



# CUMULATIVE IMPACT ASSESSMENT FOR 1.4 MMTPA GREENFIELD RE-ROLLING STEEL PLANT AT CUMILLA ECONOMIC ZONE, CUMILLA, BANGLADESH



**DRAFT REPORT**

**MAY 2024**

## DOCUMENT DETAILS

Document Title	Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh
Document Type	Draft CIA Report
Project Ref. No.	2051230658
Date	05/05/2024
Author	EQMS Consulting Limited
Client Name	Meghna Re-Rolling and Steel Mills Ltd.
Country	Bangladesh

## DISTRIBUTION LIST

Hardcopy	Softcopy	CDs	Other form
x	✓	x	x

## DOCUMENT HISTORY

Version	Date	Description	Reviewed by	Approved by
V-1	21/03/2024	Issue for Client Review	DB	KFI
V-2	05/05/2024	Revised incorporating comments	DB	KFI

## SIGNATURE PAGE

05 May 2024

# CUMULATIVE IMPACT ASSESSMENT FOR 1.4 MMTPA GREENFIELD RE-ROLLING STEEL PLANT AT CUMILLA ECONOMIC ZONE, CUMILLA, BANGLADESH

---

Prepared by

Md. Zahidul Islam  
Salil Das

Reviewed by

Debanjan Bandyopadhyay

---

Approved by



Kazi Farhed Iqbal  
Executive Director, EQMS Consulting Limited

---

### **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.....	v
LIST OF TABLES.....	vi
LIST OF APPENDIXES.....	vi
ACRONYMS AND ABBREVIATIONS.....	viii
EXECUTIVE SUMMARY .....	x
<b>1 INTRODUCTION.....</b>	<b>1-1</b>
1.1 Project Background .....	1-1
1.2 Objectives of the Study .....	1-3
1.3 Context of CIA .....	1-3
1.4 Proposed Project.....	1-3
1.5 Limitation .....	1-5
1.6 Structure of the Report.....	1-5
<b>2 APPROACH AND METHODOLOGY .....</b>	<b>2-1</b>
2.1 Approach .....	2-1
2.2 Methodology .....	2-1
2.2.1 CIA Scoping .....	2-2
2.2.2 Determining Present Conditions of VECs .....	2-10
2.2.3 Assess Cumulative Impacts on VECs.....	2-10
2.2.4 Management of Cumulative Impacts – Design and Implementation .....	2-11
<b>3 ADMINISTRATIVE FRAMEWORK .....</b>	<b>3-1</b>
3.1 IFC Performance Standards (PS) 2012 .....	3-1
3.1.1 Reference Framework and their Applicability.....	3-1
3.2 Environment and Social Regulation Framework.....	3-5
<b>4 DEVELOPMENTS IN INDUSTRIAL CLUSTERS .....</b>	<b>4-1</b>
4.1 Project under Consideration (PUC).....	4-1
4.1.1 Capacity.....	4-1
4.1.2 Raw Materials.....	4-1
4.1.3 Resource Requirement .....	4-1
4.1.4 Pollution Sources and Control Measures .....	4-2
4.1.5 Accommodation Facility .....	4-3
4.2 Past and Present Development .....	4-3
4.2.1 Meghnaghat North Industry Cluster .....	4-3
4.2.2 Meghnaghat South Industry Cluster.....	4-8
4.2.3 Meghnaghat South-South Industry Cluster .....	4-12
4.2.4 Cumilla Economic Zone (CuEZ).....	4-15
4.3 Reasonably Foreseeable Future Actions (RFFAs) .....	4-15
4.3.1 Meghnaghat North Industry Cluster .....	4-15
4.3.2 Meghnaghat South Industry Cluster.....	4-15
4.3.3 Meghnaghat South-South Industry Cluster .....	4-15

4.3.4	Cumilla Economic Zone (CuEZ).....	4-16
4.4	External Stressors or Drivers .....	4-18
4.4.1	Industrialization .....	4-18
4.4.2	Climate Change and Natural Hazards .....	4-18
5	VALUED ENVIRONMENTAL AND SOCIAL COMPONENTS .....	5-1
5.1	Impact Sources Scoped into CIA .....	5-1
5.1.1	Past and Present Projects in the CIA Spatial Area .....	5-1
5.1.2	Reasonably Foreseeable Future Actions (RFFAs) .....	5-1
5.1.3	External Stressors or Drivers .....	5-1
5.2	VEC Selection for CIA Study.....	5-1
5.3	Indicators and Threshold to Assess Cumulative Impacts .....	5-22
5.4	Activity/ Project- VEC Interaction and Effects .....	5-23
6	STAKEHOLDER ENGAGEMENT .....	6-1
6.1	Introduction.....	6-1
6.2	Identification of Stakeholders .....	6-1
6.3	Stakeholder Mapping .....	6-2
6.4	Stakeholder Consultation Summary.....	6-2
6.4.1	Draft CIA Report Preparation Stage.....	6-2
7	ASSESSMENT OF CUMULATIVE IMPACT .....	7-1
7.1	Land Use Change .....	7-1
7.1.1	Baseline Condition .....	7-1
7.1.2	Stressors and Impact .....	7-4
7.1.3	Significance of Cumulative Impact .....	7-4
7.2	Air Environment (Air Quality).....	7-6
7.2.1	Baseline Condition .....	7-6
7.2.2	Concentration of PM.....	7-6
7.2.3	Concentration of NO <sub>2</sub> .....	7-12
7.3	Ground Water Resource .....	7-17
7.3.1	Baseline Condition .....	7-17
7.3.2	Stressors and Impacts.....	7-18
7.3.3	Significance of Cumulative Impact .....	7-19
7.4	Surface Water Quality .....	7-21
7.4.1	Baseline Condition .....	7-21
7.4.2	Concentration of DO & BOD .....	7-22
7.4.3	Concentration of Toxic Metals.....	7-24
7.5	Migratory Bird Species .....	7-27
7.5.1	Stressors and Impacts.....	7-29
7.5.2	Significance of Cumulative Impact .....	7-29
7.6	Social Well-being.....	7-31
7.6.1	Baseline Condition .....	7-31
7.6.2	Stressors and Impact .....	7-31
7.6.3	Significance of Impact .....	7-32
7.7	Community Health and Safety .....	7-34

7.7.1	Baseline Condition .....	7-34
7.7.2	Stressors and Impacts.....	7-34
7.7.3	Significance of Impacts .....	7-35
7.8	Livelihood (Land-based and Fisherman).....	7-37
7.8.1	Baseline Condition .....	7-37
7.8.2	Stressors and Impacts.....	7-37
7.8.3	Significance of Cumulative Impact .....	7-37
8	RECOMMENDATIONS AND CONCLUSIONS.....	8-1
8.1	Summary of Cumulative Impacts .....	8-1
8.2	Management Measures.....	8-1
8.3	Monitoring.....	8-6
	Reference.....	8-7

## LIST OF FIGURES

Figure 1-1: Industrial Cluster Location Map .....	1-2
Figure 1-2: Location of MRSML .....	1-4
Figure 2-1: IFC Good Practice Handbook CIA Six-Step Approach .....	2-1
Figure 2-2: CIA Guidance Process .....	2-2
Figure 2-3: CIA Spatial Boundary Map .....	2-9
Figure 4-1: Flue Gas Treatment System.....	4-2
Figure 4-2: Industries in Meghnaghat North Industry Cluster .....	4-7
Figure 4-3: Industries in Meghnaghat South Industry Cluster .....	4-11
Figure 4-4: Industries in Meghnaghat South-South Industry Cluster.....	4-14
Figure 4-5: Master Layout Plan of Cumilla Economic Zone .....	4-17
Figure 5-1: VEC Screening Process .....	5-2
Figure 5-2: Activity/Project – VEC Interactions and Effects.....	5-24
Figure 6-1: Stakeholder Consulted during CIA Process .....	6-2
Figure 7-1: Decadal Land Use and Land Cover in Spatial Boundary .....	7-3
Figure 7-2: Land Use Change- Cause and Effect Relationship.....	7-5
Figure 7-3: PM Concentration in Air-shed- Cause and Effect Relationship.....	7-11
Figure 7-4: NOx Concentration in Air-shed- Cause and Effect Relationship.....	7-16
Figure 7-5: Hydrographs of GWT of Narayanganj District .....	7-17
Figure 7-6: Hydrographs of GWT of Cumilla District .....	7-18
Figure 7-7: Depletion of Groundwater Resource- Cause and Effect Relationship .....	7-20
Figure 7-8: Surface Water Quality (DO and BOD)- Cause and Effect Relationship.....	7-23
Figure 7-9: Surface Water Quality (Toxic Metals)- Cause and Effect Relationship.....	7-26
Figure 7-10: Migratory Bird Sighting Area Present in the AOI .....	7-28
Figure 7-11: Aquatic and Migratory Birds Habitat- Cause and Effect Relationship .....	7-30
Figure 7-12: Social Well-beings - Cause and Effect Relationship .....	7-33
Figure 7-13: Community Health and Safety - Cause and Effect Relationship.....	36

Figure 7-14: Livelihood (Land-based and Fisherman) - Cause and Effect Relationship .....7-38

## LIST OF TABLES

Table 2-1: VEC-wise Spatial Boundary for CIA Study .....	2-6
Table 2-2: Impact Significance Definition.....	2-11
Table 3-1: IFC Performance Standards .....	3-1
Table 3-2: Environmental and Social Regulations Applicable for Project.....	3-5
Table 4-1: Industries and Development in Meghnaghat North Industry Cluster .....	4-4
Table 4-2: Industries and Development in Meghnaghat South Industry Cluster .....	4-9
Table 4-3: Industries and Development in Meghnaghat South-South Industry Cluster.....	4-13
Table 5-1: VEC Screening and Selection .....	5-3
Table 5-2: Indicators & Threshold Value for Assessment of Cumulative Impacts.....	5-22
Table 6-1: Stakeholders Mapping .....	6-3
Table 7-1: Land Use Changes in Spatial Boundary.....	7-2
Table 7-2: Results of Air Quality Modeling for PM <sub>10</sub> .....	7-7
Table 7-3: Predicted 24-Hourly Maximum Ground Level Concentration of PM <sub>10</sub> .....	7-10
Table 7-4: Results of Air Quality Modeling for NO <sub>2</sub> due to Proposed Steel Mill Operation .....	7-12
Table 7-5: Predicted 24-Hourly Maximum Ground Level Concentration of NO <sub>2</sub> .....	7-15
Table 8-1: Cumulative Impact Mitigation Measure.....	8-2
Table 8-2: Monitoring Plan .....	8-6

## LIST OF APPENDIXES

Appendix A: Emission Source.....	A-1
Appendix A-1: Emission Sources for PM <sub>10</sub> .....	A-1
Appendix A-2: Emission Sources for NO <sub>2</sub> .....	A-2
Appendix B: ISOPLETHS.....	B-1
Appendix B-1: Isopleths of 24-Hourly Maximum PM <sub>10</sub> GLC – Proposed Meghna Steel Plant .	B-1
Appendix B-2: Isopleths of 24-Hourly Maximum PM <sub>10</sub> GLC – Existing (Thermal Power Plants) .....	B-2
Appendix B-3: Isopleths of 24-Hourly Maximum PM <sub>10</sub> GLC – Proposed (Thermal Power Plants) .....	B-3
Appendix B-4: Isopleths of 24-Hourly Maximum PM <sub>10</sub> GLC – Proposed and Existing (Thermal Power Plants) .....	B-4
Appendix B-5: Isopleths of 24-Hourly Maximum PM <sub>10</sub> GLC – Proposed Ceramic Industries...	B-5
Appendix B-6: Isopleths of 24-Hourly Maximum PM <sub>10</sub> GLC – Proposed Glass Industry.....	B-6
Appendix B-7: Isopleths of 24-Hourly Maximum PM <sub>10</sub> GLC – Existing PVC Industry .....	B-7
Appendix B-8: Isopleths of 24-Hourly Maximum PM <sub>10</sub> GLC – All Industries (Existing and Proposed TPP, Glass, Ceramic, Steel, PVC).....	B-8
Appendix B-9: Isopleths of 24-Hourly Maximum NO <sub>2</sub> GLC – Proposed Meghna Steel Mill .....	B-9

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Appendix B-10: Isopleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Existing (Thermal Power Plants) ... B-10

Appendix B-11: Isopleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Proposed (Thermal Power Plants) ..... B-11

Appendix B-12: Isopleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Proposed and Existing (Thermal Power Plants) ..... B-12

Appendix B-13: Isopleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Proposed Ceramic Industries B-13

Appendix B-14: Isopleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Proposed Glass Industry ..... B-14

Appendix B-15: Isopleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Existing PVC Industry ..... B-15

Appendix B-16: Isopleths of 24-Hourly Maximum NO<sub>2</sub> GLC – All Industries (Existing and Proposed TPP, Glass, Ceramic, Steel, PVC) ..... B-16

## ACRONYMS AND ABBREVIATIONS

AAQ	Ambient Air Quality
ANL	Ambient Noise Level
AOI	Area of Influence
BEZA	Bangladesh Economic Zone Authority
BNBC	Bangladesh National Building Code
BOD	Biochemical Oxygen Demand
CETP	Central Effluent Treatment Plant
CIA	Cumulative Impact Assessment
COD	Chemical Oxygen Demand
CPRs	Common Property Resources
CSTP	Central Sewage Treatment Plant
CuEZ	Cumilla Economic Zone
dB(A)	A-weighted Decibel
DEM	Digital Elevation Model
DO	Dissolved Oxygen
DOE	Department of Environment
EAF	Electric Arc Furnace
EC	Electrical Conductivity
ECC	Environmental Clearance Certificate
EHS	Environment, Health, and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPC	Engineering, Procurement, and Construction
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FCPS	Fellowship of the College of Bangladesh and Surgeons
HMS	Heavy Melting Steel
HSE	Health, Safety, and Environment
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LC	Least Concern
LPG	Liquefied Petroleum Gas

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

MBBS	Bachelor of Medicine and Bachelor of Surgery
MGI	Meghna Group of Industries
MMTPA	Million Metric Tons Per Annum
MRSML	Meghna Re-Rolling and Steel Mills Ltd.
MS	Mild Steel
NT	Near Threatened
PM	Particulate Matter
PPE	Personnel Protective Equipment
PUC	Project Under Consideration
RCC	Reinforced Cement Concrete
RL	Reduced Level
SPM	Suspended Particulate Matter
SRTM	Shuttle Radar Topography Mission
TDS	Total Dissolved Solids
TOR	Terms of Reference
VECs	Valued Environmental and Social Components
VOC	Volatile Organic Compound
WARPO	Water Resources Planning Organization
WHO	World Health Organization
ZOI	Zone of Influence

## EXECUTIVE SUMMARY

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.

Figure E-1: CIA Guidance Process



Source: IFC Good Practice Handbook for CIA and Management, 2013

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).

## Draft Report

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

- 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 approach 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 CuEZ can continue to build upon as plans for additional development progress.

The cumulative impact assessment of the selected VECs have clearly indicated that there is a level of stress on the VECs not only due to the proposed terminals under PUC but also due to other industries and developmental projects, which were studied. Summary of cumulative impacts are the followings:

- The cumulative impact of land use change in terms of loss of land and wetland is assessed as high and the PUC contribution as low.
- The cumulative impact of air quality in terms of concentration of PM and NO<sub>x</sub> is assessed as high and medium respectively and the PUC contribution as low.
- The cumulative impact of groundwater resources on depletion rate is assessed to be medium and the PUC contribution is low.
- The cumulative impact of surface water quality in terms of concentration of DO, BOD, and toxic metals is assessed as medium the PUC contribution is low.
- The cumulative impact of migratory birds and aquatic bird species is assessed as medium; the PUC contribution is low.
- The cumulative impact of social wellbeing is assessed to be medium and contribution from PUC is low.
- The cumulative impact of community health and safety is assessed to be medium and contribution from PUC is low.
- The cumulative impact of Livelihood (land -based and fisherman) is assessed to be medium and contribution from PUC is low.

In order to reduce further adverse impacts on the VECs as well as to mitigate some of the impacts, which were identified as key differentiators, the following recommendations have been provided for better environmental and social management. The management of cumulative impacts is being proposed at two levels:

- Project Specific: The responsibility for the management of cumulative impacts on the VECs for the PUC will be entirely on project developers.
- Cluster Group Specific: The cumulative impacts on the VECs in the entire CIA spatial could be managed through collaborative efforts from other project developers, local communities, and government and public authorities.

## Draft Report

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

A monitoring plan has been developed for monitoring the measures that have been recommended as part of the CIA. This plan tracks the progress of the program/actions during the implementation phase and accordingly informs agencies that are responsible for implementation / supervision.

Principally the monitoring will entail:

- Collection of data on the implementation of activities and outputs, according to the indicators specified in the recommended action plan;
- Collecting data on the delivery of results and impacts according to the indicators identified in the monitoring framework and evaluation programs to be able to follow an adaptive management approach to initiate any changes (if required) to the programs that have been proposed as part of the CIA Study;

MRSML is therefore encouraged to participate in regular and ongoing cooperation with DOE, CuEZ, 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 CuEZ on the topic of CIA, including future directions of study, monitoring, and collation of information from the different areas, projects, and initiatives in the CuEZ area.

# 1 INTRODUCTION

## 1.1 Project Background

Steel is a basic commodity for all industrial activity and its consumption marks industrial prosperity. The steel industry is a core industry and thus its demand is strongly linked to the overall economic activity of the nation. Bangladesh's steel and re-rolling industry has played a vital role in developing the overall infrastructure of the country. Currently, the demand of the steel industry in Bangladesh is very high. Keeping all these in mind, Meghna Group of Industries (hereinafter referred to as "MGI"), one of the largest and leading conglomerates of Bangladesh, intends to establish a 1.4 million metric tons per annum (MMTPA) re-rolling steel mill at Cumilla Economic Zone (CuEZ), Cumilla in Bangladesh through its subsidiary Meghna Re-Rolling and Steel Mills Ltd. (hereinafter referred to as "MRSML"). Besides the re-rolling capacity, the plant will also have a billet capacity of 0.9 million metric tons per annum (MMTPA). Administratively, the proposed project site falls in Meghna Upazila under the Cumilla District of Bangladesh.

The CuEZ is an upcoming industrial cluster planned for the glass industry, re-rolling and steel mills, RMG and textiles, food processing, vehicle and parts manufacturing, leather goods, plastic articles, machinery and electronic equipment, light engineering, pharmaceuticals, beverage and mineral water, etc. Apart from the CuEZ, there are three other industrial clusters located within a six-kilometer radius of the CuEZ. These are the Meghnaghat North Industrial Cluster, the Meghnaghat South Industrial Cluster, and the Meghnaghat South-South Industrial Cluster (refer to Figure 1.1). There are a number of operating industries in these three clusters, viz., thermal power plants, cement plants, chemical industries, food processing industries, paper mills, textiles, shipyards, and RMG.

Over the course of time, all the existing projects in these industrial clusters are contributing to environmental and social impacts on Valued Environment Components (VECs) like air quality, water quality, aquatic ecology, community health and safety, socioeconomics, etc.

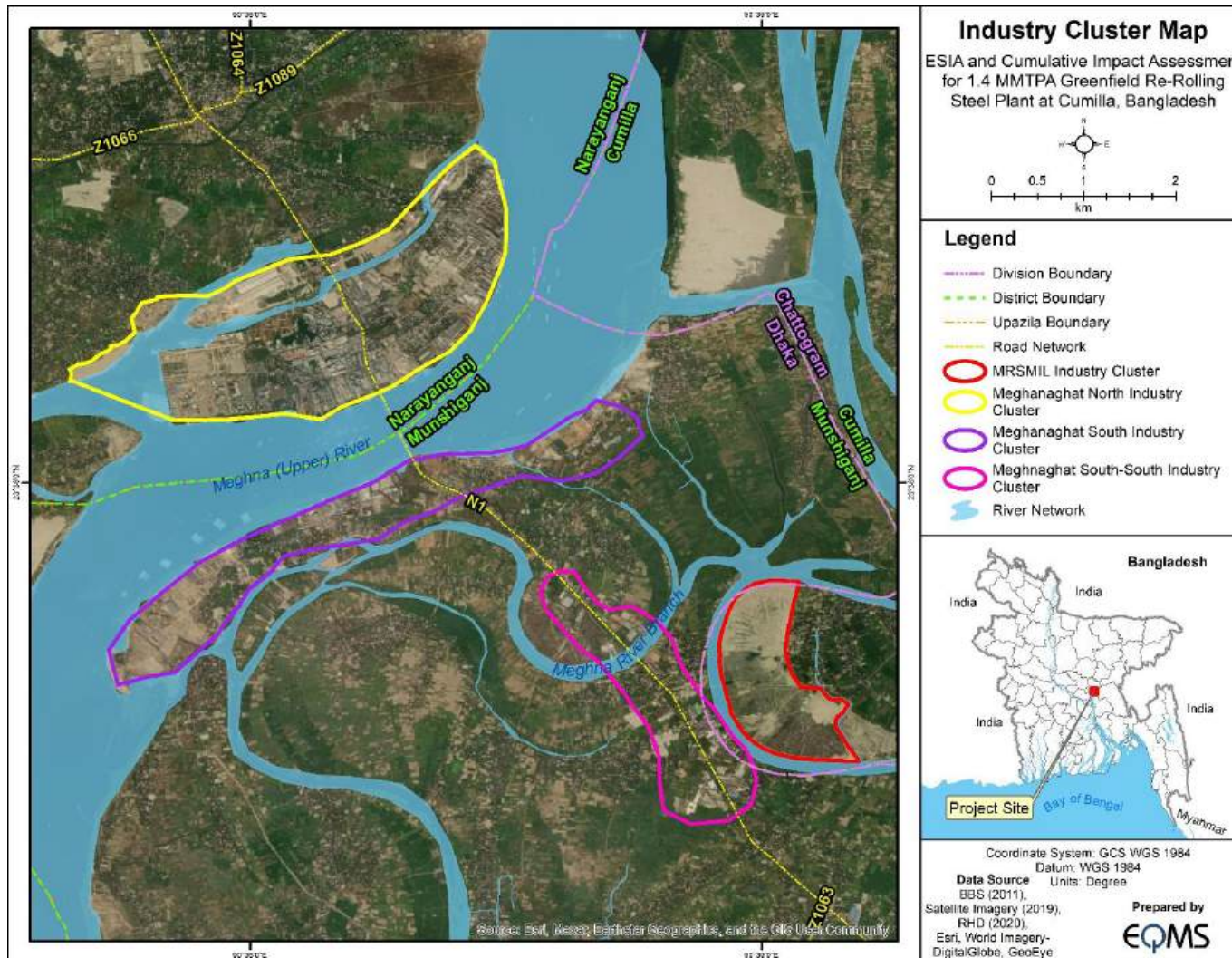
Over the years, project-level Environmental Impact Assessments (EIAs) studies have been carried out in the region before the development of industrial or infrastructural projects, confirming the regulatory requirements in Bangladesh. These assessments have restricted themselves to the project being studied as standalone operations without any consideration for surrounding projects or developmental activities. However, a cumulative impact assessment (CIA), considering all the existing and proposed industries and other development activities has not been conducted. Power Cell, Power Division Government of Bangladesh had conducted CIA for Shiddhirganj and Meghnaghat in 2016. However, only the Meghnaghat North and South Industrial Clusters have been considered; the Meghnaghat South-South Industrial Cluster and CuEZ have not been considered.

Therefore, in view of the situation prevailing in these industrial clusters, it is important to understand the cumulative impact of the existing industries and proposed industrial projects, developmental activities in this region that are in operation, and those that have been planned in the future in these industrial clusters on a set of key VECs. Therefore, MRSML has commissioned this cumulative impact assessment (CIA) study for the proposed re-rolling steel mill located inside the CuEZ.

MRSML has engaged EQMS Consulting Limited, Bangladesh to undertake a Cumulative Impact Assessment (CIA) for the proposed re-rolling steel mill located inside of the CuEZ.

