazaria, Munshiganj
AAQ-4: Project Site, CEZ, Meghna-Homna Road, Meghna, Cumilla
AAQ-5: Joshim Uddin's House, 9no word Abdullapur, Meghna, Cumilla

Monitoring Date : 10-12.02.2024

Date of Analysis : 18.02.2024

Description of Analysis:

Location	Dates	Ambient Air Pollutants Concentration in $\mu\text{g}/\text{m}^3$				CO ppm
		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	
AAQ-1	10.02.24	26.53	17.26	12.21	14.25	0.5
AAQ-2	10.02.24	42.62	27.58	14.31	26.36	0.4
AAQ-3	11.02.24	29.57	22.36	16.73	18.67	0.7
AAQ-4	11.02.24	47.37	31.42	22.68	37.54	0.4
AAQ-5	12.02.24	21.26	16.34	9.42	8.36	0.9
Standard Duration (hour)		24	24	24	24	8
Method of Analysis Instrument Use: Haz-Scanner™ HIM 6000		Light Scattering Nephelometer	Light Scattering Nephelometer	High Sensitivity Electrochemical	High Sensitivity Electrochemical	High Sensitivity Electrochemical

Legend: PM₁₀ -Particulate Matter of a diameter of 10 micron or less. PM_{2.5} -Particulate Matter of a diameter of 2.5 micron or less, SO₂ -Sulphur Dioxide; NO₂ -Nitrogen Dioxide; CO -Carbon Monoxide

Collected By:

M. Rahman

Muzahid Rahman
Consultant
EQMS Consulting Limited

Analyzed By:

Shihabuddin Ahmed

Shihabuddin Ahmed
Technical Manager
EQMS Consulting Limited



Checked By:

Md. Jahidul Islam

Md. Jahidul Islam
Quality Manager
EQMS Consulting Limited



Head Office: H # 53, R # 04, B # C, Banani, Dhaka -1213, Bangladesh
Lab Office: Flat # F1, House # Ta-134/A, Boishakhi Sarani, Gulshan-Badda Link Road, Dhaka - 1212
Toronto Office: 7 Arnot Street, Scarborough Ontario, M1K4B5 Canada



Ref: EQMS/Air Quality/202403180342

EQMS ENVIRONMENTAL LABORATORY**Test Results of Ambient Air Quality**

Project Name : Environmental and Social Impact Assessment (ESIA) for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Description of Activities : Ambient Air Quality

Monitoring by : EQMS Personnel

Monitoring Location : AAQ-1: Faruqe Khondokar's House, Vaterchar, Gazaria, Munshiganj
AAQ-2: Jamia Faruqia Raujatul Ulum Madrasah, Gazaria, Munshiganj
AAQ-3: Vitikandi Government Primary School, Gazaria, Munshiganj
AAQ-4: Project Site, CEZ, Meghna-Homna Road, Meghna, Cumilla
AAQ-5: Joshim Uddin's House, 9no word Abdullahpur, Meghna, Cumilla

Monitoring Date : 25-29.02.2024

Date of Analysis : 05.03.2024

Description of Analysis:

Location	Dates	Ambient Air Pollutants Concentration in $\mu\text{g}/\text{m}^3$				CO ppm
		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	
AAQ-1	25.02.24	17.37	12.62	12.46	14.35	0.3
AAQ-2	29.02.24	32.74	26.52	16.73	28.64	0.6
AAQ-3	26.02.24	29.37	15.61	18.46	32.56	0.4
AAQ-4	28.02.24	43.78	35.84	27.59	34.73	0.6
AAQ-5	27.02.24	21.85	17.89	12.63	7.36	0.4
Standard Duration (hour)		24	24	24	24	8
Method of Analysis Instrument Use: Haz-Scanner™ HIM 6000		Light Scattering Nephelometer	Light Scattering Nephelometer	High Sensitivity Electrochemical	High Sensitivity Electrochemical	High Sensitivity Electrochemical

Legend: PM₁₀ -Particulate Matter of a diameter of 10 micron or less. PM_{2.5} -Particulate Matter of a diameter of 2.5 micron or less, SO₂ -Sulphur Dioxide; NO₂ -Nitrogen Dioxide; CO -Carbon Monoxide

Collected By:



Muzahid Rahman
Consultant
EQMS Consulting Limited

Analyzed By:



Shihabuddin Ahmed
Technical Manager
EQMS Consulting Limited



Checked By:



Md. Jahidul Islam
Quality Manager
EQMS Consulting Limited



Head Office: H # 53, R # 04, B # C, Banani, Dhaka -1213, Bangladesh
Lab Office: Flat # F1, House # Ta-134/A, Boishakhi Sarani, Gulshan-Badda Link Road, Dhaka - 1212
Toronto Office: 7 Arnot Street, Scarborough Ontario, M1K4B5 Canada

Ref: EQMS/Air Quality/202403180341

EQMS ENVIRONMENTAL LABORATORY**Test Results of Ambient Air Quality**

Project Name : Environmental and Social Impact Assessment (ESIA) for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Description of Activities : Ambient Air Quality

Monitoring by : EQMS Personnel

Monitoring Location : AAQ-1: Faruqe Khondokar's House, Vaterchar, Gazaria, Munshiganj
AAQ-2: Jamia Faruqia Raujatul Ulum Madrasah, Gazaria, Munshiganj
AAQ-3: Vitikandi Government Primary School, Gazaria, Munshiganj
AAQ-4: Project Site, CEZ, Meghna-Homna Road, Meghna, Cumilla
AAQ-5: Joshim Uddin's House, 9no word Abdullapur, Meghna, Cumilla

Monitoring Date : 18-22.02.2024

Date of Analysis : 27.02.2024

Description of Analysis:

Location	Dates	Ambient Air Pollutants Concentration in $\mu\text{g}/\text{m}^3$				CO ppm
		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	
AAQ-1	18.02.24	21.54	15.35	15.25	16.23	0.4
AAQ-2	21.02.24	47.53	38.47	15.82	23.46	0.6
AAQ-3	19.02.24	25.56	17.74	18.26	25.35	0.3
AAQ-4	20.02.24	53.73	42.35	23.36	42.56	0.5
AAQ-5	22.02.24	26.74	16.47	8.37	12.25	0.7
Standard Duration (hour)		24	24	24	24	8
Method of Analysis Instrument Use: Haz-Scanner™ HIM 6000		Light Scattering Nephelometer	Light Scattering Nephelometer	High Sensitivity Electrochemical	High Sensitivity Electrochemical	High Sensitivity Electrochemical

Legend: PM₁₀ -Particulate Matter of a diameter of 10 micron or less. PM_{2.5} -Particulate Matter of a diameter of 2.5 micron or less, SO₂ -Sulphur Dioxide; NO₂ -Nitrogen Dioxide; CO -Carbon Monoxide

Collected By:

M. Rahman

Muzahid Rahman
Consultant
EQMS Consulting Limited

Analyzed By:

Shihabuddin Ahmed

Technical Manager
EQMS Consulting Limited

Checked By:

Md. Jahidul Islam

Quality Manager
EQMS Consulting Limited



Head Office: H # 53, R # 04, B # C, Banani, Dhaka -1213, Bangladesh

Lab Office: Flat # F1, House # Ta-134/A, Boishakhi Sarani, Gulshan-Badda Link Road, Dhaka - 1212

Toronto Office: 7 Arnot Street, Scarborough Ontario, M1K4B5 Canada



Appendix H: Pollution Concentration on Sensitive Receptors**Appendix H-1: NO₂ Concentration on Sensitive Receptors**

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR1	Luter Char Government Primary School	260792.4	2610427	2.26	0.18	0.81	East
SR2	Luterchar Mofizul Islam High School	260778	2610389	2.19	0.18	0.80	East
SR3	Luterchar South Govt. Primary School	261056.2	2609810	1.11	0.11	1.24	East
SR4	75 No. Boroikandi Bhaterchar Govt. Primary School	259510.9	2610133	7.39	0.63	0.55	SSW
SR5	Jhauchar Darunnajt Girls Madrasa	257391.2	2615317	1.24	0.22	5.52	NNW
SR6	Chengakandi Karimia Mujahidia Hafizia Kawmi Madrasa	255581	2615135	0.97	0.10	6.44	NNW
SR7	68 No Chengakandi Govt. Primary school	255729.2	2615310	0.95	0.11	6.47	NNW
SR8	Nagergaon Govt. Primary School	256281.9	2615118	0.97	0.14	5.97	NNW
SR9	Jhauchar Fulkoli Kindergarten	257224.5	2614979	1.24	0.20	5.32	NNW
SR10	Mehgna Shilpa Nagari School and College	256512.9	2613554	1.28	0.11	4.66	NNW
SR11	Protaperchar Govt. Primary School	256577.1	2613511	1.32	0.11	4.58	NNW
SR12	Ikra Cadet School and Madrasa	257046.6	2613880	1.48	0.16	4.53	NNW
SR13	Morning Sun Kindergarten School	257115.1	2613745	1.55	0.16	4.38	NNW
SR14	Darul Hikmah Islamic Academy	257122.4	2613724	1.56	0.16	4.35	NNW
SR15	Sonargaon Star Flower S R School & College	255857.9	2613902	0.96	0.09	5.38	NNW
SR16	1No. Vobhanipue Govt. Primary school	255496.8	2611225	0.60	0.05	4.55	WNW
SR17	Hossaindi High School	255728	2611311	0.56	0.06	4.33	WNW
SR18	Jamaldi Nesaria Dinia Madrasah	256158.8	2611420	0.53	0.06	3.94	WNW
SR19	73 No Jamaldi Government Primary School	256150.7	2611440	0.53	0.06	3.97	WNW
SR20	New Sunrise Ideal School, Jamaldi	256372.5	2611358	0.55	0.07	3.72	WNW
SR21	Brian Improbe Kindergarten	256368.7	2611399	0.57	0.07	3.74	WNW
SR22	Tetaitala Ideal School	257426.6	2612216	1.97	0.13	3.12	NW
SR23	Aralia Government Primary School	257537.3	2612051	2.15	0.13	2.93	NW
SR24	Tatuitola Govt. Primary School	257760.6	2611943	2.42	0.14	2.68	NW
SR25	Tetaitala Al-Amin Islami Madrasa	257382.9	2611923	1.99	0.11	2.99	NW
SR26	Nazma General Hospital	256997.4	2611815	1.44	0.09	3.23	NW
SR27	Hamdard University Bangladesh	257090.5	2611747	1.48	0.09	3.17	NW
SR28	Tetaitola Al Amin Islami Madrasa	257378.2	2611813	1.92	0.11	2.94	NW
SR29	Tengarchar Razia Kader Adorsha High School	255901.6	2610026	0.91	0.06	4.10	W

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR30	13 NoTengar Char gov:t Primary School	256346.5	2610408	0.93	0.07	3.63	W
SR31	HarbLaboratory School	256288.6	2610243	0.90	0.07	3.69	W
SR32	Tengarchar Uttorpara Madrasa	255958.8	2610679	0.87	0.06	4.02	W
SR33	Tengarchar Samsul Ulum Hafizia Madrasa and Orphanage	255915.7	2610741	0.85	0.06	4.07	W
SR34	Bara Bhater Char Markazul Ulom Madrasa	256921.9	2610701	1.12	0.08	3.07	W
SR35	Bara Bhater Char Govt. Primary School	257011.8	2610871	1.01	0.08	3.00	W
SR36	No.13 Tengar Char Government Primary School	256669.5	2611240	0.63	0.07	3.40	WNW
SR37	Gazaria Government Pilot Model High School	255783.4	2605748	0.82	0.08	6.29	SW
SR38	Gazaria Pilot Girls High School	255718.8	2605665	0.80	0.08	6.35	SW
SR39	Tazbidul Quran Nurani Kindergarten and Adosho Hifz Madrasa	255774.3	2605668	0.81	0.08	6.39	SW
SR40	Kauniyakandi Madrasha	259437.3	2605572	0.64	0.06	4.88	S
SR41	19 No. Lakkhipur Government Primary School	259830.1	2605644	0.61	0.05	4.78	S
SR42	Bhaberchar Wazir Ali High School	259895.5	2606392	0.75	0.06	4.04	S
SR43	S.K. Residential School	259755.2	2606510	0.83	0.06	3.92	S
SR44	Bhaberchar Union Parishad	259925.1	2606444	0.75	0.06	3.98	S
SR45	Bhaberchar Community Clinic	259846.9	2606345	0.75	0.06	4.08	S
SR46	Bokterkandi Primary School	262363	2605861	1.02	0.05	5.13	SSE
SR47	Baushia Mohammed Abdul Azhar High School	262204.1	2607155	0.95	0.05	5.15	SSE
SR48	Gazaria Govt. Technical School & College	261193.3	2607005	1.03	0.06	3.93	SSE
SR49	Shekher Gao Abdul Wadud Munshi High School	263290	2608600	0.49	0.04	3.61	SE
SR50	Satgharia Kandi darunnazat Madrasha o yatimkhana	263970.5	2608657	0.49	0.04	3.79	ESE
SR51	Grameen KG and Day Care Center	263280.7	2613591	0.87	0.07	4.36	NE
SR52	Horipur Govt. Primary School	261569.5	2613750	1.36	0.18	4.58	NNE
SR53	Meghna Upazila Health Complex	264615.2	2615086	0.81	0.05	3.68	NE
SR54	Meghna Upazila Ideal High School	263505.8	2614517	0.98	0.07	5.39	NE
SR55	33 No. Rasulpur (North) Govt. Primary School	263263.5	2614680	0.91	0.08	5.37	NE
SR56	13 no. Vaorkhola Uttor Govt. Primary School	263404.5	2614393	1.00	0.07	5.24	NE
SR57	Darul Ershad Madrasa, Shibnagar	263835	2614868	0.95	0.06	5.88	NE
SR58	11 no. Shibnagar Govt. Primary School	263957	2615139	0.92	0.06	6.17	NE
SR59	Boidonathpur Forkania Hafizia Madrasa	264132.2	2615353	0.90	0.06	6.44	NE
SR60	Doulat Hossen Govt. Primary School	264463.6	2613281	0.53	0.04	5.31	ENE

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR61	Mirzanagar Govt. Primary School	263970.6	2611969	0.70	0.04	4.30	ENE
SR62	Madrasa Muaz Ibne Jabal ®	263145	2611568	0.89	0.05	3.37	ENE
SR63	Meghna Residential Model School & College	261845.8	2610221	0.74	0.08	1.87	E
SR64	Sat Ghorikandi Govt. Primary School	264088.5	2608537	0.48	0.03	4.52	ESE
SR65	Shakhergoan High School	263264.7	2608546	0.48	0.04	3.78	ESE
SR66	Shakhergaon Govt. Primary School	263114.3	2608406	0.45	0.04	3.73	ESE
SR67	Sekhergaon bage Jannat Nurani Madrasha and Orphanage	263312.2	2608815	0.53	0.04	3.67	ESE
SR68	Lakhipur Govt. Primary School, Luterchar	263533.8	2609407	0.57	0.04	3.73	ESE
SR69	Dori Mirzanagar Govt. Primary School	263590	2611964	0.80	0.05	3.92	ENE
SR70	Mirzanagar Darul Uloom Model Madrasa	263766.6	2612268	0.77	0.05	4.20	ENE
SR71	Shibnagar Govt. Primary School, Debidwar, Cumilla	264377.1	2615426	0.89	0.06	6.68	
SR72	Fulkori Pre Cadet School	262020.2	2614985	0.93	0.14	4.99	NNE
SR73	Borokanda Afrahimia Women Madrasa	261793.4	2614822	1.00	0.15	4.79	NNE
SR74	Horipur Adasho Primary School	261727.8	2613155	1.50	0.15	3.24	NE
SR75	Mohammadpur Govt. Primary School	262258.1	2610526	0.82	0.07	2.28	E
SR76	S.D Khan Memorial Primary School	260817.1	2607843	1.13	0.07	2.71	SSE
SR77	Nateshwar Govt. Primary School	261590.3	2608153	1.19	0.06	2.78	SE
SR78	Ambia khatun Ideal Academy	261730.2	2607013	1.10	0.05	3.83	SSE
SR79	Scholars Model School	262269.8	2607031	0.92	0.05	4.08	SSE
SR80	Porachak Baushia Pachim Noyakandi Community Clinic	261644.7	2606801	1.03	0.05	3.95	SSE
SR81	Bausia UH&FWC, Gozaria, Munshigonj	261844.6	2606810	1.04	0.05	4.05	SSE
SR82	23 no. Moddho Bausia Govt. Primary School	261950.6	2605885	0.85	0.05	4.94	SSE
SR83	Moddhu Baushia Ideal School and College	261781.7	2605833	0.85	0.05	4.91	SSE
SR84	22 no sreenagor govt primary school	259626	2607379	1.23	0.08	3.06	S
SR85	Alipura Dakkhin Para Jame Masjid	259290.2	2607448	1.39	0.09	3.05	S
SR86	Bhater Char Dewan Abdul Mannan.Pilot High School	259045.9	2609802	5.51	0.40	1.13	SSW
SR87	61no Tengerchar Govt.Primary School	259189.1	2610179	8.33	0.40	0.828	SW
SR88	Anarpura Idial Kindergarten	258624.1	2608957	3.21	0.23	2.01	SSW
SR89	18 No. Alipura Govt. Primary School	259996.7	2607875	1.30	0.08	2.56	S
SR90	10 no. Aralia Govt. Primary School	260758.2	2612468	3.20	0.37	2.19	NNE
SR91	Mudarkandi Govt. Primary School	260328.6	2613583	2.38	0.38	3.15	N

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR92	5 No Borokanda Union Parishad	261333.7	2614404	1.38	0.20	4.12	NNE
SR93	Dhakhin Fuldi community clinic	255691.1	2606429	0.88	0.09	5.85	SW
SR94	Dokhin Fuldi Community Clinic	255877.4	2606571	0.93	0.09	5.63	SW
SR95	Gazaria Government College	256734.4	2605721	0.73	0.08	5.72	SSW
SR96	Upazila Parishad Complex, Gazaria Munshiganj	256573	2605619	0.70	0.08	5.89	SSW
SR97	Mathavanga Mohila Madrasha	256886.9	2605823	0.76	0.08	5.54	SSW
SR98	35 No Charshahebani government primary school	257076.2	2605928	0.79	0.08	5.34	SSW
SR99	Child Welfare Model School	257642.9	2605798	0.81	0.08	5.20	SSW
SR100	Kauniakandi Madrasa	258937.3	2605373	0.73	0.06	5.15	S by SSW
SR101	Khirachok Govt. Primary School	264446.2	2612162	0.62	0.04	4.79	ENE
SR102	Bardem Hospital, Sonargaon	252644.3	2617641	0.55	0.07	10.2	NW
SR103	Alhaz Abul Bashar Jame Masjid & Madrasha	253256.4	2617690	0.61	0.08	9.82	NNW
SR104	Nolchor Government Primary School	259505.2	2617546	0.98	0.25	7.14	N
SR105	Ansar Ali Model High School	263359.7	2617820	1.02	0.10	8.15	NNE
SR106	Tulatuli Community Clinic	263938	2617716	0.85	0.08	8.30	NNE
SR107	Joypur Government Primary School.	265397.5	2617712	0.72	0.06	9.05	NNE
SR108	Boro Shapmara Primary School	267152.9	2617795	0.69	0.04	10.03	NE
SR109	Baghaikandi Government Primary School	266091.1	2617200	0.82	0.05	9.13	NE
SR110	55No.Joypur primary School	265456	2617178	0.84	0.06	8.73	NE
SR111	Joypur Adorsho Biddanikaton	265333.7	2617123	0.83	0.06	8.52	NE
SR112	Tulatuli Primary School	263447.3	2617208	0.96	0.09	8.57	NE
SR113	Vatibondor Miftahol Ulom Madrasa..	257334.3	2616885	1.15	0.23	6.97	N by NNW
SR114	Sonargaon Pilot Girls High School	255927.4	2617177	1.04	0.16	7.88	NNW
SR115	Mohammad Motiur Rahman Memorial Model School	255856.1	2617119	1.04	0.16	7.46	NNW
SR116	Madrasatul Quaran	254973.2	2617419	0.90	0.12	8.62	NNW
SR117	Tajpur Govt. Primary School	254809.4	2617374	0.84	0.12	8.57	NNW
SR118	Jameah Al-Zahra Al- Islamiah for girls (Bhagalpur Mahila Madrasah)	252663	2616550	0.49	0.06	9.5	WNW
SR119	Chilarbag Dargabari Jama Masjid	254897.1	2616804	0.77	0.11	8.16	NNW
SR120	Rahe Jannat Madrasa	255089.3	2616646	0.81	0.12	7.88	NNW
SR121	Abdul Malek Smriti Academy	255704.1	2616731	1.05	0.15	7.67	NNW
SR122	Ayesha Amzad Hospital	256075.5	2616839	1.08	0.17	7.52	NNW
SR123	Late Hazi Mojiullah Govt. Hospital	259597.5	2616550	1.17	0.28	6.12	N

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR124	Satani Ashraful Uloom Madrasah	262208.5	2616515	1.08	0.14	6.47	N by NNE
SR125	Jolarpar Noyagaon Govt. Primary School	266600	2616489	0.64	0.04	9.00	ENE
SR126	Nazrul Academy	266995.6	2616070	0.51	0.04	8.67	ENE
SR127	Manikarchar Govt. Primary School	266705.3	2615900	0.52	0.04	8.74	ENE
SR128	Bollover Kandi Govt. Primary School	266982.9	2615642	0.52	0.04	8.36	ENE
SR129	Mahadul Quran Model Madrasah	266346.1	2615853	0.59	0.04	8.38	ENE
SR130	Govt. Manikarchor Bangabandhu College	266077.5	2615877	0.67	0.05	8.18	ENE
SR131	Manikarchar L.L. High School	266024.5	2615840	0.68	0.05	8.12	ENE
SR132	Manikerchor LL High School	266010.7	2615793	0.67	0.05	8.08	ENE
SR133	Mataber Kandi Govt. Primary School	265666.4	2615701	0.75	0.05	7.76	ENE
SR134	Kandargaon Darul Quran Islamia Madrasa	262382.7	2615826	1.06	0.14	5.89	NNE
SR135	Mokhles Master's Teaching Academy	262219.8	2615899	1.03	0.15	5.90	NNE
SR136	Muzaffar Ali High School and College	262472.8	2616074	1.07	0.13	6.16	NNE
SR137	Khossal Bari Mohila Madrasa	262305.9	2615844	1.05	0.14	5.88	NNE
SR138	Saleha Awal Ideal School	262211.4	2615788	1.04	0.15	5.79	NNE
SR139	Nurul Quran Fatemia Mohila Madrasah	259949	2615896	1.36	0.30	5.49	N
SR140	5 No. Chalidanga Govt. Primary School & High School	259816.1	2616025	1.30	0.30	5.60	N
SR141	Kander Goan Primary School	256898	2615627	1.24	0.21	6.02	NNW
SR142	Kander Goan Madrasha	256688.9	2615727	1.24	0.20	6.22	NNW
SR143	Pirojpur ideal school	255244.9	2615638	0.97	0.11	6.26	NNW
SR144	Pirojpur Jamia Arabia Madrasha	255112.7	2615715	0.94	0.11	7.05	NW
SR145	Talimul Quran Mohila Madrasha	255132.7	2615659	0.95	0.11	7.19	NW
SR146	United International School	254859.1	2616109	0.87	0.11	7.11	NW
SR147	Sonargaon Central Hospital, Habibpur, Sonargaon.	255040.9	2616163	0.87	0.11	7.55	NW
SR148	Kazi Fazlul Haque Women's University College	254991.9	2616253	0.85	0.11	7.65	NW
SR149	Sonargaon Laboratory School	254581.4	2616221	0.83	0.10	7.92	NW
SR150	Shaikh Abu Tawamah Islamic Academy	254824.3	2616334	0.83	0.11	7.84	NW
SR151	ICON International School	253563.9	2615997	0.62	0.07	7.87	NW
SR152	Sonargaon Govt. Degree College	253535.6	2615690	0.57	0.07	8.31	NW
SR153	Madrasah Al-sharaf Al-islamiah	253366.6	2615900	0.55	0.07	8.57	NW
SR154	Rahamudpur Primary School	252829.6	2615902	0.47	0.06	9.00	NW
SR155	Kabliganj Darus Sunnah Madrasha	252861.9	2615538	0.45	0.06	8.79	WNW
SR156	Mograpara H.G.G.S. Smriti Government Biddayatn	253936.1	2615858	0.70	0.08	8.11	WNW

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR157	Kazirgaon Haji Moulavi Tomijuddin Ahmed Islamia Madrasaha and Orphnage Center	252713.1	2614632	0.47	0.05	8.40	WNW
SR158	Islamia Adorsho Govt. Primary School	253049.1	2614666	0.51	0.05	8.13	WNW
SR159	Holy Child Model School	253511.4	2614285	0.57	0.06	7.52	WNW
SR160	Taherpur Islamia Alim Madrasha	253261	2614145	0.53	0.05	7.65	WNW
SR161	Taherpur Haji Lal Mia High School	253386.2	2614121	0.54	0.05	7.54	WNW
SR162	Tatua Kandi Primary Government School	252510.4	2614066	0.42	0.05	8.29	WNW
SR163	Taherpur Darussunnat Salehiya Mohebbiya Diniya Madrasah	253145.9	2613746	0.47	0.05	6.91	WNW
SR164	89 no. Quarbanpur Govt. Primary School	253783.1	2613540	0.56	0.05	7.58	WNW
SR165	Vhati Balaki Govt. Primary School	252710.7	2610710	0.48	0.04	7.27	W
SR166	Ismanir Char Primary School	253624.2	2607866	0.78	0.06	6.86	WSW
SR167	Daulatpur Govt primary School, munsiganja.	254945.2	2603321	0.54	0.06	8.70	SSW
SR168	Abdullahpur Govt. Primary School	255375.6	2604686	0.74	0.08	7.33	SW
SR169	Rosulpur Model Govt. Primary School	255964.5	2604568	0.61	0.08	7.09	SSW
SR170	Gazaria Ideal School	256443.9	2604950	0.69	0.08	6.50	SSW
SR171	43 No. Noyanagar Govt. Primary School	254126.2	2604975	0.66	0.08	7.99	SW
SR172	Gazaria Miabari Dakhil Madrasha	254398.9	2605322	0.70	0.08	7.54	SW
SR173	79 Gazaria Govt Primary school	254238	2605548	0.77	0.08	7.50	SW
SR174	Gazaria Holy Child Pre Cadet School	254889.4	2605711	0.77	0.09	6.91	SW
SR175	Bashgoan Government primary school	254709.9	2606099	0.88	0.09	6.81	SW
SR176	Kazipura Baitun Nazat Hafiziya Madrasha	253911	2606229	0.82	0.08	7.34	SW
SR177	62 Darikandi Koloserkandi Govt Primary School	254227.8	2606632	0.85	0.08	6.85	SW
SR178	Ismanikchar Community Clinic	253904.4	2607479	0.71	0.07	6.76	WSW
SR179	Ismanikchar High School	254019.4	2607335	0.75	0.07	6.71	WSW
SR180	Nazir Bhuiya Bari Govt. Primary School	254766	2608058	0.85	0.08	5.73	WSW
SR181	Goalgaon government primary school	254013	2608834	0.77	0.06	6.18	WSW
SR182	6 No. Hosendi Primary School	254524.1	2609921	0.72	0.05	5.46	W
SR183	Hossaindi M.L High school	254914.2	2610585	0.76	0.06	5.06	W
SR184	41 no Goshairchar Govt primary school	255431.8	2605295	0.82	0.09	6.82	SW
SR185	Gazaria Bateniya Abdul Mannaniya Hafezia Sishu Sodon	256073.6	2604824	0.65	0.08	6.83	SSW
SR186	Kauniakandi Madrasa	258937.3	2605373	0.85	0.07	5.12	SSW