The CIA study has been carried out by following the prevailing regulatory framework of the Government of Bangladesh as well as IFC Performance Standards, and IFC's Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for Private Sector in Emerging Markets (IFC 2013).

Figure 1-1: Industrial Cluster Location Map



## 1.2 Objectives of the Study

Based on the scope specified by MRSML in the Terms of Reference (ToR), the main objective of this CIA was to identify the cumulative impacts of implementation of the proposed project in the context of previous, existing, and reasonably foreseeable future development in the surrounding area of CuEZ. The specific objectives of the CIA study include the following:

- Delineate the spatial and temporal boundary for cumulative impact assessment.
- Identify the valued environmental and social components (VECs) that could be impacted cumulatively in the study area potentially affected by the proposed project, considering input from relevant stakeholders and potential project-affected communities through the consultation process.
- Identify and mapping other existing and planned projects and external environmental and social drivers that could cumulatively impact VECs.
- Stakeholder consultation for identification of VEC and formulation of recommendations towards the management of cumulative impacts.
- Assessment of potential cumulative impacts on VECs, considering the proposed project and other identified projects (existing and planned) and external drivers in the region, identifying the contribution of the project to the cumulative impacts.
- Recommend a management framework for the integrated management of potential cumulative impacts.

## 1.3 Context of CIA

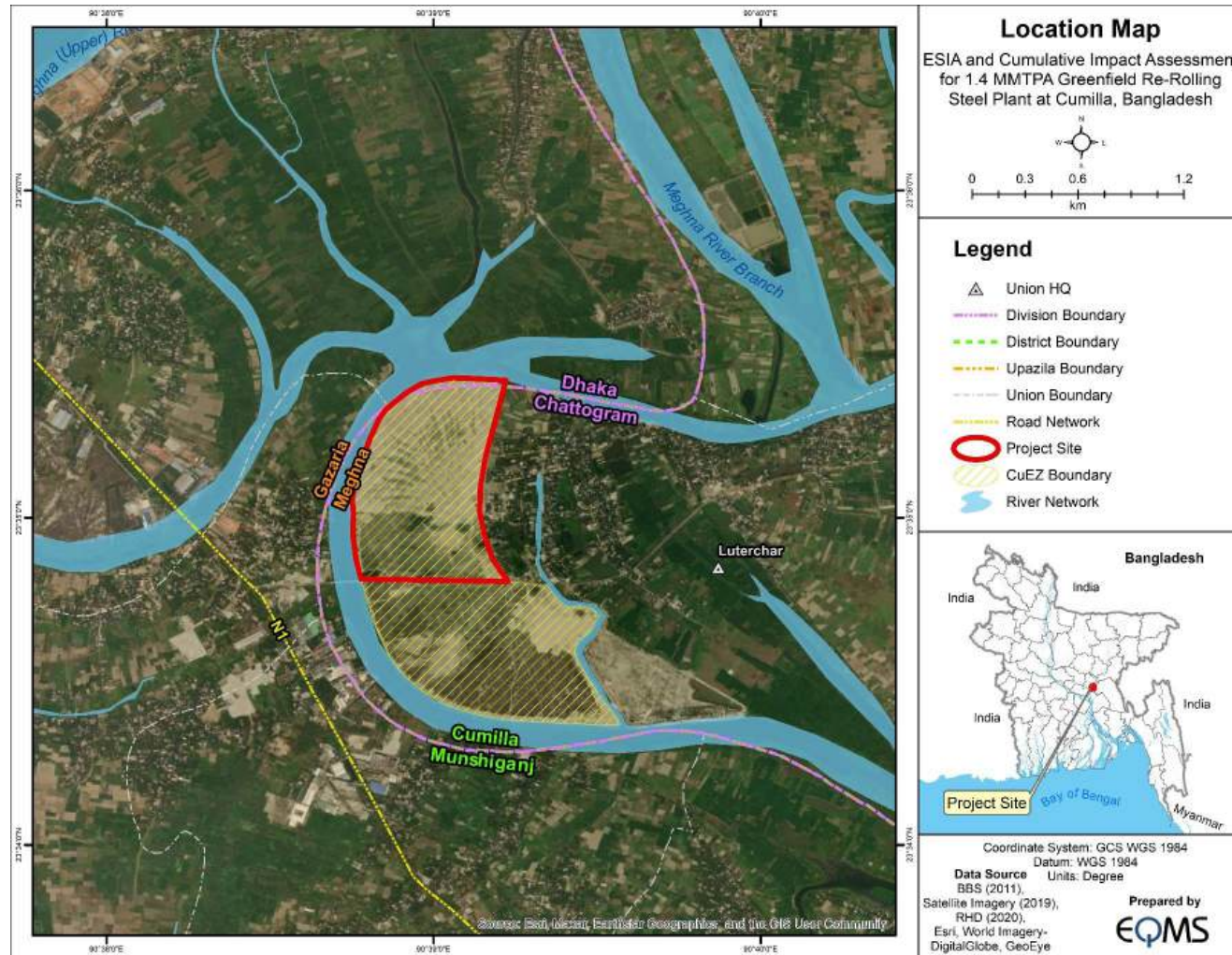
This CIA used secondary baseline data that were collected from earlier prepared environmental assessment reports in the study area, knowledge gained from literature review, primary baseline survey as part of MRSML's Environmental and Social Impact Assessment (ESIA), observations, and assessment as part of meetings and site visits conducted by the Consultant. As per the CuEZ project understanding and in consultation with MRSML, the Consultant has validated the data present in various existing environmental assessments and other available reports prepared under CuEZ and other projects to ensure the accuracy and quality of data. The collected data were cross-checked and analyzed to meet the standards of quality, accuracy, and completeness, and conduct a primary baseline survey. The primary goal of the data validation was to prevent inaccurate, incomplete, or inconsistent data from being collected (secondary sources), which can lead to errors and problems in various analyses and decisions.

This CIA identifies mitigation and enhancements that should be put in place by MRSML as part of their development to prevent or reduce adverse cumulative impacts. Because of the complex and long-term nature of the strategic development of the CuEZ, it also identifies mitigation and enhancement measures that fall outside of MRSML's immediate influence and responsibility. These measures include those that should be implemented by organizations such as MRSML and/or other proponents involved in the development and operation of facilities, initiatives, and programmes of work in CuEZ.

## 1.4 Proposed Project

MRSML proposed to construct a 1.4 million metric tons per year (MMTPA) steel manufacturing unit in CuEZ. The proposed project is considered as a project under consideration (PUC) for the CIA study. The proposed project is located in Sonachar Mauza, Luterchar Union, Meghna Upazila, Cumilla District of Bangladesh. The national Dhaka-Chattogram Highway (N1) passes along the western boundary of the project site, and it is just 1 km away from the project site. Also, the Meghna-Homna Road connects the CuEZ. Besides, the project area is close to the Meghna Ferry Ghat (away from 4.35 km) and the Daunkandi Launch Terminal (away from almost 8 km). Hazrat Shah Jalal International Airport is approximately 48.8 km away from the project site and can be accessed in two hours by the national highway. Chattogram Seaport is the nearest seaport and is approximately 227 km by road. A location map of the project site is shown in Figure 1-2.

Figure 1-2: Location of MRSML



Source: MRSML, April 2024

## 1.5 Limitation

The CIA study has some limitations:

- CIA includes a discussion of the cumulative impacts of the steel mill project and surrounding projects in the region based on information received from MRSML. Information on associated facilities of the re-rolling steel mill project (wharf, electricity, substation, gas transmission lines, access roads, central sewage treatment plant, central effluent treatment plant, etc.) is depicted based on available data received from MRSML.
- Baseline information within available environmental assessment reports used for the assessment. Data available within the environmental assessment reports and in the public domain were triangulated with stakeholder perceptions at a regional level to compile the environmental, ecological, and social conditions of identified VECs. Additional primary data collection on environmental, ecological, and social parameters was also undertaken as part of the ESIA.
- Available maps and related nonspatial data were collected and collated from MRSML, different government agencies, and stakeholders and then utilized for preparing GIS layers.
- Incomplete information about other projects and activities (information is not available in the public domain).

## 1.6 Structure of the Report

The CIA report is structured as follows:

- **Chapter 1: Introduction:** provides an objective of the study, context, and limitations.
- **Chapter 2: Approach and Methodology:** identification of potential VECs and defining the spatial and temporal boundaries for CIA.
- **Chapter 3: Administrative framework:** Applicable national regulations and international guidelines to the project
- **Chapter 4: Development in industry clusters:** describes the baseline condition in relation to all identified VECs.
- **Chapter 5: Valued environmental and Social Components:** VEC selection for cumulative impact assessment, selection of indicator and threshold values for assessment of VEC impact.
- **Chapter 6: Stakeholder Engagement:** Identification of stakeholders, stakeholder mapping, and consultation brief.
- **Chapter 7: Assessment of Cumulative Impacts:** Describing the baseline condition of selected VEC, cumulative impact assessment of selected VEC based on indicator and threshold levels for each VEC.
- **Chapter 8: Recommendations and conclusion:** recommendations formulated considering short and long-term environmental planning considering proposed/planned and anticipated developments within the study area.

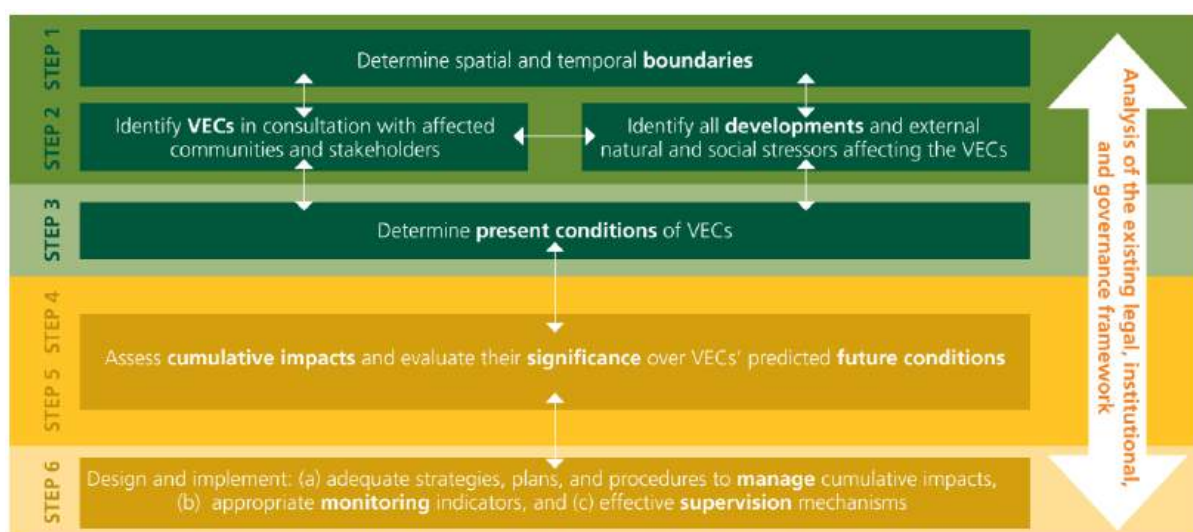
## 2 APPROACH AND METHODOLOGY

### 2.1 Approach

The IFC ‘Good Practice Handbook for CIA and Management’ (IFC, 2013) provides a practical and preliminary six-step approach (**Figure 2-1**) for developers in emerging markets to conduct a CIA that meets such requirements.

The proposed approach recognizes that, especially in emerging markets, the many challenges associated with managing a good CIA process include a lack of basic baseline data, uncertainty associated with anticipated developments, limited government capacity, and absence of strategic regional, sectoral, or integrated resource planning schemes.

**Figure 2-1: IFC Good Practice Handbook CIA Six-Step Approach**



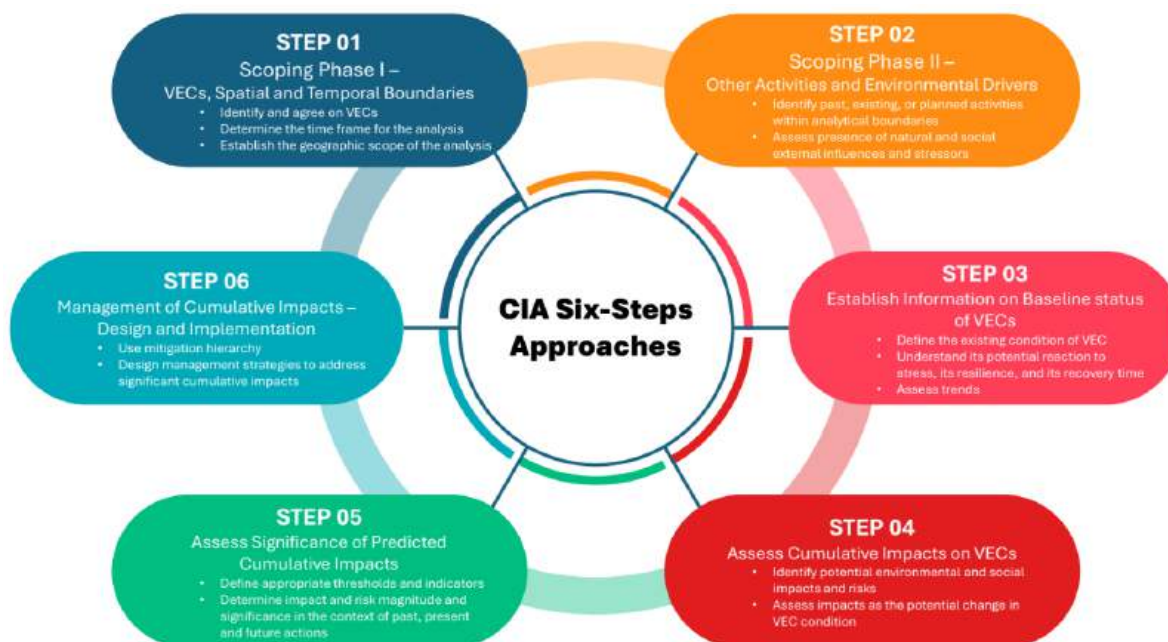
Source: IFC Good Practice Handbook for CIA and Management, 2013

### 2.2 Methodology

The methodology in this CIA has been based on the principles of the IFC guidance, which sets out a six-step structure (i.e., the foundation) for conducting a comprehensive CIA, with the objectives from each step presented in **Figure 2-2**. 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. The assessment was adapted and modified throughout the course of compiling the CIA.

The report’s sections which follow present the findings of the six steps for the assessment of the cumulative impacts upon the relevant VECs of the Project.

Figure 2-2: CIA Guidance Process



Source: IFC Good Practice Handbook for CIA and Management, 2013

## 2.2.1 CIA Scoping

The scoping steps 1 and 2 comprise the identification of the VECs to be studied in the assessment and determination of the spatial and temporal boundaries of each VEC. VECs were identified by the CIA team with the participation of stakeholders.

The present and proposed industrial projects and developmental projects were identified from the review of documents prepared by MRSML and consultation with the CuEZ authority. External activities and natural and social stressors were identified by the CIA team through a review of secondary data and from knowledge of the regional context gained through the site reconnaissance visit and consultation with the MRSML team.

### 2.2.1.1 Identifying VECs

Valued Environmental and Social Components (VECs) are defined as fundamental elements of the physical, biological, or socio-economic environment that are likely to be the most sensitive receptors to cumulative impacts of PUC, other projects in combination with PUC, and any other associated stressors.

A set of preliminary VECs have been identified through a review of the individual project level EIA/ESIA's, outcomes of stakeholder consultations and site-based observations and reviews on impacts to environmental and social components that could be cumulatively impacted by the PUC, other developmental projects and natural & anthropogenic drivers. The VECs have been shortlisted such that they can be primarily linked to cumulative impacts that may be caused by the construction and operation phase of the projects, while also taking into account other past, present, and future developments within the identified spatial boundary as also other stressors which would be at play. However, some residual construction-related impacts viz. habitat loss, and loss of livelihoods, if not mitigated, may also result in cumulative impacts on environmental and social components.

In the preliminary VEC selection process, project-level EIA and ESIA conducted in this region have been considered. The following VECs have not been considered for preliminary VECs:

*Aquatic biodiversity*: 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).

During the 1.4 MMTPA Greenfield Re-Rolling Steel Plant ESIA study period 2024, 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 the Ganges River Dolphin in the project adjacent branch of the Meghna River. Also, consultation with the Upazila Fisheries Officer of Meghna Upazila confirms the absence of the Ganges River Dolphin in the project's adjacent river (Meghna River branch) area. The Key Informant Interviews (KIIs) were conducted with forest department officials, NGOs, and university professors to assess the likelihood of the Aol being a suitable dolphin habitat. Each of them also confirmed that due to the lack of suitable habitat in the Aol, the likelihood of the presence of this species seems to be very low. Considering, this protected aquatic biodiversity has not been considered for preliminary VEC.

The following candidate VECs were identified for the CIA study:

- Land environment
  - Land use
  - Soil and sediment quality
- Topography & Drainage
- Air environment (air quality)
- Acoustic environment (noise quality)
- Water Environment
  - Surface water resources
  - Groundwater resources
  - Surface water quality
  - Groundwater quality
- Biodiversity
  - Aquatic and Migratory birds
- Socio-economy
  - Livelihood (land-based & fisherman)
  - Community Health & Safety
  - Social well-being

VEC screening process was conducted to determine which of the preliminary VECs would be included in the CIA. Findings from the VEC screening process are presented in **Table 5-1**.

The first stage of the CIA identified potential VECs and defined the spatial and temporal boundaries. It entailed defining which VECs needed to be included within the CIA considering the characteristics of the Project and the prevailing environmental and social conditions within areas that are potentially impacted by the Project. The VECs identification process has been assisted through the completion of engagement activities with relevant stakeholders.

### **2.2.1.2 Identification of Source of Impacts**

The past and present projects or activities with the potential to cause cumulative impacts on VECs have been identified in the scoping stage. An analysis has then been undertaken which aims to define those development projects that are scoped into the CIA given their potential ability to generate a cumulative impact associated with the Project (due to temporal/spatial interactions with the Project).

## Past and Present Activities

As discussed in Section 1.1 of this report, there are four industrial clusters namely, Cumilla Economic Zone, Meghnaghat North Industrial Cluster, the Meghnaghat South Industrial Cluster, and the Meghnaghat South-South Industrial Cluster. There are under-construction industries in the CuEZ or planned for future development. However, in the other three industrial clusters, there are a number of operating industries like thermal power plants, cement plants, chemical industries, food processing industries, paper mills, textiles, shipyards, and textile and RMG.

The Dhaka-Chattogram Highway (N1) is the major road passing through these industrial clusters, and this has been used as a major transport route for these industries, as well as the Meghna River for river transport. All four industrial clusters are located in rural settings; however, due to industrial activities, population density has increased considerably; however, the basic amenities (water supply, sewage treatment, municipal solid waste disposal, housing, etc.) have not been upgraded accordingly. Industry cluster-wise industrial activities and development activities in the region have been discussed in **Section 4** of this report.

## Reasonably Foreseeable Future Actions (RFFAs)

The glass industry, re-rolling and steel mills, RMG and textiles, food processing, vehicle and parts manufacturing, leather goods, plastic articles, machinery and electronic equipment, light engineering, pharmaceuticals, beverage and mineral water, etc. have been planned in the CuEZ. New industries are also planned in all three industrial clusters. The details have been provided in **Section 4**.

## External Stressors or Drivers

Human activities and natural drivers that exert an influence on VEC conditions have been identified and characterized based on existing knowledge and secondary information available in the public domain.

*Industrialization:* There is no settlement in the CuEZ, the nearby settlements are rural areas. Employees and workers of the upcoming industries (during construction and operational stage) are likely to stay in the nearby area. Industrialization will increase the consumption of natural resources like the use of water, generate sewage and municipal solid wastes. Presently, there is no water supply and sewage treatment plant, or municipal solid waste disposal site.

*Natural Stressors:* Natural influences and environmental drivers include those linked to climate change. These include floods, cyclones, etc. (refer to *section 4.4*). comprise major stressors that reportedly affect the surface water resource and aquatic biodiversity, livelihood, physical infrastructure, and properties in the CuEZ.

### 2.2.1.3 Identification of Stakeholders

The stakeholder engagement process typically refers to the efforts made to understand and involve identified stakeholders to find solutions to shared challenges within the wider socio-economic and ecological context. The process essential begins with the identification of relevant stakeholders impacting or being impacted by the project.

The potential stakeholders are mapped as part of CIA scoping and are listed in Table 6-1. The identified stakeholders that were found to be relevant to the CIA on the basis of the information review undertaken and the guidance provided by IFC's expectations on identification, i.e., stakeholders that represent one or more entities that:

- Directly benefit from the PUCs;
- Are adversely affected by the PUCs;
- Directly interact with or oversee environmental and social components that overlap with the PUCs; and
- Indirectly influence or regulate the condition of environmental and social components.

#### 2.2.1.4 Determining Spatial Boundaries

The spatial boundary demarcation for the CIA has been done based on the location of projects and their likely impacts on potential VECs within their Area of Influence (AOI). Special attention was given to the impacts caused by the PUC activities, viz., construction and operation of the plant that could exacerbate the impacts of other projects in the vicinity. The CIA spatial boundary considers a combination of these impacts and extends beyond the PUC's area of influence, keeping the likely extent of cumulative impacts in mind.