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR187	Mother's Care International School	259191	2604962	0.71	0.06	5.47	S
SR188	25 No. Porachak Bausia Govt. Primary School	261752.4	2604759	0.91	0.05	5.97	S
SR189	69 no. Porachak Bausia Purbo Noyakandi Govt. Primary School	262187.1	2604913	1.01	0.05	5.92	SSE
SR190	Porachak Bausia High School	262251.2	2605182	1.00	0.05	5.69	SSE
SR191	Kolimullah Madrasah	263204.7	2604800	1.08	0.05	6.48	S
SR192	Boro kandi Adarsha Shishu Niketan	263414.9	2604889	1.00	0.04	6.51	SE
SR193	Taqwa Adarsha Girls Madrasah	263437.2	2604800	1.01	0.04	6.61	SE
SR194	28 no. Char Baushia Borokandi Govt. Primary School	263423.5	2605384	0.84	0.04	6.11	SSE
SR195	3 no. Daudkandi Adorsho (Pailot) High School	266463.1	2604786	0.64	0.03	8.62	SSE
SR196	Upazila Parishad Complex, Daudkandi Cumilla	267008.7	2604723	0.62	0.03	8.91	SSE
SR197	04. Begum Amana Sultan Govt. Girls' High School	266663.2	2604535	0.62	0.03	8.93	SSE
SR198	Engineering Staff College	264482.7	2604211	0.61	0.04	7.71	SSE
SR199	IEB University of Engineering & Technology (IUET)	264239.9	2604152	0.75	0.04	7.59	SSE
SR200	27 no. Dokkhin-Kandi Government Primary School	263686.3	2604354	0.98	0.04	7.10	SSE
SR201	Master Laboratory School	261638.9	2604468	0.86	0.05	6.18	SSE
SR202	68 No. Porachak Bausia Pachimkandi Govt. Primary School	260936.4	2604182	0.78	0.05	6.33	SSE
SR203	Huglakandi Madrasha	259067.6	2604072	0.64	0.06	6.43	S
SR204	Karim Khan Govt. Primary School	257910.3	2604431	0.80	0.07	6.33	S
SR205	Karim Khan Keratul Quran Madrasha	257923	2604311	0.78	0.07	6.45	S
SR206	Imampur Primary School	256963.2	2604036	0.64	0.07	7.05	SSW
SR207	37 no. Adharmanik Govt. Primary School	256687.4	2603451	0.60	0.06	7.70	SSW
SR208	59 No. Hoglekandi Govt Primary School	258737.3	2603607	0.63	0.06	6.94	SSE
SR209	Shanti Nagar High School	261345.1	2603478	0.77	0.05	7.08	SSE
SR210	Forajikandi Somajkollan Biddaniketon	263786.1	2603851	1.00	0.04	7.60	SSE
SR211	Refaitullah Khan government primary school	264987.3	2603554	0.56	0.03	8.52	SSE
SR212	10 no. Uttar Nacruddi Govt. Primary School	266986.9	2603592	0.55	0.03	9.78	SE
SR213	Kadamtoli Hohseniya Qaumi Madrasha	267035.9	2606127	0.65	0.03	8.29	ESE
SR214	Government Primary School Gongaprosad	265469	2606770	0.60	0.03	6.60	ESE
SR215	Gungaprosad Govt. primary school	265845.9	2607797	0.52	0.03	6.44	ESE
SR216	Hasnabad Primary School	266865.3	2608448	0.58	0.03	7.16	ESE
SR217	Dudhghata Govt. Primary School	267130.4	2609664	0.56	0.03	7.21	E

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR218	Nondir char Govt Medical Hospital	267075.4	2610138	0.46	0.03	7.10	E
SR219	Sennagar abbasia darul ulum madrasa & athimkhana	265522.7	2611300	0.42	0.04	5.63	ENE
SR220	Little Star Ideal School (LSIS)	265521.7	2611472	0.41	0.04	5.67	ENE
SR221	Dakkhin Kandi Govt. Primary School	266187	2611888	0.38	0.03	6.39	ENE
SR222	Sennagar Govt. Primary School	265601.6	2611978	0.44	0.04	5.85	ENE
SR223	Joynagar Govt. Primary School	265417.1	2612956	0.59	0.04	6.02	ENE
SR224	Daulat Hossain High School	265041	2613428	0.56	0.05	5.91	ENE
SR225	Sonarchar High School	266717.2	2613811	0.44	0.03	7.55	ENE
SR226	Gobindapur Government Primary School	266130.2	2614510	0.47	0.04	7.39	ENE

Appendix H-2: SO₂ Concentration on Sensitive Receptors

ID	Sensitive Receptors Name	Coordinates		SO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution - 24 hr.		
SR1	Luter Char Government Primary School	260792.4	2610427	6.5	1.89	0.81	East
SR2	Luterchar Mofizul Islam High School	260778	2610389	6.3	1.85	0.80	East
SR3	Luterchar South Govt. Primary School	261056.2	2609810	4.0	0.94	1.24	East
SR4	75 No. Boroikandi Bhaterchar Govt. Primary School	259510.9	2610133	17.4	5.99	0.55	SSW
SR5	Jhauchar Darunnajt Girls Madrasa	257391.2	2615317	2.0	0.98	5.52	NNW
SR6	Chengakandi Karimia Mujahidia Hafizia Kawmi Madrasa	255581	2615135	2.1	0.76	6.44	NNW
SR7	68 No Chengakandi Govt.Primary school	255729.2	2615310	2.1	0.75	6.47	NNW
SR8	Nagergaon Govt. Primary School	256281.9	2615118	2.0	0.77	5.97	NNW
SR9	Jhauchar Fulkoli Kindergarten	257224.5	2614979	2.1	0.99	5.32	NNW
SR10	Mehgna Shilpa Nagari School and College	256512.9	2613554	2.4	1.03	4.66	NNW
SR11	Protaperchar Govt. Primary School	256577.1	2613511	2.4	1.06	4.58	NNW
SR12	Ikra Cadet School and Madrasa	257046.6	2613880	2.5	1.17	4.53	NNW
SR13	Morning Sun Kindergarten School	257115.1	2613745	2.6	1.23	4.38	NNW
SR14	Darul Hikmah Islamic Academy	257122.4	2613724	2.6	1.25	4.35	NNW
SR15	Sonargaon Star Flower S R School & College	255857.9	2613902	2.0	0.76	5.38	NNW
SR16	1No.Vobhanipue Govt. Primary school	255496.8	2611225	3.6	0.47	4.55	WNW

ID	Sensitive Receptors Name	Coordinates		SO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution - 24 hr.		
SR17	Hossaindi High School	255728	2611311	3.7	0.44	4.33	WNW
SR18	Jamaldi Nesaria Dinia Madrasah	256158.8	2611420	3.6	0.44	3.94	WNW
SR19	73 No Jamaldi Govenment Primary School	256150.7	2611440	3.6	0.44	3.97	WNW
SR20	New Sunrise Ideal School, Jamaldi	256372.5	2611358	3.6	0.46	3.72	WNW
SR21	Brian Improbe Kindergarten	256368.7	2611399	3.6	0.47	3.74	WNW
SR22	Tetaitala Ideal School	257426.6	2612216	3.5	1.54	3.12	NW
SR23	Aralia Government Primary School	257537.3	2612051	3.7	1.68	2.93	NW
SR24	Tatuitola Govt. Primary School	257760.6	2611943	4.2	1.90	2.68	NW
SR25	Tetaitala Al-Amin Islami Madrasa	257382.9	2611923	3.7	1.57	2.99	NW
SR26	Nazma General Hospital	256997.4	2611815	3.3	1.15	3.23	NW
SR27	Hamdard University Bangladesh	257090.5	2611747	3.4	1.18	3.17	NW
SR28	Tetaitola Al Amin Islami Madrasa	257378.2	2611813	3.7	1.53	2.94	NW
SR29	Tengarchar Razia Kader Adorsha High School	255901.6	2610026	2.5	0.70	4.10	W
SR30	13 NoTengar Char gov:t Primary School	256346.5	2610408	3.1	0.75	3.63	W
SR31	HarbLaboratory School	256288.6	2610243	3.0	0.71	3.69	W
SR32	Tengarchar Uttarpara Madrasa	255958.8	2610679	3.5	0.69	4.02	W
SR33	Tengarchar Samsul Ulum Hafizia Madrasa and Orphanage	255915.7	2610741	3.6	0.68	4.07	W
SR34	Bara Bhater Char Markazul Ulom Madrasa	256921.9	2610701	3.6	0.88	3.07	W
SR35	Bara Bhater Char Govt. Primary School	257011.8	2610871	3.7	0.81	3.00	W
SR36	No.13 Tengar Char Government Primary School	256669.5	2611240	3.7	0.49	3.40	WNW
SR37	Gazaria Government Pilot Model High School	255783.4	2605748	2.0	0.66	6.29	SW
SR38	Gazaria Pilot Girls High School	255718.8	2605665	2.0	0.63	6.35	SW
SR39	Tazbidul Quran Nurani Kindergarten and Adosho Hifz Madrasa	255774.3	2605668	2.0	0.64	6.39	SW
SR40	Kauniyakandi Madrasha	259437.3	2605572	2.3	0.53	4.88	S
SR41	19 No. Lakkhipur Government Primary School	259830.1	2605644	2.3	0.50	4.78	S
SR42	Bhaberchar Wazir Ali High School	259895.5	2606392	2.8	0.61	4.04	S
SR43	S.K. Residential School	259755.2	2606510	2.9	0.66	3.92	S
SR44	Bhaberchar Union Parishad	259925.1	2606444	2.9	0.62	3.98	S
SR45	Bhaberchar Community Clinic	259846.9	2606345	2.8	0.61	4.08	S
SR46	Bokterkandi Primary School	262363	2605861	2.0	0.85	5.13	SSE
SR47	Baushia Mohammed Abdul Azhar High School	262204.1	2607155	2.8	0.78	5.15	SSE

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

ID	Sensitive Receptors Name	Coordinates		SO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution - 24 hr.		
SR48	Gazaria Govt. Technical School & College	261193.3	2607005	2.9	0.87	3.93	SSE
SR49	Shekher Gao Abdul Wadud Munshi High School	263290	2608600	2.3	0.41	3.61	SE
SR50	Satgharia Kandi darunnazat Madrasha o yatimkhana	263970.5	2608657	2.4	0.41	3.79	ESE
SR51	Grameen KG and Day Care Center	263280.7	2613591	2.4	0.76	4.36	NE
SR52	Horipur Govt. Primary School	261569.5	2613750	3.1	1.06	4.58	NNE
SR53	Meghna Upazila Health Complex	264615.2	2615086	2.2	0.67	3.68	NE
SR54	Meghna Upazila Ideal High School	263505.8	2614517	2.0	0.81	5.39	NE
SR55	33 No. Rasulpur (North) Govt. Primary School	263263.5	2614680	2.0	0.74	5.37	NE
SR56	13 no. Vaorkhola Uttor Govt. Primary School	263404.5	2614393	2.1	0.84	5.24	NE
SR57	Darul Ershad Madrasa, Shibnagar	263835	2614868	2.2	0.79	5.88	NE
SR58	11 no. Shibnagar Govt. Primary School	263957	2615139	2.2	0.76	6.17	NE
SR59	Boidonathpur Forkania Hafizia Madrasa	264132.2	2615353	2.3	0.74	6.44	NE
SR60	Doulat Hossen Govt. Primary School	264463.6	2613281	2.0	0.41	5.31	ENE
SR61	Mirzanagar Govt. Primary School	263970.6	2611969	2.6	0.58	4.30	ENE
SR62	Madrasa Muaz Ibne Jabal ®	263145	2611568	3.2	0.72	3.37	ENE
SR63	Meghna Residential Model School & College	261845.8	2610221	3.6	0.62	1.87	E
SR64	Sat Ghorikandi Govt. Primary School	264088.5	2608537	2.3	0.40	4.52	ESE
SR65	Shakhergoan High School	263264.7	2608546	2.3	0.40	3.78	ESE
SR66	Shakhergaon Govt. Primary School	263114.3	2608406	2.7	0.38	3.73	ESE
SR67	Sekhergaon bage Jannat Nurani Madrasha and Orphanage	263312.2	2608815	2.6	0.44	3.67	ESE
SR68	Lakhipur Govt. Primary School, Luterchar	263533.8	2609407	2.6	0.49	3.73	ESE
SR69	Dori Mirzanagar Govt. Primary School	263590	2611964	2.8	0.66	3.92	ENE
SR70	Mirzanagar Darul Uloom Model Madrasa	263766.6	2612268	2.5	0.62	4.20	ENE
SR71	Shibnagar Govt. Primary School, Debidwar, Cumilla	264377.1	2615426	2.3	0.73	6.68	
SR72	Fulkori Pre Cadet School	262020.2	2614985	2.2	0.78	4.99	NNE
SR73	Borokanda Afrahimia Women Madrasa	261793.4	2614822	2.3	0.83	4.79	NNE
SR74	Horipur Adasho Primary School	261727.8	2613155	3.3	1.18	3.24	NE
SR75	Mohammadpur Govt. Primary School	262258.1	2610526	4.1	0.71	2.28	E
SR76	S.D Khan Memorial Primary School	260817.1	2607843	3.9	1.01	2.71	SSE
SR77	Nateshwar Govt. Primary School	261590.3	2608153	3.9	1.00	2.78	SE
SR78	Ambia khatun Ideal Academy	261730.2	2607013	2.8	0.90	3.83	SSE
SR79	Scholars Model School	262269.8	2607031	2.7	0.76	4.08	SSE

ID	Sensitive Receptors Name	Coordinates		SO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution - 24 hr.		
SR80	Porachak Baushia Pachim Noyakandi Community Clinic	261644.7	2606801	2.8	0.85	3.95	SSE
SR81	Bausia UH&FWC, Gozaria, Munshigonj	261844.6	2606810	2.7	0.87	4.05	SSE
SR82	23 no. Moddho Bausia Govt. Primary School	261950.6	2605885	2.2	0.72	4.94	SSE
SR83	Moddhu Baushia Ideal School and College	261781.7	2605833	2.2	0.74	4.91	SSE
SR84	22 no sreenagor govt primary school	259626	2607379	3.6	0.98	3.06	S
SR85	Alipura Dakkhin Para Jame Masjid	259290.2	2607448	3.6	1.15	3.05	S
SR86	Bhater Char Dewan Abdul Mannan.Pilot High School	259045.9	2609802	9.7	4.34	1.13	SSW
SR87	61no Tengerchar Govt.Primary School	259189.1	2610179	12.5	6.20	0.828	SW
SR88	Anarpura Idial Kindergarten	258624.1	2608957	5.5	2.65	2.01	SSW
SR89	18 No. Alipura Govt. Primary School	259996.7	2607875	4.5	1.08	2.56	S
SR90	10 no. Aralia Govt. Primary School	260758.2	2612468	5.2	2.52	2.19	NNE
SR91	Mudarkandi Govt. Primary School	260328.6	2613583	3.6	1.89	3.15	N
SR92	5 No Borokanda Union Parishad	261333.7	2614404	2.7	1.09	4.12	NNE
SR93	Dhakhin Fuldi community clinic	255691.1	2606429	2.1	0.69	5.85	SW
SR94	Dokhin Fuldi Community Clinic	255877.4	2606571	2.0	0.73	5.63	SW
SR95	Gazaria Government College	256734.4	2605721	1.9	0.58	5.72	SSW
SR96	Upazila Parishad Complex, Gazaria Munshiganj	256573	2605619	1.9	0.56	5.89	SSW
SR97	Mathavanga Mohila Madrasha	256886.9	2605823	2.0	0.60	5.54	SSW
SR98	35 No Charshahebani government primary school	257076.2	2605928	2.1	0.63	5.34	SSW
SR99	Child Welfare Model School	257642.9	2605798	2.2	0.64	5.20	SSW
SR100	Kauniakandi Madrasa	258937.3	2605373	2.1	0.59	5.15	S by SSW
SR101	Khirachok Govt. Primary School	264446.2	2612162	2.3	0.51	4.79	ENE
SR102	Bardem Hospital, Sonargaon	252644.3	2617641	2.2	0.39	10.2	NW
SR103	Alhaz Abul Bashar Jame Masjid & Madrasha	253256.4	2617690	2.0	0.42	9.82	NNW
SR104	Nolchor Government Primary School	259505.2	2617546	2.4	0.69	7.14	N
SR105	Ansar Ali Model High School	263359.7	2617820	2.3	0.71	8.15	NNE
SR106	Tulatuli Community Clinic	263938	2617716	2.0	0.59	8.30	NNE
SR107	Joypur Government Primary School.	265397.5	2617712	2.1	0.50	9.05	NNE
SR108	Boro Shapmara Primary School	267152.9	2617795	2.1	0.48	10.03	NE
SR109	Baghaikandi Government Primary School	266091.1	2617200	2.3	0.57	9.13	NE
SR110	55No.Joypur primary School	265456	2617178	2.3	0.59	8.73	NE
SR111	Joypur Adorsho Biddanikaton	265333.7	2617123	2.3	0.58	8.52	NE

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

ID	Sensitive Receptors Name	Coordinates		SO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution - 24 hr.		
SR112	Tulatuli Primary School	263447.3	2617208	2.1	0.67	8.57	NE
SR113	Vatibondor Miftahol Ulom Madrasa..	257334.3	2616885	2.0	0.81	6.97	N by NNW
SR114	Sonargaon Pilot Girls High School	255927.4	2617177	2.7	0.73	7.88	NNW
SR115	Mohammad Motiur Rahman Memorial Model School	255856.1	2617119	2.6	0.73	7.46	NNW
SR116	Madrasatul Quaran	254973.2	2617419	2.3	0.63	8.62	NNW
SR117	Tajpur Govt. Primary School	254809.4	2617374	2.2	0.59	8.57	NNW
SR118	Jameah Al-Zahra Al- Islamiah for girls (Bhagalpur Mahila Madrasah)	252663	2616550	2.6	0.34	9.5	WNW
SR119	Chilarbag Dargabari Jama Masjid	254897.1	2616804	2.0	0.54	8.16	NNW
SR120	Rahe Jannat Madrasa	255089.3	2616646	2.0	0.57	7.88	NNW
SR121	Abdul Malek Smriti Academy	255704.1	2616731	2.3	0.73	7.67	NNW
SR122	Ayesha Amzad Hospital	256075.5	2616839	2.4	0.76	7.52	NNW
SR123	Late Hazi Mojiullah Govt. Hospital	259597.5	2616550	2.1	0.82	6.12	N
SR124	Satani Ashraful Uloom Madrasah	262208.5	2616515	2.4	0.76	6.47	N by NNE
SR125	Jolarpar Noyagaon Govt. Primary School	266600	2616489	2.1	0.45	9.00	ENE
SR126	Nazrul Academy	266995.6	2616070	2.1	0.36	8.67	ENE
SR127	Manikarchar Govt. Primary School	266705.3	2615900	2.2	0.36	8.74	ENE
SR128	Bollover Kandi Govt. Primary School	266982.9	2615642	2.1	0.36	8.36	ENE
SR129	Mahadul Quran Model Madrasah	266346.1	2615853	2.2	0.41	8.38	ENE
SR130	Govt. Manikarchor Bangabandhu College	266077.5	2615877	2.2	0.47	8.18	ENE
SR131	Manikarchar L.L. High School	266024.5	2615840	2.2	0.47	8.12	ENE
SR132	Manikerchor LL High School	266010.7	2615793	2.2	0.47	8.08	ENE
SR133	Mataber Kandi Govt. Primary School	265666.4	2615701	2.2	0.53	7.76	ENE
SR134	Kandargaon Darul Quran Islamia Madrasa	262382.7	2615826	2.2	0.74	5.89	NNE
SR135	Mokhles Master's Teaching Academy	262219.8	2615899	2.2	0.72	5.90	NNE
SR136	Muzaffar Ali High School and College	262472.8	2616074	2.2	0.75	6.16	NNE
SR137	Khossal Bari Mohila Madrasa	262305.9	2615844	2.2	0.73	5.88	NNE
SR138	Saleha Awal Ideal School	262211.4	2615788	2.2	0.73	5.79	NNE
SR139	Nurul Quran Fatemia Mohila Madrasah	259949	2615896	2.0	0.95	5.49	N
SR140	5 No. Chalidanga Govt. Primary School & High School	259816.1	2616025	2.0	0.91	5.60	N
SR141	Kander Goan Primary School	256898	2615627	2.1	0.87	6.02	NNW
SR142	Kander Goan Madrasa	256688.9	2615727	2.1	0.86	6.22	NNW
SR143	Pirojpur ideal school	255244.9	2615638	2.1	0.68	6.26	NNW

ID	Sensitive Receptors Name	Coordinates		SO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution - 24 hr.		
SR144	Pirojpur Jamia Arabia Madrasha	255112.7	2615715	2.2	0.66	7.05	NW
SR145	Talimul Quran Mohila Madrasha	255132.7	2615659	2.2	0.67	7.19	NW
SR146	United International School	254859.1	2616109	2.1	0.61	7.11	NW
SR147	Sonargoan Central Hospital, Habibpur, Sonargoan.	255040.9	2616163	2.1	0.61	7.55	NW
SR148	Kazi Fazlul Haque Women's University College	254991.9	2616253	2.1	0.59	7.65	NW
SR149	Sonargaon Laboratory School	254581.4	2616221	2.2	0.58	7.92	NW
SR150	Shaikh Abu Tawamah Islamic Academy	254824.3	2616334	2.1	0.58	7.84	NW
SR151	ICON International School	253563.9	2615997	2.6	0.43	7.87	NW
SR152	Sonargaon Govt. Degree College	253535.6	2615690	2.6	0.40	8.31	NW
SR153	Madrasah Al-sharaf Al-islamiah	253366.6	2615900	2.7	0.39	8.57	NW
SR154	Rahamudpur Primary School	252829.6	2615902	2.6	0.33	9.00	NW
SR155	Kabliganj Darus Sunnah Madrasha	252861.9	2615538	2.4	0.32	8.79	WNW
SR156	Mograpara H.G.G.S. Smrity Government Biddayatn	253936.1	2615858	2.6	0.49	8.11	WNW
SR157	Kazirgaon Haji Moulavi Tomijuddin Ahmed Islamia Madrasah and Orphanage Center	252713.1	2614632	2.5	0.33	8.40	WNW
SR158	Islamia Adorsho Govt. Primary School	253049.1	2614666	2.6	0.36	8.13	WNW
SR159	Holy Child Model School	253511.4	2614285	2.3	0.40	7.52	WNW
SR160	Taherpur Islamia Alim Madrasha	253261	2614145	2.4	0.37	7.65	WNW
SR161	Taherpur Haji Lal Mia High School	253386.2	2614121	2.4	0.38	7.54	WNW
SR162	Tatua Kandi Primary Government School	252510.4	2614066	2.8	0.29	8.29	WNW
SR163	Taherpur Darussunnat Salehiya Mohebbiya Diniya Madrasah	253145.9	2613746	2.7	0.33	6.91	WNW
SR164	89 no. Quarbanpur Govt. Primary School	253783.1	2613540	2.5	0.40	7.58	WNW
SR165	Vhati Balaki Govt. Primary School	252710.7	2610710	2.4	0.33	7.27	W
SR166	Ismanir Char Primary School	253624.2	2607866	2.1	0.55	6.86	WSW
SR167	Daulatpur Govt primary School, munsiganja.	254945.2	2603321	2.6	0.38	8.70	SSW
SR168	Abdullahpur Govt. Primary School	255375.6	2604686	2.2	0.52	7.33	SW
SR169	Rosulpur Model Govt. Primary School	255964.5	2604568	2.0	0.43	7.09	SSW
SR170	Gazaria Ideal School	256443.9	2604950	1.9	0.49	6.50	SSW
SR171	43 No. Noyanagar Govt. Primary School	254126.2	2604975	2.5	0.46	7.99	SW
SR172	Gazaria Miabari Dakhil Madrasha	254398.9	2605322	2.3	0.49	7.54	SW
SR173	79 Gazaria Govt Primary school	254238	2605548	2.4	0.54	7.50	SW
SR174	Gazaria Holy Child Pre Cadet School	254889.4	2605711	2.3	0.54	6.91	SW

ID	Sensitive Receptors Name	Coordinates		SO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution - 24 hr.		
SR175	Bashgoan Government primary school	254709.9	2606099	2.3	0.62	6.81	SW
SR176	Kazipura Baitun Nazat Hafiziya Madrasha	253911	2606229	2.3	0.58	7.34	SW
SR177	62 Darikandi Koloserkandi Govt Primary School	254227.8	2606632	2.3	0.59	6.85	SW
SR178	Ismanikchar Community Clinic	253904.4	2607479	2.1	0.50	6.76	WSW
SR179	Ismanikchar High School	254019.4	2607335	2.2	0.52	6.71	WSW
SR180	Nazir Bhuiya Bari Govt. Primary School	254766	2608058	2.0	0.60	5.73	WSW
SR181	Goalgaon government primary school	254013	2608834	1.9	0.54	6.18	WSW
SR182	6 No. Hosendi Primary School	254524.1	2609921	2.0	0.50	5.46	W
SR183	Hossaindi M.L High school	254914.2	2610585	3.0	0.53	5.06	W
SR184	41 no Goshairchar Govt primary school	255431.8	2605295	2.3	0.57	6.82	SW
SR185	Gazaria Bateniya Abdul Mannaniya Hafezia Sishu Sodon	256073.6	2604824	2.0	0.45	6.83	SSW
SR186	Kauniakandi Madrasa	258937.3	2605373	2.1	0.59	5.12	SSW
SR187	Mother's Care International School	259191	2604962	1.9	0.49	5.47	S
SR188	25 No. Porachak Bausia Govt. Primary School	261752.4	2604759	2.1	0.64	5.97	S
SR189	69 no. Porachak Bausia Purbo Noyakandi Govt. Primary School	262187.1	2604913	1.8	0.71	5.92	SSE
SR190	Porachak Bausia High School	262251.2	2605182	1.9	0.70	5.69	SSE
SR191	Kolimullah Madrasah	263204.7	2604800	2.0	0.76	6.48	S
SR192	Boro kandi Adarsha Shishu Niketan	263414.9	2604889	2.2	0.70	6.51	SE
SR193	Taqwa Adarsha Girls Madrasah	263437.2	2604800	2.2	0.71	6.61	SE
SR194	28 no. Char Baushia Borokandi Govt. Primary School	263423.5	2605384	2.2	0.59	6.11	SSE
SR195	3 no. Daudkandi Adorsho (Pailot) High School	266463.1	2604786	1.9	0.45	8.62	SSE
SR196	Upazila Parishad Complex, Daudkandi Cumilla	267008.7	2604723	2.1	0.43	8.91	SSE
SR197	04. Begum Amena Sultan Govt. Girls' High School	266663.2	2604535	1.9	0.43	8.93	SSE
SR198	Engineering Staff College	264482.7	2604211	2.4	0.43	7.71	SSE
SR199	IEB University of Engineering & Technology (IUET)	264239.9	2604152	2.3	0.53	7.59	SSE
SR200	27 no. Dokkhin-Kandi Government Primary School	263686.3	2604354	2.2	0.69	7.10	SSE
SR201	Master Laboratory School	261638.9	2604468	2.3	0.60	6.18	SSE
SR202	68 No. Porachak Bausia Pachimkandi Govt. Primary School	260936.4	2604182	2.2	0.54	6.33	SSE
SR203	Huglakandi Madrasha	259067.6	2604072	2.0	0.45	6.43	S
SR204	Karim Khan Govt. Primary School	257910.3	2604431	2.2	0.56	6.33	S

ID	Sensitive Receptors Name	Coordinates		SO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution - 24 hr.		
SR205	Karim Khan Keratul Quran Madrasha	257923	2604311	2.2	0.55	6.45	S
SR206	Imampur Primary School	256963.2	2604036	2.3	0.45	7.05	SSW
SR207	37 no. Adharmanik Govt. Primary School	256687.4	2603451	2.6	0.42	7.70	SSW
SR208	59 No. Hoglekandi Govt Primary School	258737.3	2603607	2.3	0.44	6.94	SSE
SR209	Shanti Nagar High School	261345.1	2603478	2.5	0.54	7.08	SSE
SR210	Forajikandi Somajkollan Biddaniketon	263786.1	2603851	2.4	0.70	7.60	SSE
SR211	Refaitullah Khan government primary school	264987.3	2603554	2.3	0.39	8.52	SSE
SR212	10 no. Uttar Nacruddi Govt. Primary School	266986.9	2603592	1.7	0.39	9.78	SE
SR213	Kadamtoli Hohseniya Qaumi Madrasha	267035.9	2606127	2.7	0.46	8.29	ESE
SR214	Government Primary School Gongaprosad	265469	2606770	2.0	0.42	6.60	ESE
SR215	Gungaproshad Govt. primary school	265845.9	2607797	2.2	0.36	6.44	ESE
SR216	Hasnabad Primary School	266865.3	2608448	2.4	0.41	7.16	ESE
SR217	Dudhghata Govt. Primary School	267130.4	2609664	2.2	0.39	7.21	E
SR218	Nondir char Govt Medical Hospital	267075.4	2610138	2.0	0.32	7.10	E
SR219	Sennagar abbasia darul ulum madrasha & athimkhana	265522.7	2611300	1.9	0.29	5.63	ENE
SR220	Little Star Ideal School (LSIS)	265521.7	2611472	2.0	0.29	5.67	ENE
SR221	Dakkhin Kandi Govt. Primary School	266187	2611888	2.4	0.26	6.39	ENE
SR222	Sennagar Govt. Primary School	265601.6	2611978	2.0	0.31	5.85	ENE
SR223	Joynagar Govt. Primary School	265417.1	2612956	2.2	0.41	6.02	ENE
SR224	Daulat Hossain High School	265041	2613428	1.9	0.39	5.91	ENE
SR225	Sonarchar High School	266717.2	2613811	2.6	0.31	7.55	ENE
SR226	Gobindapur Government Primary School	266130.2	2614510	1.9	0.33	7.39	ENE

Appendix H-3: CO Concentration on Sensitive Receptors

ID	Sensitive Receptors Name	Coordinates		CO Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution -8 hr.		
SR1	Luter Char Government Primary School	260792.4	2610427	50.5	33.8	0.81	East
SR2	Luterchar Mofizul Islam High School	260778	2610389	50.7	34.5	0.80	East
SR3	Luterchar South Govt. Primary School	261056.2	2609810	36.5	25.5	1.24	East
SR4	75 No. Boroikandi Bhaterchar Govt. Primary School	259510.9	2610133	76.6	49.9	0.55	SSW

ID	Sensitive Receptors Name	Coordinates		CO Concentration (µg/m³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution -8 hr.		
SR5	Jhauchar Darunnajt Girls Madrasa	257391.2	2615317	17.6	11.7	5.52	NNW
SR6	Chengakandi Karimia Mujahidia Hafizia Kawmi Madrasa	255581	2615135	18.5	9.7	6.44	NNW
SR7	68 No Chengakandi Govt.Primary school	255729.2	2615310	18.3	9.7	6.47	NNW
SR8	Nagergaon Govt. Primary School	256281.9	2615118	17.8	10.6	5.97	NNW
SR9	Jhauchar Fulkoli Kindergarten	257224.5	2614979	17.7	12.5	5.32	NNW
SR10	Mehgna Shilpa Nagari School and College	256512.9	2613554	18.7	12.3	4.66	NNW
SR11	Protaperchar Govt. Primary School	256577.1	2613511	18.9	12.7	4.58	NNW
SR12	Ikra Cadet School and Madrasa	257046.6	2613880	19.2	15.1	4.53	NNW
SR13	Morning Sun Kindergarten School	257115.1	2613745	20.1	15.8	4.38	NNW
SR14	Darul Hikmah Islamic Academy	257122.4	2613724	20.3	16.0	4.35	NNW
SR15	Sonargaon Star Flower S R School & College	255857.9	2613902	18.4	9.5	5.38	NNW
SR16	1No.Vobhanipue Govt. Primary school	255496.8	2611225	31.0	8.9	4.55	WNW
SR17	Hossaindi High School	255728	2611311	31.2	8.4	4.33	WNW
SR18	Jamaldi Nesaria Dinia Madrasah	256158.8	2611420	30.4	9.0	3.94	WNW
SR19	73 No Jamaldi Govenment Primary School	256150.7	2611440	30.1	9.2	3.97	WNW
SR20	New Sunrise Ideal School, Jamaldi	256372.5	2611358	30.8	9.4	3.72	WNW
SR21	Brian Improbe Kindergarten	256368.7	2611399	30.3	9.6	3.74	WNW
SR22	Tetaitala Ideal School	257426.6	2612216	28.0	18.7	3.12	NW
SR23	Aralia Government Primary School	257537.3	2612051	29.3	19.4	2.93	NW
SR24	Tatuitola Govt. Primary School	257760.6	2611943	32.1	22.2	2.68	NW
SR25	Tetaitala Al-Amin Islami Madrasa	257382.9	2611923	28.6	18.5	2.99	NW
SR26	Nazma General Hospital	256997.4	2611815	26.7	14.6	3.23	NW
SR27	Hamdard University Bangladesh	257090.5	2611747	26.9	15.1	3.17	NW
SR28	Tetaitola Al Amin Islami Madrasa	257378.2	2611813	28.8	17.5	2.94	NW
SR29	Tengarchar Razia Kader Adorsha High School	255901.6	2610026	21.6	12.6	4.10	W
SR30	13 NoTengar Char gov:t Primary School	256346.5	2610408	29.5	17.6	3.63	W
SR31	HarbLaboratory School	256288.6	2610243	26.5	16.6	3.69	W
SR32	Tengarchar Uttorpara Madrasa	255958.8	2610679	31.6	15.1	4.02	W
SR33	Tengarchar Samsul Ulum Hafizia Madrasa and Orphanage	255915.7	2610741	31.9	14.5	4.07	W
SR34	Bara Bhater Char Markazul Ulom Madrasa	256921.9	2610701	33.4	18.3	3.07	W
SR35	Bara Bhater Char Govt. Primary School	257011.8	2610871	33.9	15.3	3.00	W

ID	Sensitive Receptors Name	Coordinates		CO Concentration ($\mu\text{g}/\text{m}^3$)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution -8 hr.		
SR36	No.13 Tengar Char Government Primary School	256669.5	2611240	31.6	9.9	3.40	WNW
SR37	Gazaria Government Pilot Model High School	255783.4	2605748	19.4	11.8	6.29	SW
SR38	Gazaria Pilot Girls High School	255718.8	2605665	19.8	11.6	6.35	SW
SR39	Tazbidul Quran Nurani Kindergarten and Adosho Hifz Madrasa	255774.3	2605668	19.5	11.8	6.39	SW
SR40	Kauniyakandi Madrasha	259437.3	2605572	18.7	12.9	4.88	S
SR41	19 No. Lakkhipur Government Primary School	259830.1	2605644	19.4	11.0	4.78	S
SR42	Bhaberchar Wazir Ali High School	259895.5	2606392	23.7	13.5	4.04	S
SR43	S.K. Residential School	259755.2	2606510	23.6	14.3	3.92	S
SR44	Bhaberchar Union Parishad	259925.1	2606444	24.1	13.6	3.98	S
SR45	Bhaberchar Community Clinic	259846.9	2606345	23.3	13.5	4.08	S
SR46	Bokterkandi Primary School	262363	2605861	18.0	13.4	5.13	SSE
SR47	Baushia Mohammed Abdul Azhar High School	262204.1	2607155	24.1	14.1	5.15	SSE
SR48	Gazaria Govt. Technical School & College	261193.3	2607005	25.2	20.4	3.93	SSE
SR49	Shekher Gao Abdul Wadud Munshi High School	263290	2608600	21.8	6.6	3.61	SE
SR50	Satgharia Kandi darunnazat Madrasha o yatimkhana	263970.5	2608657	20.6	6.6	3.79	ESE
SR51	Grameen KG and Day Care Center	263280.7	2613591	19.1	12.1	4.36	NE
SR52	Horipur Govt. Primary School	261569.5	2613750	24.0	16.6	4.58	NNE
SR53	Meghna Upazila Health Complex	264615.2	2615086	19.8	9.3	3.68	NE
SR54	Meghna Upazila Ideal High School	263505.8	2614517	18.2	11.6	5.39	NE
SR55	33 No. Rasulpur (North) Govt. Primary School	263263.5	2614680	17.2	11.4	5.37	NE
SR56	13 no. Vaorkhola Uttor Govt. Primary School	263404.5	2614393	17.9	12.0	5.24	NE
SR57	Darul Ershad Madrasa, Shibnagar	263835	2614868	19.4	10.9	5.88	NE
SR58	11 no. Shibnagar Govt. Primary School	263957	2615139	19.7	10.4	6.17	NE
SR59	Boidonathpur Forkania Hafizia Madrasa	264132.2	2615353	19.9	10.0	6.44	NE
SR60	Doulat Hossen Govt. Primary School	264463.6	2613281	16.6	9.4	5.31	ENE
SR61	Mirzanagar Govt. Primary School	263970.6	2611969	20.7	13.4	4.30	ENE
SR62	Madrasa Muaz Ibne Jabal @	263145	2611568	26.2	16.8	3.37	ENE
SR63	Meghna Residential Model School & College	261845.8	2610221	32.2	12.8	1.87	E
SR64	Sat Ghorikandi Govt. Primary School	264088.5	2608537	19.4	6.4	4.52	ESE
SR65	Shakhergoan High School	263264.7	2608546	21.1	6.4	3.78	ESE
SR66	Shakhergaon Govt. Primary School	263114.3	2608406	21.1	7.0	3.73	ESE

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

ID	Sensitive Receptors Name	Coordinates		CO Concentration (µg/m³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution -8 hr.		
SR67	Sekhergaon bage Jannat Nurani Madrasha and Orphanage	263312.2	2608815	23.5	7.1	3.67	ESE
SR68	Lakhipur Govt. Primary School, Luterchar	263533.8	2609407	23.6	7.4	3.73	ESE
SR69	Dori Mirzanagar Govt. Primary School	263590	2611964	22.2	14.9	3.92	ENE
SR70	Mirzanagar Darul Uloom Model Madrasha	263766.6	2612268	20.6	13.3	4.20	ENE
SR71	Shibnagar Govt. Primary School, Debidwar, Cumilla	264377.1	2615426	20.3	9.9	6.68	
SR72	Fulkori Pre Cadet School	262020.2	2614985	17.5	11.9	4.99	NNE
SR73	Borokanda Afrahimia Women Madrasha	261793.4	2614822	18.5	12.4	4.79	NNE
SR74	Horipur Adasho Primary School	261727.8	2613155	26.6	21.0	3.24	NE
SR75	Mohammadpur Govt. Primary School	262258.1	2610526	37.1	13.8	2.28	E
SR76	S.D Khan Memorial Primary School	260817.1	2607843	33.4	24.7	2.71	SSE
SR77	Nateshwar Govt. Primary School	261590.3	2608153	33.3	19.5	2.78	SE
SR78	Ambia khatun Ideal Academy	261730.2	2607013	24.1	16.8	3.83	SSE
SR79	Scholars Model School	262269.8	2607031	22.9	13.6	4.08	SSE
SR80	Porachak Baushia Pachim Noyakandi Community Clinic	261644.7	2606801	23.9	17.4	3.95	SSE
SR81	Bausia UH&FWC, Gozaria, Munshigonj	261844.6	2606810	22.6	16.2	4.05	SSE
SR82	23 no. Moddho Bausia Govt. Primary School	261950.6	2605885	18.5	15.1	4.94	SSE
SR83	Moddhu Baushia Ideal School and College	261781.7	2605833	18.7	14.6	4.91	SSE
SR84	22 no sreenagor govt primary school	259626	2607379	29.9	20.1	3.06	S
SR85	Alipura Dakkhin Para Jame Masjid	259290.2	2607448	30.1	19.3	3.05	S
SR86	Bhater Char Dewan Abdul Mannan.Pilot High School	259045.9	2609802	65.3	49.4	1.13	SSW
SR87	61no Tengerchar Govt.Primary School	259189.1	2610179	76.0	64.4	0.828	SW
SR88	Anarpura Idial Kindergarten	258624.1	2608957	44.2	35.6	2.01	SSW
SR89	18 No. Alipura Govt. Primary School	259996.7	2607875	37.9	24.8	2.56	S
SR90	10 no. Aralia Govt. Primary School	260758.2	2612468	39.8	30.3	2.19	NNE
SR91	Mudarkandi Govt. Primary School	260328.6	2613583	28.1	21.9	3.15	N
SR92	5 No Borokanda Union Parishad	261333.7	2614404	21.0	14.7	4.12	NNE
SR93	Dhakhin Fuldi community clinic	255691.1	2606429	19.3	12.2	5.85	SW
SR94	Dokhin Fuldi Community Clinic	255877.4	2606571	18.6	12.6	5.63	SW
SR95	Gazaria Government College	256734.4	2605721	17.3	11.3	5.72	SSW
SR96	Upazila Parishad Complex, Gazaria Munshiganj	256573	2605619	17.6	11.4	5.89	SSW
SR97	Mathavanga Mohila Madrasha	256886.9	2605823	16.9	11.3	5.54	SSW

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

ID	Sensitive Receptors Name	Coordinates		CO Concentration (µg/m³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution -8 hr.		
SR98	35 No Charshahebani government primary school	257076.2	2605928	17.0	11.5	5.34	SSW
SR99	Child Welfare Model School	257642.9	2605798	18.1	13.9	5.20	SSW
SR100	Kauniakandi Madrasa	258937.3	2605373	17.8	13.2	5.15	S by SSW
SR101	Khirachok Govt. Primary School	264446.2	2612162	18.3	11.7	4.79	ENE
SR102	Bardem Hospital, Sonargaon	252644.3	2617641	19.1	5.9	10.2	NW
SR103	Alhaz Abul Bashar Jame Masjid & Madrasha	253256.4	2617690	16.4	6.9	9.82	NNW
SR104	Nolchor Government Primary School	259505.2	2617546	22.1	10.7	7.14	N
SR105	Ansar Ali Model High School	263359.7	2617820	20.2	8.8	8.15	NNE
SR106	Tulatuli Community Clinic	263938	2617716	17.4	7.2	8.30	NNE
SR107	Joypur Government Primary School.	265397.5	2617712	17.9	7.2	9.05	NNE
SR108	Boro Shapmara Primary School	267152.9	2617795	17.5	6.1	10.03	NE
SR109	Baghaikandi Government Primary School	266091.1	2617200	19.3	7.2	9.13	NE
SR110	55No.Joypur primary School	265456	2617178	19.3	7.3	8.73	NE
SR111	Joypur Adorsho Biddanikaton	265333.7	2617123	19.2	7.4	8.52	NE
SR112	Tulatuli Primary School	263447.3	2617208	19.0	8.1	8.57	NE
SR113	Vatibondor Miftahol Ulom Madrasa	257334.3	2616885	18.4	9.7	6.97	N by NNW
SR114	Sonargaon Pilot Girls High School	255927.4	2617177	24.5	8.5	7.88	NNW
SR115	Mohammad Motiur Rahman Memorial Model School	255856.1	2617119	24.4	8.6	7.46	NNW
SR116	Madrasatul Quaran	254973.2	2617419	21.3	7.9	8.62	NNW
SR117	Tajpur Govt. Primary School	254809.4	2617374	20.0	7.4	8.57	NNW
SR118	Jameah Al-Zahra Al- Islamiah for girls (Bhagalpur Mahila Madrasah)	252663	2616550	22.7	5.3	9.5	WNW
SR119	Chilarbag Dargabari Jama Masjid	254897.1	2616804	18.4	7.7	8.16	NNW
SR120	Rahe Jannat Madrasa	255089.3	2616646	19.0	7.9	7.88	NNW
SR121	Abdul Malek Smriti Academy	255704.1	2616731	22.2	8.8	7.67	NNW
SR122	Ayesha Amzad Hospital	256075.5	2616839	23.5	8.9	7.52	NNW
SR123	Late Hazi Mojiullah Govt. Hospital	259597.5	2616550	20.3	12.1	6.12	N
SR124	Satani Ashraful Uloom Madrasah	262208.5	2616515	21.0	11.2	6.47	N by NNE
SR125	Jolarpar Noyagaon Govt. Primary School	266600	2616489	18.1	7.8	9.00	ENE
SR126	Nazrul Academy	266995.6	2616070	18.3	7.8	8.67	ENE
SR127	Manikarchar Govt. Primary School	266705.3	2615900	18.7	8.2	8.74	ENE
SR128	Bollover Kandi Govt. Primary School	266982.9	2615642	18.1	7.4	8.36	ENE
SR129	Mahadul Quran Model Madrasah	266346.1	2615853	18.9	8.5	8.38	ENE

Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

ID	Sensitive Receptors Name	Coordinates		CO Concentration (µg/m³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution -8 hr.		
SR130	Govt. Manikarchor Bangabandhu College	266077.5	2615877	18.9	8.6	8.18	ENE
SR131	Manikarchar L.L. High School	266024.5	2615840	19.0	8.6	8.12	ENE
SR132	Manikerchor LL High School	266010.7	2615793	19.0	8.7	8.08	ENE
SR133	Mataber Kandi Govt. Primary School	265666.4	2615701	19.0	8.7	7.76	ENE
SR134	Kandargaon Darul Quran Islamia Madrasa	262382.7	2615826	19.8	10.4	5.89	NNE
SR135	Mokhles Master's Teaching Academy	262219.8	2615899	20.2	11.1	5.90	NNE
SR136	Muzaffar Ali High School and College	262472.8	2616074	20.2	9.9	6.16	NNE
SR137	Khossal Bari Mohila Madrasa	262305.9	2615844	20.0	10.5	5.88	NNE
SR138	Saleha Awal Ideal School	262211.4	2615788	20.0	10.9	5.79	NNE
SR139	Nurul Quran Fatemia Mohila Madrasah	259949	2615896	18.8	14.7	5.49	N
SR140	5 No. Chalidanga Govt. Primary School & High School	259816.1	2616025	19.0	14.1	5.60	N
SR141	Kander Goan Primary School	256898	2615627	18.3	11.0	6.02	NNW
SR142	Kander Goan Madrasha	256688.9	2615727	18.4	10.6	6.22	NNW
SR143	Pirojpur ideal school	255244.9	2615638	18.2	8.7	6.26	NNW
SR144	Pirojpur Jamia Arabia Madrasha	255112.7	2615715	18.4	8.5	7.05	NW
SR145	Talimul Quran Mohila Madrasha	255132.7	2615659	18.5	8.6	7.19	NW
SR146	United International School	254859.1	2616109	17.9	8.3	7.11	NW
SR147	Sonargoan Central Hospital, Habibpur, Sonargoan.	255040.9	2616163	17.8	8.3	7.55	NW
SR148	Kazi Fazlul Haque Women's University College	254991.9	2616253	17.7	8.2	7.65	NW
SR149	Sonargaon Laboratory School	254581.4	2616221	18.4	8.0	7.92	NW
SR150	Shaikh Abu Tawamah Islamic Academy	254824.3	2616334	17.6	8.1	7.84	NW
SR151	ICON International School	253563.9	2615997	23.5	5.9	7.87	NW
SR152	Sonargaon Govt. Degree College	253535.6	2615690	23.8	6.0	8.31	NW
SR153	Madrasah Al-sharaf Al-islamiah	253366.6	2615900	23.7	5.6	8.57	NW
SR154	Rahamudpur Primary School	252829.6	2615902	22.9	6.0	9.00	NW
SR155	Kabliganj Darus Sunnah Madrasha	252861.9	2615538	22.3	6.5	8.79	WNW
SR156	Mograpara H.G.G.S. Smrity Government Biddayat	253936.1	2615858	23.1	6.2	8.11	WNW
SR157	Kazirgaon Haji Moulavi Tomijuddin Ahmed Islamia Madrasah and Orphanage Center	252713.1	2614632	24.0	6.4	8.40	WNW
SR158	Islamia Adorsho Govt. Primary School	253049.1	2614666	24.3	7.0	8.13	WNW
SR159	Holy Child Model School	253511.4	2614285	22.9	7.6	7.52	WNW
SR160	Taherpur Islamia Alim Madrasha	253261	2614145	23.1	7.1	7.65	WNW
SR161	Taherpur Haji Lal Mia High School	253386.2	2614121	22.7	7.1	7.54	WNW

ID	Sensitive Receptors Name	Coordinates		CO Concentration ($\mu\text{g}/\text{m}^3$)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution -8 hr.		
SR162	Tatua Kandi Primary Government School	252510.4	2614066	24.0	6.8	8.29	WNW
SR163	Taherpur Darussunnat Salehiya Mohebbiya Diniya Madrasah	253145.9	2613746	24.1	7.2	6.91	WNW
SR164	89 no. Quarbanpur Govt. Primary School	253783.1	2613540	22.0	7.8	7.58	WNW
SR165	Vhati Balaki Govt. Primary School	252710.7	2610710	22.0	7.4	7.27	W
SR166	Ismanir Char Primary School	253624.2	2607866	20.1	8.7	6.86	WSW
SR167	Daulatpur Govt primary School, munsiganja.	254945.2	2603321	23.2	7.8	8.70	SSW
SR168	Abdullahpur Govt. Primary School	255375.6	2604686	23.1	10.5	7.33	SW
SR169	Rosulpur Model Govt. Primary School	255964.5	2604568	21.6	9.1	7.09	SSW
SR170	Gazaria Ideal School	256443.9	2604950	17.3	9.1	6.50	SSW
SR171	43 No. Noyanagar Govt. Primary School	254126.2	2604975	21.7	8.6	7.99	SW
SR172	Gazaria Miabari Dakhil Madrasha	254398.9	2605322	21.2	9.2	7.54	SW
SR173	79 Gazaria Govt Primary school	254238	2605548	21.3	9.0	7.50	SW
SR174	Gazaria Holy Child Pre Cadet School	254889.4	2605711	20.9	10.2	6.91	SW
SR175	Bashgoan Government primary school	254709.9	2606099	20.7	10.1	6.81	SW
SR176	Kazipura Baitun Nazat Hafiziya Madrasha	253911	2606229	21.2	8.7	7.34	SW
SR177	62 Darikandi Koloserkandi Govt Primary School	254227.8	2606632	21.1	9.2	6.85	SW
SR178	Ismanikchar Community Clinic	253904.4	2607479	18.9	8.0	6.76	WSW
SR179	Ismanikchar High School	254019.4	2607335	19.3	8.7	6.71	WSW
SR180	Nazir Bhuiya Bari Govt. Primary School	254766	2608058	17.9	10.3	5.73	WSW
SR181	Goalgaon government primary school	254013	2608834	14.8	8.6	6.18	WSW
SR182	6 No. Hosendi Primary School	254524.1	2609921	18.4	8.9	5.46	W
SR183	Hossaindi M.L High school	254914.2	2610585	26.9	11.9	5.06	W
SR184	41 no Goshairchar Govt primary school	255431.8	2605295	22.0	11.1	6.82	SW
SR185	Gazaria Bateniya Abdul Mannaniya Hafezia Sishu Sodon	256073.6	2604824	19.5	9.8	6.83	SSW
SR186	Kauniakandi Madrasa	258937.3	2605373	17.8	13.2	5.12	SSW
SR187	Mother's Care International School	259191	2604962	16.7	12.9	5.47	S
SR188	25 No. Porachak Bausia Govt. Primary School	261752.4	2604759	18.9	13.5	5.97	S
SR189	69 no. Porachak Bausia Purbo Noyakandi Govt. Primary School	262187.1	2604913	15.7	12.5	5.92	SSE
SR190	Porachak Bausia High School	262251.2	2605182	16.0	13.2	5.69	SSE
SR191	Kolimullah Madrasah	263204.7	2604800	18.2	11.9	6.48	S

ID	Sensitive Receptors Name	Coordinates		CO Concentration ($\mu\text{g}/\text{m}^3$)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution -8 hr.		
SR192	Boro kandi Adarsha Shishu Niketan	263414.9	2604889	19.5	11.5	6.51	SE
SR193	Taqwa Adarsha Girls Madrasah	263437.2	2604800	19.5	11.5	6.61	SE
SR194	28 no. Char Baushia Borokandi Govt. Primary School	263423.5	2605384	19.7	10.1	6.11	SSE
SR195	3 no. Daudkandi Adorsho (Pailot) High School	266463.1	2604786	18.0	8.2	8.62	SSE
SR196	Upazila Parishad Complex, Daudkandi Cumilla	267008.7	2604723	19.4	7.8	8.91	SSE
SR197	04. Begum Amena Sultan Govt. Girls' High School	266663.2	2604535	17.2	7.9	8.93	SSE
SR198	Engineering Staff College	264482.7	2604211	21.0	8.5	7.71	SSE
SR199	IEB University of Engineering & Technology (IUET)	264239.9	2604152	20.9	9.3	7.59	SSE
SR200	27 no. Dokkhin-Kandi Government Primary School	263686.3	2604354	20.0	11.2	7.10	SSE
SR201	Master Laboratory School	261638.9	2604468	20.7	13.0	6.18	SSE
SR202	68 No. Porachak Bausia Pachimkandi Govt. Primary School	260936.4	2604182	20.0	11.4	6.33	SSE
SR203	Huglakandi Madrasha	259067.6	2604072	18.9	11.5	6.43	S
SR204	Karim Khan Govt. Primary School	257910.3	2604431	18.9	10.8	6.33	S
SR205	Karim Khan Keratul Quran Madrasha	257923	2604311	19.0	10.7	6.45	S
SR206	Imampur Primary School	256963.2	2604036	22.5	9.1	7.05	SSW
SR207	37 no. Adharmanik Govt. Primary School	256687.4	2603451	24.1	8.2	7.70	SSW
SR208	59 No. Hoglekandi Govt Primary School	258737.3	2603607	20.9	11.0	6.94	SSE
SR209	Shanti Nagar High School	261345.1	2603478	22.2	9.5	7.08	SSE
SR210	Forajikandi Somajkollan Biddaniketon	263786.1	2603851	21.9	11.1	7.60	SSE
SR211	Refaitullah Khan government primary school	264987.3	2603554	20.5	7.9	8.52	SSE
SR212	10 no. Uttar Nacruddi Govt. Primary School	266986.9	2603592	14.0	8.3	9.78	SE
SR213	Kadamtoli Hohseniya Qaumi Madrasha	267035.9	2606127	24.8	7.5	8.29	ESE
SR214	Government Primary School Gongaprosad	265469	2606770	16.9	7.0	6.60	ESE
SR215	Gungaprosad Govt. primary school	265845.9	2607797	20.8	5.7	6.44	ESE
SR216	Hasnabad Primary School	266865.3	2608448	20.8	4.7	7.16	ESE
SR217	Dudhghata Govt. Primary School	267130.4	2609664	18.9	5.1	7.21	E
SR218	Nondir char Govt Medical Hospital	267075.4	2610138	16.7	4.5	7.10	E
SR219	Sennagar abbasia darul ulum madrasha & athimkhana	265522.7	2611300	18.2	4.9	5.63	ENE
SR220	Little Star Ideal School (LSIS)	265521.7	2611472	18.7	5.3	5.67	ENE
SR221	Dakkhin Kandi Govt. Primary School	266187	2611888	21.3	5.5	6.39	ENE
SR222	Sennagar Govt. Primary School	265601.6	2611978	18.2	7.2	5.85	ENE