As discussed in Section 1.1, there are three other industrial clusters located within a 6-kilometer radius of the CuEZ. The existing air-polluting industries, like gas-based thermal power plants and cement plants, are mostly located in the Meghnaghat North Industrial Cluster and a few in the Meghnaghat South Cluster. The PUC has the potential to have a negative impact on ambient air quality during the construction and operational stages; therefore, emissions from the PUC may have a cumulative impact on the airshed of the area. PUC is likely to discharge the treated wastewater into the Meghana branch channel, which is ultimately connected with the Meghna River; the other industries in three industrial clusters are also directly or indirectly discharging into the Megan River; therefore, surface water may have a cumulative impact. There are a number of villages located in the region, and community health and safety may have a cumulative impact due to environmental pollution from these industries. Considering the above, CuEZ and the other three industrial clusters have been considered for the CIA study. **Table 2.1** below provides a shortlisting of the identified VECs along with the delineated spatial boundaries:

**Table 2-1: VEC-wise Spatial Boundary for CIA Study**

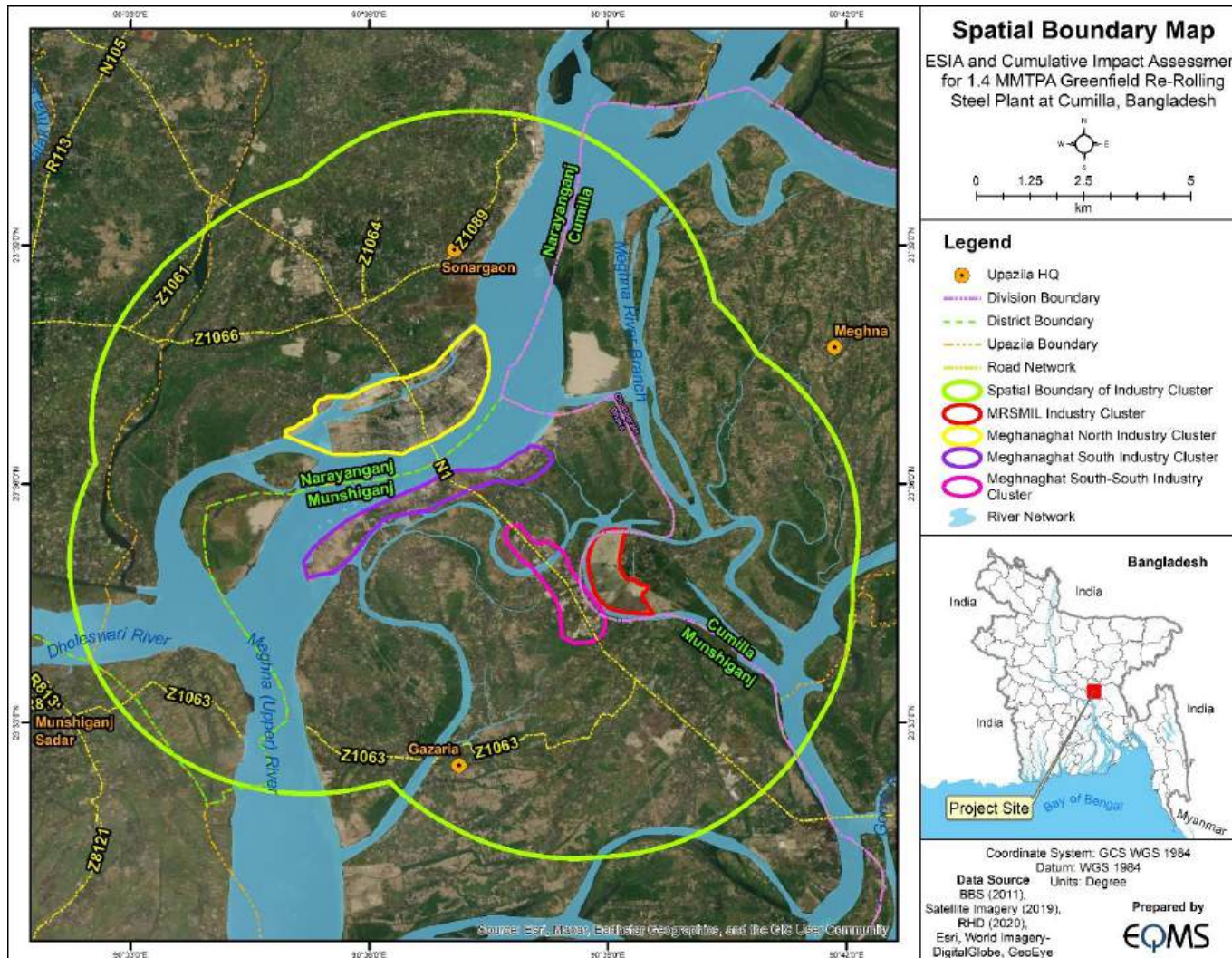
Candidate VECs	Consideration for spatial boundary	Spatial boundary
Land Environment (Land use)	PUC will be constructed in CuEZ, which was developed by the Bangladesh Economic Zones Authority (BEZA). The entire CuEZ area was developed on agricultural land. The land use changes also occurred in the other three industrial clusters—either agricultural or river island—over time. Potential land use change is localized within the project site or its immediate vicinity	Spatial boundary for this VEC is a 2.0 km buffer from the four industrial clusters.
Land Environment (soil and sediment quality)	PUC will be constructed on CuEZ land, which was agricultural land. The construction activity has the potential to have an impact on the topsoil, if not scraped before land development and stored for future use. The hazardous waste generated during the construction and operational stages of the proper. If not properly managed (stored and disposed), the potential will also have an impact on soil and sediment quality. There is no common hazardous waste landfill site in these industrial clusters or in Bangladesh; hazardous waste generated from these industries is generally disposed of through a third-party vendor for recycling, reuse, or final disposal. Improper handling of these wastes by the operating industry has the potential to have a localized impact on soil and sediment quality	Spatial boundary for this VEC is a 1.0 km buffer from the four industrial clusters.
Air environment (Air quality)	The VEC may be impacted by the construction of PUCs and process emissions (stack and fugitive) during the operational stage. There are operating air-polluting industries like gas- and oil-based thermal power plants, cement plants, and steel plants in three industrial clusters. The vehicular emissions from road and river traffic also contributed to air pollution in the airshed. The air emissions from the above-mentioned activities have the potential to have a negative impact on air quality, and the impact will be at the regional level.	Spatial boundary for this VEC is a 5.0 km buffer from the four industrial clusters.
Acoustic environment (noise quality)	The VEC may be impacted by the construction and operation of PUCs; however, the potential impact is likely to be localized considering the project-level engineering control measures and additional mitigation measures proposed in ESIA. The other operating industries in the three clusters also have a negative impact on noise levels. Potential cumulative noise quality impacts may be localized within the project site or its immediate vicinity.	Spatial boundary for this VEC is a 1.0 km buffer from the four industrial clusters.
Water environment (surface and groundwater resources)	The VEC may be impacted by the PUC during construction stage (construction water and domestic use) and operation stage (cooling water and domestic use) activities. The required cooling water will be sourced from the surface water and domestic water from the groundwater. The other operating industries are also sourcing the cooling water from the river and domestic and process water from groundwater. The local people in the villages are also dependent on the groundwater	Spatial boundary for this VEC is a 5.0 km buffer from the four industrial clusters.

Candidate VECs	Consideration for spatial boundary	Spatial boundary
	for domestic use and drinking water. PUC and other industries have a potential impact on water resources and the impact may be at the regional level.	
Water environment (surface and groundwater quality)	The VEC may be impacted by the PUC during construction stage (accidental discharge of untreated surface runoff and sewage) and operation stage (accidental discharge of untreated cooling blowdown water and sewage) activities. There are a number of water-polluting industries, like paper mills, chemical industries, food processing, and textile industries, in three industrial clusters. There are once-through cooling system power plants, and cooling blowdown water is also discharged in the Meghna River or its branches. The above-mentioned activities have the potential to have a negative cumulative impact on surface water quality; the impact may be at the regional level.	The spatial boundary for this VEC is 1 km upstream and 3 km downstream of the Meghna River.
Biodiversity (Aquatic & Migratory species)	<p>There was no protected ecological habitat (National Park, Wildlife Sanctuary) or conservation importance habitat (Important Bird Area, Ramsar site) in the industry clusters or 10 km radius area of the industry cluster. Endangered, threatened, or vulnerable mammalian or avian fauna was not reported in the 10-kilometer radius area of the industry cluster. Eight migratory bird species were reported in a 10-kilometer radius area of the industry cluster, of which Grey-headed Lapwing (<i>Vanellus cinereus</i>) was observed in large numbers, especially in the char-area of the river, marshy areas, and near inland water bodies.</p> <p>The VEC may be impacted by the PUCs due to the discharge of wastewater and noise during the construction and operation phases of the projects. Land use change- conversion of marshy and wetlands to industrial and residential land causes the degradation of habitat. The river quality may be impacted by other industrial projects, as discussed in the water quality VEC section. The above-mentioned interactions potentially have a negative impact on migratory birds' habitats.</p>	The spatial boundary for this VEC is a 5 km radius area of industry clusters.
Socio-economy (land-based and Fishery)	<p>Land-based livelihood- especially economic displacement of cultivator agriculture workforce in the region.</p> <p>The Meghna River is traditionally used for commercial fishing by the local fishermen. The abundance of fish in the river may be impacted due to the degradation of surface water quality, as discussed in the water quality VEC section. The potential cumulative impact is also at the regional level.</p>	<p>The spatial boundary for land-based livelihood is 5 km around the industry cluster.</p> <p>The spatial boundary for river use and river-dependent livelihoods is also the same as that considered for surface water quality.</p>

Candidate VECs	Consideration for spatial boundary	Spatial boundary
Community Health & Safety	Community health and safety may be impacted by the PUC, other industrial projects, and developmental activities due to degradation of environmental quality like air and water quality. The industrialization also caused the migration of the workforce, which has the potential to have a negative impact on community health and safety due to communicable diseases.	Spatial boundary for this VEC is a 5.0 km buffer from the four industrial clusters.
Social well beings	There is no industrial township or planned residential area in these industrial clusters. It was observed that low-cost housing, civic amenities, and infrastructure are not adequate. The existing and proposed industries may have a potential impact on social well-being.	Spatial boundary for this VEC is a 5.0 km buffer from the four industrial clusters.

The spatial boundary map for the CIA study has been presented in **Figure 2.3**.

Figure 2-3: CIA Spatial Boundary Map



### 2.2.1.5 Determining Temporal Boundaries

Temporal delineation for a CIA is a challenge due to the inherent uncertainty about potential future projects and activities. The following are the basic assumptions to determine temporal boundaries for the assessment according to the IFC CIA Guidelines.

- a. The time frame expected for the complete life cycle of the proposed development (including construction, operation, and decommissioning)
- b. The expected time frame for the potential effects of the proposed development can extend beyond (a).
- c. The most conservative time frame is between (a) and (b).
- d. Use of professional judgment to balance between overestimating and underestimating, and make sure to document the justification or rationale.
- e. Exclusion of future actions if (i) they are outside the geographical boundary, (ii) they do not affect VECs, or (iii) their inclusion cannot be supported by technical or scientific evidence.

Most of the projects identified within the spatial boundary are existing boundaries in the Meghnaghat North Industrial Cluster, the Meghnaghat South Industrial Cluster, and the Meghnaghat South-South Industrial Cluster and proposed industries in CuEZ and other industrial clusters. The temporal boundaries for the current CIA have been established keeping in mind the following:

- **Life cycle of existing projects and foreseeable planned projects:** At least a 20-year period for the current project lifecycle, which includes 5 years in the foreseeable future for proposed industrial development on CuEZ, the 10-year period represents a feasible and appropriate timeline for identifying projects to be considered for the CIA.
- **Climate change and anthropogenic factors:** anticipated timescales for selected other external factors (e.g., climate change) that may impact all selected VEC conditions beyond the project lifecycle and stretch to a 100-year period. These consider the contribution of the natural driving forces of long-term climate cycles and anthropological activities that may impact hydrological factors such as water availability, floods, etc.

The temporal boundaries for the CIA study have been considered for 10 years, considering the foreseeable projects planned in all four industrial clusters.

Based on the CIA scoping, further assessment has been conducted, focusing on the present condition of VECs, cumulative impact assessment, and management measures. The methodology has been discussed in the following sections.

### 2.2.2 Determining Present Conditions of VECs

Defining the baseline characteristics of VECs is an important stage in the whole CIA process, as this identifies their sensitivity to change. The purpose of this task was to define the existing condition of VECs, understand potential interaction with development influences and stressors. Available relevant baseline data were gathered from an extensive review of secondary documents (available IEE/EIA/ESIA/EMP reports of ongoing and proposed projects and associated facilities) and primary surveys for the identified VECs as part of the ESIA. Cause-effect (Network) diagrams were also developed to clearly understand the interactions between the key VECs and the developmental stressors (refer to **Figure 5.2**).

### 2.2.3 Assess Cumulative Impacts on VECs

Assessing the cumulative impact on the screened-in VECs was done for the identification of indicators (linked to the baseline conditions of the VECs) and thresholds (indicating vulnerability that may lead to an adverse impact) and thereafter assessing significance. The considerations for the development of indicators were conducted keeping in mind:

- Representation of VECs;
- Measurable based on some temporal data availability; and
- Understood by the decision makers and other key stakeholders.

Threshold levels for the indicators have been developed to assess the significance of cumulative impacts on VECs. The threshold level for an indicator has considered any national regulatory standards of or comparison with previous studies as part of different ESIA's in the area. This approach is based on certain exemplary socio-economic indicators, discussed in *Section 5.3* of the IFC GPH on CIA (2013) to reflect cumulative impacts over selected VECs. These indicators and thresholds have estimated potential impact on the vulnerability, and/or risk to the sustainability, of the VECs assessed.

### 2.2.3.1 Assessment of Cumulative Impacts on VECs

The significance of cumulative impact will be determined based on the criteria set below.

**Table 2-2: Impact Significance Definition**

High	VEC would experience changes that would likely exceed its range of tolerance/resilience within the spatial and temporal boundaries considered and the viability of the VEC would be threatened.
Substantial	VEC would experience changes beyond natural variation, but within its range of tolerance/resilience within the spatial and temporal boundaries considered; the viability of VEC will not be threatened.
Moderate	VEC would experience noticeable changes but within natural variations within the spatial and temporal boundaries considered.
Negligible	VEC would not experience noticeable changes within the spatial and temporal boundaries considered.

### 2.2.4 Management of Cumulative Impacts – Design and Implementation

Many of the mitigation measures were identified to apply for the mitigation of cumulative impacts. However, it was also recognized that the CIA identified potential cumulative impacts of Moderate or Major significance, which may require additional mitigation or management actions (or monitoring) beyond those that have been developed for the proposed project-induced impacts as reported within the ESIA report.

### 3 ADMINISTRATIVE FRAMEWORK

This section provides an overview of the existing legal, institutional, governance, and planning framework, as it pertains to CIAs for the MRSML Re-Rolling Steel Plant project in order to identify existing legal instruments, precedents, and/or initiatives to review towards management of cumulative impacts in Bangladesh. The review attempts to bring together the Country's environmental and social policies, regulations, and International Finance Corporation (IFC) performance standards (PS) that could be relevant to the implementation of PUC.

#### 3.1 IFC Performance Standards (PS) 2012

The IFC Performance Standards, 2012 is widely followed by most international lenders, who prefer their projects/invests to be consistent with the requirements of the performance standards. The IFC PSs offer a framework for understanding and managing environmental and social risks for high-profile, complex, international, or potentially high-impact projects. The IFC Performance Standards help IFC and its clients manage and improve their environmental and social performance through an outcomes-based approach and also provide a solid base from which clients may increase the sustainability of their business operations. IFC's Performance Standards sets out the policy objectives, scope, risk management, and principles for eight key Environmental and Social Sustainability areas:

- a. Risk Management,
- b. Labour,
- c. Resource Efficiency,
- d. Community,
- e. Land Resettlement,
- f. Biodiversity,
- g. Indigenous People, and
- h. Cultural Heritage

##### 3.1.1 Reference Framework and their Applicability

Based on the review of the Project facility and the corresponding operational details, the following IFC Performance Standards (2012) are found to be applicable to the Project in the current scenario.

**Table 3-1: IFC Performance Standards**

IFC PS	Description	Applicability/relevance to the Project
PS 1	<p><i>Assessment and Management of Environmental and Social Risks and Impacts</i></p> <p>This PS aims to assess the existing social and environmental management systems and to identify the gaps with respect to their functioning, existence, and implementation of an environmental and social management plan (ESMP), a defined EHS Policy, organization chart with defined roles and responsibilities, risk identification and management procedures as well as processes like stakeholder engagement and grievance management</p>	<p>Applicable</p> <p>Considering the proposed project activity (re-rolling steel plant, using scrap iron). It is essential to have a defined mechanism towards the assessment and management of associated environmental and social risks and impacts. These E&amp;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</p>

IFC PS	Description	Applicability/relevance to the Project
		Ltd. (MRSML) also needs to develop and implement an Environmental and Social Management Plan to manage the risks associated with project operations.
PS 2	<p><u><i>Labour and Working Conditions</i></u></p> <p>This PS is guided by a number of international conventions and instruments on labor and workers' rights. It recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by the protection of the fundamental rights of workers. The PS covers the following themes: human resource policy and management, workers' organization, non-discrimination and equal opportunity, retrenchment, protecting the workforce, and occupational health and safety. The requirements set out in this PS have been in part guided by a number of international conventions and instruments.</p>	<p>Applicable</p> <p>The EPC and OM contractors deputed thereunder will be deploying their own and/or contracted workforce at the project sites during the construction and operation phases of the project, wherein labor and working conditions need to be ensured by the contractor. The MRSML shall not make employment decisions on the basis of personal characteristics such as gender, race, nationality, ethnicity, social and indigenous origin, religion or belief, disability, age, or sexual orientation.</p> <p>Also, labor in-migration may lead to the development of labor camps or workers living in rented accommodation in the local area, which may have potential impacts on local resources, a potential rise in gender-based violence (GBV), the possibility of the spread of vector-borne and communicable diseases, and potential risks for local safety and security due to potential conflict between the local community and migrant workers. Thus, ensuring alignment with PS 2 is required for the project.</p>
PS 3	<p><u><i>Resource Efficiency and Pollution Prevention</i></u></p> <p>This PS-3 focuses on increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention and GHG emission avoidance and mitigation technologies and practices have become</p>	<p>Applicable</p> <p>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.</p>

IFC PS	Description	Applicability/relevance to the Project
	more accessible and achievable in virtually all parts of the world.	
PS 4	<p><b>Community Health, Safety, and Security</b></p> <p>This PS-4 requires due diligence to anticipate and avoid adverse impacts on the health and safety of the affected community during the project life from both routine and non-routine circumstances. It also requires ensuring that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the affected Communities. Key areas of alignment screened under PS-4 include infrastructure/equipment safety, hazardous material safety, natural resource issues, exposure to disease, emergency preparedness and response, and security personnel requirements.</p>	<p>Applicable</p> <p>The construction and operational phases of the project may lead to surrounding community health, safety, and security-related issues, possibly due to air and noise emissions, surface and groundwater pollution, and traffic movement. Thus, ensuring alignment with PS 4 will be relevant to the project activity.</p>
PS 5	<p><b>Land Acquisition and Involuntary Resettlement</b></p> <p>PS-5 requires project proponents to anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use. The key themes covered under this are compensation and benefits for displaced persons, consultation and grievance mechanisms, resettlement planning and implementation, physical displacement, and economic displacement. The PS-5 also prescribes private sector responsibility to supplement government actions and bridge the gap between government-assigned entitlements and procedures and the requirements of PS-5.</p>	<p>Not applicable</p> <p>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 and economic displacement were taken place for the proposed project. Thus, the provision of PS 5 will not be applicable for the proposed project</p>
PS 6	<p><b>Biodiversity Conservation and Sustainable Management of Living Natural Resources</b></p> <p>The requirements of this Performance Standard are applied to Project (i) located in modified, natural, and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant</p>	<p>Not Applicable</p> <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.</p>

IFC PS	Description	Applicability/relevance to the Project
	influence; or (iii) that include the production of living natural resources (e.g., agriculture, animal husbandry, fisheries, forestry). PS-6 screens relevant threats to biodiversity and ecosystem services, especially focusing on habitat loss, degradation and fragmentation, invasive alien species, overexploitation, hydrological changes, nutrient loading, and pollution. The key themes covered under PS-6 are: natural habitat, critical habitat, legally protected areas, international introduction of alien species, and living natural resources (natural and plantation forest, aquatic resources, etc.) are sustainably managed.	
PS 7	<p><u>Indigenous Peoples</u></p> <p>This Performance Standard applies to communities or groups of Indigenous Peoples who maintain a collective attachment, i.e., whose identity as a group or community is linked, to distinct habitats or ancestral territories and the natural resources therein. PS-7 endeavor to ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. Key themes covered under PS-7 are avoidance of adverse impacts, consultation and informed participation, impacts on traditional or customary lands under use, relocation of Ips from traditional or customary lands, and cultural resources.</p>	<p>Not Applicable</p> <p>This Performance Standard is not applicable to the Project Area. Based on the information provided, the project does not trigger any impact on traditional land, ancestral domain, or critical cultural heritage of any communities that are identified as Indigenous Peoples. Thus PS 7 will not be applicable for the Project. Moreover, as per BBS 2011 population data for the Meghnaghat industrial area located under Union Parishads, the ethnic population (Barmon, Coach, Garo, and others) only constitutes 0.82% of the overall population and is a part of the mainstream urban population.</p>
PS 8	<p><u>Cultural Heritage</u></p> <p>For the purposes of PS-8, cultural heritage refers to (i) tangible forms of cultural heritage; (ii) unique natural features or tangible objects that embody cultural values; and (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes. The requirements of PS-8 apply to cultural heritage regardless of whether or not it has been legally protected or previously disturbed.</p>	<p>Not Applicable</p> <p>Site reconnaissance of the proposed sites and review of secondary information did not point toward the presence of any significant cultural heritage site within the vicinity of the Project site. Thus, compliance with PS 8 is not likely to be applicable for the Project.</p>

### 3.2 Environment and Social Regulation Framework

The GoB has developed a policy framework that requires environmental issues to be incorporated into the economic development planning. The key tenets of the various applicable policies are detailed in the following subsections. A brief analysis of the local laws and regulations and their applicability to PUC is presented in **Table 3.2**.

**Table 3-2: Environmental and Social Regulations Applicable for Project**

S. No.	Regulations	Applicability/relevance to the Project
<b>A.</b>	<b>Applicable Regulations</b>	
1.	Environment Conservation Act, 1995 and its amendments in 2000, 2002, and 2010	Applicable - according to the Act “no industrial unit or project shall be established or undertaken without obtaining an ECC from the DG”. Therefore, the provisions of the act apply to all the project life cycles.
2.	Environment Conservation Rules, 2023	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.
3.	Environment Court Act, 2010 and its amendment in 2019	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.
4.	Noise Pollution (Control) Rules, 2006	Applicable - the project construction and operation activities will create noise within the project site and surroundings. Therefore, requires complying with these rules.
5.	Air Pollution (Control) Rules, 2022	Applicable - as the project has significant pollution sources, including emissions from construction and operation processes, scrap materials transportation and handling, etc. It will be under the obligation of this act.
6.	Ecologically Critical Areas Management Rules, 2016	Not applicable - the proposed project is located far away from any ECA. Therefore, this rule is not applicable to this project.
7.	Biodiversity Act, 2017	Applicable - the project is going to be established in the CuEZ and a wharf will be constructed on 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 environment.
8.	Forests Act, 1927 and its amendment in 1982, 1989, 2000 and 2018	Not applicable - the proposed project is going to be established in the CuEZ and no reserve forest and protected areas are found within the project site and surrounding.
9.	Wildlife (Conservation and Security) Act, 2012	Not applicable - as no project activities are going to undertake within the buffer zone of the eco-sensitive zone notified in this act.
10.	Protected Area Management Rules, 2017	Not applicable - no protected areas are found within the project site and its surroundings.
11.	Bangladesh Water Act, 2013	Applicable - the project installed 3 borewells and proposes to use groundwater for the labor camp and other purposes during construction and operation.

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

<b>S. No.</b>	<b>Regulations</b>	<b>Applicability/relevance to the Project</b>
12.	Bangladesh Water Rules, 2018	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.
13.	Protection and Conservation of Fish Act, 1950 and its amendment in 1982 and Rules, 1985	Applicable - the project requires compliance with any rules set out to protect fish in inland surface waters. Therefore, this act and rule are applicable.
14.	Bangladesh Economic Zone Act, 2010	Applicable - the proposed project is going to be established in the CuEZ under MGI complying with the operational guidelines of BEZA. Therefore, this act will comply to ensure environmental protection.
15.	Ports Act, 1908	Applicable - as the proposed project has the likeliness of pollutant discharges in the environment.
16.	Bangladesh Merchant Shipping Ordinance, 1983	Applicable - as the proposed project has a provision of scrap material transportation and unloading from water vessels in the territorial water of Bangladesh. Therefore, a NOC will be required to take from the Shipping Authority.
17.	Acquisition and Requisition of Immovable Property Act, 2017	Not applicable - no land acquisition issue in this project as the proposed project going to be established inside of CuEZ under MGI.
18.	Fatal Accidents Act, 1855	Applicable - as the proposed project has a provision for an unlikely and accidental event that may cause fatal accidents.
19.	Penal Code, 1860	Applicable - as the proposed project has a provision of pollution impact on the surrounding environment.
20.	Fire Prevention & Extinguish Act, 2003 and Rules, 2014	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.
21.	Factories Act, 1965 and the Factories Rules, 1979 Bangladesh Labor Act, 2006 and amendments 2009, 2010, 2013 and 2018 Bangladesh Labor Rules, 2015	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.
22.	Solid Waste Management Rules, 2021	Applicable - provide guidelines for solid waste management.
23.	National 3R Strategy for Waste Management, 2010	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.

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

<b>S. No.</b>	<b>Regulations</b>	<b>Applicability/relevance to the Project</b>
24.	Hazardous Waste (e-waste) Management Rules, 2021	Applicable - provide guidelines for hazardous waste (e-waste) management.
25.	Medical Waste (Management and Handling) Rules, 2008	Applicable - provide guidelines for medical waste management.
26.	Antiquities Act, 1968 and Antiquities Preservation Rules, 1986	Not applicable - there are no archaeological and cultural sites on the project site.
<b>B.</b>	<b>Applicable Policies</b>	
1	National Environment Policy, 2018	Applicable - as the proposed project has a likeliness of having an impact on the surrounding environment
2	Bangladesh Climate Change Strategy and Action Plan, 2009	Applicable - as the project has the potential to generate pollutants in the air during its construction and operation.
3	National Forest Policy, 2016	Not applicable - as the project site is in CuEZ. There is no designated forest in the project site and its surrounding area.
4	National Water Policy, 1999	Applicable - for the preservation of water quality in the Meghna River, Branches of Meghna River, and adjacent water bodies.
5	National Fisheries Policy, 1999	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.
6	National Agriculture Policy, 2018	Not applicable - as the project is going to be established in the Cumilla Economic Zone and has no impact on agricultural land and productivity.
7	National Land Use Policy, 2001	Applicable - as the proposed project is going to be established on purchased for industrial purposes.
8	National Industry Policy, 2016	Applicable - as the project is a public sector industrial development to maintain a good environment.
9	National Occupational Health and Safety Policy, 2013	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.

## 4 DEVELOPMENTS IN INDUSTRIAL CLUSTERS

This section defines the planned and reasonably defined developments in the vicinity of the Projects. If the Projects are able to interact with such developments (temporally and/or spatially), the Projects may be able to exert a potential cumulative impact. Information was obtained from the stakeholder engagement and consultation process in particular information has been obtained from local and national governmental organizations and a review of available literature.

Detailed identification of other projects, activities, or actions that are likely to have significant impacts and can play an important role in the management of cumulative impacts is appropriate. In addition to other human activities, natural drivers that exert an influence on VEC conditions were identified and characterized. Natural environmental processes-for example, flooding has significant impacts on a variety of environmental and social components.

### 4.1 Project under Consideration (PUC)

#### 4.1.1 Capacity

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 a 1.4 million Metric Tonnes per Annum (MMTPA) Greenfield Re-Rolling Steel Plant. The Project is proposed to operate using a scrap-fed Electric Arc Furnace (EAF) based melt shop with a hot rolling mill. The initial production capacity will be 1.4 million MT/year and a billet capacity of 0.9 million MT/year with different grades. The main process starts with the unloading of the scrap materials from the wharf to the scrap yard and then the materials will be processed in the melt shop and rolling mill and finished at the storage facility.

#### 4.1.2 Raw Materials

The land requirement for the proposed re-rolling steel mill is approximately 71 acres. 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. Heavy melting steel (HMS) or heavy melting scrap and shredded scrap will both be significant feedstocks for the melt shop. As per MRSML, approximately 55-60% of the feedstock will be HMS-based, and 40-45% in the form of shredded scrap.

Transport of raw materials: As per MGI, 2024, a wharf will be constructed on the northern side of the proposed steel plant in order to transport the raw materials from the vessels. The length of the wharf will be 200m and the width will be 16m.

#### 4.1.3 Resource Requirement

Land: The Meghna Re-Rolling & Steel Mills Ltd. (MRSML) is situated in the Cumilla Economic Zone (CuEZ), about approximately 71 acres. The procurement of land entailed the CuEZ which was purchased from the local community from Luterchar Union of Meghna Upazila of Cumilla district through a willing buying and willing selling process.

Water: During the construction stage, approximately 56.9 m<sup>3</sup>/day of water will be required, and the same will be sourced from groundwater and river water. During the operational stage, approximately 13 m<sup>3</sup>/hr of water will be required as cooling water. The water will be sourced from the Meghna River. The cooling system is closed-loop cooling; only makeup water will be required. The domestic water requirement during the operational stage is 50 m<sup>3</sup>/day, and the same will be sourced from groundwater.

Power: The construction stage power requirement will be sourced from the Bangladesh Rural Electrification Board (BREB) grid connection. The power requirement is 254.5 MW and will be sourced from BPDB.

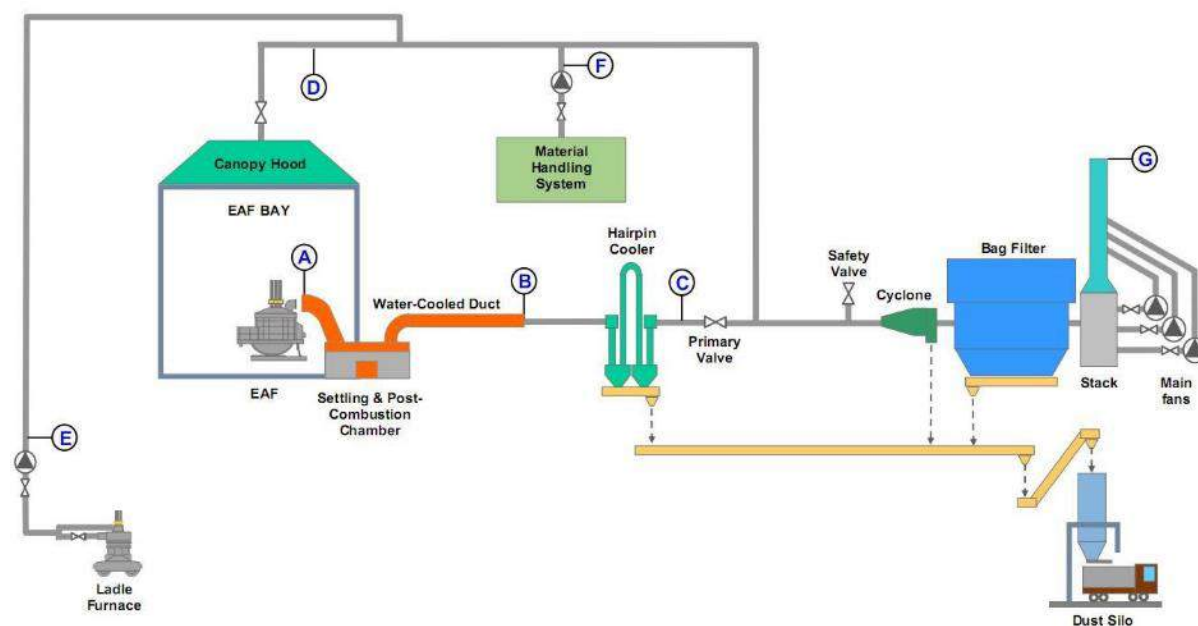
**Fuel:** Natural gas will be the primary fuel used directly in the production process of steel during continuous casting. The gas requirement is 7000 nm<sup>3</sup>/hr. and sourced from TITAS.

**Manpower:** During the construction stage, approximately 300–350 workers will be required. The project will create employment opportunities for approximately 700 workers.

#### 4.1.4 Pollution Sources and Control Measures

**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. The flue gas treatment system flow is shown in Figure 4-1.

Figure 4-1: Flue Gas Treatment System



Source: Technical Feasibility Study Report, September 2023

**Solid waste:** The slag will be generated from the steelmaking process. The project authority will install a “Slag Treatment Plant” in their industry premises to minimize and recycle the slag waste that is generated from the steel-making process. The treated slag will then be exported to China.

**Hazardous waste:** The hazardous waste like waste oil, lubricant, etc. will be stored in the dedicated hazardous waste storage area and then disposed of through an authorized vendor for reuse.

**Effluent:** The proposed plant 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. The blowdown water from the cooling tower will be treated through the Central Effluent Treatment Plant (CETP) of the economic zone. As per MGI, a zero-discharge system will be adopted and operated, and the treated water will be utilized for toilet flushing, vehicle washing, and gardening purposes.

**Sewage treatment:** The maximum sewage volume is 48m<sup>3</sup> per day. The sources of sewage are canteens, toilets, office buildings, and toilets in various buildings. All the sewage will be treated through septic tanks and then discharged into the sewage treatment plant of CSTP in the economic zone for advanced treatment. The treated sewage will be disposed of in the river. In case of discharge, the

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

#### **4.1.5 Accommodation Facility**

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 12-storied staff dormitory building will accommodate approximately 1000 employees. Water consumption is projected to be around 72 m<sup>3</sup>/day for the admin office and 135 m<sup>3</sup>/day for worker accommodation. 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. All the sewage will be treated through septic tanks and then discharged into the sewage treatment plant of CSTP in the economic zone for advanced treatment.

### **4.2 Past and Present Development**

As discussed, four industrial clusters, namely the Meghnaghat North Industrial Cluster, the Meghnaghat South Industrial Cluster, the Meghnaghat South-South Industrial Cluster, and CuEZ, have been considered for the CIA study. The cluster-wise past and present development have been discussed in the following sections:

#### **4.2.1 Meghnaghat North Industry Cluster**

The Meghnaghat north industry cluster is located on the north bank of the Meghna River. It is located in the Sonargaon Upazila of Narayanganj district. This industrial cluster is located between the Meghna River main channel and the minor channel, as well as on the northern side of the minor channel. Dhaka. Dhaka-Chattogram Highway (N1) passes through the industry cluster and is divided into two parts: the eastern part and the western part. The approximate distance from PUC to Meghnaghat North Industry Cluster is 5.2 km. The major industries are:

- Thermal power plant (gas and HFO-based) located in the western part;
- Cement grinding units, located on both sides of the N-1 towards the southern part;
- Chemical industries are located in the eastern part;
- Pulp and paper mills are located in the eastern part;
- Shipyards towards the south side, towards the Meghana River main channel
- Food processing plants are located on the eastern and western sides, mainly near the N-1.
- There are a number of jetties in the Meghna River, the main channel for the transport of raw materials for industries.

There are three clusters of settlements located in the Meghnaghat North Industry Cluster (Islampur, near the thermal power cluster, near the Basundhara paper mill (south-western side), and two settlements towards the Megha Mintor Channel (eastern and western sides).

Different industries in this cluster are listed in Table 4.1 and the location of the industries is presented in Figure 4.1.

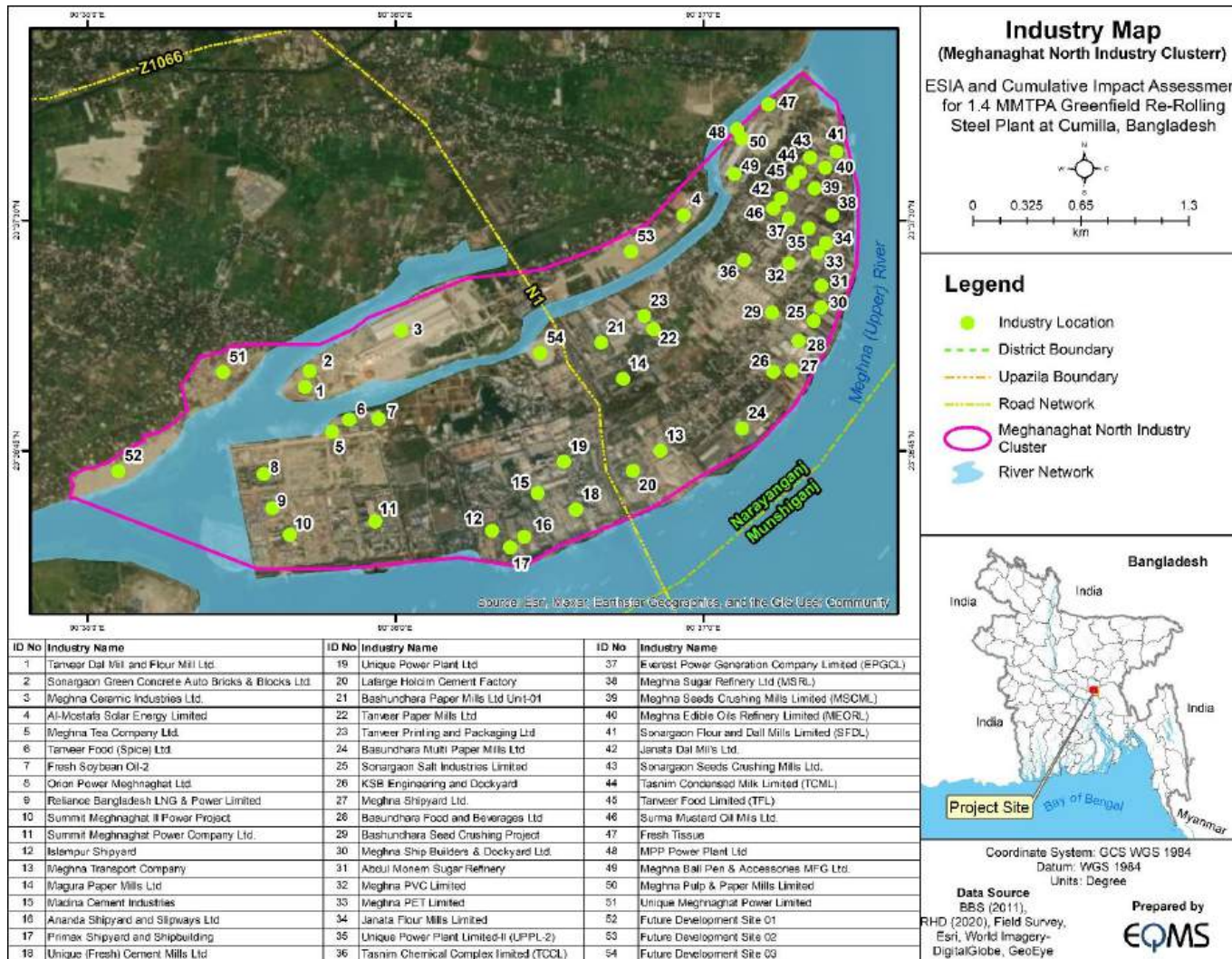
Table 4-1: Industries and Development in Meghnaghat North Industry Cluster

S. No.	Type of Industry	Number	Name	Present status	Natural Resource Dependency (Water)	Air emission	Effluent Discharge	Noise emission	Waste generation & Disposal
1	Thermal power plant- gas based	8	<ol style="list-style-type: none"> <li>Orion Power Meghnaghat Ltd., MPP Power Plant Ltd.</li> <li>Everest Power Generation Company Limited (EPGCL)</li> <li>Unique Power Plant Limited-II (UPPL-2)</li> <li>Unique Power Plant Ltd</li> <li>Reliance Bangladesh LNG &amp; Power Limited,</li> <li>Summit Meghnaghat II Power Project,</li> <li>Summit Meghnaghat Power Company Ltd.</li> <li>Unique Meghnaghat Power Limited</li> </ol>	Operational	<ul style="list-style-type: none"> <li>Open cycle, once through cooling system (105 to 107 m<sup>3</sup>/MWh) and water sourced from river.</li> <li>Closed cooling system: 1.7 to 2.1 m<sup>3</sup>/ MWh and water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Major air pollutant is NO<sub>x</sub> (0.31 to 0.67 g/ kWh).</li> <li>Low NO<sub>x</sub> burner and 60-70 m stack</li> </ul>	<ul style="list-style-type: none"> <li>Thermal discharge from once-through cooling system</li> <li>Cooling blow down, boiler blow down, DM reject</li> <li>Blowdown water treated in a neutralization pit;</li> <li>Sewage generated from the plant treated through a septic tank and soak pit.</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from boiler and turbine</li> </ul>	<ul style="list-style-type: none"> <li>Hazardous waste-used oil and lubricant and disposed of through a third-party vendor</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
2.	Thermal power plant- oil-based	1	<ol style="list-style-type: none"> <li>100 MW Engine-based Power Plant of Orion Group</li> </ol>	Operational	<ul style="list-style-type: none"> <li>Cooling and domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Major air pollutant NO<sub>x</sub> – 0.99 g/ kWh; SO<sub>2</sub> – 11.6 g/ kWh and PM – 0.74 g/ kWh</li> <li>Low NO<sub>x</sub> burner and 30 m stack</li> </ul>	<ul style="list-style-type: none"> <li>Sewage generated from the plant treated through a septic tank and soak pit.</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from the engine</li> </ul>	<ul style="list-style-type: none"> <li>Hazardous waste-used oil and lubricant and disposed of through a third-party vendor</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
3.	Pulp & paper mill	7	<ol style="list-style-type: none"> <li>Meghna Pulp &amp; Paper Mills Limited,</li> <li>Basundhara Multi Paper Mills Ltd,</li> <li>Tanveer Paper Mills Ltd,</li> <li>Bashundhara Paper Mills Unit-1</li> <li>Bashundhara Paper Mills Unit-2</li> <li>Multi Paper Mill</li> <li>Magura Paper Mills</li> </ol>	Operational	<ul style="list-style-type: none"> <li>Process water- 100 lit/kg of paper, sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Air emission from gas-based boiler and backup DG- NO<sub>x</sub>, PM</li> </ul>	<ul style="list-style-type: none"> <li>75 lit/kg of wastewater generated. Alkaline in nature with high BOD, COD, and TDS. Effluent treated through ETP</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from boiler and machinery</li> </ul>	<ul style="list-style-type: none"> <li>Hazardous waste-used oil and lubricant and disposed of through a third-party vendor</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
4.	Cement Plant	5	<ol style="list-style-type: none"> <li>Tiger Cement Plant Unit 1</li> <li>Tiger Cement Plant Unit 2</li> <li>Holcim Cement Plant Unit 1</li> <li>Holcim Cement Plant Unit 2</li> <li>Fresh Cement Plant</li> </ol>	Operational	<ul style="list-style-type: none"> <li>170-350 KLD per unit (cooling and domestic requirements);</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Major air pollutant is PM. Raw material handling is 11.1 g/ton of material handling and from the process is 219 g/ton of cement.</li> <li>Air emission control equipment is a Cyclone separator and Bag filter</li> </ul>	<ul style="list-style-type: none"> <li>Cooling blowdown water discharged into the river.</li> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from ball mill and material unloading operation</li> </ul>	<ul style="list-style-type: none"> <li>Hazardous waste-used oil and lubricant and disposed of through a third-party vendor</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
5.	Steel Mills	1	<ol style="list-style-type: none"> <li>Tanveer Steel Mill</li> </ol>	Operational	<ul style="list-style-type: none"> <li>Cooling water and domestic water;</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>The main air emission source is from induction furnaces and</li> </ul>	<ul style="list-style-type: none"> <li>Cooling blowdown water discharged into the river.</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from furnace and machineries</li> </ul>	<ul style="list-style-type: none"> <li>Slag generated from the process and disposed of locally.</li> </ul>

S. No.	Type of Industry	Number	Name	Present status	Natural Resource Dependency (Water)	Air emission	Effluent Discharge	Noise emission	Waste generation & Disposal
						<p>pollutants like PM and NOx.</p> <p><u>Stack emission</u></p> <ul style="list-style-type: none"> <li>• NOx-33.6 g/ton of steel;</li> <li>• PM 400.02 g/ton.</li> </ul> <p><u>Fugitive emission:</u></p> <ul style="list-style-type: none"> <li>• NOx-562.87 g/ton of steel;</li> <li>• PM- 2297.49 g/ton of steel</li> <li>• The fume extraction system with bag filter is the air pollution control device.</li> </ul>	<ul style="list-style-type: none"> <li>• Domestic water is treated through a septic tank and soak pit</li> </ul>		<ul style="list-style-type: none"> <li>• Hazardous waste-used oil and lubricant and disposed of through a third-party vendor</li> <li>• Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
6.	Shipyards	6	<ol style="list-style-type: none"> <li>1. Meghna Shipyards</li> <li>2. KSB Engineering and Dockyard</li> <li>3. Primax Shipyards and Shipbuilding</li> <li>4. Ananda Shipyards and Slipways</li> <li>5. Islampur Shipyards,</li> <li>6. Meghna Ship Builders &amp; Dockyard</li> </ol>	Operational	<ul style="list-style-type: none"> <li>• Domestic water</li> <li>• Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>• Fugitive dust during sandblasting</li> </ul>	<ul style="list-style-type: none"> <li>• Domestic water is treated through a septic tank and soak pit</li> </ul>	Noise generation during ship body manufacturing	<ul style="list-style-type: none"> <li>• Scrap and dispose of it through recycler.</li> <li>• Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
7.	Food Processing Unit	18	<ol style="list-style-type: none"> <li>1. Janata Dal Mil's Ltd.,</li> <li>2. Surma Mustard Oil Mills Ltd.</li> <li>3. Tanveer Food Limited,</li> <li>4. Tasnim Condensed Milk Limited,</li> <li>5. Sonargaon Seeds Crushing Mills Ltd.</li> <li>6. Sonargaon Flour and Dall Mills Limited,</li> <li>7. Meghna Edible Oils Refinery Limited,</li> <li>8. Meghna Seeds Crushing Mills Limited,</li> <li>9. Meghna Sugar Refinery Ltd,</li> <li>10. Janata Flour Mills Limited</li> <li>11. Abdul Monem Sugar Refinery,</li> <li>12. Sonargaon Salt Industries Limited,</li> <li>13. Bashundhara Seed Crushing Project,</li> <li>14. Basundhara Food and Beverages Ltd,</li> <li>15. Fresh Soybean Oil-2,</li> <li>16. Tanveer Food (Spice) Ltd,</li> <li>17. Meghna Tea Company Ltd.</li> <li>18. Tanveer Dal Mill and Flour Mill Ltd.</li> </ol>	Operational	<ul style="list-style-type: none"> <li>• Process water/ cooling water and domestic water.</li> <li>• Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>• Fugitive emissions from the process, mainly particulate matter</li> <li>• Backup DG sets- PM, NOx, and Sox</li> </ul>	<ul style="list-style-type: none"> <li>• Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>• Noise generation from machinery and equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging waste and disposed of through local recycler</li> <li>• Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
8.	Chemical Industry		<ol style="list-style-type: none"> <li>1. Tasnim Chemical Complex Limited (TCCL)</li> <li>2. Meghna Chemicals</li> </ol>	Operational	<ul style="list-style-type: none"> <li>• Process water, Cooling, and domestic water</li> </ul>	<ul style="list-style-type: none"> <li>• Fugitive process emission (VOC);</li> </ul>	<ul style="list-style-type: none"> <li>• Effluent from the plant has been treated through ETP</li> </ul>	<ul style="list-style-type: none"> <li>• Noise generation from machinery and equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Chemical contaminated containers</li> </ul>

S. No.	Type of Industry	Number	Name	Present status	Natural Resource Dependency (Water)	Air emission	Effluent Discharge	Noise emission	Waste generation & Disposal
			3. Meghna Group of Industry		<ul style="list-style-type: none"> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Backup DG sets- PM, NOx, and Sox</li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>		<ul style="list-style-type: none"> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
9.	Ceramic Industry	1	1. Meghna Ceramic Industries Ltd.	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive process emission (PM);</li> <li>Backup DG sets- PM, NOx and SO<sub>2</sub></li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from machinery and equipment</li> </ul>	-
10.	Brick	1	1. Sonargaon Green Concrete Auto Bricks & Blocks Ltd.	Operational	<ul style="list-style-type: none"> <li>Process water, and domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive process emission (PM);</li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from machinery and equipment</li> </ul>	-
11.	Solar Power	1	1. Al-Mostafa Solar Energy Limited	Operational	<ul style="list-style-type: none"> <li>Panel cleaning water and domestic water;</li> <li>Water sourced from groundwater</li> </ul>	-	-	-	<ul style="list-style-type: none"> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
12.	Plastic	3	1. Meghna Ball Pen & Accessories, MFG Ltd. 2. Meghna PVC Limited, 3. Meghna PET Limited	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>	-	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	-	<ul style="list-style-type: none"> <li>Plastic waste and disposed of through third-party vendor</li> </ul>
13.	Printing and Packaging	1	1. Tanveer Printing and Packaging Ltd	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>	-	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	-	<ul style="list-style-type: none"> <li>Packaging waste and disposed of through a third-party vendor</li> </ul>
14.	Meghna Transport Company	1	1. Meghna Transport Company,	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>		<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>		

Figure 4-2: Industries in Meghnaghat North Industry Cluster



Source: MRSML, 2024

## **4.2.2 Meghnaghat South Industry Cluster**

The Meghna Ghat South Industry Cluster is an industrial area situated on the southern bank of the Meghna River, within Gazaria Upazila of Munshiganj district. While the main channel of the Meghna River runs along the southern edge of this cluster, the Meghna Minor channel is located on the southern side of the cluster. Dhaka-Dhaka-Chattoogram Highway (N1) passes through the industrial cluster and is divided into two parts: the eastern part and the western part. The approximate distance from PUC to Meghnaghat South Industry Cluster is 3.6 km.