ID	Sensitive Receptors Name	Coordinates		CO Concentration ($\mu\text{g}/\text{m}^3$)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution -1 hr.	Only project contribution -8 hr.		
SR223	Joynagar Govt. Primary School	265417.1	2612956	20.2	9.0	6.02	ENE
SR224	Daulat Hossain High School	265041	2613428	16.1	8.1	5.91	ENE
SR225	Sonarchar High School	266717.2	2613811	22.4	6.5	7.55	ENE
SR226	Gobindapur Government Primary School	266130.2	2614510	17.5	6.7	7.39	ENE

Appendix H-4: $\text{PM}=\text{PM}_{10}=\text{PM}_{2.5}$ Concentration on Sensitive Receptors

ID	Sensitive Receptors Name	Coordinates		NO_2 Concentration ($\mu\text{g}/\text{m}^3$)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR1	Luter Char Government Primary School	260792.4	2610427	0.83	0.071	0.81	East
SR2	Luterchar Mofizul Islam High School	260778	2610389	0.83	0.071	0.80	East
SR3	Luterchar South Govt. Primary School	261056.2	2609810	0.44	0.043	1.24	East
SR4	75 No. Boroikandi Bhaterchar Govt. Primary School	259510.9	2610133	2.08	0.206	0.55	SSW
SR5	Jhauchar Darunnajt Girls Madrasa	257391.2	2615317	0.41	0.075	5.52	NNW
SR6	Chengakandi Karimia Mujahidia Hafizia Kawmi Madrasa	255581	2615135	0.32	0.036	6.44	NNW
SR7	68 No Chengakandi Govt. Primary school	255729.2	2615310	0.31	0.039	6.47	NNW
SR8	Nagergaon Govt. Primary School	256281.9	2615118	0.32	0.047	5.97	NNW
SR9	Jhauchar Fulkoli Kindergarten	257224.5	2614979	0.41	0.070	5.32	NNW
SR10	Mehgna Shilpa Nagari School and College	256512.9	2613554	0.44	0.039	4.66	NNW
SR11	Protaperchar Govt. Primary School	256577.1	2613511	0.45	0.040	4.58	NNW
SR12	Ikra Cadet School and Madrasa	257046.6	2613880	0.49	0.056	4.53	NNW
SR13	Morning Sun Kindergarten School	257115.1	2613745	0.52	0.057	4.38	NNW
SR14	Darul Hikmah Islamic Academy	257122.4	2613724	0.52	0.056	4.35	NNW
SR15	Sonargaon Star Flower S R School & College	255857.9	2613902	0.32	0.032	5.38	NNW
SR16	1No. Vobhanipue Govt. Primary school	255496.8	2611225	0.19	0.018	4.55	WNW
SR17	Hossaindi High School	255728	2611311	0.18	0.019	4.33	WNW
SR18	Jamaldi Nesaria Dinia Madrasah	256158.8	2611420	0.19	0.021	3.94	WNW
SR19	73 No Jamaldi Government Primary School	256150.7	2611440	0.19	0.021	3.97	WNW
SR20	New Sunrise Ideal School, Jamaldi	256372.5	2611358	0.20	0.023	3.72	WNW
SR21	Brian Improbe Kindergarten	256368.7	2611399	0.20	0.023	3.74	WNW
SR22	Tetaitala Ideal School	257426.6	2612216	0.63	0.044	3.12	NW

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR23	Aralia Government Primary School	257537.3	2612051	0.69	0.045	2.93	NW
SR24	Tatuitola Govt. Primary School	257760.6	2611943	0.78	0.051	2.68	NW
SR25	Tetaitala Al-Amin Islami Madrasa	257382.9	2611923	0.66	0.039	2.99	NW
SR26	Nazma General Hospital	256997.4	2611815	0.49	0.031	3.23	NW
SR27	Hamdard University Bangladesh	257090.5	2611747	0.50	0.031	3.17	NW
SR28	Tetaitola Al Amin Islami Madrasa	257378.2	2611813	0.64	0.037	2.94	NW
SR29	Tengarchar Razia Kader Adorsha High School	255901.6	2610026	0.29	0.021	4.10	W
SR30	13 NoTengar Char gov:t Primary School	256346.5	2610408	0.32	0.023	3.63	W
SR31	HarbLaboratory School	256288.6	2610243	0.29	0.023	3.69	W
SR32	Tengarchar Uttarpara Madrasa	255958.8	2610679	0.29	0.020	4.02	W
SR33	Tengarchar Samsul Ulum Hafizia Madrasa and Orphanage	255915.7	2610741	0.28	0.020	4.07	W
SR34	Bara Bhater Char Markazul Ulom Madrasa	256921.9	2610701	0.37	0.026	3.07	W
SR35	Bara Bhater Char Govt. Primary School	257011.8	2610871	0.33	0.027	3.00	W
SR36	No.13 Tengar Char Government Primary School	256669.5	2611240	0.22	0.025	3.40	WNW
SR37	Gazaria Government Pilot Model High School	255783.4	2605748	0.28	0.028	6.29	SW
SR38	Gazaria Pilot Girls High School	255718.8	2605665	0.27	0.028	6.35	SW
SR39	Tazbidul Quran Nurani Kindergarten and Adosho Hifz Madrasa	255774.3	2605668	0.27	0.028	6.39	SW
SR40	Kauniyakandi Madrasha	259437.3	2605572	0.23	0.020	4.88	S
SR41	19 No. Lakkhipur Government Primary School	259830.1	2605644	0.22	0.019	4.78	S
SR42	Bhaberchar Wazir Ali High School	259895.5	2606392	0.27	0.022	4.04	S
SR43	S.K. Residential School	259755.2	2606510	0.29	0.023	3.92	S
SR44	Bhaberchar Union Parishad	259925.1	2606444	0.27	0.022	3.98	S
SR45	Bhaberchar Community Clinic	259846.9	2606345	0.27	0.022	4.08	S
SR46	Bokterkandi Primary School	262363	2605861	0.38	0.016	5.13	SSE
SR47	Baushia Mohammed Abdul Azhar High School	262204.1	2607155	0.34	0.017	5.15	SSE
SR48	Gazaria Govt. Technical School & College	261193.3	2607005	0.39	0.021	3.93	SSE
SR49	Shekher Gao Abdul Wadud Munshi High School	263290	2608600	0.18	0.014	3.61	SE
SR50	Satgharia Kandi darunnazat Madrasha o yatimkhana	263970.5	2608657	0.18	0.012	3.79	ESE
SR51	Grameen KG and Day Care Center	263280.7	2613591	0.35	0.024	4.36	NE
SR52	Horipur Govt. Primary School	261569.5	2613750	0.44	0.063	4.58	NNE
SR53	Meghna Upazila Health Complex	264615.2	2615086	0.30	0.018	3.68	NE

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR54	Meghna Upazila Ideal High School	263505.8	2614517	0.35	0.024	5.39	NE
SR55	33 No. Rasulpur (North) Govt. Primary School	263263.5	2614680	0.32	0.027	5.37	NE
SR56	13 no. Vaorkhola Uttor Govt. Primary School	263404.5	2614393	0.36	0.025	5.24	NE
SR57	Darul Ershad Madrasa, Shibnagar	263835	2614868	0.34	0.022	5.88	NE
SR58	11 no. Shibnagar Govt. Primary School	263957	2615139	0.33	0.022	6.17	NE
SR59	Boidonathpur Forkania Hafizia Madrasa	264132.2	2615353	0.32	0.021	6.44	NE
SR60	Doulat Hossen Govt. Primary School	264463.6	2613281	0.17	0.015	5.31	ENE
SR61	Mirzanagar Govt. Primary School	263970.6	2611969	0.25	0.016	4.30	ENE
SR62	Madrasa Muaz Ibne Jabal ®	263145	2611568	0.31	0.019	3.37	ENE
SR63	Meghna Residential Model School & College	261845.8	2610221	0.28	0.028	1.87	E
SR64	Sat Ghorikandi Govt. Primary School	264088.5	2608537	0.17	0.012	4.52	ESE
SR65	Shakhergoan High School	263264.7	2608546	0.18	0.014	3.78	ESE
SR66	Shakhergaon Govt. Primary School	263114.3	2608406	0.17	0.014	3.73	ESE
SR67	Sekhergaon bage Jannat Nurani Madrasha and Orphanage	263312.2	2608815	0.19	0.014	3.67	ESE
SR68	Lakhipur Govt. Primary School, Luterchar	263533.8	2609407	0.22	0.014	3.73	ESE
SR69	Dori Mirzanagar Govt. Primary School	263590	2611964	0.28	0.017	3.92	ENE
SR70	Mirzanagar Darul Uloom Model Madrasa	263766.6	2612268	0.26	0.017	4.20	ENE
SR71	Shibnagar Govt. Primary School, Debidwar, Cumilla	264377.1	2615426	0.32	0.020	6.68	
SR72	Fulkori Pre Cadet School	262020.2	2614985	0.34	0.048	4.99	NNE
SR73	Borokanda Afrahimia Women Madrasa	261793.4	2614822	0.36	0.054	4.79	NNE
SR74	Horipur Adasho Primary School	261727.8	2613155	0.49	0.055	3.24	NE
SR75	Mohammadpur Govt. Primary School	262258.1	2610526	0.31	0.024	2.28	E
SR76	S.D Khan Memorial Primary School	260817.1	2607843	0.46	0.026	2.71	SSE
SR77	Nateshwar Govt. Primary School	261590.3	2608153	0.44	0.022	2.78	SE
SR78	Ambia khatun Ideal Academy	261730.2	2607013	0.39	0.019	3.83	SSE
SR79	Scholars Model School	262269.8	2607031	0.33	0.017	4.08	SSE
SR80	Porachak Baushia Pachim Noyakandi Community Clinic	261644.7	2606801	0.37	0.020	3.95	SSE
SR81	Bausia UH&FWC, Gozaria, Munshigonj	261844.6	2606810	0.39	0.019	4.05	SSE
SR82	23 no. Moddho Bausia Govt. Primary School	261950.6	2605885	0.32	0.018	4.94	SSE
SR83	Moddhu Baushia Ideal School and College	261781.7	2605833	0.33	0.018	4.91	SSE
SR84	22 no sreenagor govt primary school	259626	2607379	0.43	0.030	3.06	S

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR85	Alipura Dakkhin Para Jame Masjid	259290.2	2607448	0.50	0.034	3.05	S
SR86	Bhater Char Dewan Abdul Mannan.Pilot High School	259045.9	2609802	1.89	0.135	1.13	SSW
SR87	61no Tengerchar Govt.Primary School	259189.1	2610179	2.31	0.132	0.828	SW
SR88	Anarpura Idial Kindergarten	258624.1	2608957	1.14	0.086	2.01	SSW
SR89	18 No. Alipura Govt. Primary School	259996.7	2607875	0.48	0.031	2.56	S
SR90	10 no. Aralia Govt. Primary School	260758.2	2612468	1.05	0.132	2.19	NNE
SR91	Mudarkandi Govt. Primary School	260328.6	2613583	0.79	0.134	3.15	N
SR92	5 No Borokanda Union Parishad	261333.7	2614404	0.46	0.070	4.12	NNE
SR93	Dhakhin Fuldi community clinic	255691.1	2606429	0.29	0.031	5.85	SW
SR94	Dokhin Fuldi Community Clinic	255877.4	2606571	0.30	0.032	5.63	SW
SR95	Gazaria Government College	256734.4	2605721	0.24	0.028	5.72	SSW
SR96	Upazila Parishad Complex, Gazaria Munshiganj	256573	2605619	0.24	0.028	5.89	SSW
SR97	Mathavanga Mohila Madrasha	256886.9	2605823	0.26	0.029	5.54	SSW
SR98	35 No Charshahebani government primary school	257076.2	2605928	0.27	0.029	5.34	SSW
SR99	Child Welfare Model School	257642.9	2605798	0.27	0.027	5.20	SSW
SR100	Kauniakandi Madrasa	258937.3	2605373	0.26	0.021	5.15	S by SSW
SR101	Khirachok Govt. Primary School	264446.2	2612162	0.22	0.014	4.79	ENE
SR102	Bardem Hospital, Sonargaon	252644.3	2617641	0.16	0.020	10.2	NW
SR103	Alhaz Abul Bashar Jame Masjid & Madrasha	253256.4	2617690	0.18	0.023	9.82	NNW
SR104	Nolchor Government Primary School	259505.2	2617546	0.29	0.073	7.14	N
SR105	Ansar Ali Model High School	263359.7	2617820	0.30	0.029	8.15	NNE
SR106	Tulatuli Community Clinic	263938	2617716	0.26	0.025	8.30	NNE
SR107	Joypur Government Primary School.	265397.5	2617712	0.21	0.017	9.05	NNE
SR108	Boro Shapmara Primary School	267152.9	2617795	0.21	0.012	10.03	NE
SR109	Baghaikandi Government Primary School	266091.1	2617200	0.25	0.014	9.13	NE
SR110	55No.Joypur primary School	265456	2617178	0.25	0.017	8.73	NE
SR111	Joypur Adorsho Biddanikaton	265333.7	2617123	0.25	0.017	8.52	NE
SR112	Tulatuli Primary School	263447.3	2617208	0.29	0.028	8.57	NE
SR113	Vatibondor Miftahol Ulom Madrasa..	257334.3	2616885	0.34	0.069	6.97	N by NNW
SR114	Sonargaon Pilot Girls High School	255927.4	2617177	0.31	0.048	7.88	NNW
SR115	Mohammad Motiur Rahman Memorial Model School	255856.1	2617119	0.31	0.046	7.46	NNW
SR116	Madrasatul Quaran	254973.2	2617419	0.27	0.036	8.62	NNW
SR117	Tajpur Govt. Primary School	254809.4	2617374	0.25	0.035	8.57	NNW

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR118	Jameah Al-Zahra Al- Islamiah for girls (Bhagalpur Mahila Madrasah)	252663	2616550	0.14	0.018	9.5	WNW
SR119	Chilarbag Dargabari Jama Masjid	254897.1	2616804	0.23	0.034	8.16	NNW
SR120	Rahe Jannat Madrasa	255089.3	2616646	0.24	0.036	7.88	NNW
SR121	Abdul Malek Smriti Academy	255704.1	2616731	0.31	0.044	7.67	NNW
SR122	Ayesha Amzad Hospital	256075.5	2616839	0.32	0.049	7.52	NNW
SR123	Late Hazi Mojiullah Govt. Hospital	259597.5	2616550	0.34	0.084	6.12	N
SR124	Satani Ashraful Uloom Madrasah	262208.5	2616515	0.33	0.043	6.47	N by NNE
SR125	Jolarpar Noyagaon Govt. Primary School	266600	2616489	0.20	0.013	9.00	ENE
SR126	Nazrul Academy	266995.6	2616070	0.15	0.011	8.67	ENE
SR127	Manikarchar Govt. Primary School	266705.3	2615900	0.16	0.012	8.74	ENE
SR128	Bollover Kandi Govt. Primary School	266982.9	2615642	0.15	0.011	8.36	ENE
SR129	Mahadul Quran Model Madrasah	266346.1	2615853	0.18	0.013	8.38	ENE
SR130	Govt. Manikarchor Bangabandhu College	266077.5	2615877	0.21	0.014	8.18	ENE
SR131	Manikarchar L.L. High School	266024.5	2615840	0.21	0.014	8.12	ENE
SR132	Manikarchor LL High School	266010.7	2615793	0.21	0.014	8.08	ENE
SR133	Mataber Kandi Govt. Primary School	265666.4	2615701	0.23	0.015	7.76	ENE
SR134	Kandargaon Darul Quran Islamia Madrasa	262382.7	2615826	0.32	0.041	5.89	NNE
SR135	Mokhles Master's Teaching Academy	262219.8	2615899	0.31	0.044	5.90	NNE
SR136	Muzaffar Ali High School and College	262472.8	2616074	0.32	0.039	6.16	NNE
SR137	Khossal Bari Mohila Madrasa	262305.9	2615844	0.31	0.042	5.88	NNE
SR138	Saleha Awal Ideal School	262211.4	2615788	0.31	0.044	5.79	NNE
SR139	Nurul Quran Fatemia Mohila Madrasah	259949	2615896	0.40	0.090	5.49	N
SR140	5 No. Chalidanga Govt. Primary School & High School	259816.1	2616025	0.38	0.090	5.60	N
SR141	Kander Goan Primary School	256898	2615627	0.37	0.063	6.02	NNW
SR142	Kander Goan Madrasa	256688.9	2615727	0.37	0.059	6.22	NNW
SR143	Pirojpur ideal school	255244.9	2615638	0.28	0.034	6.26	NNW
SR144	Pirojpur Jamia Arabia Madrasa	255112.7	2615715	0.28	0.033	7.05	NW
SR145	Talimul Quran Mohila Madrasa	255132.7	2615659	0.28	0.033	7.19	NW
SR146	United International School	254859.1	2616109	0.25	0.031	7.11	NW
SR147	Sonargaon Central Hospital, Habibpur, Sonargaon.	255040.9	2616163	0.26	0.034	7.55	NW
SR148	Kazi Fazlul Haque Women's University College	254991.9	2616253	0.25	0.033	7.65	NW
SR149	Sonargaon Laboratory School	254581.4	2616221	0.24	0.029	7.92	NW

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR150	Shaikh Abu Tawamah Islamic Academy	254824.3	2616334	0.25	0.032	7.84	NW
SR151	ICON International School	253563.9	2615997	0.18	0.021	7.87	NW
SR152	Sonargaon Govt. Degree College	253535.6	2615690	0.17	0.020	8.31	NW
SR153	Madrasah Al-sharaf Al-islamiah	253366.6	2615900	0.16	0.020	8.57	NW
SR154	Rahamudpur Primary School	252829.6	2615902	0.14	0.018	9.00	NW
SR155	Kabliganj Darus Sunnah Madrasha	252861.9	2615538	0.13	0.017	8.79	WNW
SR156	Mograpara H.G.G.S. Smrity Government Biddayatn	253936.1	2615858	0.21	0.023	8.11	WNW
SR157	Kazirgaon Haji Moulavi Tomijuddin Ahmed Islamia Madrasah and Orphnage Center	252713.1	2614632	0.14	0.015	8.40	WNW
SR158	Islamia Adorsho Govt. Primary School	253049.1	2614666	0.15	0.016	8.13	WNW
SR159	Holy Child Model School	253511.4	2614285	0.17	0.017	7.52	WNW
SR160	Taherpur Islamia Alim Madrasha	253261	2614145	0.15	0.016	7.65	WNW
SR161	Taherpur Haji Lal Mia High School	253386.2	2614121	0.16	0.016	7.54	WNW
SR162	Tatua Kandi Primary Government School	252510.4	2614066	0.12	0.014	8.29	WNW
SR163	Taherpur Darussunnat Salehiya Mohebbiya Diniya Madrasah	253145.9	2613746	0.14	0.015	6.91	WNW
SR164	89 no. Quarbanpur Govt. Primary School	253783.1	2613540	0.17	0.016	7.58	WNW
SR165	Vhati Balaki Govt. Primary School	252710.7	2610710	0.14	0.012	7.27	W
SR166	Ismanir Char Primary School	253624.2	2607866	0.24	0.018	6.86	WSW
SR167	Daulatpur Govt primary School, munsiganja.	254945.2	2603321	0.17	0.019	8.70	SSW
SR168	Abdullahpur Govt. Primary School	255375.6	2604686	0.23	0.024	7.33	SW
SR169	Rosulpur Model Govt. Primary School	255964.5	2604568	0.19	0.023	7.09	SSW
SR170	Gazaria Ideal School	256443.9	2604950	0.20	0.025	6.50	SSW
SR171	43 No. Noyanagar Govt. Primary School	254126.2	2604975	0.20	0.023	7.99	SW
SR172	Gazaria Miabari Dakhil Madrasha	254398.9	2605322	0.21	0.024	7.54	SW
SR173	79 Gazaria Govt Primary school	254238	2605548	0.23	0.024	7.50	SW
SR174	Gazaria Holy Child Pre Cadet School	254889.4	2605711	0.23	0.026	6.91	SW
SR175	Bashgoan Government primary school	254709.9	2606099	0.26	0.026	6.81	SW
SR176	Kazipura Baitun Nazat Hafiziya Madrasha	253911	2606229	0.24	0.023	7.34	SW
SR177	62 Darikandi Koloserkandi Govt Primary School	254227.8	2606632	0.25	0.024	6.85	SW
SR178	Ismanikchar Community Clinic	253904.4	2607479	0.22	0.020	6.76	WSW
SR179	Ismanikchar High School	254019.4	2607335	0.22	0.021	6.71	WSW
SR180	Nazir Bhuiya Bari Govt. Primary School	254766	2608058	0.26	0.023	5.73	WSW

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR181	Goalgaon government primary school	254013	2608834	0.23	0.017	6.18	WSW
SR182	6 No. Hosendi Primary School	254524.1	2609921	0.21	0.016	5.46	W
SR183	Hossaindi M.L High school	254914.2	2610585	0.22	0.016	5.06	W
SR184	41 no Goshairchar Govt primary school	255431.8	2605295	0.25	0.026	6.82	SW
SR185	Gazaria Bateniya Abdul Mannaniya Hafezia Sishu Sodon	256073.6	2604824	0.20	0.024	6.83	SSW
SR186	Kauniakandi Madrasa	258937.3	2605373	0.26	0.021	5.12	SSW
SR187	Mother's Care International School	259191	2604962	0.22	0.019	5.47	S
SR188	25 No. Porachak Bausia Govt. Primary School	261752.4	2604759	0.28	0.016	5.97	S
SR189	69 no. Porachak Bausia Purbo Noyakandi Govt. Primary School	262187.1	2604913	0.31	0.016	5.92	SSE
SR190	Porachak Bausia High School	262251.2	2605182	0.31	0.016	5.69	SSE
SR191	Kolimullah Madrasah	263204.7	2604800	0.33	0.014	6.48	S
SR192	Boro kandi Adarsha Shishu Niketan	263414.9	2604889	0.30	0.013	6.51	SE
SR193	Taqwa Adarsha Girls Madrasah	263437.2	2604800	0.31	0.013	6.61	SE
SR194	28 no. Char Baushia Borokandi Govt. Primary School	263423.5	2605384	0.25	0.013	6.11	SSE
SR195	3 no. Daudkandi Adorsho (Pailot) High School	266463.1	2604786	0.19	0.008	8.62	SSE
SR196	Upazila Parishad Complex, Daudkandi Cumilla	267008.7	2604723	0.19	0.008	8.91	SSE
SR197	04. Begum Amena Sultan Govt. Girls' High School	266663.2	2604535	0.19	0.008	8.93	SSE
SR198	Engineering Staff College	264482.7	2604211	0.19	0.011	7.71	SSE
SR199	IEB University of Engineering & Technology (IUET)	264239.9	2604152	0.23	0.011	7.59	SSE
SR200	27 no. Dokkhin-Kandi Government Primary School	263686.3	2604354	0.30	0.013	7.10	SSE
SR201	Master Laboratory School	261638.9	2604468	0.26	0.016	6.18	SSE
SR202	68 No. Porachak Bausia Pachimkandi Govt. Primary School	260936.4	2604182	0.24	0.016	6.33	SSE
SR203	Huglakandi Madrasha	259067.6	2604072	0.20	0.017	6.43	S
SR204	Karim Khan Govt. Primary School	257910.3	2604431	0.24	0.020	6.33	S
SR205	Karim Khan Keratul Quran Madrasha	257923	2604311	0.24	0.020	6.45	S
SR206	Imampur Primary School	256963.2	2604036	0.19	0.020	7.05	SSW
SR207	37 no. Adharmanik Govt. Primary School	256687.4	2603451	0.18	0.019	7.70	SSW
SR208	59 No. Hoglekandi Govt Primary School	258737.3	2603607	0.19	0.017	6.94	SSE
SR209	Shanti Nagar High School	261345.1	2603478	0.23	0.015	7.08	SSE
SR210	Forajikandi Somajkollan Biddaniketon	263786.1	2603851	0.30	0.012	7.60	SSE

ID	Sensitive Receptors Name	Coordinates		NO ₂ Concentration (µg/m ³)		Distance from the Project Location (km)	Direction from Stack
		X	Y	Only project contribution - 24 hr.	Only project contribution - Annual		
SR211	Refaitullah Khan government primary school	264987.3	2603554	0.17	0.010	8.52	SSE
SR212	10 no. Uttar Nacruddi Govt. Primary School	266986.9	2603592	0.17	0.008	9.78	SE
SR213	Kadamtoli Hohseniya Qaumi Madrasha	267035.9	2606127	0.20	0.008	8.29	ESE
SR214	Government Primary School Gongaprosad	265469	2606770	0.18	0.009	6.60	ESE
SR215	Gungaproshad Govt. primary school	265845.9	2607797	0.16	0.009	6.44	ESE
SR216	Hasnabad Primary School	266865.3	2608448	0.17	0.008	7.16	ESE
SR217	Dudhghata Govt. Primary School	267130.4	2609664	0.16	0.008	7.21	E
SR218	Nondir char Govt Medical Hospital	267075.4	2610138	0.13	0.008	7.10	E
SR219	Sennagar abbasia darul ulum madrasha & athimkhana	265522.7	2611300	0.13	0.011	5.63	ENE
SR220	Little Star Ideal School (LSIS)	265521.7	2611472	0.13	0.011	5.67	ENE
SR221	Dakkhin Kandi Govt. Primary School	266187	2611888	0.11	0.010	6.39	ENE
SR222	Sennagar Govt. Primary School	265601.6	2611978	0.14	0.011	5.85	ENE
SR223	Joynagar Govt. Primary School	265417.1	2612956	0.18	0.012	6.02	ENE
SR224	Daulat Hossain High School	265041	2613428	0.16	0.014	5.91	ENE
SR225	Sonarchar High School	266717.2	2613811	0.13	0.010	7.55	ENE
SR226	Gobindapur Government Primary School	266130.2	2614510	0.14	0.012	7.39	ENE

Appendix H-5: Plant Emission Concentration

NOTES

(1) Indicated values are representative of the entire EAF TTT cycle. Indicated flow rate refers to 32" power ON* phase at 1 242 500 Nm³/h and 8" power OFF* phase at 1 751 500 Nm³/h

(2) No suction system foreseen

(3) Data referred to driers and pre-heaters are preliminary. Danieff will purchase these systems by specialised company, the emission data will be confirmed by manufacturer when purchase order will be issued

(4) The flowrate is indicated for one system (preheater or drier)

(5) Data are only the emissions of the burners, emissions of the refractory material are not considered

(6) Indicated values are estimated average values of the burners representative of the entire drying / pre-heating cycle. Consumption based on an average sequence of approx. 24 hours (36 heats). These fumes will be diluted in the surrounding atmosphere (no dedicated stack).