To the eastern side of the industry cluster, there are cement plants, ready-mix concrete plants, brick kilns, and chemical manufacturing facilities. On the western side are chemical industries, heavy industrial units, research and development centers, and shipyards.

Hosendi Economic Zone is located in the western part of the Meghnaghat South Industry Cluster. Within this economic zone, there are under construction cement plants, chemical industries, thermal power plants, and land available for future development.

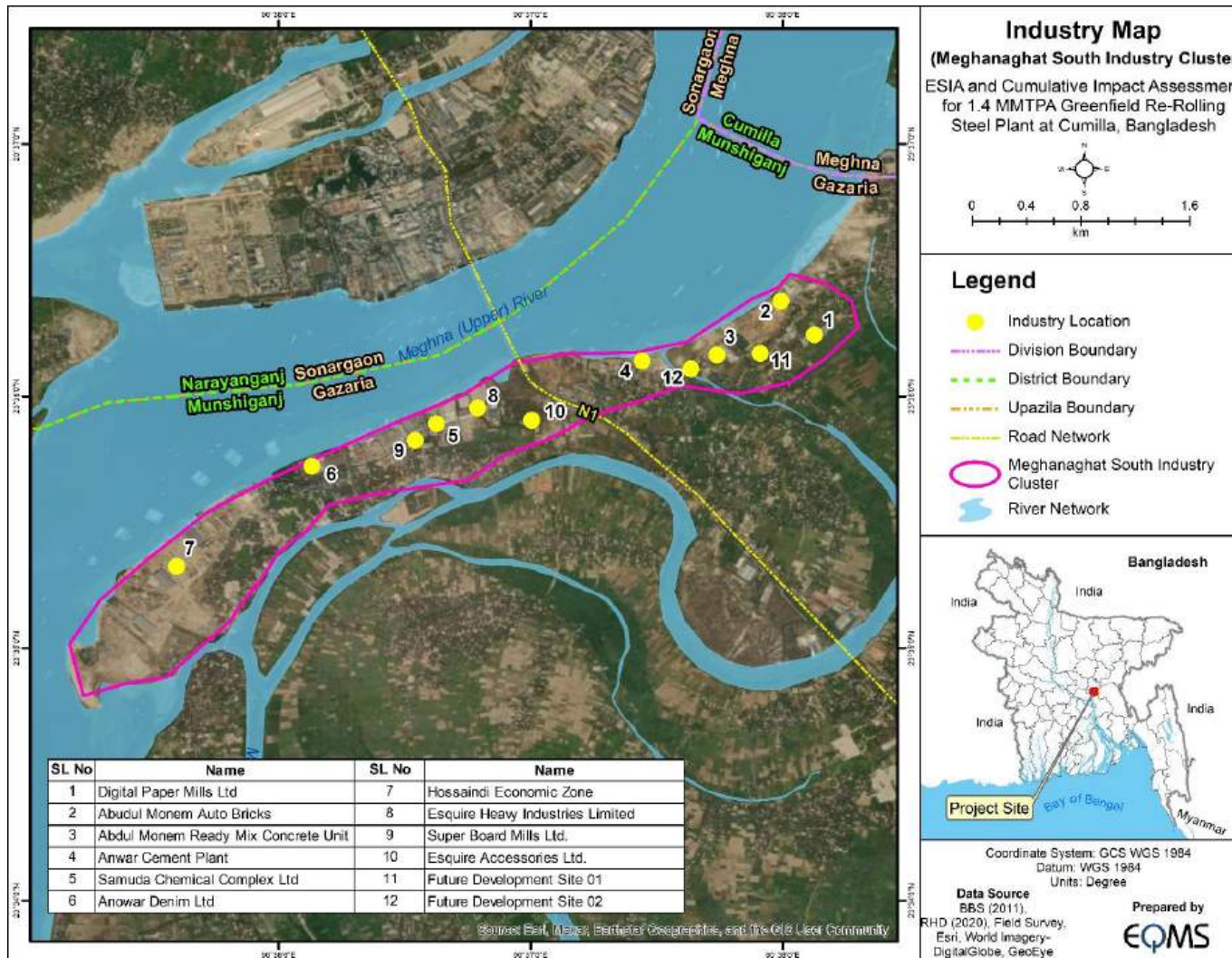
There are also residential settlements interspersed within the boundaries of this industrial cluster. Different industries in this cluster are listed in Table 4.2 and the location of the industries is presented in Figure 4.2.

Table 4-2: Industries and Development in Meghnaghat South Industry Cluster

S. No.	Type of Industry	Number	Name	Present status	Natural Resource Dependency (Water)	Air emission	Effluent Discharge	Noise emission	Waste generation & Disposal
1	Cement Plant	1	1. Anwar Cement Plant 2. UK Bangla Cement Ltd. (Hosendi Economic Zone)	Operational Under-construction	<ul style="list-style-type: none"> <li>Cooling and domestic water;</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Major air pollutant is PM. Raw material handling is 11.1 g/ton of material handling and from the process is 219 g/ton of cement.</li> <li>Air emission control equipment is a Cyclone separator and Bag filter</li> </ul>	<ul style="list-style-type: none"> <li>Cooling blowdown water discharged into the river.</li> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from ball mill and material unloading operation</li> </ul>	<ul style="list-style-type: none"> <li>Hazardous waste- used oil and lubricant and disposed of through a third-party vendor</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
2	Bricks	1	1. Abdul Monem Auto Bricks	Operational	<ul style="list-style-type: none"> <li>Process water, and domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive process emission (PM);</li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from machinery and equipment</li> </ul>	-
3	Particle Board Factory	1	1. Super Board Mills Ltd.	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive process emission (PM);</li> </ul>	<ul style="list-style-type: none"> <li>Domestic wastewater Control Measure Treated through the septic tank and soak</li> </ul>		-
4	Textile	3	1. Anowar Denim Ltd., 2. Esquire Heavy Industries Limited, 3. Esquire Color Coating Mill	Operational	<ul style="list-style-type: none"> <li>Process and domestic water</li> <li>Water sourced from groundwater</li> </ul>		<ul style="list-style-type: none"> <li>15Effluents with TSS, TDS, Oil &amp; Grease, Chromium, Sulfide and Phenolic Compound</li> <li>Control Measure ETP</li> </ul>		-
5	Chemical Industry	2	1. Samuda Chemical Complex Ltd 2. Echo food color 3. Dhaka Chemicals Ltd. (Hosendi Economic Zone)	2-Operational 1-under construction	<ul style="list-style-type: none"> <li>Process water, Cooling, and domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive process emission (VOC);</li> <li>Backup DG sets- PM, NOx and SOx</li> </ul>	<ul style="list-style-type: none"> <li>Effluent from the plant has been treated through ETP</li> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from machinery and equipment</li> </ul>	<ul style="list-style-type: none"> <li>Chemical contaminated containers</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
6	Ready Mix	2	1. Abdul Monem Ready Mix Concrete Unit 2. Concord Ready Mix Factory	Operational	<ul style="list-style-type: none"> <li>Process and domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Particulate Matter (PM)</li> </ul>	<ul style="list-style-type: none"> <li>Cooling water and domestic water</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from machinery and equipment</li> </ul>	-
7	Plastic	1	1. Esquire Accessories Ltd	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Particulate Matter (PM)</li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>		<ul style="list-style-type: none"> <li>Plastic waste and disposed of through a third-party vendor</li> </ul>
8	Paper & Pulp	1	1. Digital Paper Mills Ltd.	Operational	<ul style="list-style-type: none"> <li>Process water- 100 lit/kg of paper, sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Air emission from gas-based boiler and backup DG- NOx, PM</li> </ul>	<ul style="list-style-type: none"> <li>75 lit/kg of wastewater generated. Alkaline in nature with high BOD, COD, and TDS. Effluent treated through ETP</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from boiler and machinery</li> </ul>	<ul style="list-style-type: none"> <li>Hazardous waste- used oil and lubricant and disposed of through a third-party vendor</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
9	Shipyard	1	1. Abul Khayer Company	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive dust during sandblasting</li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation during ship body manufacturing</li> </ul>	<ul style="list-style-type: none"> <li>Scrap and dispose through a recycler.</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>

S. No.	Type of Industry	Number	Name	Present status	Natural Resource Dependency (Water)	Air emission	Effluent Discharge	Noise emission	Waste generation & Disposal
10	R&D	1	1. HSG Industrial Complex	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	-	-
11.	Thermal power plant	1	1. Hosendi Economic Zone Power plant	Under-construction	<ul style="list-style-type: none"> <li>Colling water will be sourced from the river.</li> <li>Domestic water from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Major air pollutant is NOx (0.31 to 0.67 g/ kWh).</li> <li>Low NOx burner and 60-70 m stack</li> </ul>	<ul style="list-style-type: none"> <li>Cooling blow down, boiler blow down, DM reject</li> <li>Blowdown water treated in a neutralization pit;</li> <li>Sewage generated from the plant is treated through a septic tank and soak pit.</li> </ul>	Noise generation from boiler and turbine	<ul style="list-style-type: none"> <li>Hazardous waste-used oil and lubricant and disposed of through a third-party vendor</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>

Figure 4-3: Industries in Meghnaghat South Industry Cluster



Source: MRSML, 2024

### **4.2.3 Meghnaghat South-South Industry Cluster**

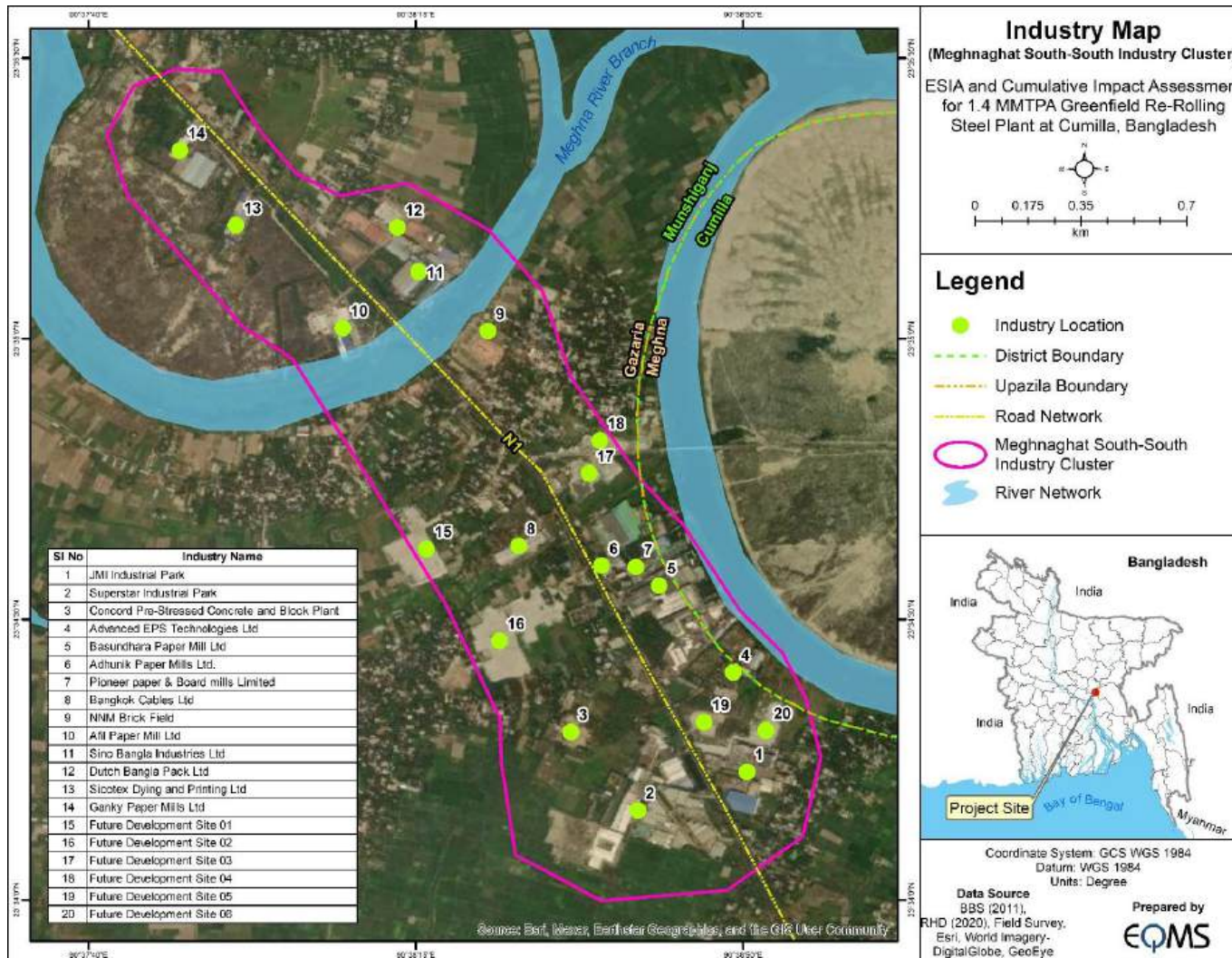
Meghnaghat South-South industry cluster is located on the south bank of the Meghna River in between the BSMSN & the north cluster. It is located in Gazaria Upazila of Munshiganj district. A smaller river channel flows through this cluster. Bisecting this industrial zone is the N1 highway. The approximate distance from PUC to the Meghnaghat South-South Industry Cluster is 0.5 km

To the east of this road lie brick kilns, paper & pulp industry, & heavy machinery facilities. On the western side are the paper & pulp industry, cable industry & LPG-CNG dispensing. There are also residential settlements interspersed within the boundaries of this industry cluster. Different industries in this cluster are listed in Table 4.3 and the location of the industries is presented in Figure 4.3.

Table 4-3: Industries and Development in Meghnaghat South-South Industry Cluster

S. No.	Type of Industry	Number	Name	Present status	Natural Resource Dependency (Water)	Air emission	Effluent Discharge	Noise emission	Waste generation & Disposal
1	Cable Industry	3	1. Bangkok Cables Ltd, 2. Superstar Industrial Park 3. Poly Cable	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>		<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>		<ul style="list-style-type: none"> <li>Hazardous waste &amp; domestic waste</li> </ul>
2	Printing & dying	1	1. Sicotex Dying and Printing Ltd	Operational	<ul style="list-style-type: none"> <li>Process water, and domestic water</li> <li>Water sourced from groundwater</li> </ul>	-	<ul style="list-style-type: none"> <li>Process water through ETP</li> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	•	-
3	Bricks	1	1. NNM Brick Field	Operational	<ul style="list-style-type: none"> <li>Process water, and domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive process emission (PM);</li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from machinery and equipment</li> </ul>	<ul style="list-style-type: none"> <li>Solid waste</li> </ul>
4	Advanced EPS Technologies Ltd	1	1. EPS(Foam)EPS	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>		<ul style="list-style-type: none"> <li>Wastewater generated.</li> </ul>	•	-
5	LPG Industry	1	1. JML Industrial Park	Operational	<ul style="list-style-type: none"> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive emission VOC</li> </ul>	<ul style="list-style-type: none"> <li>Wastewater generated</li> </ul>	•	•
6	Woven Polypropylene bags	2	1. Sino Bangla Industries Ltd, 2. Dutch Bangla Pack Ltd	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive emission, Particulate Matter (PM)</li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	•	•
7	Ready Mix	1	1. Concord Pre-Stressed Concrete and Block Plant	Operational	<ul style="list-style-type: none"> <li>Process water, and domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive emission, Particulate Matter (PM)</li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	•	•
8	Paper & Pulp	5	1. Ganky Paper Mills Ltd, 2. Afil Paper Mill Ltd, Pioneer 3. paper & Board Mills Limited, 4. Adhunik Paper Mills Ltd., 5. Basundhara Paper Mill Ltd	Operational	<ul style="list-style-type: none"> <li>Process water- 100 lit/kg of paper, sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Air emission from gas-based boiler and backup DG- NOx, PM</li> </ul>	<ul style="list-style-type: none"> <li>75 lit/kg of wastewater generated. Alkaline in nature with high BOD, COD, and TDS. Effluent treated through ETP</li> </ul>	<ul style="list-style-type: none"> <li>Noise generation from boiler and machinery</li> </ul>	<ul style="list-style-type: none"> <li>Hazardous waste- used oil and lubricant and disposed of through a third-party vendor</li> <li>Municipal solid waste (MSW) and disposed of through a third-party vendor</li> </ul>
9	Heavy Industry	1	1. Swift elevator manufacturing	Operational	<ul style="list-style-type: none"> <li>Domestic water</li> <li>Water sourced from groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Fugitive emission, Particulate Matter (PM)</li> </ul>	<ul style="list-style-type: none"> <li>Domestic water is treated through a septic tank and soak pit</li> </ul>	<ul style="list-style-type: none"> <li>Noise pollution</li> </ul>	•

Figure 4-4: Industries in Meghnaghat South-South Industry Cluster



Source: MRSML, 2024

#### 4.2.4 Cumilla Economic Zone (CuEZ)

The CuEZ is owned by the Meghna Group of Industries (MGI) and it will be operated as per the guidelines of the Bangladesh Economic Zone Authority (BEZA). The total land area of the economic zone is approximately 246 acres. The land is purchased by MGI. According to the CuEZ, the economic zone will be developed with the aim of establishing non-polluting industries. At present CuEZ is developing onsite and off-site facilities for the economic zone so that “ready to develop” land is available for industrialists and investors to establish industries.

**Meghna Glass Industries Ltd.:** In the CuEZ, Meghna Glass Industries Ltd. Construction activities have been initiated. The land requirement of the project is 84.18 acres. Annual production capacity of the glass industry is 150,000 MT. The total manpower requirements will be 235 persons. The water requirement is 5,000 m<sup>3</sup>/day and it will be sourced from groundwater sources. The total natural gas requirement is 168,488 m<sup>3</sup>/day and diesel 30,000 liter/day. Daily 2,000 m<sup>3</sup> of wastewater will be generated and will be treated in the CETP of CuEZ.

### 4.3 Reasonably Foreseeable Future Actions (RFFAs)

#### 4.3.1 Meghnaghat North Industry Cluster

During the site visit and analysis of Google imagery, it was observed that two sites have been developed for future industrial development. The details are as follows:

- On the western side of the industry cluster, towards the north-western side of the Meghna Minor channel near Unique Meghnaghat Power Plant, 10.50 ha. of land has been developed for future industry development.
- On the eastern side of the industry cluster, towards the north-eastern side of the Meghna Minor channel near the Mostafa Solar Energy plant, 7.50 ha. of land have been developed for future industry development.

The area under future industrial development has been marked in Figure 4.1.

#### 4.3.2 Meghnaghat South Industry Cluster

Hosendi Economic Zone (HEZ) is located in the Meghnaghat South Industry Cluster, towards the western side of the industry cluster. Cement plants, thermal power plants, and chemical industries are already under construction (refer to Section 4.2.2).

- On the western side of the HEZ, land has been developed for future industries.
- On the eastern side of the Meghnaghat South Industry Cluster near Abdul Monem Auto Bricks limited land has also been developed for future industrial development.

The area under future industrial development has been marked in Figure 4.2.

#### 4.3.3 Meghnaghat South-South Industry Cluster

During the site visit and analysis of Google imagery, it was observed that four sites have been developed for future industrial development. The details are as follows:

- On the western side of the industry cluster, on the western side of the Bangkok Cables limited facility approximately 2.00 ha. of land have been developed for future industry development.
- On the western side of the industry cluster, on the southern side of the Bangkok Cables limited facility approximately 5.00 ha. of land have been developed for future industry development.
- On the eastern side of the industry cluster, towards the CoEM connecting road approximately 3.25 ha. of land has been developed for future industry development.
- On the eastern side of the industry cluster, near JMI industrial park approximately 5.00 ha. of land has been developed for future industry development.

The area under future industrial development has been marked in Figure 4.3.

### 4.3.4 Cumilla Economic Zone (CuEZ)

#### 4.3.4.1 Future Industries

As discussed in Section 4.2.4, CuEZ has been planned for non-polluting industries. Based on the review of the Master Plan of CuEZ, it is understood that the following industries are proposed to be established within the economic zone:

- i. RMG & Textile
- ii. Food Processing
- iii. Vehicles & Parts Manufacturing
- iv. Leather Goods wear
- v. Plastic Articles
- vi. Machineries/Electronics Equipment/Light Engineering
- vii. Pharmaceuticals
- viii. Beverage & Mineral Water
- ix. Packaging Film Industries
- x. Tiles & Ceramic
- xi. IT Enabled Services
- xii. IT & Computer Related Equipment
- xiii. Electronics Equipment & Assembling
- xiv. Mobile, Telephone, and Assembling
- xv. Plastic Products

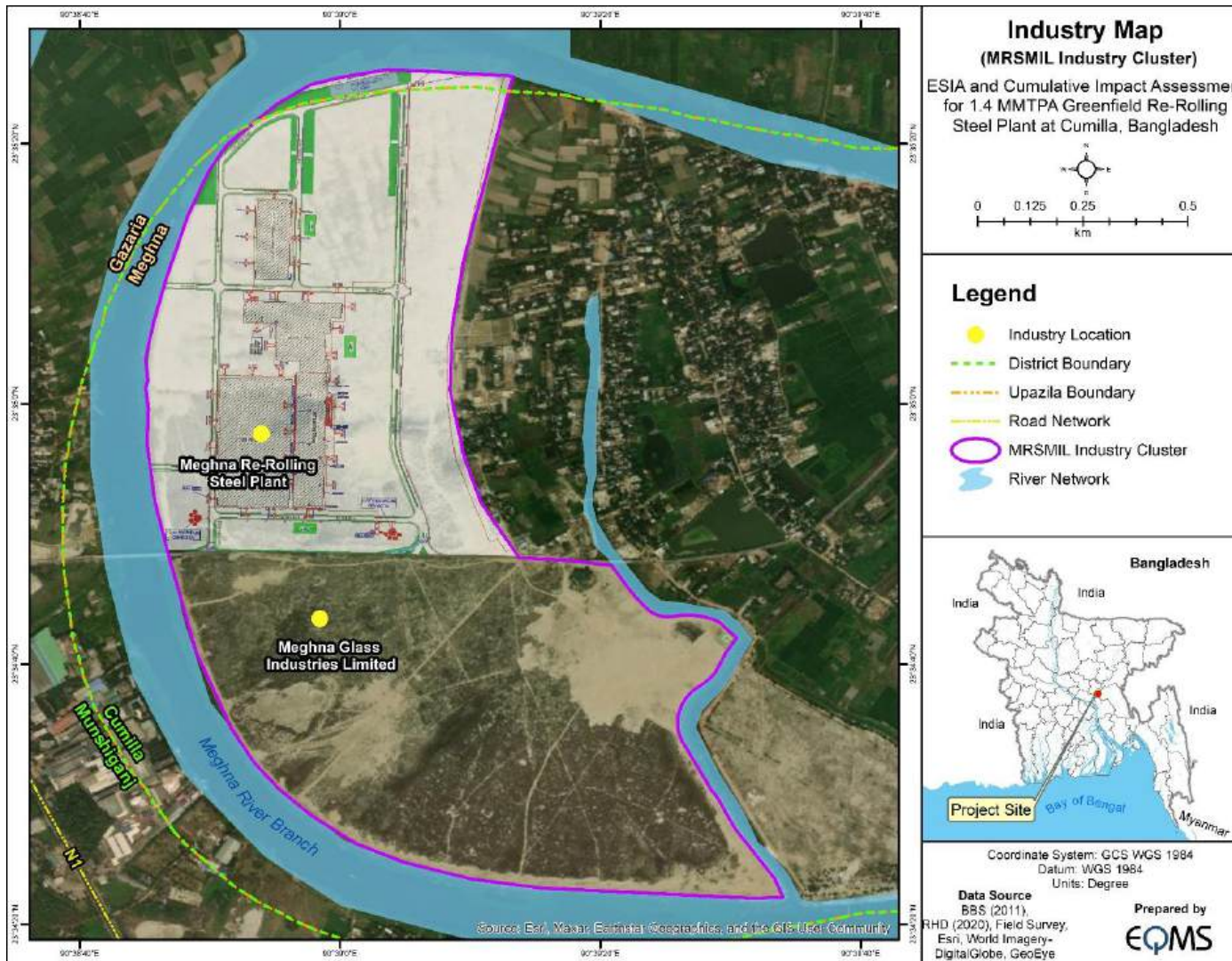
Master Layout Plan of the Cumilla Economic Zone is shown in Figure 4-5.