(7) Close to burner exit

(8) Average flow rate of inlet gas mixture to the cutting system is 90 Nm³/h (gas composition at mixing point: 27% NG and 73% oxygen)

Source: Danielli and Meghna Re-Rolling and Steel Mills Ltd. (MRSML)

Appendix H-6: Statement of Compliance Air Emissions Levels



05 April 2024

Subject: Statement of compliance of air emission levels with the IFC EHS guidelines for integrated steel mills, 2007

We state that:

We will comply with the air emission levels of the IFC EHS guidelines for integrated steel mills, 2007 as indicated below. We will ensure the compliance through:

- Adopting state of the art Danieli EAF Technology with FTP for our steel mill (MRSML), provided that it is European standard.
- Performing the monitoring, checking and measuring of the air emission levels during plant operations as frequently as required by IFC EHS guidelines
- Making sure to have fairly clean and good quality imported scrap and good quality fuels. Ensuring no plastics /chemicals, heavy metals are in the scrap.
- Installing and Implementing a dedicated abatement system and special equipment during plant operation.

We will keep the levels of **applicable** air emissions from below table within the "Guideline Value":

Pollutant	Units	Guideline Value
Particulate Matter	mg/Nm ³	20-50 ^b
Oil Mist	mg/Nm ³	15
NO _x	mg/Nm ³	500 750 (peak over)
SO ₂	mg/Nm ³	500
VOC	mg/Nm ³	20
PCDD/F	ng TEQ/Nm ³	0.1
Carbon Monoxide (CO)	mg/Nm ³	100 (EAF) 300 (peak over)
Chromium (Cr)	mg/Nm ³	4
Cadmium (Cd)	mg/Nm ³	0.2
Lead (Pb)	mg/Nm ³	2
Nickel (Ni)	mg/Nm ³	2
Hydrogen Chloride (HCl)	mg/Nm ³	10
Fluoride	mg/Nm ³	5
Hydrogen Fluoride (HF)	mg/Nm ³	10
H ₂ S	mg/Nm ³	5
Ammonia	mg/Nm ³	30
Benzo(a)pyrene	mg/Nm ³	0.1
Tar fume ^c	mg/Nm ³	5

^a Lower values where toxic metals are present
^b Tar fume measured as organic matter extractable by solvent from total matter collected by membrane filter
^c Reference conditions for limits: For combustion gases: dry, temperature 273K (0°C), pressure 101.3 kPa (1 atmosphere), oxygen content 21% dry for liquid and gaseous fuels, 6% dry for solid fuels. For non-combustion gases: no correction for water vapor or oxygen content, temperature 273K (0°C), pressure 101.3 kPa (1 atmosphere).

Yours faithfully,

Mohammed Firoz

Chief Executive Officer (CEO)

Meghna Re-rolling & Steel Mills Ltd.

m: +8801894-887880 || IPT: 10021

e: firoz.m@mgil.org

w: www.mgil.org

a: Fresh Cottage || House-48, Road-

Garib E Nawaz Avenue, Sec-13, Uttara, Dhaka-1230

Head Office: Fresh Villa, House 15, Road 34, Gulshan-1, Dhaka-1212, Bangladesh | Tel: +88 09666777055
 Fax: +880 222289361, 222284896 | Email: info@mgil.org | Factory: Meghnaghat, Sonargaon, Narayanganj, Bangladesh
 Web: www.mgil.org

AERMOD View - Source Parameters													
MS Excel - Lakes Format: Version 3.0													
Supported Source Types: Point, Rectangular Area, Circular Area, Polygon Area, Volume, Open Pit, Line Volume, Line Area													
ParametersUnitsDescription													
Type		POINT, AREA, AREA_CIRC, AREA_POLY, VOLUME, OPEN_PIT, LINE, LINE_VOLUME, LINE_AREA, BUOYLINE, RLINE, RLINEXT											
ID		Source ID up to 12 characters											
Desc		Optional description											
SourceID_Prefix		Text prefix up to 4 characters long for generated LINE_VOLUME, RLINE, RLINEXT and LINE_AREA sources											
Base_Elev[m]	[m]	Source base elevation above mean sea level											
Height[m]	[m]	Release height above ground											
Diam[m]	[m]	Inner stack diameter (POINT) or circular area radius (AREA_CIRC)											
Exit_Vel[m/s]	[m/s]	Exit velocity (POINT only)											
Exit_Temp[K]	[K]	Exit temperature (POINT only)											
Release_Type		VERTICAL, HORIZONTAL, CAPPED (POINT only) - HORIZONTAL and CAPPED are non-default beta options											
SigmaY[m]	[m]	Initial sigma Y (VOLUME only)											
SigmaZ[m]	[m]	Initial sigma Z (AREA, AREA_CIRC, AREA_POLY, VOLUME, LINE, RLINE, RLINEXT and LINE_AREA only; optional for AREA, AREA_CIRC, AREA_POLY, and LINE)											
Length_X[m]	[m]	X side length (AREA, VOLUME, OPEN PIT, RLINE, RLINEXT, and LINE_AREA only; optional for VOLUME, will be used to calculate SigmaY)											
Length_Y[m]	[m]	Y side length (AREA and OPEN PIT only); width for LINE sources; DCL for RLINEXT sources											
Rotation_Angle[degrees]	[degrees]	Clockwise rotation from North of Y side (AREA and OPEN PIT only)											
Pit_Volume[m³]	[m³]	Volume of the open pit (OPEN PIT only)											
Emission_Rate[g/s or g/s/m²]	[g/s or g/s/m²]	Emission rate [g/s for POINT, VOLUME, and LINE_VOLUME; g/s/m² for AREA, AREA_CIRC, AREA_POLY, OPENPIT, LINE, RLINE, RLINEXT and LINE_AREA)											
Configuration		LINE_VOLUME configuration: Separated, Adjacent or Separated2W											
LineVolumeHeight[m]	[m]	Plume Height or Building Height for LINE_VOLUME source											
PlumeWidth[m]	[m]	Plume width for LINE_VOLUME source											
LineVolumeType		LINE_VOLUME type: None, Surface-Based, Elevated, Elevated Building											
LineArea_Ratio1		Ratio 1 for LINE_AREA sources											
Line_FPRIMEL=[m**4/s**3]	[m**4/s**3]	Average buoyancy parameter (BUOYLINE source only)											
Line_L=[m]	[m]	Building Length (BUOYLINE source only)											
Line_HB=[m]	[m]	Building Height (BUOYLINE source only)											
Line_WB=[m]	[m]	Building Width (BUOYLINE source only)											
Line_WM=[m]	[m]	Line Source Width (BUOYLINE source only)											
Line_DX=[m]	[m]	Separation between buildings (BUOYLINE source only)											
Num_Coords		Number of coordinate pairs (POINT, AREA, AREA_CIRC, VOLUME, OPENPIT = 1; AREA_POLY >= 3; LINE = 2; LINE_AREA, LINE_VOLUME >> 2, RLINE/RLINEXT >> 2)											
X1[m]	[m]	X coordinate of source location [m]											
Y1[m]	[m]	Y coordinate of source location [m]											
X2[m]	[m]	Secondary X coordinate of source location [m] (AREA_POLY, LINE, LINE_VOLUME, LINE_AREA, RLINE, RLINEXT, BUOYLINE sources only)											
Y2[m]	[m]	Secondary Y coordinate of source location [m] (AREA_POLY, LINE, LINE_VOLUME, LINE_AREA, RLINE, RLINEXT, BUOYLINE sources only)											
X3[m]	[m]	Additional X coordinate of source location [m] (AREA_POLY, LINE_VOLUME, RLINE, RLINEXT, LINE_AREA only)											
Y3[m]	[m]	Additional Y coordinate of source location [m] (AREA_POLY, LINE_VOLUME, RLINE, RLINEXT, LINE_AREA only)											
X4[m]	[m]	Additional X coordinate of source location [m] (AREA_POLY, LINE_VOLUME, RLINE, RLINEXT, LINE_AREA only)											
Y4[m]	[m]	Additional Y coordinate of source location [m] (AREA_POLY, LINE_VOLUME, RLINE, RLINEXT, LINE_AREA only)											
Base_Elev_m[m]	[m]	Base Elevation for LINE_VOLUME, LINE_AREA, RLINE, RLINEXT Nodes											
Rel_Height_m[m]	[m]	Release height for LINE_VOLUME, LINE_AREA, RLINE, RLINEXT Nodes											
Rbarrier[m]	[m]	Barrier properties HW1, DW1, HW2, DW2 for RLINEXT sources											
Rdepression	[m]	Depression properties Depth, Wtop, Wbottom for RLINEXT sources											
NOTE: you may keep adding additional coordinate pairs for an AREA_POLY or LINE_VOLUME sources, be sure to add the headers as well (eg. X5, Y5, etc)													
Type	ID	Desc	SourceID_Prefix	Base_Elev [m]	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]	Release_Type	Emission_Rate	Num_Coords	X1 [m]	Y1 [m]
POINT	STCK1	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK2	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK3	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK4	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK5	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK6	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK7	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK8	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK9	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK10	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK11	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK12	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL		0.73	1	
POINT	STCK13	SMIPCOL 583 MW Dual Fuel CCPP (I		7	75	4.85	20	373	VERTICAL		2.87	1	
POINT	STCK14	Relence 2X750 MW CCPP (Stack-1)		7	70	6.3	25	670	VERTICAL		2.52	1	
POINT	STCK15	Relence 2X750 MW CCPP (Stack-2)		7	70	6.3	25	670	VERTICAL		2.52	1	
POINT	STCK16	450 MW CCPP Meghnaghat Power P	1.33	60	5.7	20	374	VERTICAL		2.52	1		
POINT	STCK17	450 MW CCPP Meghnaghat Power P	7.46	60	5.7	20	374	VERTICAL		2.52	1		
POINT	STCK18	337 MW Dual Fuel CCPP (Stack-1)		7	75	5.5	20	410	VERTICAL		2.52	1	
POINT	STCK19	337 MW Dual Fuel CCPP (Stack-2)		7	75	5.5	20	410	VERTICAL		2.52	1	
POINT	STCK20	UMPL 600 MW CCPP		7	75	7.4	20.2	364.4	VERTICAL		2.52	1	
POINT	STCK21	Meghna PVC Plant Incinerator Stack	3.45										

Appendix H-8: Appendix A- Emission Sources for NO2

AERMOD View - Source Parameters													
MS Excel - Lakes Format: Version 3.0													
Supported Source Types: Point, Rectangular Area, Circular Area, Polygon Area, Volume, Open Pit, Line Volume, Line Area													
Parameters		Units	Description										
Type			POINT, AREA, AREA_CIRC, AREA_POLY, VOLUME, OPEN_PIT, LINE, LINE_VOLUME, LINE_AREA, BUOYLINE, RLINE, RLINEXT										
ID			Source ID up to 12 characters										
Desc			Optional description										
SourceID_Prefix			Text prefix up to 4 characters long for generated LINE_VOLUME, RLINE, RLINEXT and LINE_AREA sources										
Base_Elev	[m]		Source base elevation above mean sea level										
Height	[m]		Release height above ground										
Diam			Inner stack diameter (POINT) or circular area radius (AREA_CIRC)										
Exit_Vel	[m/s]		Exit velocity (POINT only)										
Exit_Temp	[K]		Exit temperature (POINT only)										
Release_Type			VERTICAL, HORIZONTAL, CAPPED (POINT only) - HORIZONTAL and CAPPED are non-default beta options										
SigmaY	[m]		Initial sigma Y (VOLUME only)										
SigmaZ	[m]		Initial sigma Z (AREA, AREA_CIRC, AREA_POLY, VOLUME, LINE, RLINE, RLINEXT and LINE_AREA only; optional for AREA, AREA_CIRC, AREA_POLY, and LINE)										
Length_X	[m]		X side length (AREA, VOLUME, OPEN_PIT, RLINE, RLINEXT, and LINE_AREA only; optional for VOLUME, will be used to calculate SigmaY)										
Length_Y	[m]		Y side length (AREA and OPEN_PIT only); width for LINE sources; DCL for RLINEXT sources										
Rotation_Angle	[degrees]		Clockwise rotation from North of Y side (AREA and OPEN_PIT only)										
Pit_Volume	[m^3]		Volume of the open pit (OPEN_PIT only)										
Emission_Rate	[g/s or g/s/m^2]		Emission rate (g/s for POINT, VOLUME, and LINE_VOLUME; g/s/m^2 for AREA, AREA_CIRC, AREA_POLY, OPENPIT, LINE, RLINE, RLINEXT and LINE_AREA)										
Configuration			LINE_VOLUME configuration: Separated, Adjacent or Separated2W										
LineVolumeHeight	[m]		Plume Height or Building Height for LINE_VOLUME source										
PlumeWidth	[m]		Plume width for LINE_VOLUME source										
LineVolumeType			LINE_VOLUME type: None, Surface-Based, Elevated, Elevated Building										
LineArea_Ratio1			Ratio 1 for LINE_AREA sources										
Line_FPRIMEL =	[m^4/s^3]		Average buoyance parameter (BUOYLINE source only)										
Line_L =	[m]		Building Length (BUOYLINE source only)										
Line_HB =	[m]		Building Height (BUOYLINE source only)										
Line_WB =	[m]		Building Width (BUOYLINE source only)										
Line_WM =	[m]		Line Source Width (BUOYLINE source only)										
Line_DX =			Separation between buildings (BUOYLINE source only)										
Num_Coords			Number of coordinate pairs (POINT, AREA, AREA_CIRC, VOLUME, OPENPIT = 1; AREA_POLY >= 3; LINE = 2; LINE_AREA, LINE_VOLUME >= 2, RLINE/RLINEXT >= 2)										
X1	[m]		X coordinate of source location [m]										
Y1	[m]		Y coordinate of source location [m]										
X2	[m]		Secondary X coordinate of source location [m] (AREA_POLY, LINE, LINE_VOLUME, LINE_AREA, RLINE, RLINEXT, BUOYLINE sources only)										
Y2	[m]		Secondary Y coordinate of source location [m] (AREA_POLY, LINE, LINE_VOLUME, LINE_AREA, RLINE, RLINEXT, BUOYLINE sources only)										
X3	[m]		Additional X coordinate of source location [m] (AREA_POLY, LINE_VOLUME, RLINE, RLINEXT, LINE_AREA only)										
Y3	[m]		Additional Y coordinate of source location [m] (AREA_POLY, LINE_VOLUME, RLINE, RLINEXT, LINE_AREA only)										
X4	[m]		Additional X coordinate of source location [m] (AREA_POLY, LINE_VOLUME, RLINE, RLINEXT, LINE_AREA only)										
Y4	[m]		Additional Y coordinate of source location [m] (AREA_POLY, LINE_VOLUME, RLINE, RLINEXT, LINE_AREA only)										
Base_Elev_m	[m]		Base Elevation for LINE_VOLUME, LINE_AREA, RLINE, RLINEXT Nodes										
Rel_Height_m	[m]		Release height for LINE_VOLUME, LINE_AREA, RLINE, RLINEXT Nodes										
Rbarrier			Barrier properties HW1, DW1, HW2, DW2 for RLINEXT sources										
Rdepression	[m]		Depression properties Depth, Wtop, Wbottom for RLINEXT sources										
NOTE: you may keep adding additional coordinate pairs for an AREA_POLY or LINE_VOLUME sources, be sure to add the headers as well (eg. X5, Y5, etc)													
Type	ID	Desc	SourceID_Prefix	Base_Elev [m]	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]	Emission_Rate [m^3/s]	Num_Coords	X1 [m]	Y1 [m]	
POINT	STCK1	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254384.09	2613240.87
POINT	STCK2	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254387.79	2613241.25
POINT	STCK3	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254384.03	2613245.52
POINT	STCK4	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254387.18	2613245.61
POINT	STCK5	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254383.84	2613250.84
POINT	STCK6	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254386.82	2613251.09
POINT	STCK7	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254441.33	2613248.07
POINT	STCK8	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254444.03	2613248.65
POINT	STCK9	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254440.90	2613252.65
POINT	STCK10	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254443.71	2613252.80
POINT	STCK11	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254440.59	2613257.03
POINT	STCK12	100 MW HFO based engine power pl		7	30	0.9	20	653		2	1	254443.29	2613257.15
POINT	STCK13	SMIIPCL 583 MW Dual Fuel CCPP (I		7	75	4.85	20	373		14.7	1	254801.13	2612907.11
POINT	STCK14	Relience 2X750 MW CCPP (Stack-1)		7	70	6.3	25	670		31.37	1	254462.81	2612808.29
POINT	STCK15	Relience 2X750 MW CCPP (Stack-2)		7	70	6.3	25	670		31.37	1	254504.89	2612817.21
POINT	STCK16	450 MW CCPP Meghnaghat Power F		1.33	60	5.7	20	374		17.8	1	254960.61	2613046.02
POINT	STCK17	450 MW CCPP Meghnaghat Power F		7.46	60	5.7	20	374		17.8	1	254971.94	2612986.78
POINT	STCK18	337 MW Dual Fuel CCPP (Stack-1)		7	75	5.5	20	410		23.8	1	255231.94	2612896.50
POINT	STCK19	337 MW Dual Fuel CCPP (Stack-2)		7	75	5.5	20	410		23.8	1	255259.80	2612904.04
POINT	STCK20	UMPL 600 MW CCPP		7	75	7.4	20.2	364.4		41	1	254138.98	2613929.23
POINT	STCK21	Meghna PVC Plant Incinerator Stack		3.45	50	0.8	8.05	328		0.722	1	257168.76	2614433.35
POINT	STCK22	Meghna PVC Plant HTM Boiler Stack		6.71	46	1.5	9	443		1.578	1	257455.00	2614472.00
POINT	STCK23	Meghna PVC Plant HTM Boiler Stack		6.7	46	1.5	9	443		1.578	1	257451.00	2614465.00
POINT	STCK24	Meghna Glass Industry		8.69	80	6.7	7	723.15		6.707	1	260145.42	2609135.22
POINT	STCK25	Meghna Steel FTP Stack		9.82	45	6.5	15.59	517.3		15.3	1	259977.79	2610431.58
POINT	STCK26	Meghna Steel RHF Stack		7.12	65	3.7	10	673		1.79	1	260081.25	2610165.18
POINT	STCK27	Proposed 660 MW Majesty Power, J		5.27	65	6	20	410		23.8	1	256731.11	2611961.33
POINT	STCK28	Proposed 250 MW Power Plant in Me		7.86	65	6	20	410		23.8	1	259835.31	2610036.27
POINT	STCK29	Proposed Ceramic Industry in Hosain		3.21	10	0.48	9.83	469.77		0.109	1	254622.27	2610294.03
POINT	STCK30	Proposed Tiles & Ceramic Industry in		5.11	10	0.5	9.83	469.77		0.109	1	260842.51	2609366.63
POINT	STCK31	Meghna PVC EDC Cracker Stack		6.7	36.9	1.37	8.2	451		1.571	1	257181.66	2614442.86
POINT	STCK32	Meghna PVC EDC/VCM Boiler Stack		6.7	30	1.25	8	393		0.731	1	257348.41	2614554.01
POINT	STCK33	Meghna PVC EDC/VCM Boiler Stack		6.7	30	1.25	8	393		0.731	1	257354.77	2614562.75
POINT	STCK34	Meghna PVC EDC/VCM Boiler Stack		6.7	40	11.76	8	373		3.928	1	257482.92	2615278.85

Figure H1: Isopleths of 24-Hourly Maximum PM₁₀ GLC – Existing (Thermal Power Plants)

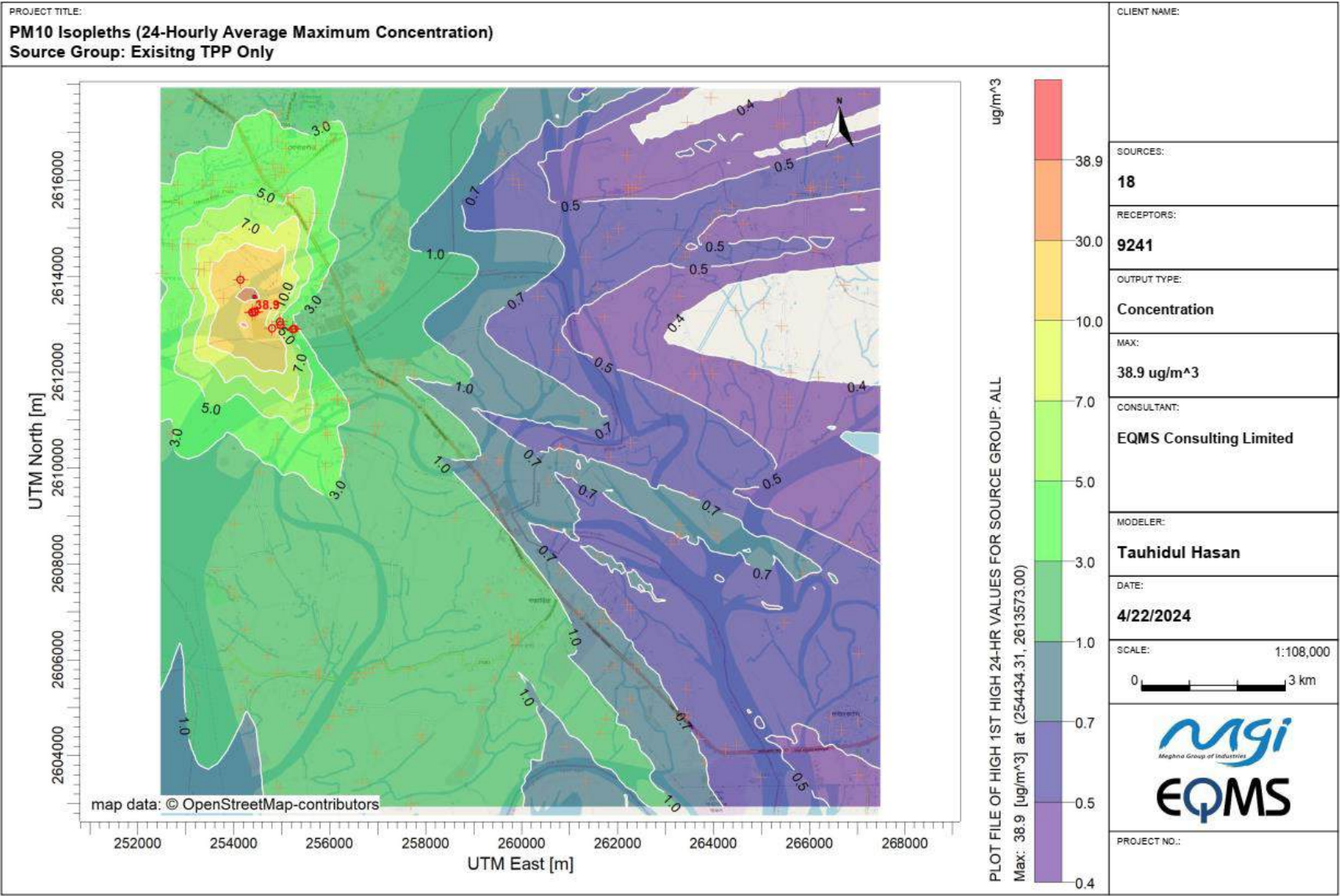


Figure H2: Isopleths of 24-Hourly Maximum PM₁₀ GLC – Proposed (Thermal Power Plants)

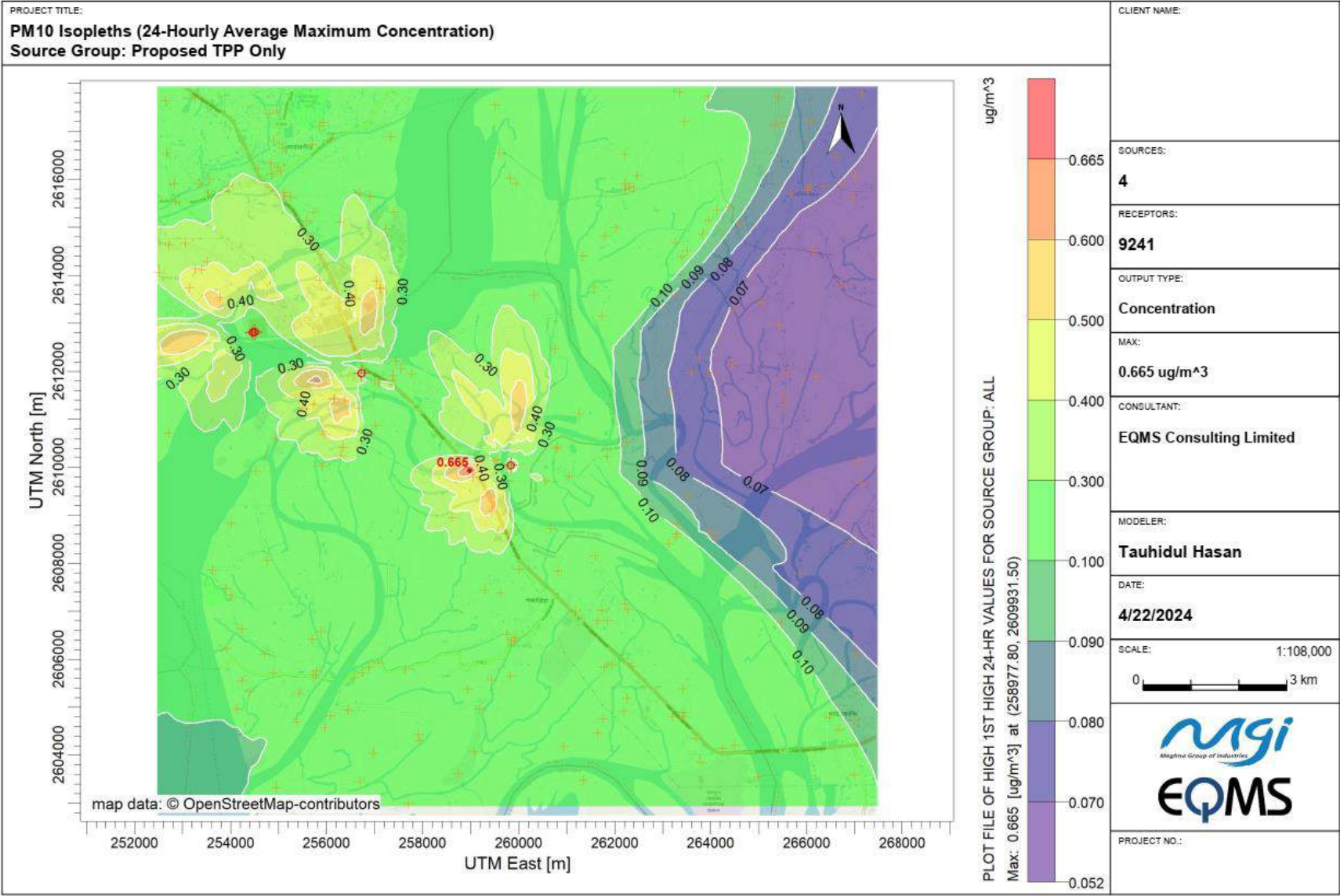


Figure H3: Isopleths of 24-Hourly Maximum PM₁₀ GLC – Proposed and Existing (Thermal Power Plants)

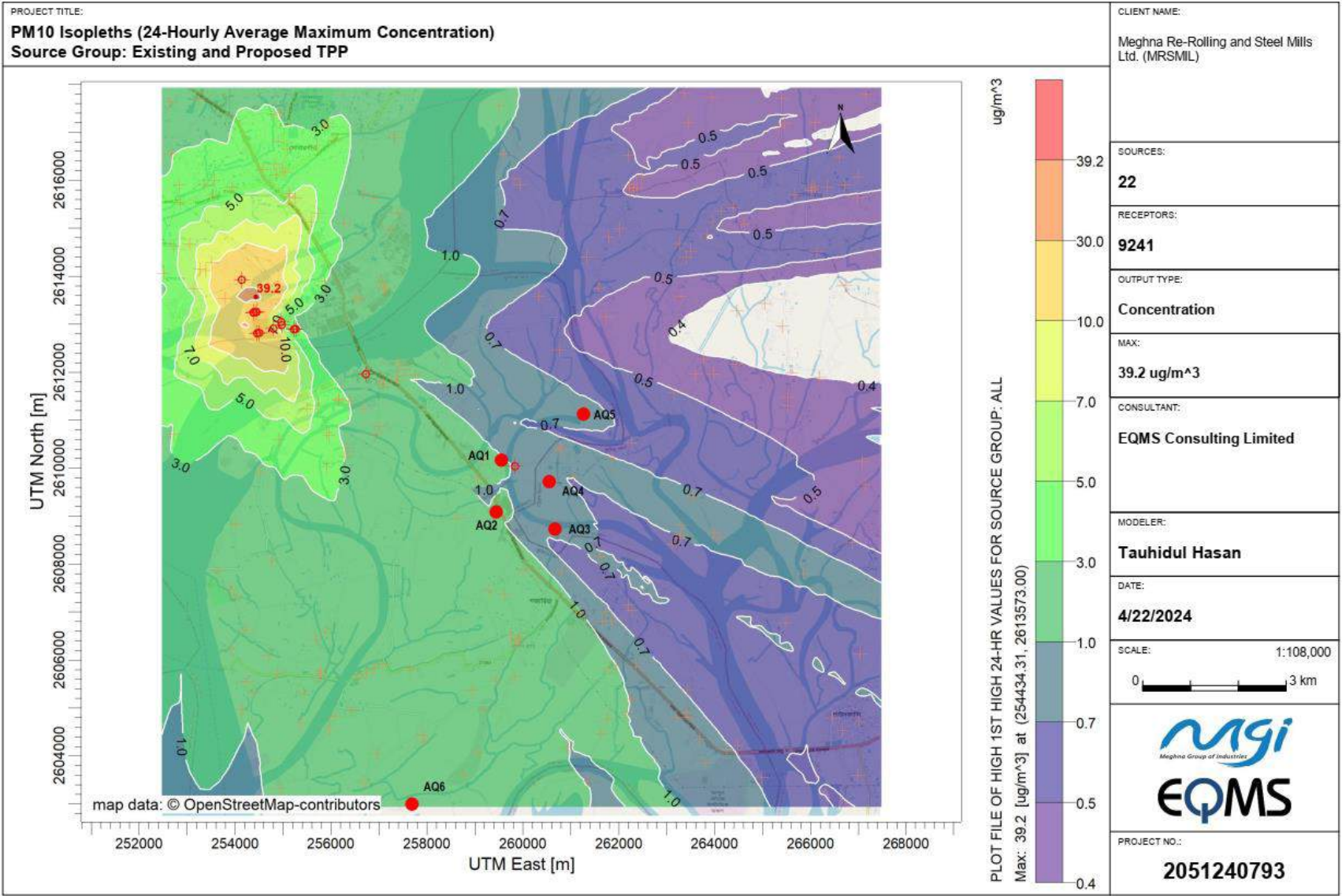


Figure H4: Isopleths of 24-Hourly Maximum PM₁₀ GLC – Proposed Ceramic Industries

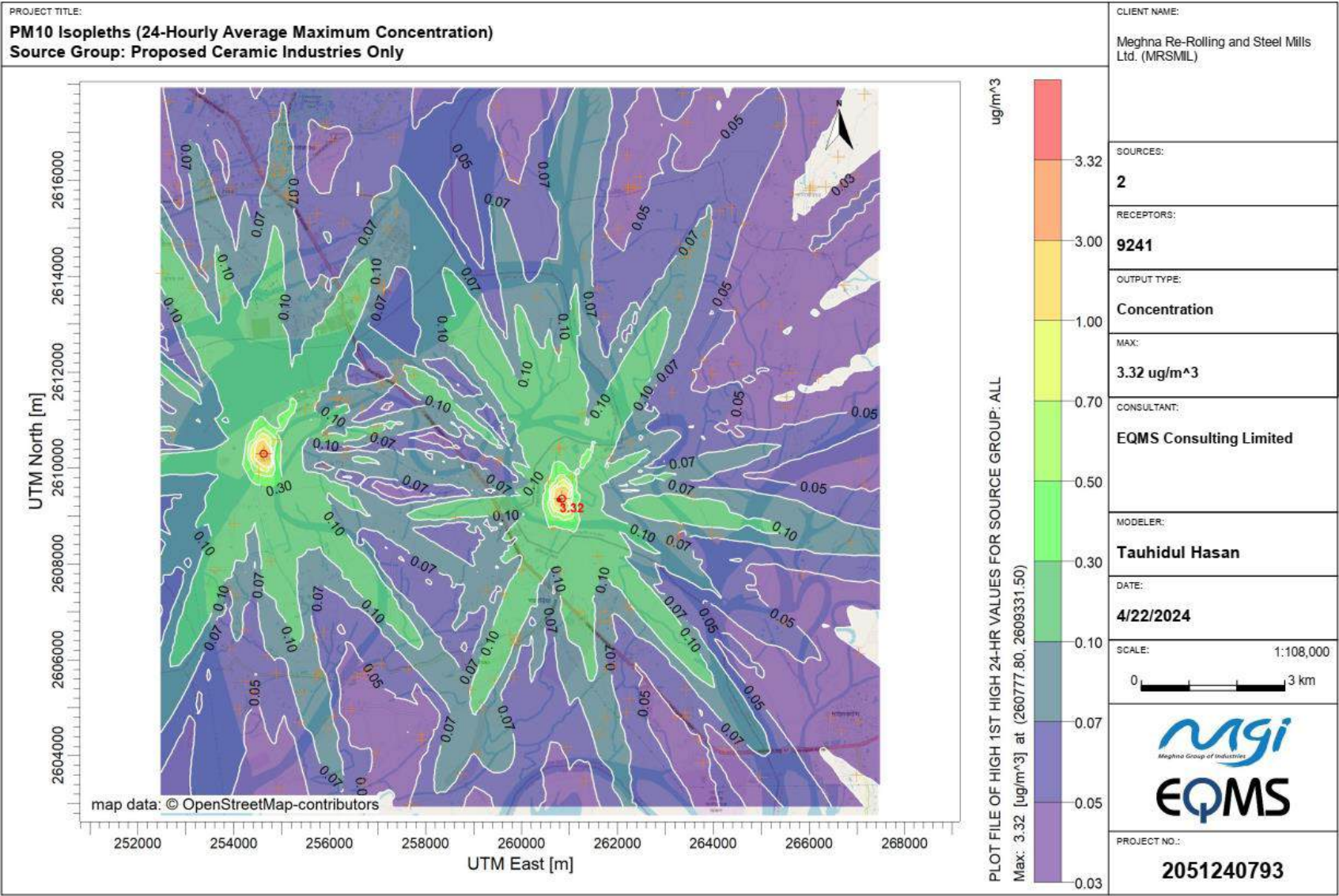


Figure H5: Isopleths of 24-Hourly Maximum PM₁₀ GLC – Proposed Glass Industry

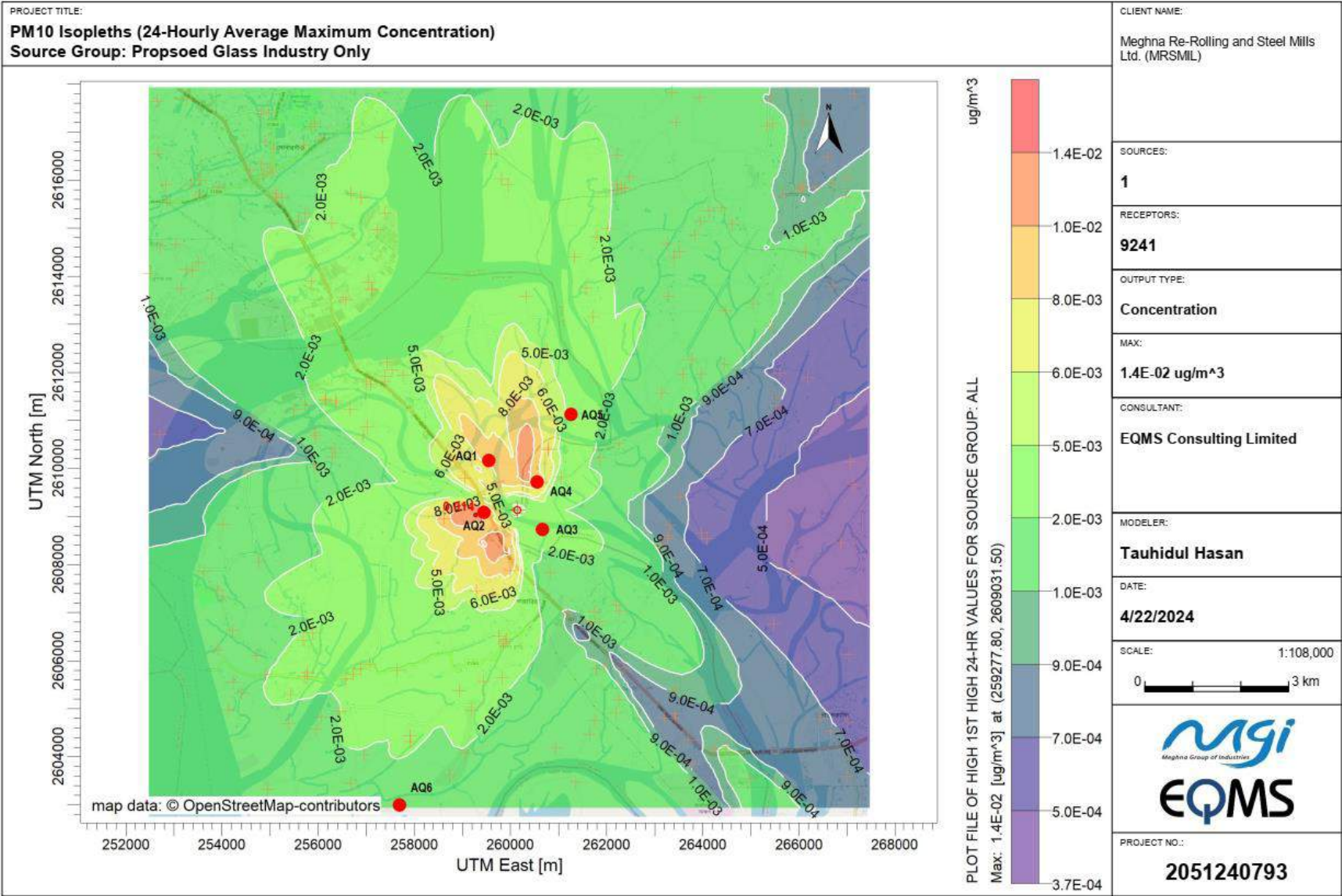


Figure H6: Isopleths of 24-Hourly Maximum PM₁₀ GLC – Existing PVC Industry

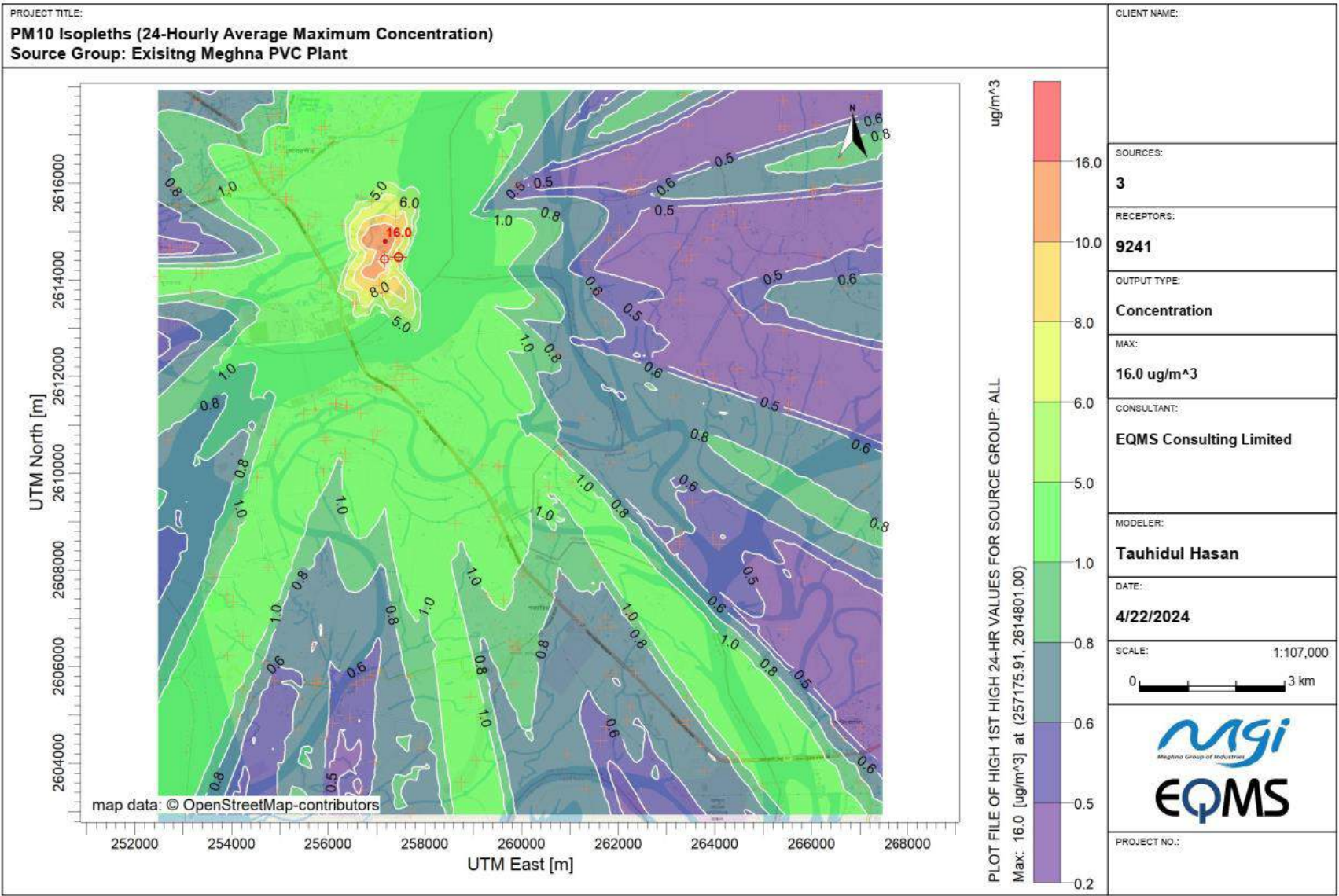


Figure H7: Isopleths of 24-Hourly Maximum PM₁₀ GLC – All Industries (Existing and Proposed TPP, Glass, Ceramic, Steel, PVC)

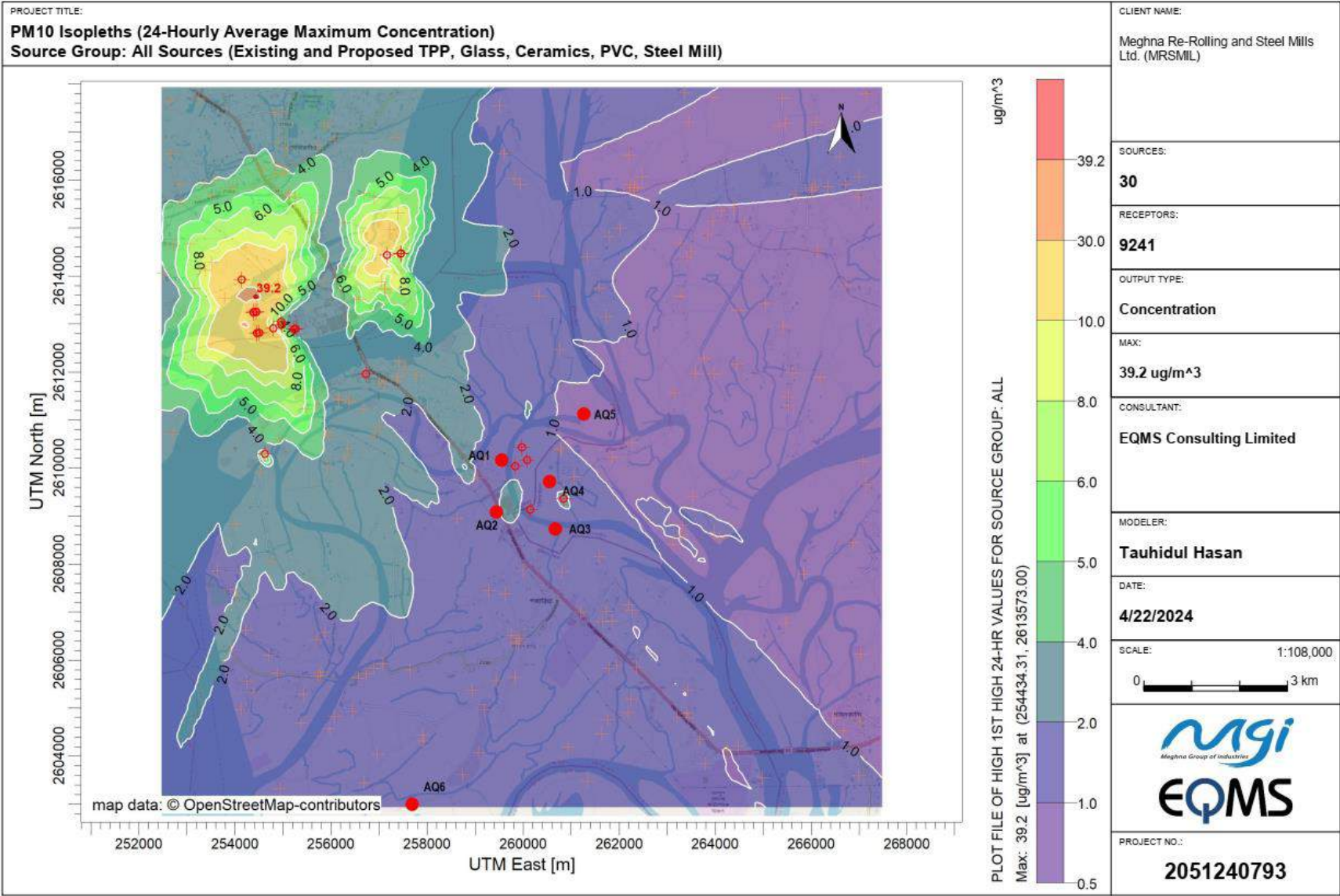


Figure H8: Isopleths of 24-Hourly Maximum NO₂ GLC – Existing (Thermal Power Plants)

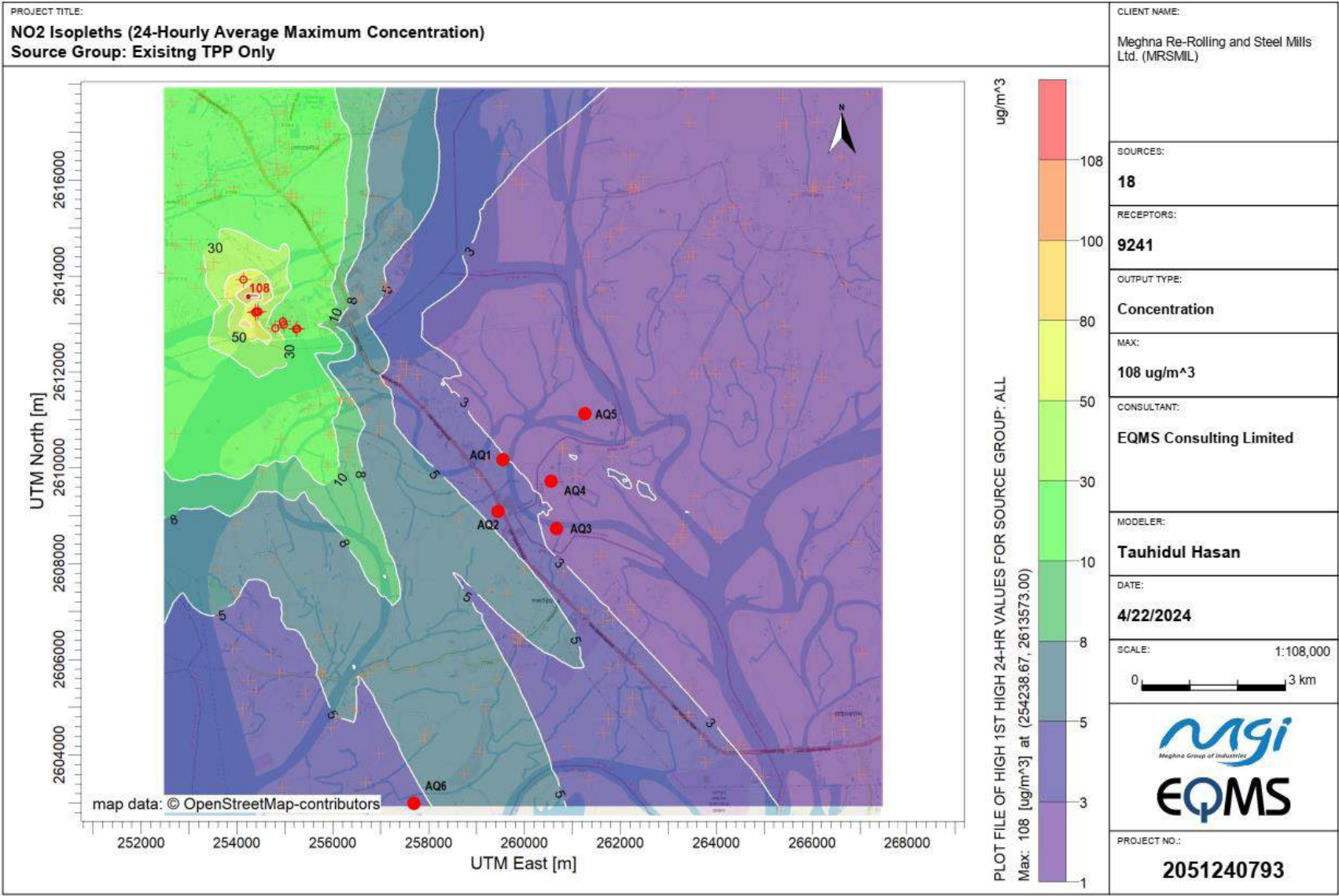


Figure H9: Isopleths of 24-Hourly Maximum NO₂ GLC – Proposed (Thermal Power Plants)

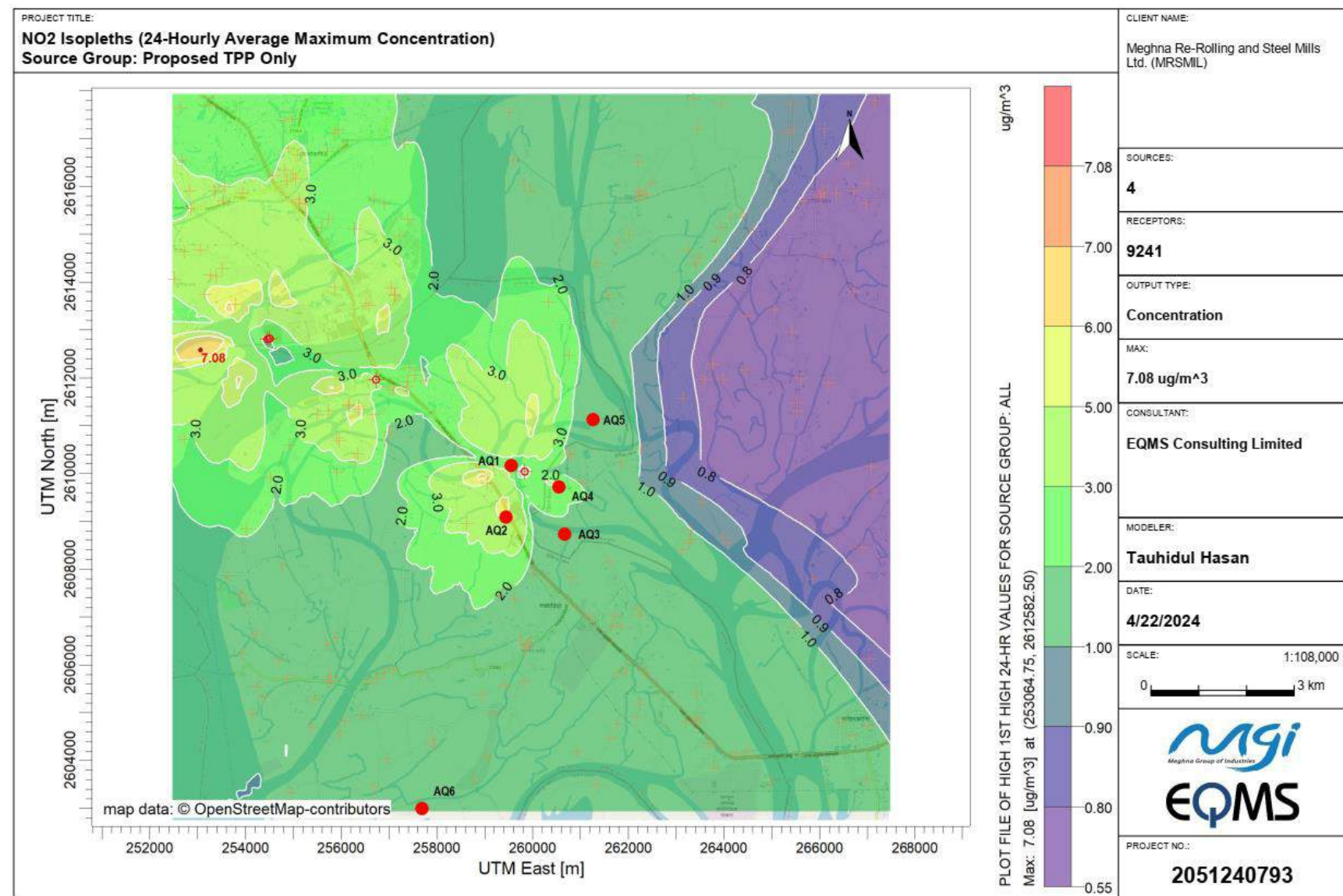


Figure H10: Isopleths of 24-Hourly Maximum NO₂ GLC – Proposed and Existing (Thermal Power Plants)