#### 4.3.4.2 Associate Facilities

The CuEZ has also proposed to provide the following facilities for the economic zone:

- Central Effluent Treatment Plant (CETP): It is proposed to install a Central Effluent Treatment Plant (CETP) in the CuEZ for the treatment of effluent from CuEZ. The capacity of the CETP is proposed to be 1000 m<sup>3</sup>/day.
- Central Sewage Treatment Plant (CSTP): It is proposed to construct a Central Sewage Treatment Plant (CSTP) for the treatment of sewage generated from the office area and accommodation area of CuEZ. The capacity of the CETP is proposed to be 720 m<sup>3</sup>/ day.
- Electricity Transmission Line and Substation: CuEZ has already developed a substation and transmission line for the supply of power. The transmission line is connected with the Gazaria substation, which is 1.5 kilometers away and provides a 230kV double-circuit power supply. CuEZ substation also provides 33kV power for other enterprises in the CuEZ. Considering the future development of the CuEZ, the substation has reserved the location and conditions for further expansion in the future.
- Gas Pipeline: Natural gas will be the primary fuel used directly in the production process of steel. The natural gas from Titas Gas Transmission and Distribution Company transmission line to the CuEZ will be constructed. As per the feasibility study report, about 7,000 nm<sup>3</sup>/h of gas will be required for production purposes which will be sent to the factory from the natural gas station.

Figure 4-5: Master Layout Plan of Cumilla Economic Zone



Source: MRSML, March 2024

## 4.4 External Stressors or Drivers

Human activities and natural drivers that exert an influence on VEC conditions have been identified and characterized based on existing knowledge and secondary information available in the public domain. Any impacts or risks these identified drivers may have on the identified VECs have been linked and assessed.

### 4.4.1 Industrialization

It is proposed to develop the workers accommodation within the CuEZ. It is also proposed that drinking water, electricity, MSW collection, and a sewage treatment system be provided in the CuEZ. The other industries located in the above-mentioned clusters mostly do not have worker accommodations. Employees and workers of existing and upcoming industries (during the construction and operational stages) mainly stay in the nearby area. The nearby area in these industry clusters is rural. The residential areas have an electric supply and drink water mainly from household-level tube wells and bore wells provided by Union Parishads. There is no sewerage network, sewage treatment system, or solid waste collection and disposal system. Industrialization will increase the consumption of natural resources like water and generate sewage and municipal solid waste. Presently, there is no water supply, sewage treatment plant, or municipal solid waste disposal site.

### 4.4.2 Climate Change and Natural Hazards

Climate change projections for Bangladesh predict increased temperature and drought, change in the precipitation intensity-frequency regime, increased flooding, salinity intrusion, and increasing sea levels. Climate variability poses economic and health concerns, including increased drought durations, decreased water quality, increased risk of disease, crop loss and failure, infrastructure damage, disruption of energy services, biodiversity loss, land degradation, increased erosion, and reduced mangrove habitat. Furthermore, Bangladesh is prone to various natural hazards that have significant environmental, social, and economic impacts. Climate change has the potential to intensify the impacts of Bangladesh's natural hazards.

Extreme climate events have become more frequent in Bangladesh and future events and impacts have been forecasted to intensify. The coastal regions of Bangladesh are the most susceptible to cyclones and associated tidal surges, making the area vulnerable to extreme weather events. The IPCC concludes that there is evidence of a 5%-10% increase in intensity (wind speed) that would contribute to enhanced storm surges and coastal flooding, and project a 20% increase in the intensity of associated precipitation that would contribute to flooding (Agrawala et al., 2003).

The rise of sea level will directly result in increased coastal flooding, which will increase in the event of storm surges. Sea level rise in Bangladesh is higher than the mean average rate of global sea level rise over the past century, because of the effects of tectonic subsidence (Rahman and Alam, 2003). The recent IPCC Fourth Assessment Report states that glaciers in the Himalayas are receding faster than in any other part of the world, and this can be attributed primarily to global warming (Cruz et al., 2007). Sea levels are expected to rise by an average of two to three mm per year during the first part of this century (IPCC, 2007), the effects on the coastal areas will be severe, and include erosion, coastal land subsistence, siltation of river estuaries, reduced sedimentation, waterlogging, and saltwater intrusion.

Climate change is also associated with hotter summers and colder winters. Temperatures in Bangladesh have increased by about 1°C in May and 0.5°C in November between 1985 and 1998, and further temperature increases are expected. However, although the overall climate is warming, temperature extremes are increasing, and winter temperatures as low as 5°C were recorded in January 2007, reportedly the lowest in 38 years (Reid and Sims, 2007).

## Draft Report

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Seismically, Bangladesh is divided into four seismic zones i.e., low (zone 1), moderate (zone 2), severe (zone 3), and very severe (zone 4) (BNBC, 2021). According to this seismic zoning, the proposed project is located in Zone-2 (moderate seismic intensity), with a seismic coefficient  $Z=0.20g$ .

There are four different types of floods encountered in Bangladesh i.e., flash floods, river floods, tidal floods, and storm surges. The proposed project area is mainly subjected to river floods and the site is a moderate river flooding area (BARC, 2000 and modification in 2021).

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.

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.

## 5 VALUED ENVIRONMENTAL AND SOCIAL COMPONENTS

### 5.1 Impact Sources Scoped into CIA

The PUC has the potential to interact with VECs like land environment (land use), air environment (air quality), water environment (resources and quality), traffic and transport, and community health and safety. The industrial activities and other developments that have potential interaction with the above-mentioned VEC have been scoped for CIA study. The consultant has considered the following sources of cumulative impacts based on the IFC Good Practice Handbook Guidance:

#### 5.1.1 Past and Present Projects in the CIA Spatial Area

The past and present projects or activities with the potential to cause cumulative impacts on VECs include the following:

- Industries:
  - Air-polluting industries- thermal power plants, cement plants, steel, and ceramic industries- are listed under four industry clusters.
  - Water polluting industry: thermal power plants, chemical industries, food processing industries, pulp and paper, textile & garments -listed under four industry clusters.
  - High water resource-dependent industries: thermal power plants chemical industries, food processing industries, pulp and paper, textile & garments-listed under four industry clusters.
  - Transport and traffic requirement industry: cement plants, steel, ceramic industries, food processing industries, pulp and paper, textile & garments -listed under four industry clusters.
- Other development projects in the area
  - Existing road and river transport.

#### 5.1.2 Reasonably Foreseeable Future Actions (RFFAs)

Proposed industrial projects identified in the Meghnaghat North Industry Cluster, Meghnaghat South Industry Cluster, and Meghnaghat South-South Industry Cluster as well CuEZ.

#### 5.1.3 External Stressors or Drivers

The external drivers and stressors, like industrialization and climate change -flood have been considered for the CIA.

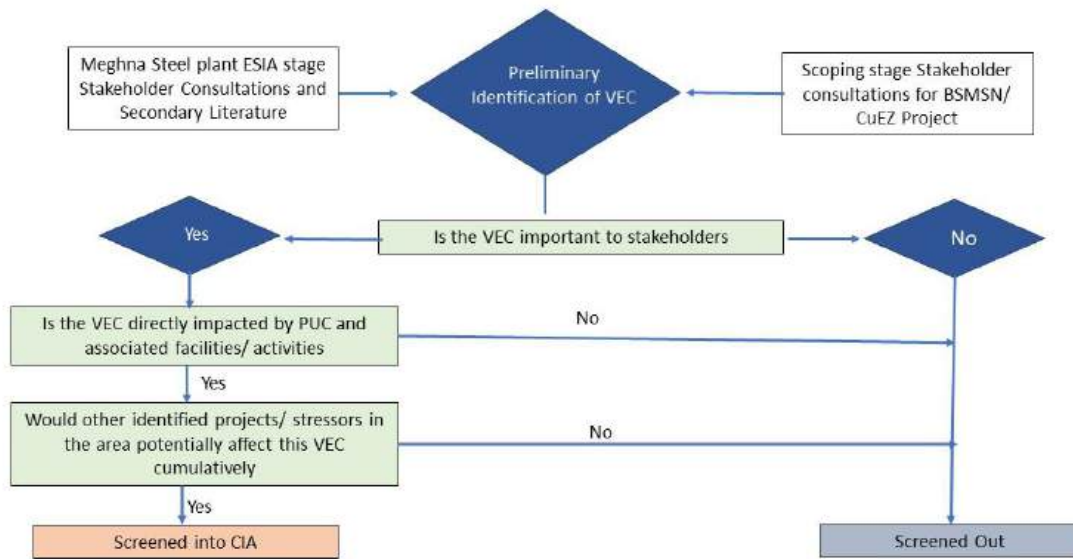
### 5.2 VEC Selection for CIA Study

VEC screening process was conducted to determine which of the preliminary VECs would be included in the CIA (Refer to Figure 5-1). The VEC must be reasonably expected to be affected by some combination of other projects and/or external stressors and the PUC.

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

**Figure 5-1: VEC Screening Process**



Based on the above-mentioned logical framework preliminary VECs have been identified. The key VECs selected for this CIA are presented in Table 5.1.

**Table 5-1: VEC Screening and Selection**

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
Land environment (land use)	Yes	Yes	Yes	Yes	Yes	<p>PUC will be built on the CuEZ, which was developed by the Meghna Group of Industries (MGI). The total land required for PUC is approximately 71 acres. The total land area of CuEZ is 246 acres. The entire CuEZ land was government land and was private agricultural land, which was acquired by MGI for CuEZ. The associated infrastructure, like transmission lines, gas pipelines, and roads, was developed for the CuEZ as well as for the PUC. For the development of associate infrastructure, some additional land will be required, and its responsibility is CuEZ. Again, the residential</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>units will be developed for industrial employees and workers within the CuEZ.</p> <p>The past and present industries in the three industry clusters were developed mostly on private agricultural land, except for the Meghnaghat North Industry Cluster (between the main Megha River channel and the Meghana Mintor channel), which was a river island. Due to industrialization, settlement areas will be expanded, and for that, agricultural land will be modified into residential areas.</p> <p>The potential impact on land use from PUC, past and present, future, and external stressors or drivers is not anticipated; therefore, land use as a</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						VEC for CIA has been considered.
Land environment (soil & sediment quality)	Yes	No	Yes	No	No	<p>Earthworks, improper handling and disposal of construction waste, and hazardous waste generated during construction work may have localized impacts on soil quality. The ESIA reports prepared for individual projects have a proposed management plan for the handling and disposal of construction waste and hazardous waste. Proper implementation of the management plan is unlikely to leave any residual effects on the quality of soil and sediment.</p> <p>The hazardous waste generated from existing industrial operations is generally disposed of through third-party</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>recyclers. The MSW from the existing industrial operations is disposed of through third-party vendors; therefore, the potential impact on soil and sediment quality due to the disposal of hazardous MSW in the CIA spatial boundary has not been envisaged.</p> <p>The other identified projects (refer to Section 4.3) are likely to have a localized impact on soil and sediment quality. The cumulative impacts on this VEC are not anticipated and, therefore, not scoped into the CIA study.</p>
Topography & drainage	No	No	Yes	Yes	No	<p>The entire CuEZ area was developed on reclaimed land. Prior to the development of the EZ area, the entire land was low-lying</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>agricultural land. The main drainage channel is the Meghna Minor channel, located towards the north, south, and western sides of the EZ, and a minor drainage channel is also located on the eastern side, which is connected with the Meghana Minor channel. All the drainage channels have been retained. There was no drainage channel within the CuEZ; therefore, landfilling and topography change may not have an impact on local drainage.</p> <p>The past and present industry clusters were also developed by landfilling. The topographical changes due to the development of these individual industries or industry</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>clusters may have a negative impact on local drainage but may not have a significant impact on regional drainage.</p> <p>The potential impact on topography and drainage from PUC is not anticipated; therefore, topography and drainage as VEC for CIA have not been considered.</p>
Air environment (air quality)	Yes	Yes	Yes	No	Yes	<p>During the PUC's construction stage, fugitive emissions are likely to be generated, which could have a negative impact on local environmental quality. During the operational phase of the project, the required power for the PUC will be sourced from natural gas and electricity to operate the furnace. The PUC will also</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>generate PM during processing, which has the potential to have a negative impact on air quality.</p> <p>The land development activity, construction of other industries in the CuEZ, and other industry clusters have the potential to have a negative impact on the air environment. There are air-polluting industries like gas and oil-based power plants, cement grinding units, steel and ceramic industries, and road and river transport that have the potential to have a negative impact on air quality.</p> <p>The PUC and past, present, and future industries and development activities have the potential to cumulatively impact ambient air quality.</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						Therefore, the air environment at VEC is screened for CIA.
Acoustic environment (noise quality)	Yes	No	Yes	No	No	<p>During the construction stage of PUC, the operation of construction machinery, equipment, and transport vehicles has a localized impact on ambient noise quality.</p> <p>During the operation stage, PUC is expected to be localized as plants and machinery will be operated in the industrial shed, and the same will act as a noise barrier.</p> <p>The existing construction activities and proposed operations of these industries are also expected to be localized, considering the project-level mitigation measures.</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						The cumulative impacts on this VEC are not anticipated and, therefore, not scoped into the CIA study.
Water environment (surface water resource)	No	No	Yes	No	No	<p>The construction stage and operational stages require water for the PUC to be sourced from the groundwater.</p> <p>The water required for the proposed industries in the CuEZ will be sourced from groundwater.</p> <p>The existing industries, like gas-based thermal power plants, and the proposed thermal power plant require a large volume of cooling water, which has been sourced from the Meghna River. The process water, domestic water, and drinking water for other industries in the spatial boundary are mostly</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>sourced from groundwater.</p> <p>Domestic and drinking water for human settlements is primarily sourced from groundwater.</p> <p>This VEC is not scoped into the CIA study, as the PUC has no impact on surface water.</p>
Water Environment (groundwater resource)	Yes	Yes	Yes	Yes	Yes	<p>During the construction stage of PUC, the required water will be sourced from the groundwater. Again, during the operational stage of the PUC, cooling water and domestic water would be sourced from the groundwater.</p> <p>The water required for the proposed industries (construction and operational stage) in the CuEZ will be sourced from groundwater.</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>The required water (process water, domestic water, and drinking water) for existing industries within the spatial boundary is mostly sourced from groundwater. The major requirement for cooling water for the thermal power plant is being sourced from the Meghana River.</p> <p>Industrialization is expected to increase the population in this region (spatial boundary). Domestic water and drinking water for existing and proposed settlements are sourced from the groundwater.</p> <p>The cumulative impacts on this VEC are anticipated and, therefore, scoped into the CIA study.</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
Water environment (surface water quality)	Yes	Yes	Yes	Yes	Yes	<p>The surface runoff from the PUC construction site during the rainy season is likely to contribute to the TDS and TSS in the receiving surface water.</p> <p>The cooling blowdown water and sewage from the plant and residential area will be treated through CETP and CSTP of CuEZ, respectively. The operation of diesel-operated vessels during the construction and operational stages of the PUC is likely to contribute oil and grease to the surface water.</p> <p>The discharge from the chemical industry, paper and pulp industries, textile and food processing industries, and thermal power plants has the</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>potential to have a negative impact on surface water quality. The untreated discharge of sewage from residential areas is also contributing to the water pollution in the river.</p> <p>The operation of passenger and cargo vessels has the potential to have an impact on surface water quality due to accidental spillage and leakage of oil grease from machinery and the disposal of sewage from the vessels.</p> <p>All the above-mentioned potential sources of impact, along with PUC, will have a cumulative impact on surface water quality.</p> <p>Considering all the potential sources of</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						impact, surface water quality has been scoped in CIA.
Aquatic and Migratory birds	Yes	Yes	Yes	Yes	Yes	<p>It was reported from the ESIA study that eight migratory bird species were reported in the spatial boundary of the CIA.</p> <p>PUC, proposed projects in CuEZ and other industry clusters, and existing industries have a potential impact on land use, especially the marshy land, and wetlands. The land use potential to have a negative impact on migratory birds' habitats,</p> <p>The noise and artificial illumination from the existing industries, and proposed industries have a potential impact on migratory birds' species.</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>PUC, past, present, and future industries, and developmental projects have the potential to have a negative impact on surface water quality and aquatic ecology. This has a negative impact on the food base of the migratory bird species.</p> <p>Considering all the potential sources of impact, fish and fish habitats have been scoped in CIA.</p>
Social well beings	Yes	Yes	Yes	Yes	Yes	<p>The PUC, proposed industries, and existing industries cause the in-migration of workforces within the spatial boundary of the CIA. The existing settlement within the spatial boundary is mostly rural. In-migration causes low-cost housing, improper sanitation, and a poor</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						drinking water supply. Social well-being is likely to be cumulatively impacted by PUC, past, present, and future projects. Therefore, this VEC has been included in the CIA study.
Livelihood (land-based & fishermen livelihood)	Yes	Yes	Yes	Yes	Yes	<p>During the CIA study, it was observed that fishing activity had been carried out by the local fishermen in the main Meghana River as well as minor channels of the Meghna River.</p> <p>Consultation with local fishermen revealed that fish catch has been reduced over time; this may be due to industrial pollution. As a result, the fishermen need to go further downstream for fishing.</p> <p>The fishery and fishermen's livelihoods are influenced by water quality and aquatic</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						ecology. As discussed in the surface water quality VEC section, surface water quality has a potential negative impact on the PUC, proposed projects within the spatial boundary, and existing industries. Therefore, this VEC has been scoped in the CIA study.
Community health and safety	Yes	Yes	Yes	Yes	Yes	<p>During the construction stage of PUC, the transport of construction materials, machinery, and equipment may cause traffic congestion on the site access roads, which already have traffic congestion-related issues.</p> <p>During the operational stage, PUC existing and proposed industries in the industry clusters will</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

Preliminary VEC	Impacted by PUC	Important to stakeholders	Impacted by past, present, and future projects & developmental activities	Impacted by Stressors	Screening in or out of the CIA	Justification
						<p>also increase the traffic load on the N-1 and other internal roads, which may cause traffic congestion, potential road accidents, noise, and air emissions that may cause discomfort to nearby communities.</p> <p>Environmental quality, in terms of air, noise, and surface water, may be degraded due to past, present, and future industrial activity, and other developmental activities may cause community health and safety.</p> <p>In-migration of the workforce from different areas has the potential to spread various communicable diseases.</p> <p>The potential impact on community health and safety has a cumulative</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

<b>Preliminary VEC</b>	<b>Impacted by PUC</b>	<b>Important to stakeholders</b>	<b>Impacted by past, present, and future projects &amp; developmental activities</b>	<b>Impacted by Stressors</b>	<b>Screening in or out of the CIA</b>	<b>Justification</b>
						impact with other ongoing activities or planned activities. Therefore, the VEC has been scoped in the CIA for study.

### 5.3 Indicators and Threshold to Assess Cumulative Impacts

Indicators have been developed to assess the cumulative impact on key VECs. The overall consideration for the development of indicators is as follows:

- Representative of VECs.
- Easily measurable; and
- Easily understood by the decision-makers and other key stakeholders.

Threshold levels for the indicators have been developed to assess the significance of cumulative impacts on VECs. The threshold level for an indicator has been considered either in the form of a national regulatory standard, international guideline (in the absence of a national standard), or by comparing with the national trend. The threshold value of the indicators selected is presented in Table 5.2.

**Table 5-2: Indicators & Threshold Value for Assessment of Cumulative Impacts**

VEC	Indicator	Threshold	Reference
Land environment (Land use)	Loss of agricultural and wetland	Loss of agricultural land/wetland $\leq$ National land conversation rate of agricultural land for industry and urbanization	Land use analysis
Air environment (Air quality)	Concentration of Particulate Matter (PM <sub>10</sub> + PM <sub>2.5</sub> ) in the air shed	PM <sub>10</sub> : 150 $\mu\text{g}/\text{m}^3$ PM <sub>2.5</sub> : 65 $\mu\text{g}/\text{m}^3$	Air Pollution Control Rules 2022
	Concentration of Oxides of Nitrogen (NOx) in the air shed	NOx: 80 $\mu\text{g}/\text{m}^3$	
Water Environment (Groundwater resource)	Depletion of groundwater resource	Depletion rate $\leq$ natural replenishment rate	State of Groundwater Management in Bangladesh
Water environment (surface water quality)	Ecological health (DO and BOD) concentration	5 mg/l or more (water usable by fisheries) 6 mg/l or less (water usable by fisheries)	ECR 2023
	Toxic metal contamination (Cr, Cd, and Pb)	Cd 13 mg/kg, Cr III- 180 mg/kg, Cr VI-78 mg/Kg, Pb- 530 mg/kg	Dutch Target and Intervention Values (Soil Remediation Circular July 2013 Revision)
Aquatic and Migratory bird species	Migratory bird population in the river stretch	Species diversity	ESIA study for MRSML
Social well-being	Low-cost housing	100% access to quality sanitation facilities and comparison with national trends	Bangladesh Census 2011
Community health & safety	Respiratory diseases in the local community	Respiratory diseases trend	Health Bulletin published by Director General of Health Services (DGHS), Bangladesh
Livelihood (land-based & fisherman)	Fish catch	No. of the local workforce in the Meghnaghat industrial area	

**Draft Report**

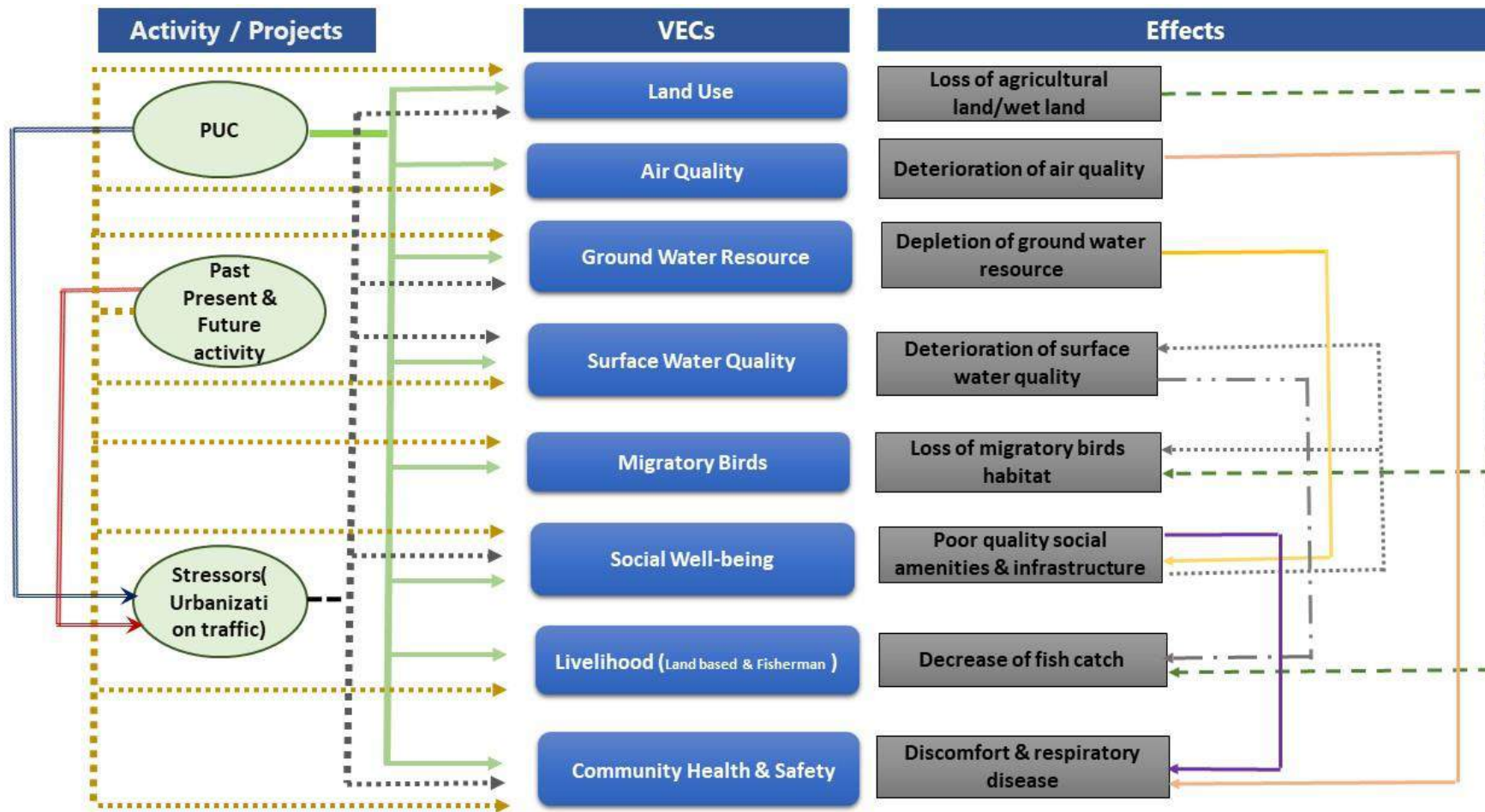
Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

VEC	Indicator	Threshold	Reference
		Fish landing data of the region	

## **5.4 Activity/ Project- VEC Interaction and Effects**

The past, present, and future industrial projects in the spatial and temporal boundary and other developmental activities and stressors have various interactions with key VECs and lead to cumulative impact on the overall environment. The interaction with VECs is presented in Figure 5.2.