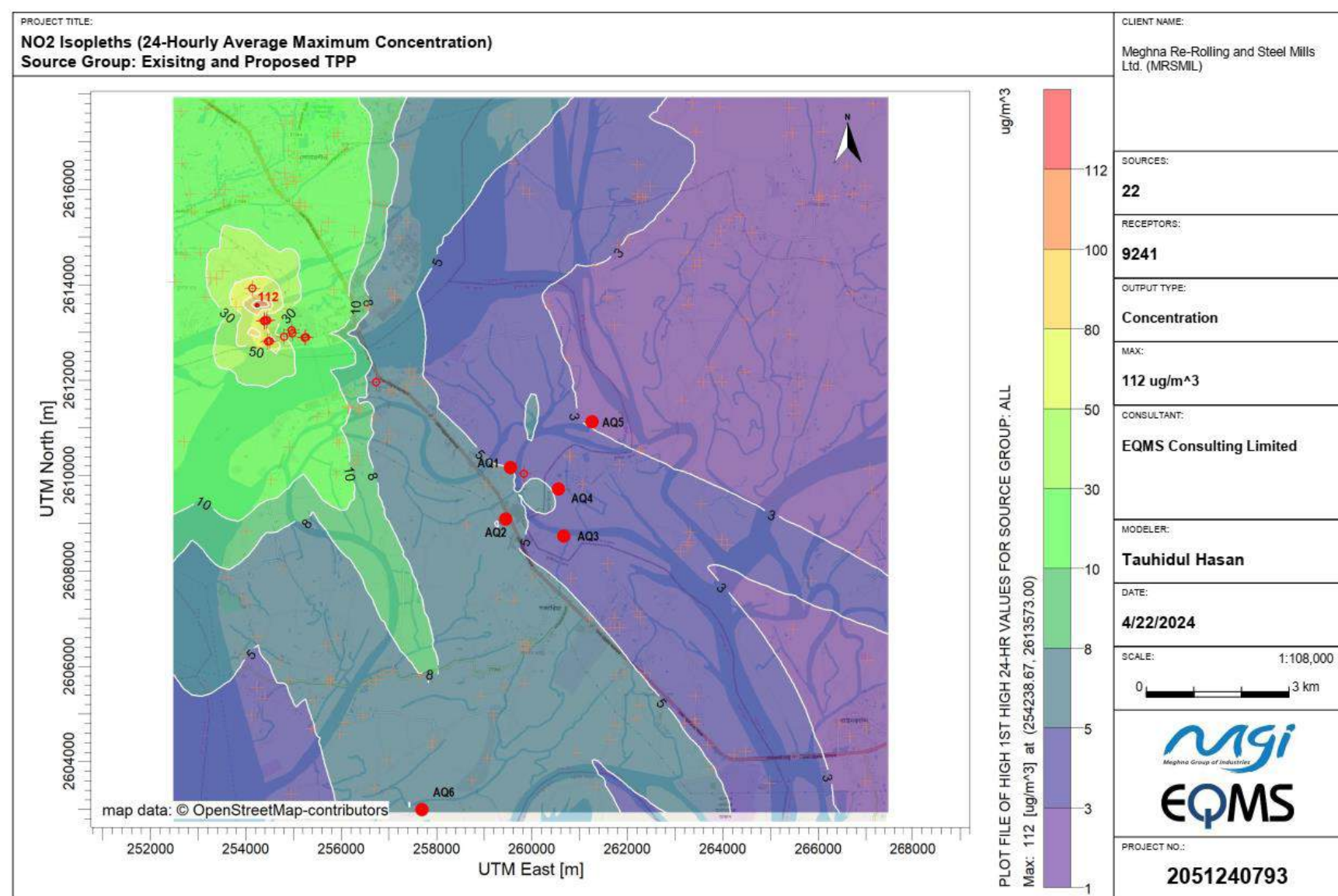


Figure H11: Isopleths of 24-Hourly Maximum NO₂ GLC – Proposed Ceramic Industries

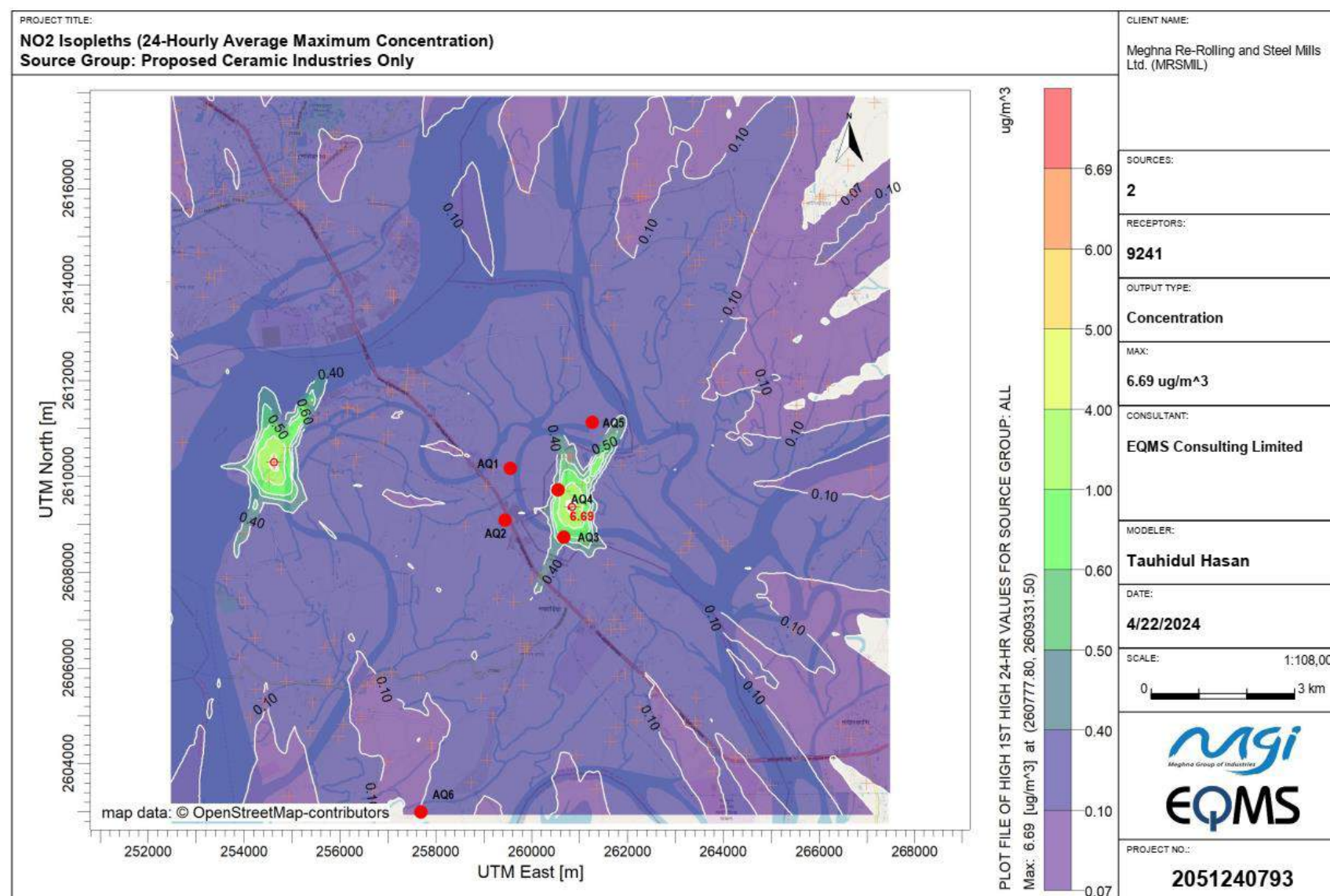


Figure H12: Isopleths of 24-Hourly Maximum NO₂ GLC – Proposed Glass Industry

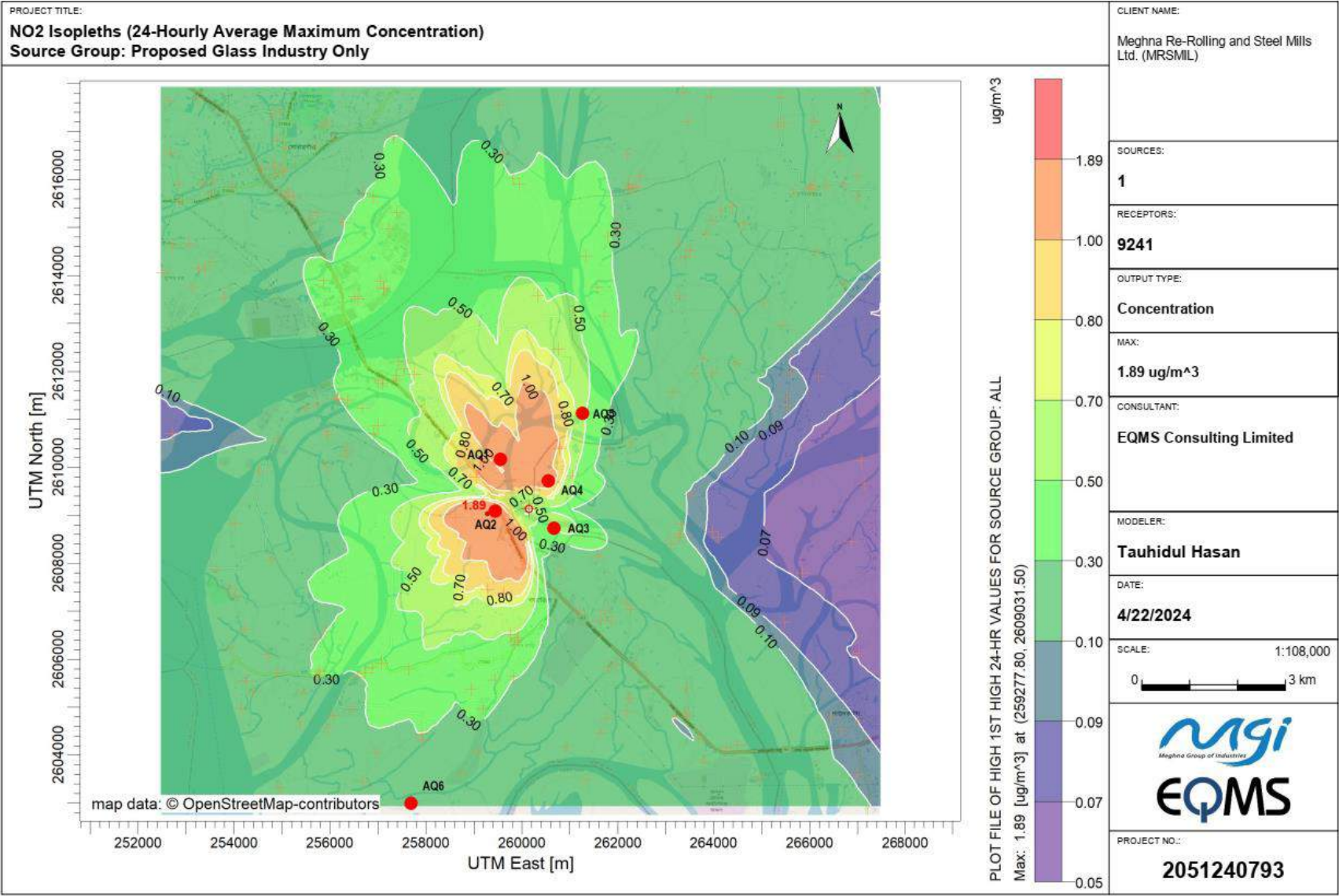


Figure H13: Isopleths of 24-Hourly Maximum NO₂ GLC – Existing PVC Industry

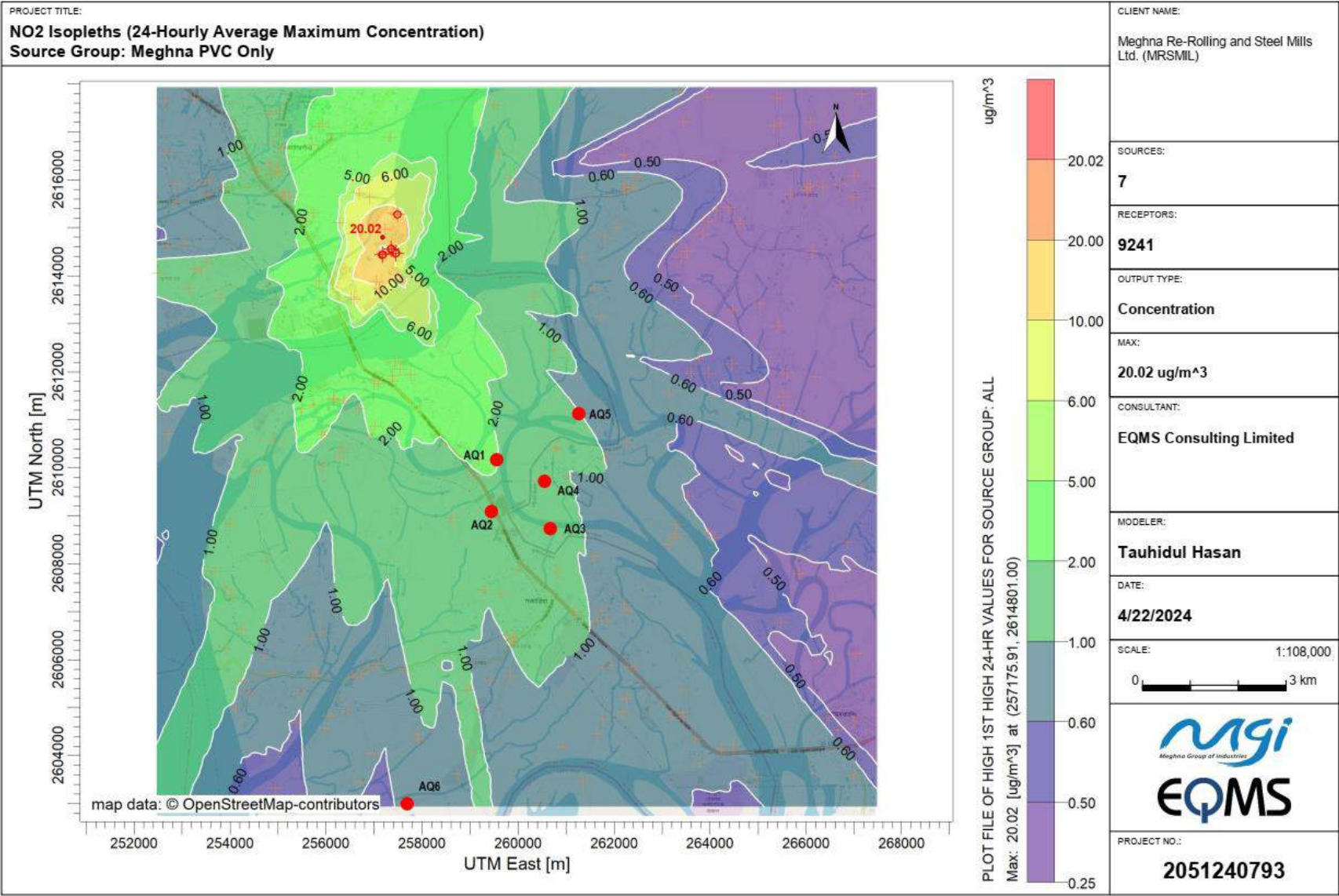
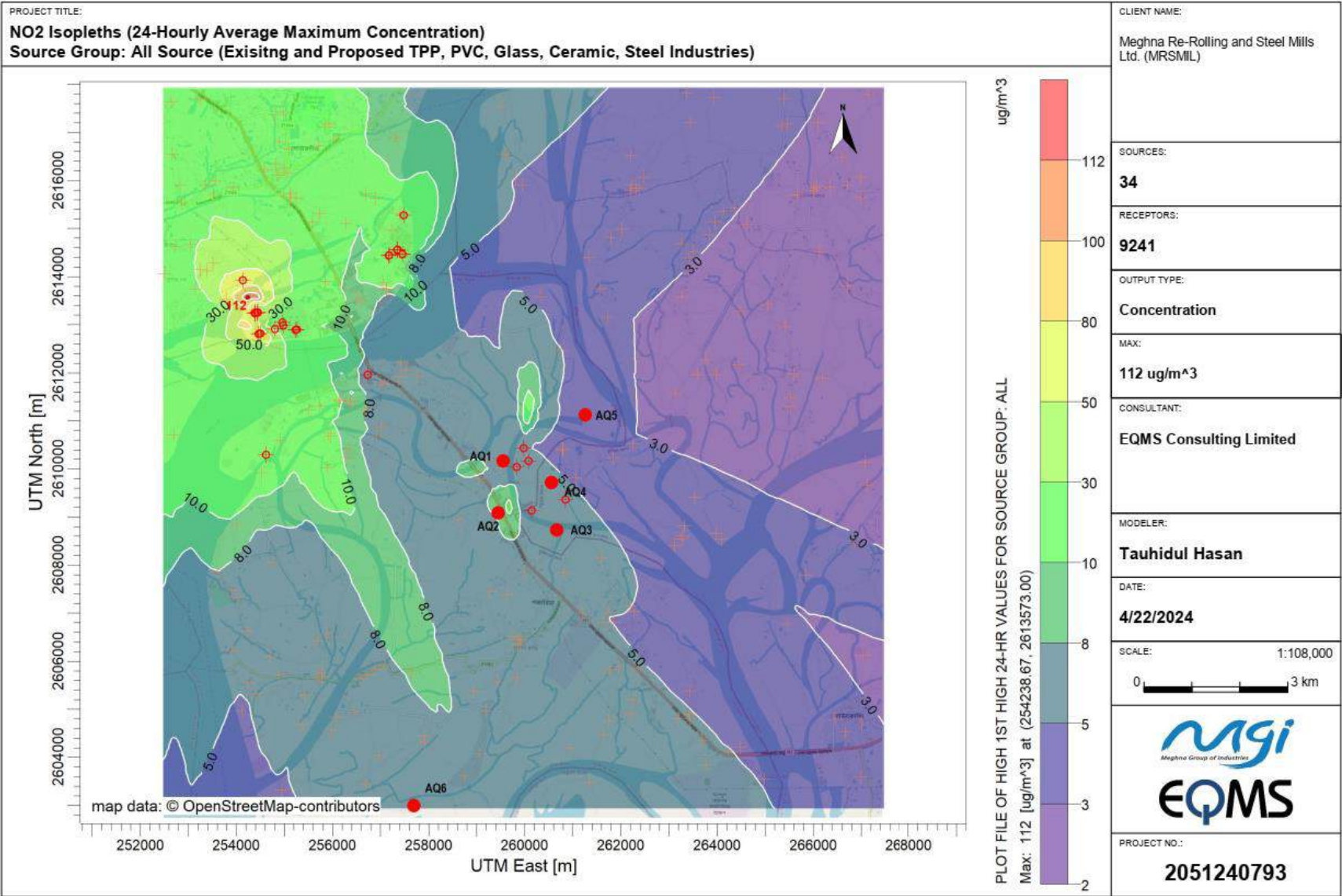


Figure B14: Isopleths of 24-Hourly Maximum NO₂ GLC – All Industries (Existing and Proposed TPP, Glass, Ceramic, Steel, PVC)



Appendix I: Environmental Quality Monitoring Results of the previously conducted regulatory EIA Report of the Steel Plant

Appendix I-1: Ambient Air Quality

Table 4.7: Results of air quality parameter monitoring at the project site during wet season

Sampling Locations	Latitude & Longitude	SPM μg/m ³	PM _{2.5} μg/m ³	PM ₁₀ μg/m ³	SO ₂ μg/m ³	NO _x μg/m ³	CO ppm	CO ₂ ppm	Tem (°C)	VOC	Humidity (%)
AQ-1	23°34'51.08"N, 90°39'0.46"E	120	46	81	372	00	1.17	191	30	0.00	84
AQ-2	23°34'52.85"N, 90°38'47.56"E	102	17	23	362	00	1.13	199	29	00	84
AQ-3	23°35'6.24"N, 90°38'48.75"E	114	33	45	354	00	1.14	208	29.1	00	80
AQ-4	23°35'3.03"N, 90°39'2.50"E	102	13	16	340	00	0.97	202	29.4	00	82
AQ-5	23°35'17.14"N, 90°39'1.54"E	98	13	15	334	00	0.82	207	29.8	00	81
AQ-6	23°34'47.85"N, 90°39'12.97"E	118	34	45	345	00	1.01	218	30.2	00	79
AQ-7	23°34'41.07"N, 90°39'4.31"E	107	35	47	350	00	1.14	263	30	00	79
AQ-8	23°34'39.56"N, 90°38'51.70"E	102	32	45	348	00	0.94	247	30	00	80
DoE Standards		200	65	150	365	100	9	-	-	-	-

Sampling Date: 04.09.2022. Performed by ESRD & CEL Team, WTB.)

Table 4.8: Results of air quality parameter monitoring at the project site during dry season

Sampling Locations	Latitude & Longitude	SPM μg/m ³	PM _{2.5} μg/m ³	PM ₁₀ μg/m ³	SO ₂ μg/m ³	NO _x μg/m ³	CO ppm	CO ₂ ppm	Tem (°C)	VOC	Humidity (%)
AQ-1	23°34'50.40"N 90°39'1.16"E	132	58	89	366	00	1.03	180	28	00	66
AQ-2	23°34'53.73"N 90°38'47.11"E	112	27	33	358	00	1.27	182	28	00	64
AQ-3	23°35'7.65"N 90°38'48.67"E	124	43	55	348	00	1.07	199	27.8	00	63
AQ-4	23°35'3.04"N 90°39'5.25"E	112	23	26	320	00	0.87	192	27	00	64
AQ-5	23°35'19.33"N 90°39'1.76"E	108	24	25	344	00	1.22	200	27	00	62
AQ-6	23°34'48.10"N 90°39'10.14"E	128	44	55	335	00	1.20	201	27.3	00	64
AQ-7	23°34'40.53"N 90°39'6.79"E	117	45	57	330	00	1.40	187	26.9	00	65
AQ-8	23°34'36.25"N 90°38'52.70"E	110	42	53	328	00	0.97	207	26	00	65
DoE Standards		200	65	150	365	100	9	-	-	-	-

Sampling Date: 20.01.2022. Performed by ESRD & CEL Team, WTB.)

Appendix I-2: Noise Quality

Table 4.9: Noise Level at the Project Area

Sample ID	Latitude & Longitude	Noise level dB(A) Day			BD Standard dB(A) (Noise Pollution Rules, 2006) Day
		Max	Min	Average	
NL-1	23°34'51.08"N 90°39'0.46"E	63.4	59	61.2	75
NL-2	23°34'52.85"N 90°38'47.56"E	68	58	63	
NL-3	23°35'6.24"N 90°38'48.75"E	58	48	53	
NL-4	23°35'3.03"N 90°39'2.50"E	56	47	51.5	
NL-5	23°35'17.14"N 90°39'1.54"E	57	50	53.5	
NL-6	23°34'47.85"N 90°39'12.97"E	60.4	57	58.7	
NL-7	23°34'41.07"N 90°39'4.31"E	59	51	55	
NL-8	23°34'39.56"N 90°38'51.70"E	62.4	56	59.2	

(Sampling Date: 04.09.2022. Performed by ESRD & CEL Team, WTB)

Appendix I-3: Surface Water Quality

Table 4.13: Surface Water Quality Sampling Result

Sample Id	COD	pH	Tem	BOD	DO	TDS	TSS	Chloride	Iron
SW-01	58	7.2	31	9.5	7.73	55	24	242	Nil
SW-02	59	7.6	31.2	10	7.41	48	21	234	Nil
SW-03	68	6.9	31	12	6.9	50	17	243	Nil
SW-04	73	6.8	31.1	10	7.6	46	09	228	Nil
SW-05	70	7.8	30.8	12	7.7	48	12	206	Nil
SW-06	67	7.6	30.5	14	7.4	56	14	224	Nil
SW-07	69	7.5	31	12	6.8	60	16	240	Nil
SW-08	74	7.9	31	15	7.9	58	18	233	Nil
DoE Standard	≤ 200	6.5-8.5	Summer-40 Winter-45	≤ 50	4.5-8.5	≤ 2100	150	600	2

(Sampling Result: 06.09.2022. Performed by ESRD & CEL Team, WTB.)

Appendix I-4: Ground Water Quality

Table 4.14: Ground water Quality| Test Report

SN	Water quality parameters	Unit	GW-01	GW-02	GW-03	GW-04	ECR, 97
1	pH	-	7.5	7.2	7.6	7.7	6.5-8.5
2	Turbidity	NTU	0.6	0.6	0.8	0.6	10
3	Total hardness	mg/L	110	120	122	120	200-500
4	Chloride	mg/L	210	180	185	190	150-600
5	Total Dissolve Solids (TDS)	mg/L	390	410	370	380	1000
6	Arsenic (As)	mg/L	<MDL	<MDL	<MDL	<MDL	0.05
7	Iron (Fe)	mg/L	0.02	0.03	0.02	0.02	0.3-1.0

(Sampling Result: 06.09.2022. Performed by ESRD & CEL Team, WTB.)

Appendix J: Rapid Construction Phase E&S Audit**PROJECT INFORMATION**

Bangladesh aims to achieve the status of a High-Income country by 2041 and an upper Middle-Income Country by 2031, as outlined in the main objective of the Perspective Plan 2041. This plan is designed to eliminate extreme poverty and is a continuation of the Vision 2021 (GED, 2020). Additionally, the country is committed to fulfilling the Sustainable Development Goals (SDGs). Bangladesh is on track to transition from a Least Developed Country (LDC) to a Developing Country by 2024.

The growth of steel production and consumption plays a crucial role in assessing a country's development. Over the past decade, Bangladesh has experienced a significant increase in both steel production and consumption, indicating rapid development. The country currently consumes over 7 million metric tons of steel, and the steel sector directly or indirectly employs around 1 million people.

With these ideas in mind, Meghna Re-Rolling and Steel Mills Ltd. (MRSML), a concern of the Meghna Group of Industries (MGI), one of the largest conglomerates in the country, has taken significant strides towards establishing a Greenfield Re-Rolling Steel Plant with a capacity of 1.4 million Metric Ton per Annum (MMTPA). The production capacity will be 1.4 million Metric Ton per year and a billet capacity of 0.9 million Metric Ton per year, featuring various grades. The proposed Meghna Re-Rolling & Steel Mills Ltd. is situated within the Cumilla Economic Zone, specifically in Block A, Plot No. # 1 - 7, 12 – 35, which falls under the Luterchar union within Meghna Upazila of Cumilla District under the Chattogram Division. The proposed project site is located between 23°35'25.10"N, 90°39'1.68"E and 23°34'48.55"N, 90°39'1.64"E, under the jurisdiction of the Bangladesh Economic Zones Authority (BEZA) (Latitude: 23°34'59.46"N, Longitude: 90°39'0.58"E), covering a total project area of 71 acres.

Now Construction activity of the project is ongoing. About 25% construction work has been completed. It has been assumed that the completion of the proposed project will be finished within 3 years. The possible completion time of the proposed project is the end of 2025.

EQMS Consulting Limited (hereinafter referred to as "EQMS") was engaged by the Meghna Group of Industries (MGI) to carry out the Environmental and Social Impact Assessment (ESIA) for the Project to meet the requirement of International Finance Corporation (IFC). As part of this, EQMS conducted an audit at MRSML construction site to assess the gap of E&S management system.

Audit Report	Meghna Re-Rolling & Steel Mills Ltd.	Audit Date	08.02.2024
Auditee (Department/ Process/Function)	Project, Admin, Store, E&S, Contractors / Construction Phase E&S management system		
Auditor(s)	Sadman K Monsur, Senior Consultant EQMS Consulting Limited Md. Mahfuzur Rahman Pavel, Consultant and Head of the Social Safeguard Department EQMS Consulting Limited Zahidul Islam, Senior Env. Specialist EQMS Consulting Limited		
Audit Criteria	IFC Performance Standards, Applicable Local Legal laws & regulations.		
Audit Findings	Number of Strength Points	14	
	Number of Weak Points	11	
AUDITOR COMMENTS			

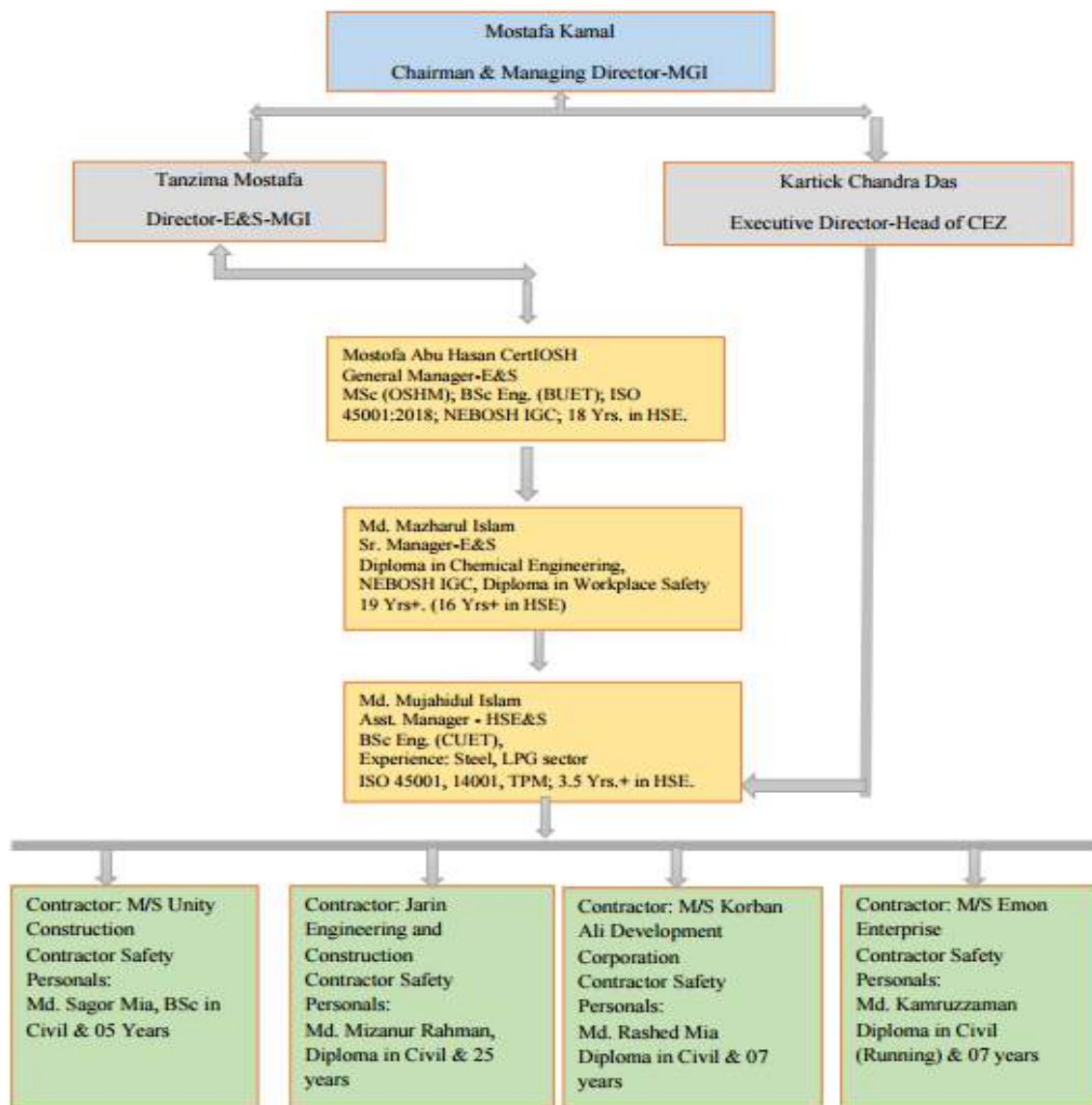
Strong Points	<ol style="list-style-type: none"> 1. MRSML has a well construction stage EHS Plan 2. MRSML has maintained Safety Terms & Condition Agreement for each Contractor 3. MRSML has a well-organized E&S organogram including the contractor's personnel also. 4. Contractors found maintaining Tool box talk 5. MRSML has a well Community & Internal Grievance Redressal Procedure. Grievance Box and register also found well maintained. 6. A well written EHS policy found and awareness among the workers on EHS policy found well. 7. Found Well written and communicated Freedom of Association & Collective Bargaining Policy, Anti-Discrimination Policy, Anti-Harassment Policy, Recruitment Policy, Child Labor and Remedial Policy, On Force Labor Policy, Supplier Selection Policy & Procedure. 8. Found well written and communicated Waste Management Plan for Construction Site, Contractor Management Plan, E&S Monitoring Procedure, Transport Fleet Management and Monitoring Plan, Security Management Plan 9. Found well maintained site visible safety sign. 10. Found record of Fire Mock drill on coordination with FSCD. 11. Found drinking water arrangement at site different place for the workers. 12. Found available first aid kit at site and also has arrangement of Medical center with Ambulance at Meghna Sugar Refinery Limited to take support in case of any emergency. 13. Found maintaining of Monthly E&S audit and it's closing report 14. Found maintaining of HSE statistics report.
Weak Points	<ol style="list-style-type: none"> 1. As per IFC Workers' accommodation: processes and standards 2009, The minimum distance between beds should be 01 meter. But at the temporary dormitory for the workers, beds are too close to each other. 2. Inside the workers temporary dormitory, cables found without double insulation and electric socket found attached to the tin shed but the earthing of the tin shed was not found there. Any leakage current may create any accident. 3. Inside the kitchen room, LPG cylinder found keeping close to the stove which should keep at safe distance. 4. At construction site rod caps of some area was missing. 5. At temporary dormitory of workers, there is some spider net found inside an electric panel box and the electric panel box not found lock & key and electric body earthing is missing. 6. Kitchen waste keep in a waste bucket without any lid very near to food. 7. At construction site, some electric panel box not found lock & key and electrical earthing of panel box not found 8. At construction site, one rod cutter machine found which guard was not in place. 9. One daily labor found using grinding machine which machine guard was missing. 10. Some clothes were found on the fence of the substation which may flew onto inside the boundary of substation and may result any incident. 11. At Re-heating furnace construction area, one substandard temporary platform found using which may result accident

Final ESIA Report**Environmental and Social Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh**

Additional Comments (if any)	Disclaimer: The Audit has been conducted on Sampling basis. Therefore, this report does not reflect complete scenario of the whole unit, in the context of IMS.		
Lead Auditor (Name & Sign)	EQMS Consulting Limited	Auditee Representative (Name & Sign)	Mohammed Moniruzzaman, General Manager (Project), CuEZ and MRSML, MGI

HSE&S Organogram

MRSML HSE&S organogram is given bellow:



Final ESIA Report

Environmental and Social Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh


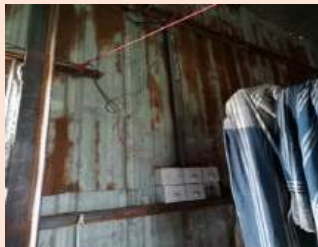



Tool Box Talk









Fire Mock Drill



Observations:

SL	Location / Area	Observation of Unsafe Practices	Pictures (During Observation)	Recommendation for Prevention	Proposed Responsibility
1	Temporary Dormitory for the workers	As per IFC Workers' accommodation: processes and standards 2009, The minimum distance between beds should be 01 meter. But here Beds are too close to each other.		As per IFC Workers' accommodation: processes and standards 2009, The minimum distance between beds should be 01 meter.	Admin, CEZ, MGI
2	Inside Temporary Dormitory for the workers	Cable found without double insulation and electric socket is attached to the tin shed but the earthing of the tin shed was not found there.		Electric cable should be double insulated with conduit pipe. Tin shed earthing should ensure.	Project, MGI
3	Kitchen for the temporary Dormitory's workers	LPG cylinder keep too close to the stove.		LPG cylinder should keep at a safe distance from the stove.	Admin, CEZ, MGI and Cook
4	MRSML Rolling site construction area	Some area rod caps not found using		Use of Rod cap should be ensured	Project, MGI and Concerned Contractor
5	Temporary Dormitory for the workers	There is some spider net found inside an electric panel box and the electric panel box not found lock & key and electric body earthing is missing.		Electric panel box should be cleaned on a scheduled basis. Electric panel box lock & key should be ensured. Electric body earthing of panel box needs to be ensured.	Project, MGI

6	Kitchen for the temporary Dormitory's workers	Kitchen waste keep in a waste bucket without any lid		Kitchen waste should be kept on bucket with lid and need to clean it frequently	Admin, CEZ, MGI and Cook
7	MRSML construction area	Electric panel box not found lock & key and electrical earthing of panel box not found		Electric panel box should clean on scheduled basis. Electric panel box lock & key should ensure. Electric body earthing of panel box need to ensure.	Project, MGI
8	MRSML construction area	Machine guard found missing		Need to ensure machine guard before using it	Project, MGI and Concerned Contractor
9	MRSML construction area	Found using grinding machine without it's guard		Need to ensure using machine guard before using it	Project, MGI and Concerned Contractor
10	Substation Area	Some clothes were found on the fence of the substation which may flew onto inside the boundary of substation.		Please increase supervision and aware people not to do it again. Need to remove those clothes from that place immediately	Project, MGI and Concerned Contractor and Admin CEZ
11	RHF area	If any worker went to the edge of the platform, fall incident may occur due to the poor stability of that temporary platform.		Need to substitute it with a standard platform. Immediately need to put barrier at both side that anyone cannot reach to the edge accidentally.	Project, MGI and Concerned Contractor

Appendix K: Detailed Description of Fume Treatment Plant

Source: MGI. 2024 and Danieli

DANIELI

TECHNICAL SPECIFICATION N. DPC6K300 Rev.03

Section 2.2 / Design Concept - FUME TREATMENT PLANT

Design Concept - FUME TREATMENT PLANT

Table of contents		Page
2.2.1	Introduction	2
2.2.2	Plant Description	3
2.2.3	Process Description	4
2.2.1.1	Primary fumes suction	4
2.2.1.2	Primary fumes conveying	4
2.2.1.3	Primary fumes cooling and mixing	5
2.2.1.4	Spark arresting	5
2.2.1.5	Secondary fumes sucked by the canopy hood	6
2.2.1.6	Fumes sucked from the LF	6
2.2.1.7	Fume filtration	7
2.2.1.8	Fume suction and exhaust	8
2.2.1.9	Dust collection and storage	8
2.2.1.10	Controls and regulating systems	9
2.2.4	Design Optimization	10
2.2.5	Process Automation	11
2.2.6	Design Data	12
2.3.6.1	Operating conditions	12
2.3.6.2	Process Flow Diagram	13
2.3.6.3	Flow Sheet	14

Section 2.2 / Design Concept - FUME TREATMENT PLANT

2.2.1 Introduction

This project concerns a fume de-dusting plant designed for the primary, secondary and auxiliary suction lines fumes of the **150 tons** tapped steel EAF according to process parameters shown in the Design Concept (EAF-LF sections).

The plant is designed to capture and treat the fumes of:

- > Primary fumes line from the furnace roof (Direct Extraction System - DES);
- > Secondary fumes line from the canopy hood arranged on the building roof over the furnace shell;
- > Ladle Furnace (LF);
- > Materials Handling System.

This project includes also the basic design of a roof canopy hood above the furnace. Since the canopy hood is conceived as an extension of the building structure, it is considered being part of the building itself.

The data shown in this offer are preliminary. Should it be necessary, Danieli reserves the right to change them during the development of the project, with plant performance remaining unaltered.

Being the Fume Treatment Plants a complex system of ducts, its routing determines the characteristics of the Fans. Due to this fact, significative variations of the preliminary routing could determine a recalculation of such characteristics, dimensioning of the machinery and parts of the FTP.

In the case that the preliminary or final layout will require modifications for reasons not attributable to the Seller, the overall timeline of the Fume Treatment Plant could be affected as well as the machinery and related power requirement could need to be resized with possible effects on costs.

Section 2.2 / Design Concept - FUME TREATMENT PLANT

2.2.2 Plant Description

The fume plant is designed for the treatment of fumes produced during operation of the EAF (Electric Arc Furnace).

A water-cooled duct conveys the fumes sucked from the EAF fourth hole to the settling and post-combustion chamber followed by another water-cooled duct and then a Hairpin Cooler.

After the Hairpin Cooler, the pre-treated fumes are conveyed to the main duct connecting the roof canopy hood to the filter plant.

Filtering is performed by a suction type filter design with bags. Cleaning of the bags is performed by means of compressed air injection (Pulse-Jet system).

The main fans installed at the bag filter clean side deliver the fume to the stack.

The plant is provided with a dust conveying system, which conveys the dust from the bag filter, the axial cyclone and the cooler to the dust collecting system.

The proposed plant features the following:

- > Settling and post-combustion chamber for the oxidation of carbon monoxide (CO) and the settling of heavier particles contained in the primary fumes;
- > Very efficient bag cleaning system, which allows a high air-to-cloth ratio, resulting in compact equipment;

- > Cyclone as spark arrestor to protect the bags of the filter;
- > Suction design (negative pressure) used for the bag filter, no dust leakage underneath the filter hoppers (Pulse Jet type filter);
- > Bag changing is performed from the top of the filter, on the clean side; there is no need for workers to operate inside the bag filter;
- > Main fans are installed on the clean side of the bag filter, which allows the use of high efficiency airfoil backward vane impellers, resulting in low energy consumption;
- > Booster fan for some auxiliary suction lines to ensure the suction in any plant operating condition;
- > Hairpin cooler to control the primary fumes temperature before mixing them with the canopy fumes and deliver them to the bag filter;
- > High consideration has been given to the environment inside the EAF bay, sizing the secondary suction as well as the Bag filter in order to provide the necessary ventilation and heat removal from the EAF area.

Section 2.2 / Design Concept - FUME TREATMENT PLANT

2.2.3 Process Description

2.2.1.1 Primary fumes suction

The fumes are sucked from the 4th hole on EAF roof through a water-cooled elbow duct. The fumes coming out of the furnace elbow are captured by a water-cooled sliding sleeve (DES, direct extraction system) and treated in the primary suction line.

By means of a hydraulic cylinder (operated by furnace hydraulic system), the water-cooled sliding sleeve can be positioned in two different operating conditions:

- > Linked to the elbow duct flange during fume suction from the 4th hole
- > Moved backward during furnace scrap charging to consent free rotation of the EAF roof

This safety system prevents any damage to the fumes ducts and to the bag filters.



Water-cooled sliding sleeve

A settling-combustion chamber is installed near the furnace: it is designed to complete the combustion of CO gas and to collect pieces of light scrap, coarse dust and slag sucked from the EAF.

The settled material can be easily removed through a water-cooled door, by means of a small front-end loader.

The DES fumes are mixed with the secondary fumes sucked from the canopy hood over the furnace and then conveyed to the bag filter.

2.2.1.2 Primary fumes conveying

The primary fumes are collected by means of a water-cooled sliding sleeve, followed by a fixed duct connected to the settling chamber.

After the settling chamber, there is another water-cooled duct for a further cooling of the primary fumes, and when the temperature of the hot fumes is cooled down to a temperature in compliance with the downstream single-wall duct or cooling equipment, the water-cooled duct ends.

All water-cooled components, such as settling and post-combustion chamber and water-cooled ducts are provided with walls having a pipe-to-pipe water-cooled design.



Water-cooled duct

Section 2.2 / Design Concept - FUME TREATMENT PLANT**2.2.1.3 Primary fumes cooling and mixing**

A "Hairpin" cooler is used to significantly reduce the temperature of the primary fumes before mixing them with the secondary fumes collected by the furnace canopy hood. The name of this particular heat exchanger derives from the long U-shaped fume tubes, which are naturally cooled by ambient air. This design is very efficient and, at the same time, does not require much maintenance as the forced draft coolers which have fume tubes of smaller diameter and require frequent cleaning to prevent an excessive increase of the cooler pressure drop.



Hairpin Cooler

Downstream of the fumes cooler there is an electrically driven damper, that can be used to adjust the flow rate of primary fumes according to the requirements of the EAF process cycle.

An emergency damper, installed downstream of the fumes mixing point, is used to protect the filter bags against the risk of overheating due to the malfunctioning of the control system of the other dampers.

2.2.1.4 Spark arresting

An axial cyclone is used as spark arrester to protect the bags of the filter (installed downstream) from the risk of being damaged by hot particles conveyed by the fumes. The cyclone is provided with a double-flap vane valve that allows the extraction of the settled material without infiltration of ambient air into the fume circuit.

Depending on the requirements of the Client, the extracted material can be temporarily stored in a container or collected and sent to the centralized dust silo.



Axial Cyclone

Section 2.2 / Design Concept - FUME TREATMENT PLANT

2.2.1.5 Secondary fumes sucked by the canopy hood

The secondary fumes emitted by the EAF, mainly during charging/tapping phases, are captured by the canopy hood installed above the EOT cranes on the roof of the building.

During the charging/tapping phases, the flow dampers are completely open and provide the necessary melt shop ventilation ensuring the suction of the generated fumes.

The flow dampers of the canopy hood are positioned automatically to a pre-set value during the melting phase. This position is automatically adjusted by the computerized control system in order to allow the correct ventilation inside the building and the correct dilution air for primary fumes cooling.



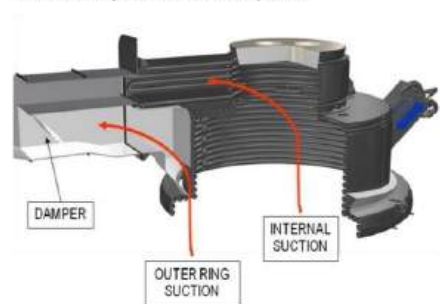
Canopy Hood

2.2.1.6 Fumes sucked from the LF

An independent suction line is provided for the Ladle Furnace.

The fumes are sucked from the LF roof. The duct has a booster fan with regulating speed that exhausts the fumes and, by compensating the pressure losses along the ducting, conveys them to the mixing point.

The fumes are then mixed with those collected by the canopy hood over the EAF and conveyed to the filter plant.



Ladle Furnace suction line

Section 2.2 / Design Concept - FUME TREATMENT PLANT

2.2.1.7 Fume filtration

DANIELI's pulse-jet bag filter technology combines efficient filtration of the fumes with low energy consumption.

The filter bags are cleaned by compressed air jets blown through electric diaphragm valves. For each bag, the air jet takes place inside a Venturi tube and therefore a strong induced gas draft is used for expanding the bag, with a sudden removal of its dust cake.

To maximize the cleaning efficiency, the bag compartment is automatically put in off-line mode during the cleaning operation. This procedure is used only during the EAF melting phase.

Normally, this safety valve is fully closed, even under the heaviest operating conditions.



BAG FILTER – External view



BAG FILTER – Internal view

The bag cleaning frequency is set by the automation system during the start-up of the plant, thus assuring effective filtration and low compressed air consumption in all operating conditions.

Upstream of the filter there is an emergency safety valve for dilution air intake. This valve opens automatically if the fume temperature should exceed the design temperature for the bags.

Section 2.2 / Design Concept - FUME TREATMENT PLANT

2.2.1.8 Fume suction and exhaust

The induced draft fans, installed downstream of the filter, suck the fumes from the whole circuit and deliver them to the centralized stack.

The main fans are located downstream of the filter and therefore they operate with filtered fumes, so high efficiency fan impellers can be used. This design reduces the maintenance requirements and the consumption of electric energy as well.



Centralized stack

2.2.1.9 Dust collection and storage

The coarser dust sucked from the 4th hole is intercepted in the settling chamber located near the EAF. The chamber has a maintenance door ensuring the access of a small front-end loader to remove the accumulated dust.

The dust discharged in the filter, cyclone and cooler is collected by chain conveyors under the hoppers and is sent to a storage silo by means of a chain elevator.

The dust is discharged from the silo through a screw conveyor to the transport truck.



Dust collecting silo

Section 2.2 / Design Concept - FUME TREATMENT PLANT

2.2.1.10 Controls and regulating systems

The variable operating conditions of the EAF requires the use of a regulation loop, to maintain a constant negative pressure inside the EAF. The pressure monitoring sensors, and the signal transducer, enable adjustment of the flow-rate, influencing the de-dusting efficiency of the plant.

Another regulation loop adjusts the operating condition of the circuits, in series with the pressure control loop, based on the temperature of the fumes.

The fume temperature control loop consists mainly of two logical circuits:

- > Control of the fume temperature at the water-cooled sliding sleeve on the 4th hole circuit. The flow of combustion air is controlled by adjusting the movable duct position according to the specified fume temperature set-point. An emergency set-point causes the opening of the movable duct to prevent damages to the water-cooled duct.

- > Fumes temperature control at the Bag-Filter inlet. The dilution air, required to keep the fumes temperature at the Bag-Filter inlet within design temperature, is sucked from the regulating damper of the canopy hood. An emergency set-point causes the opening of the second dilution air valve situated just upstream the Bag-Filter, to prevent damages to the bags.

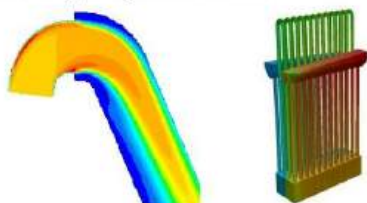
Another emergency control loop is based on the monitoring of the cooling water temperature and pressure. The levels of temperature and pressure are monitored via the PLC.

Any of the above-mentioned set-points can be adjusted at any time, via the PLC, to allow for optimum performance of the de-dusting plant.

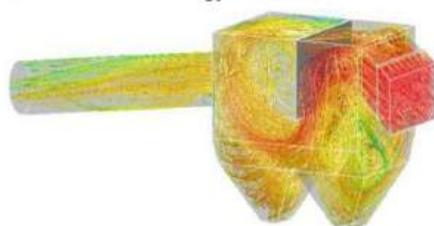
Section 2.2 / Design Concept - FUME TREATMENT PLANT**2.2.4 Design Optimization**

At the base of the Fume Treatment Plant engineering there is a careful and detailed study of each equipment.

During the years, FTP machines have been modelled by means of dedicated CFD (Computational Fluid Dynamics) software in order to refine their design and optimize their efficiency and performances.



The CFD analysis involves the numerical solution of the governing partial differential equations that describe the transport of mass, momentum and energy of a fluid.

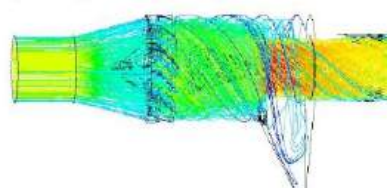


With the use of the CFD modelling it is possible to predict and analyze the fumes flow and to optimize the design of the equipment in order to maximize the efficiency of the entire system.

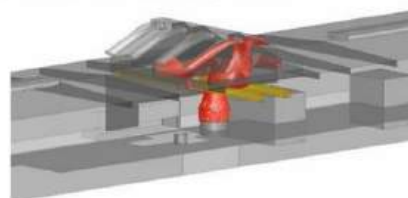
Even though this type of study cannot be applied to all processes (for numerical

reasons), its applicability is quite wide, allowing to predict multi-phase flow processes inside equipment and buildings as well.

One of the advantages of the CFD analysis is that it is based on the homothety principle, so it is more related to the shape of the equipment than to its size. For this reason, it is not necessary to repeat the analysis for each different size of the same equipment, but only if its geometry changes.



Everything starts from a 3D model of the specific equipment and with the definition of the boundary conditions. After that, the input data are entered in the model and, when everything is properly set up, the analysis is launched. As a result, the software shows the route of the fumes flow as well as possible problems and efficiency losses.



This document contains intellectual property of Danieli & C. Officine Meccaniche S.p.A. (hereinafter "Danieli") which is the sole owner. According to law, this document is a company secret, also of considerable economic value, which cannot be reproduced and transmitted in any way or method, in whole or in part, by any person, for any reason, to other parties without a specific prior written authorization of an authorised representative of Danieli. All rights reserved.

Page B2.10 / 14

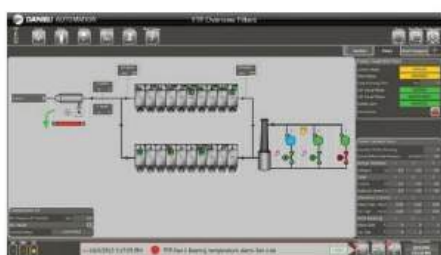
Section 2.2 / Design Concept - FUME TREATMENT PLANT

2.2.5 Process Automation

The fume treatment process is fully automated by means of a dedicated Programmable Logic Controller (PLC), which is interfaced with a PC used for data acquisition, recording and visualization.



Computerized process control



PC visualization of FTP operating data

Section 2.2 / Design Concept - FUME TREATMENT PLANT**2.2.6 Design Data****Fume Treatment Plant**

Equipment	One Fume Treatment Plant common for EAF and canopy hood
Suction lines	Electric Arc Furnace primary fumes Electric Arc Furnace secondary fumes from canopy hood LF suction line MHS suction line
Filter design	Suction design pulse jet filter

2.3.6.1 Operating conditions

The variable operating conditions of the EAF requires the use of a regulation loop, to maintain a constant negative pressure inside the EAF. The pressure monitoring sensors, and the signal transducer, enable adjustment of the flow-rate, influencing the de-dusting efficiency of the plant.

Melting phase

EAF in melting phase (roof closed, primary fumes suction line open):

- > Suction from the primary line (direct extraction system);
- > Suction from the canopy hood to provide melt shop ventilation and primary fumes cooling;
- > Suction from the LF in refining phase;
- > Suction from the Materials Handling System.

Charging / Tapping phase

EAF in charging/tapping phase (roof open or inclined EAF, primary fumes suction line closed):

- > Suction from the canopy hood;
- > Suction from the LF in refining phase;
- > Suction from the Materials Handling System.

Section 2.2 / Design Concept - FUME TREATMENT PLANT**2.3.6.2 Process Flow Diagram**

Height above sea level: 0 m

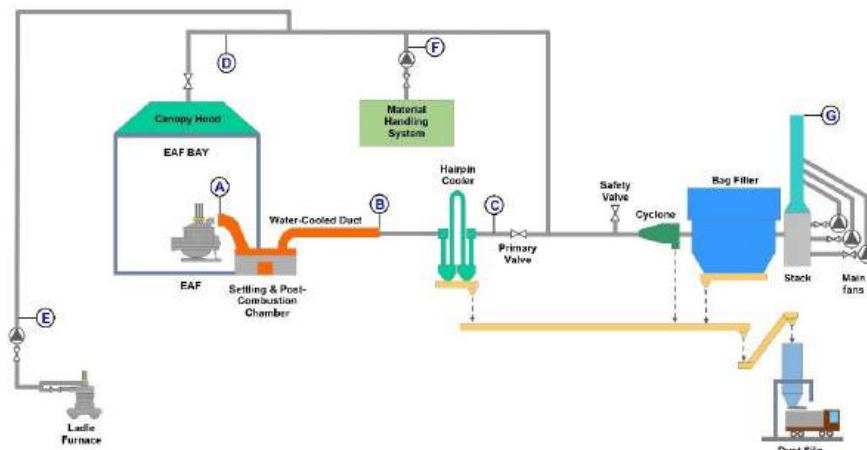
EAF 150 ton - MELTING - PULSE JET FILTER

Description	Point	Qn [Nm ³ /h]	T [°C]	Qe [m ³ /h]
Water-cooled duct inlet	A	300.000	1.200	1.619.000
Water-cooled duct outlet	B	300.000	550	904.000
Hairpin Cooler Outlet	C	300.000	300	630.000
EAF Canopy hood duct	D	815.000	55	979.000
LF duct	E	77.500	150	120.000
Material Handling System	F	50.000	40	57.000
Stack	G	1.242.500	115	1.786.000

EAF 150 ton - CHARGING / TAPPING - PULSE JET FILTER

Description	Point	Qn [Nm ³ /h]	T [°C]	Qe [m ³ /h]
Water-cooled duct inlet	A	-	-	-
Water-cooled duct outlet	B	-	-	-
Hairpin Cooler Outlet	C	-	-	-
EAF Canopy hood duct	D	1.624.000	80	2.100.000
LF duct	E	77.500	150	120.000
Material Handling System	F	50.000	40	57.000
Stack	G	1.751.500	80	2.277.000

2.3.6.3 Flow Sheet



This document contains intellectual property of Danieli & C. Officine Meccaniche S.p.A. (hereinafter "Danieli") which is the sole owner. According to law, this document is a company secret, also of considerable economic value, which cannot be reproduced and transmitted in any way or method, in whole or in part, by any person, for any reason, to other parties without a specific prior written authorization of an authorized representative of Danieli. All rights reserved.

Page 82 / 141