Figure 5-2: Activity/Project – VEC Interactions and Effects



## 6 STAKEHOLDER ENGAGEMENT

### 6.1 Introduction

The stakeholder engagement process provided a platform for two-way communication between the CIA study team and various stakeholders. This helped the CIA study team develop an understanding of the key issues relevant to this study. All through the CIA study period and at different stages, several stakeholders were consulted with a view to (i) gathering information on VECs, (ii) understanding the past and present condition of VECs, (iii) assessing the cumulative impact on VECs, (iv) suggesting appropriate recommendations, and (v) finding out about reasonably foreseeable future actions. A dissemination workshop was also conducted to share the findings of the study with key stakeholders, which also paved the way for formulating the suggestions and recommendations that have been proposed as part of the CIA study.

### 6.2 Identification of Stakeholders

The stakeholder engagement process typically refers to the efforts made to understand and involve identified stakeholders to find solutions to shared challenges within the wider socio-economic and ecological context. The process essential begins with the identification of relevant stakeholders impacting or being impacted by the project.

The identified stakeholders that were found to be relevant to the CIA on the basis of the information review undertaken and the guidance provided by IFC's expectations on identification, i.e., stakeholders that represent one or more entities that:

- Directly benefit from the PUCs;
- Are adversely affected by the PUCs;
- Directly interact with or oversee environmental and social components that overlap with the PUCs; and
- Indirectly influence or regulate the condition of environmental and social components.

The key stakeholders were consulted during various stages of the CIA study comprised:

- Institutional stakeholders- direct interaction with PUC
- Local people- directly or indirectly impacted by PUC
- NGO & Experts- indirectly influenced by PUC

Stakeholders were consulted during the CIA process are represented in Figure 6-1.

**Figure 6-1: Stakeholder Consulted during CIA Process**

Local People	Institutional Stakeholder	NGO and Experts
<ul style="list-style-type: none"> <li>• Local People</li> <li>• Land Sellers</li> <li>• Local Women</li> <li>• Local Farmers</li> <li>• Local Fishermen</li> <li>• Local Youth</li> </ul>	<ul style="list-style-type: none"> <li>• Department of Fisheries</li> <li>• Department of Agriculture</li> <li>• Department of Primary Education</li> <li>• Fire Service &amp; Civil Defense</li> <li>• Local Govt. Engineering Division (LGED)</li> <li>• Local Elected Representatives</li> <li>• Department of Livestock</li> </ul>	<ul style="list-style-type: none"> <li>• NGO working for Social Development</li> <li>• NGO working for Dolphin Conservation</li> </ul>

### 6.3 Stakeholder Mapping

Stakeholder mapping is the process of examining the relative influence that different individuals have over a project as well as the influence of the project over them. The purpose of stakeholder mapping is to:

- Study the profile of the stakeholders identified and the nature of their stake;
- Understand each 's specific issues, concerns, and expectations from the project that each retains;
- Gauge their influence on the project.

On the basis of such an understanding, the stakeholders are categorized into High Influence/ Priority, Medium Influence/ Priority, and Low Influence/ Priority.

- **High Influence/Priority:** Which implies a high degree of influence of the stakeholder on the Project in terms of participation and decision-making or a high priority for the Project proponent to engage that stakeholder.
- **Medium Influence/Priority:** Which implies a moderate level of influence and participation of the stakeholder in the Project as well as a priority level for the Project proponent to engage the stakeholders who are neither highly critical nor insignificant in terms of influence.
- **Low Influence/Priority:** Which implies a low degree of influence of the stakeholder on the Project in terms of participation and decision-making or a low priority for the Project proponent to engage that stakeholder.

### 6.4 Stakeholder Consultation Summary

#### 6.4.1 Draft CIA Report Preparation Stage

The stakeholder consultations were carried out during the ESIA screening and scoping stages, the ESIA report preparation stage, and the CIA draft report preparation stages. The stakeholder consultations have provided input towards the selection of VEC, VEC conditions, and past and present conditions of VEC. The summary of consultations has been presented in Table 6-1.

Table 6-1: Stakeholders Mapping

S. No	Stakeholder	Relevance to the CIA	Engagement Priority (high, medium, low)	Concerns raised by the Stakeholders	Emerging Issues for CIA Study
1.	Land Sellers and Community People	Directly impacted due to the land procurement of CuEZ.	Medium	<ul style="list-style-type: none"> <li>■ They have received a satisfactory amount of price against the sold land and have no complaint about the land price.</li> <li>■ The prime concerning issue is the anticipated pollution that can be created by the project.</li> <li>■ Health and safety issues due to labor influx need to be considered as an important issue to take care of the project authority.</li> <li>■ Local resources might have been shared and there might have been a chance of being a shortage of local resources for the community people if not managed properly by the project authority.</li> <li>■ Common resource sharing will also be an issue to be considered for concerning issues to avoid conflict between local people and migrated labor.</li> <li>■ Pollution to natural water sources like rivers and canals is also addressed as an important issue by the consultees.</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>Community health and safety:</b> construction of this project might have air pollution due to vehicular movement and construction within the project area.</li> <li>■ <b>Job and economic opportunity:</b> Fair employment opportunities should be given to the local people to avoid any conflict.</li> <li>■ <b>Shortage of local resources and community property:</b> Due to labor influx, sharing of community resources and property may cause conflict between the community people and labor.</li> </ul>
2.	Local Farmers	Directly impacted their agriculture practice due to the land procurement of CuEZ and other industries in this region.	Medium	<ul style="list-style-type: none"> <li>■ Due to industrial growth in this region, farmers are showing less interest in crop cultivation and cultivation has been decreasing with the course of time since the last two decades.</li> <li>■ Shifting dynamics of agriculture to small and medium scale business is often seen in the region.</li> <li>■ 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.</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>Land use change:</b> Due to land procurement for CuEZ land scarcity has been pointed out for running agriculture activities.</li> <li>■ <b>Surface water pollution:</b> Pollution of surface water potential to have an impact on irrigation.</li> <li>■ <b>Job-economic opportunity:</b> livelihood has been impacted</li> </ul>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

S. No	Stakeholder	Relevance to the CIA	Engagement Priority (high, medium, low)	Concerns raised by the Stakeholders	Emerging Issues for CIA Study
				<ul style="list-style-type: none"> <li>Unemployed and marginal farmers should be considered for employment in the project. The scarcity of agricultural land due to the water logging in the river adjacent areas and land procurement for the CuEZ and other industries are responsible for the livelihood impact on the farmers of that area.</li> </ul>	<p>due to the procurement of agricultural land.</p>
3.	Local Fisherman	Directly impacted their fish catch due to surface water pollution from various industries in this region.	Medium	<ul style="list-style-type: none"> <li>Currently, fish catch has decreased due to the water pollution by the industries to the river upstream and nearby areas.</li> <li>River pollution, navigation loss, and other factors are responsible for decreasing fish.</li> <li>2/3 fishing “Jhop” (an area surrounded by bamboo with twigs within the demarked area by bamboo) will be impacted due to the construction of the Wharf and water vessel movement.</li> <li>Consultees expect the project authority will consider the surface water pollution issue seriously and act accordingly.</li> </ul>	<ul style="list-style-type: none"> <li><b>Livelihood:</b> Due to industrial growth in this region and untreated water discharge in the river have caused the reduction of fish catch.</li> <li><b>Surface water pollution:</b> Local fishermen are concerned about the increase of further pollution to the river and canal water due to this issue.</li> </ul>
4.	Local Women near the project area	Directly influence or operation of the PUC and other industries has a potential socio-economic impact on the local community, especially women.	Medium	<ul style="list-style-type: none"> <li>During the construction period, the local community may face air pollution, noise pollution, traffic congestion, and conflict with labor camp workers. This needs to be properly addressed throughout the project.</li> <li>Movement to the local areas may hinder the fluent routing of local women within their territory.</li> <li>Employment opportunities for available local women also should be in consideration.</li> </ul>	<ul style="list-style-type: none"> <li><b>Community health and safety:</b> air pollution from various industrial activities that may cause inconvenience to the local people.</li> <li><b>Employment:</b> Local women have an interest in employment within the project.</li> </ul>
5.	Local Youth near the project area	Directly influence or operation of the PUC and other industries has a	Low	<ul style="list-style-type: none"> <li>Efforts shall be made to recruit from the local youth force.</li> </ul>	<ul style="list-style-type: none"> <li><b>Economic Enhancement:</b> If employment has been ensured for the locally</li> </ul>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

S. No	Stakeholder	Relevance to the CIA	Engagement Priority (high, medium, low)	Concerns raised by the Stakeholders	Emerging Issues for CIA Study
		potential socio-economic impact on the local youth.		<ul style="list-style-type: none"> <li>■ An increase in employment opportunities during the construction and operational phase is expected.</li> <li>■ Some of the boys are urged for a playground as they are lacking in it due to a bulk procurement of land from the locality.</li> <li>■ Unemployment status will be changed if employment for the local workforce is ensured.</li> </ul>	available youth the enhanced economy will contribute to this area for economic development.
	Firoz Ahmed Mridha, Senior Fishery Officer, Meghna, Cumilla	Indirectly influence or be responsible for guidance regarding fishing practices in the river and addressing the concerns of the fishermen.	Medium	<ul style="list-style-type: none"> <li>■ The entire upazila has 2100 registered fishermen of which 250 plus are in Luterchar union.</li> <li>■ Most of the fishing activity takes part in the Chalivanga Union.</li> <li>■ Fish culture is performed in nearly 350 ponds of different sizes.</li> <li>■ Few fishermen are involved in fishing in the nearby channel of river Meghna by creating artificial shelter zones using bamboo and twigs.</li> <li>■ If the wastewater cannot manage centrally and ETP is not installed the river will be polluted and fish catch will be decreased.</li> <li>■ The river Meghna is also connected with a few other upazila upstream and downstream. Pollution prevention should be ensured in both ways.</li> <li>■ Govt. should be attentive to river dredging as the river navigability has decreased in alarming layers.</li> <li>■ Proper consultation should be taking place with local fishermen as well.</li> <li>■ Hope the project authority will consider the wastewater issue seriously.</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>Surface water pollution and fish catch:</b> provision of wastewater treatment system to avoid the impact on fish</li> </ul>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

S. No	Stakeholder	Relevance to the CIA	Engagement Priority (high, medium, low)	Concerns raised by the Stakeholders	Emerging Issues for CIA Study
	Md Monir Hossen Leader, Fire Service & Civil Defense, Meghna, Cumilla	Indirectly influence or responsible for issuing fire NOC, arranging mock drills, provide support for fire emergencies in the industry	Low	<ul style="list-style-type: none"> <li>■ Firefighting, rescue, and first aid are the primary services provided by any fire station.</li> <li>■ Provide NoC of residential/commercial multi-storied buildings for a fire safety plan.</li> <li>■ Provide firefighting training to any team consisting of 40 members based on application from any industry or private organization.</li> <li>■ Conduct mock drills on firefighting and rescue.</li> <li>■ A company must train at least 20% of its employees for firefighting.</li> <li>■ Due to continuous public engagement, awareness campaigns, and other activities, the incidence of fire in this area has decreased.</li> <li>■ Recommend to installation of an adequate fire extinguisher, hydrant, and fire exit as per the plan.</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>Fire emergency-</b> training, mock drill, etc. to control any emergency</li> </ul>
	Md Hafijur Rahman, Agriculture Extension Officer, Meghna, Cumilla	Indirectly influence or responsible for promoting agriculture activity in the district.		<ul style="list-style-type: none"> <li>■ The Upazila has a total of 8017 hectares of cultivable land.</li> <li>■ A total of 7762 hectares of land were found cultivated in different seasons from the total arable land.</li> <li>■ The total of agricultural families in this upazila is 21,143 and sharecroppers are 5285.</li> <li>■ Most of the arable land is cultivated in two seasons except the land that is near to river due to water logging and low-lying conditions near and adjacent to the project area.</li> <li>■ Major crops grown in this region are Paddy, Mustard, Chili, vegetables, Corn, Potato, etc.</li> <li>■ Paddy grows at 4.5 metric tons per hectare.</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>Land use change:</b> Agricultural land is decreasing day by day due to unplanned urbanization and expansion of industrial areas</li> </ul>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

S. No	Stakeholder	Relevance to the CIA	Engagement Priority (high, medium, low)	Concerns raised by the Stakeholders	Emerging Issues for CIA Study
				<ul style="list-style-type: none"> <li>■ Agricultural land is decreasing day by day due to unplanned urbanization and expansion of industrial areas.</li> <li>■ This project will not impact agricultural land unless the waste and wastewater are controlled.</li> <li>■ Project authority should focus on controlling the generated waste and not release any of it into the surrounding land as well into the natural water source.</li> </ul>	
	<p>Ohidul Islam Sikdar, Upazila Engineer, Local Govt. Engineering Division (LGED) Meghna, Cumilla</p>	<p>Indirectly influence or responsible for the maintenance of rural roads and infrastructure</p>	<p>Medium</p>	<ul style="list-style-type: none"> <li>■ Formulation of plans for infrastructural development in rural and urban areas with implementation supervision.</li> <li>■ Maintenance of rural infrastructure.</li> <li>■ Planning, implementation, and monitoring of Growth Center/Hat Bazar development.</li> <li>■ Rural roads are mostly under the jurisdiction of LGED unless any municipal or other govt. the agency takes over it with a mutual transfer of jurisdiction.</li> <li>■ Normally all the connecting roads to Upazila center are under Roads and Highways (RHD) jurisdiction, and they maintain construction and supervision of it.</li> <li>■ From Vatercahr to Homna (another Upazila of Cumilla adjacent to Meghna) a total of 21km of roads will be constructed by RHD. This is the road that crosses through the economic zone with a 24 ft. total width of which 18 ft. will be pavement and 6 fit shoulders.</li> <li>■ Within 2-3 months the construction of the road will be started.</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>Traffic and transport:</b> Internal roads and mostly maintained by LGED and damaged due to heavy vehicular movement for industrial activities.</li> </ul>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

S. No	Stakeholder	Relevance to the CIA	Engagement Priority (high, medium, low)	Concerns raised by the Stakeholders	Emerging Issues for CIA Study
				<ul style="list-style-type: none"> <li>■ 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.</li> <li>■ This project will create a large employment which will increase the economy from the regional to the national level.</li> <li>■ LGED wishes to collaborate with MGI for a better road condition in this locality and MGI can contribute from their ground.</li> </ul>	
	<p>Gazi Md Anwar Hossen, Upazila Primary Education Officer, Meghna, Cumilla</p>	<p>Indirectly influence or responsible for the promotion of primary education in the district</p>	<p>Low</p>	<ul style="list-style-type: none"> <li>■ Meghna upazila has sub-divided into two clusters for primary education from the upazila education office.</li> <li>■ One cluster has 33 and another has 32 primary schools, of which 42 are from govt. primary, 16 are registered primary and 7 school is from govt. project.</li> <li>■ 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.</li> <li>■ Near the project area, the condition of primary education is good.</li> <li>■ No case of school dropout was reported, and no child labor issue was also reported to the education officials.</li> <li>■ The proposed project authority should be concerned about vehicular movement while passing or crossing to any school.</li> <li>■ If local people get appointed to the project, it will flourish the local economy and parents will</li> </ul>	<p>-</p>

**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

S. No	Stakeholder	Relevance to the CIA	Engagement Priority (high, medium, low)	Concerns raised by the Stakeholders	Emerging Issues for CIA Study
				<p>emphasize education more if the economy grows.</p> <ul style="list-style-type: none"> <li>Child labor issues should be dealt with properly.</li> </ul>	
	<p>Nadir Alom, Secretary, Luterchar Union Parishad, Meghna, Cumilla</p>	<p>Directly influence, as the industry CuEZ land is Luterchar Union Parishad, provide the permission from Union Parishad</p>	<p>High</p>	<ul style="list-style-type: none"> <li>This area is comprised mainly of agriculture.</li> <li>Most of the landowners reside adjacent to the project area named Dori Luterchar and Kandargaon.</li> <li>Union Parishad has given NoC for the project.</li> <li>Land procurement was started from 2016-2017.</li> <li>A willing buying and willing selling process was applied during land procurement.</li> <li>No grievances were raised in terms of land procurement.</li> <li>Employment opportunity for local people is expected.</li> <li>People will benefit from business growth due to this project.</li> <li>Proper safety measures for community health and safety and women-friendly work are well appreciated.</li> <li>Hope the project authority will consider every aspect in terms of the safety of women, children, and community people during the project construction and operation phase.</li> </ul>	<ul style="list-style-type: none"> <li><b>Community health and safety:</b> CuEZ should consider community health and safety, especially for women and children</li> </ul>
	<p>Sultana Parvin Sathi, Member of Ward-1,2,3 (Reserved) Luterchar Union, Meghna, Cumilla</p>				

## 7 ASSESSMENT OF CUMULATIVE IMPACT

This section presents a qualitative assessment of the cumulative impacts posed by the past, present, and foreseeable industrial and development stressors in the CuEZ and three other industry clusters, namely, Meghnaghat North Industry Cluster, Meghnaghat South Industry Cluster and Meghnaghat South-South Industry Cluster on the Valued Environmental Components (VECs). It also looks at the specific contributions from the IFC-financed 1.4 MMTPA Greenfield Re-Rolling Steel Plant (referred to as the projects under consideration or PUC) toward impacts that cumulate on VECs in these industrial areas.

### 7.1 Land Use Change

The VEC interaction and effect diagram (Figure 5.2) indicates that the PUC and other industrial projects in three existing industry clusters Meghnaghat North, Meghnaghat South, Meghnaghat South-south) and CuEZ projects and external factors or stressors (expansion of residential area) directly or indirectly interacted with land use of spatial boundary of CIA. The cumulative impact on land use change is assessed through Loss of agricultural land/ wetland  $\leq$  National land conversation rate of agricultural land for industry and urbanization.

#### 7.1.1 Baseline Condition

The Meghnaghat north industry cluster has been developed on a river island (between the Meghna main channel and minor channels) as well as along the shores of the Meghna River minor channel. Before industrialization, the area was mostly utilized for agriculture. There were also a few wetlands, which were used for fishing purposes. Presently, all the agricultural land within the Meghnaghat North cluster has been converted to industrial or semi-urban land use. The surface water bodies within this industry cluster area and part of the river channel are also reclaimed for industrial purposes.

The Meghnaghat South Cluster has also developed mostly on agricultural land. Part of the residential area, especially the Hosendi Economic Zone, was converted into industrial land. The decadal land use change analysis revealed that wetlands and rivers were also reclaimed for industry development. The residential area also significantly increased from agricultural land to residential land. The present land pattern showed that, in the demarcated industry cluster, there is no agricultural land. Other land uses are surface water bodies and road networks. A simultaneous process of land development for the expansion of new industrial units by converting agricultural land was also noticed.

The Meghnaghat South Cluster has also developed mostly on agricultural land. The land use and land cover during 2002 show that there was a small residential area at Vaterchar village. The other land use during 2002 was agricultural land. The present land use and land cover pattern shows that the entire agricultural land is now converted to industrial land and the residential areas and road infrastructure.

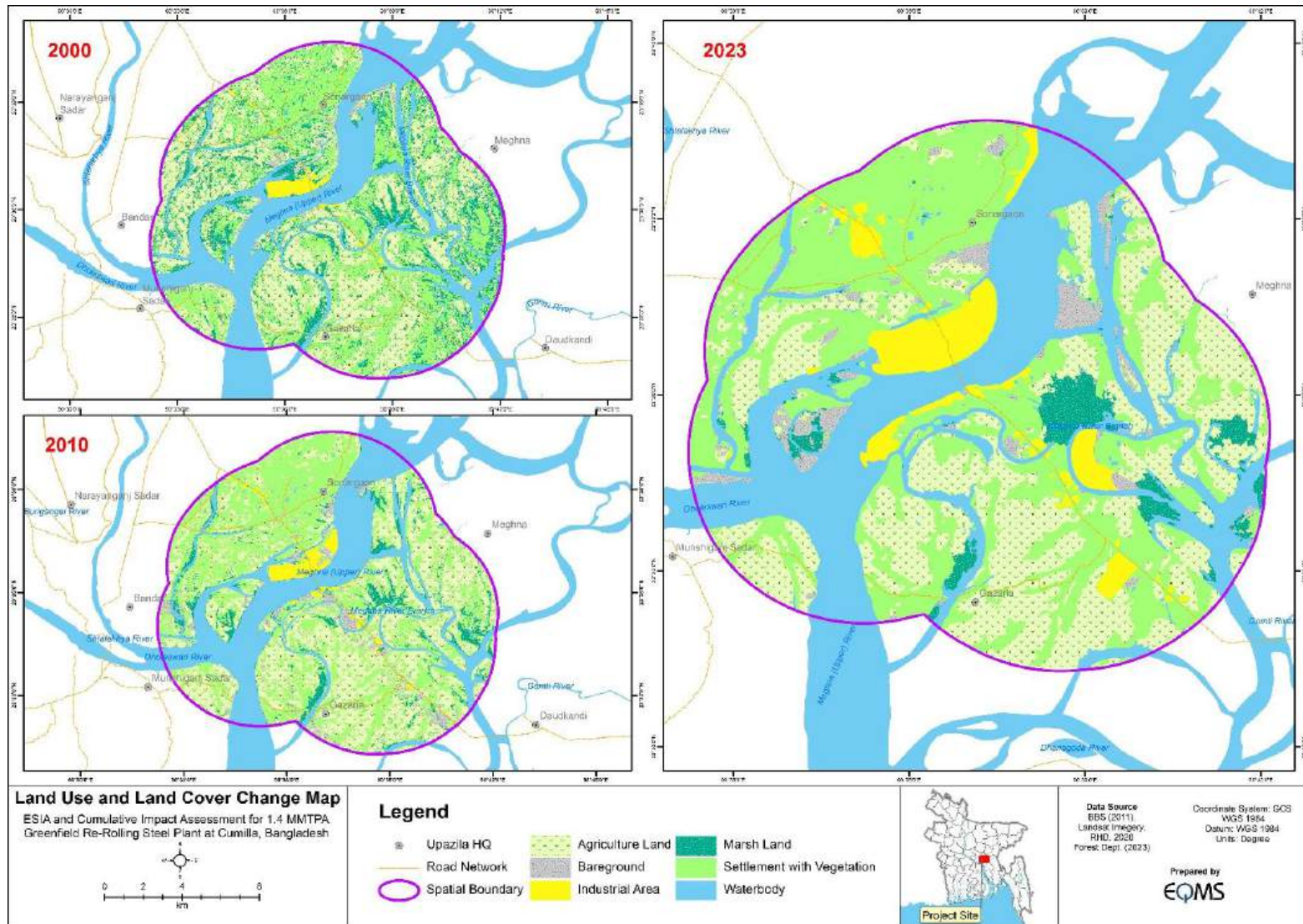
The total area under CuEZ is 1.50 sq. km. The entire land was agricultural land, which was converted to industrial land.

The summary of decadal land use change in the spatial boundary of CIA and industry clusters has been presented in Table 7.1 and Figure 7.1.

**Table 7-1: Land Use Changes in Spatial Boundary**

Land use Category	Spatial Boundary (area in sq. km)				Existing industry clusters: Meghnaghat- Noth, South, South-South (area in sq. km)				CuEZ (area in sq. km)			
	2000	2010	2024	% of change	2000	2010	2024	% of change	2000	2010	2024	% of change
Water Body (River, Canal, Ponds, etc)	47.02	47.28	57.68	22.69	1.22	1.18	0.49	59.71	0.07	0.01	-	0.00
Agriculture Land	80.72	84.35	60.78	24.70	3.31	2.39	0.22	93.49	0.97	1.04	-	0.00
Settlement with Homestead Vegetation	52.50	60.88	73.84	40.66	2.18	1.67	2.98	36.71	0.31	0.37	-	0.00
Industry Area	2.43	4.06	12.49	80.52	2.31	3.59	7.67	232.08	-	-	1.49	100
Marsh Land	32.64	11.51	7.44	77.22	1.91	0.47	0.01	99.48	0.15	0.04	-	0.00
Bare-ground	4.74	12.09	7.95	67.61	0.63	2.27	0.20	68.30	0.00	0.03	-	0.00

Figure 7-1: Decadal Land Use and Land Cover in Spatial Boundary



## 7.1.2 Stressors and Impact

PUC: The total land required for the PUC is 71 acres, which is located in CuEZ. The procurement of land entailed the CuEZ, which was purchased from the local community of Luterchar Union through a willing buying and willing selling process. The entire land was agricultural land, which is now modified into industrial land. The potential impact of the construction PUC on land use change is assessed to be low.

Meghnaghat North Industry Cluster: The total area of the Meghnaghat North Industry Cluster is 6.20 sq. km. The entire industry cluster was developed on agricultural and reclaimed wetlands. The major industries in this cluster are thermal power plants, cement plants, chemical industries, pulp and paper mills, and food processing industries. There is approximately 0.22 sq. km of residential area within this cluster, which was also developed on agricultural land. It was observed that the Meghnaghat North Cluster is now expanding on the northern side of the Meghna minor channels, which is again agricultural land. The potential impact of the development of the Meghnaghat North cluster on land use changes is assessed to be high.

Meghnaghat South Industry Cluster: The entire industry cluster was developed on agricultural, reclaimed wetland, and partly settlement areas. The major industries in this cluster are thermal power plants, cement plants, chemical industries, pulp and paper mills, shipyards, textiles and RMG. The decadal land-use study shows that some parts of residential land have been converted into industrial land use. The decadal land use results also show that the residential land use area has increased compared to 2000 to 2024. The potential impact of the development of the Meghnaghat South Cluster on land use changes is assessed to be medium.

Meghnaghat South-South Industry Cluster: The entire industry cluster was developed on agricultural land. The major industries in this cluster are pulp and paper mills, ready-mix plants, Printing & dying, bricks, LPG bottling plants, etc. The decadal land use results also show that the residential land use area has increased. The potential impact of the development of the Meghnaghat South Cluster on land use changes is assessed to be medium.

CuEZ: The total area of the CuEZ is 1.50 sq. km. The entire industry cluster was developed on agricultural land. The proposed industries in CuEZ are PUC, glass industry, RMG & textile, food Processing, vehicles & parts manufacturing, leather goods wear, pharmaceuticals, etc. The potential impact of the development of the Meghnaghat South Cluster on land use changes is assessed to be low.

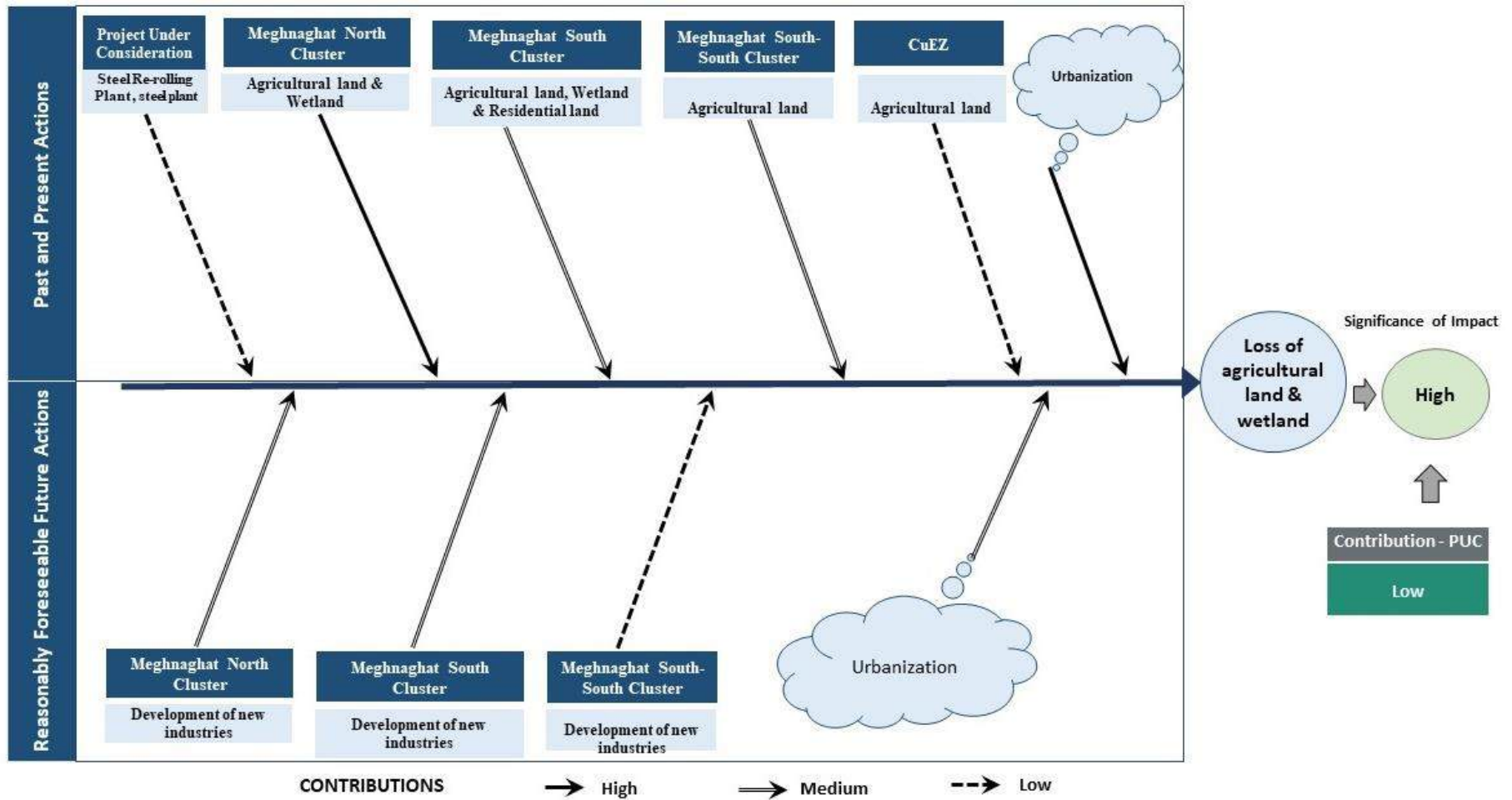
Proposed Industries: The proposed industries identified in these industry clusters will be developed on agricultural land. As there is a land use masterplan for this CIA spatial boundary, industrial areas will be expanded and the same will be developed on agricultural land.

Stressors or Drivers: Most of the industries do not have a residential township, and the working population mostly resides in nearby residential areas. The decadal land use analysis results show that residential land use has increased from 52.50 sq. km to 73.84 sq. km, i.e. 40.66% of the increase in the last two decades. The potential impact of stressors on land use is assessed to be medium.

## 7.1.3 Significance of Cumulative Impact

Loss of agricultural land and wetland in the spatial boundary is more than the national land conversation rate of agricultural land for industry and urbanization. The contributions to land use change from past and present activities are already moderate. The past, present, and future development activities, along with external factors (urban growth), will cumulatively impact the land use change. The cumulative impact is assessed to be high. However, the contribution from PUC to the land use change is assessed to be low.

Figure 7-2: Land Use Change- Cause and Effect Relationship



## 7.2 Air Environment (Air Quality)

### 7.2.1 Baseline Condition

Meghnaghat Industry Clusters (North and South) are situated on both sides of the wide Meghna River, and Meghnaghat Soth-South Cluster and CuEZ are situated on both sides of the N-1. The area is not densely populated and mostly has rural settings. Traffic movement on the internal roads of the industrial area is less compared to N-1. The wide Meghna River and vast open area around the industrial area influence the efficient dispersal of pollutants.

The baseline ambient air quality in the spatial boundary has been assessed based on primary monitoring carried out for the MRMSL ESIA study and secondary data from the ESIA study carried out for other industries. The baseline conditions of PM<sub>10</sub>, PM<sub>2.5</sub>, and NO<sub>x</sub> have been presented in the following section.

**MRMSL ESIA:** The ambient air quality monitoring was monitored in six locations during February-March for four weeks.

**Particulate Matter (PM<sub>10</sub>):** The 24-hour minimum and maximum PM<sub>10</sub> concentrations in the monitoring locations were found from 12.34 µg/m<sup>3</sup> (AAQ6) to 53.73 µg/m<sup>3</sup> (AAQ4). The average PM<sub>10</sub> concentration varies between 14.02 µg/m<sup>3</sup> - 48.18 µg/m<sup>3</sup> which is within the national ambient air quality standard (150 µg/m<sup>3</sup>-24 hourly average).

**Particulate Matter (PM<sub>2.5</sub>):** The 24-hour minimum and maximum PM<sub>2.5</sub> concentrations in the monitoring locations were found from 8.42 µg/m<sup>3</sup> (AAQ6) to 42.35 µg/m<sup>3</sup> (AAQ4). The average PM<sub>2.5</sub> concentrations were found between 9.66 µg/m<sup>3</sup> - 35.59 µg/m<sup>3</sup>. The PM<sub>2.5</sub> concentration was within the NAAQS (65 µg/m<sup>3</sup>-24 hourly average) in all the monitoring locations.

**Nitrogen Dioxide (NO<sub>2</sub>):** The minimum and maximum 24-hour concentration of NO<sub>2</sub> in the monitoring locations were found from 6.23 µg/m<sup>3</sup> (AAQ6) to 42.56 µg/m<sup>3</sup> (AAQ4). During the 4-week monitoring period, average NO<sub>2</sub> concentration was found between 7.35 µg/m<sup>3</sup> - 37.89 µg/m<sup>3</sup> which are within the value of NAAQS (80 µg/m<sup>3</sup>-24-hour average) but exceed the WHO standards (40 µg/m<sup>3</sup>).

A total of eight ambient air quality monitoring was carried out during wet season (September 2022) and dry season (January 2022) under the Environmental Impact Assessment of Meghna Re-Rolling and Steel Mills Ltd. Based on the monitoring, the PM<sub>10</sub> during wet season was found ranges between 15 µg/m<sup>3</sup> to 81 µg/m<sup>3</sup>. Similarly, PM<sub>10</sub> during the dry season was found to range between 25 µg/m<sup>3</sup> to 89 µg/m<sup>3</sup>. All the observed values were within the Air Pollution (Control) Rules 2022 standard (150 µg/m<sup>3</sup>).

A total of four ambient air quality monitoring was carried out during two seasons (October 2019-November 2019 and June 2020) under the Environmental and Social Impact Assessment Report for the Proposed 600MW Combined Cycle Power Plant at Sonargaon, Narayanganj, Bangladesh. The 24-hour average PM<sub>10</sub> concentrations in the monitoring locations varied between 40.2 µg/m<sup>3</sup> to 90.0 µg/m<sup>3</sup>. All the monitoring values were within the NAAQS (150 µg/m<sup>3</sup>-24 hourly average) at all monitoring locations.

The baseline result shows that the ambient air quality of Meghnaghat was moderately polluted.

### 7.2.2 Concentration of PM

#### 7.2.2.1 Stressors and Impact

**PUC:** During the construction stage of the PUC, fugitive dust may be generated due to the handling (unloading from the transport vehicle to the storage area and handling during construction activity) of construction materials (sand, aggregate, cement) and earthwork. contribute to the air pollutant load. The pollutants, especially particulate matter, will settle in areas surrounding the site and are expected to last for the entire duration of the site development stage.

During the operational stage of the PUC, PM may be generated from the raw material handling, and unloading from ships or trucks. The source of PM from the process is the ladle furnace and electric arc furnace. The process emission will be treated through a fume treatment plant. 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 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 a 45 m stack. Fumes from Reheat Furnace (RHF) will be emitted through a 65 m stack.

Air quality modelling has been carried out to understand the impact of PM from the proposed project (PUC) in the ESIA study. The PUC will contribute a maximum Ground Level Concentration (GLC) of  $3.4 \mu\text{g}/\text{m}^3$  (24-hourly averaging time) of  $\text{PM}_{10}$  to the airshed based on an emission concentration of  $30 \text{ mg}/\text{Nm}^3$ . The 24-hourly predicted maximum  $\text{PM}_{10}$  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  $\text{PM}_{10}$  concentration was found as  $0.47 \mu\text{g}/\text{m}^3$  (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  $\text{PM}_{10}$  are presented in Table 7-2. The details of air quality modelling have been presented in **Appendix A and B**.

**Table 7-2: Results of Air Quality Modeling for  $\text{PM}_{10}$**

Scenario	Max. Conc. ( $\mu\text{g}/\text{m}^3$ )		Max. Conc. Location	APCR, 2022 <sup>a</sup> ( $\mu\text{g}/\text{m}^3$ )	WHO, 2021 <sup>b</sup> ( $\mu\text{g}/\text{m}^3$ )		% 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 ( $\mu\text{g}/\text{m}^3$ )- 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

<sup>a</sup>Schedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

<sup>b</sup> WHO Global Air Quality Guideline Value 2021

**Past and Present Activities:** The major air-polluting industries in the spatial boundaries are thermal power plants (gas-based and HFO-based), cement plants, particle board factories, ceramic industry,

and brick manufacturing units. Industry sector-wise contribution of PM in the airshed has been discussed in the following section:

Thermal power plant: There are 10 operating gas-based power plants in the Meghna North Cluster. Natural gas is the cleaner fuel, the emission of PM during routine operations is expected to be negligible. However, some PM will be generated in the form of unburned carbon particulates (incomplete combustion) during the use of oil as a start-up fuel. There is one operating oil-based power plant of 100 MW. Burning oil is generating PM in the form of unburnt carbon particulates. The emission of PM from oil-based plants is higher than gas-based power plants.

Cement plants: There are six cement grinding units in the Spatial boundary – in North and South Clusters. The sources of PM from cement plants are uncontrolled emissions from raw material unloading areas; partly controlled emissions from raw material transport areas (conveyor belt, covered storage, and crushing area), and controlled emissions from cement mills, cement packing plants, and cement storage units, i.e. silos. The generation of fugitive dust from cement plants was high; the same has been reported in the six-monthly compliance monitoring report.

Particle Board Manufacturing Unit: A large-scale particle board manufacturing unit is located in the Meghnaghat South Industry Cluster. The major source of PM from this unit is fugitive emissions of wood fines, sawdust, etc., that are mostly uncontrolled and are dispersed locally.

Ceramic industries: There are few ceramic industries in the spatial boundary. The major source of PM from this unit is fugitive emissions from material handling and process emissions. However, the process emission is controlled through the bag-house.

Brick manufacturing unit: There are few concretes in the spatial boundary. The major source of PM from this unit is fugitive emissions from material handling and process emissions. Emissions from brick manufacturing units are uncontrolled.

RFFAs: A list of the RFFAs shows the number of new industries proposed in all four industry clusters. During construction and operational phase (thermal power plant, cement mills) will contribute to the PM emission in the air-shed.

Stressors or Drivers: Other than industrial activities, development stressors like road & traffic and construction material handling yards are also contributing to PM concentrations in the air-shed. The Dhaka-Chittagong Highway passes through the Meghnaghat Industrial area. The existing traffic load on this highway is high. The burning of fossil fuel (oil/gas) in vehicles playing on this road is generating PM in the form of exhaust emissions. Re-entrainment of dust is also caused due to the movement of vehicles on poorly maintained roads. The particulates are likely to be dispersed locally along the transport corridors. Future industrial growth is also expected to further increase the traffic load; the increased traffic volume will result in more PM emissions.

The contribution towards PM in the air shed due to PUC, air-polluting industries, and development activities along with their cause-effect relationship is graphically presented in Figure 7.5.

Air quality modelling: To assess the cumulative impact on PM from the above-mentioned industry sectors and their contribution to the air shed has been assess through a modelling exercise. Predicted GLC from industry sectors has been presented in Table 7.3. Details have been provided in Appendix B.

The air quality modelling study reveals that the predicted contribution of PM<sub>10</sub> from existing power plants at different receptor locations varied from 0.71 µg/Nm<sup>3</sup> (minimum) at AQ3 receptor location (akandi asroykendro, vitikandi, Gazaria, Munshiganj) to i.e. 1.18 µg/Nm<sup>3</sup> (maximum) at AQ6 receptor location (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj).

The predicted contribution of PM<sub>10</sub> from the proposed power plant varied from 0.11 µg/m<sup>3</sup> (minimum) i.e. only 0.67% of the monitored PM concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria,

Munshiganj) to  $0.52 \mu\text{g}/\text{m}^3$  (maximum) i.e. 1.1% of monitored PM concentration at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhaber Char, Gazaria, Munshiganj).

The predicted contribution of  $\text{PM}_{10}$  from the proposed and existing power plant varied from  $0.74 \mu\text{g}/\text{m}^3$  (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  $\text{PM}_{10}$  from the 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  $\text{PM}_{10}$  from the 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 Masjid, Anarpura Mahmudbag, Bhaber Char, Gazaria, Munshiganj).

The air quality modelling study shows that the predicted contribution of  $\text{PM}_{10}$  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 Ansar Camp, CEZ, Meghna-Homna Road, Meghna, Cumilla).

The contribution of  $\text{PM}_{10}$  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 the 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 Masjid, Anarpura Mahmudbag, Bhaber Char, Gazaria, Munshiganj).

### **7.2.2.2 Significance of Cumulative Impact**

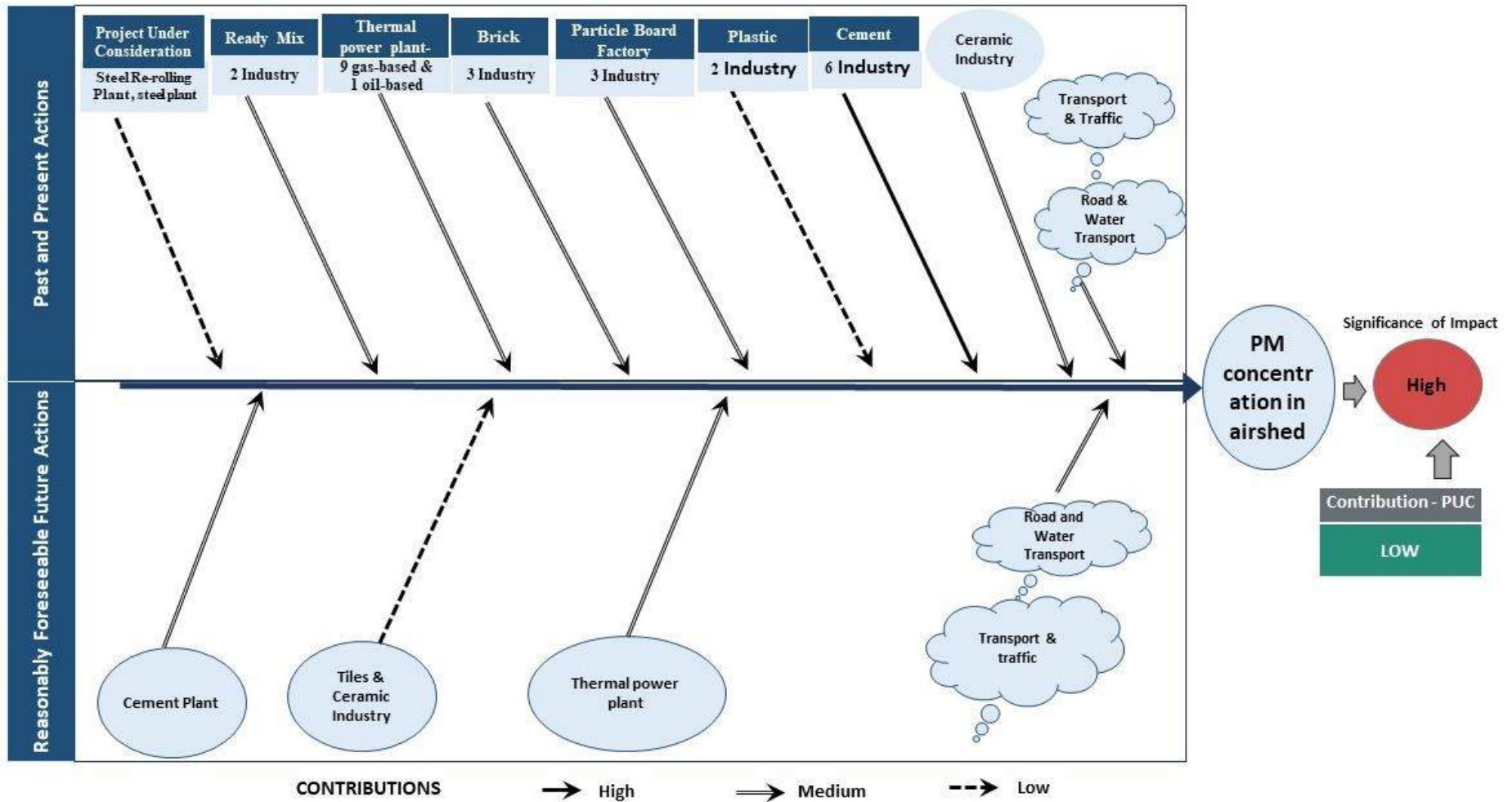
The contributions to the PM in the air-shed from past and present activities (industrial and developmental stressors) are already high. The monitored PM concentration in the Meghnaghat area is within the threshold limit. The past, present, and future industrial activity along with external factors (rapid urban growth and traffic) will cumulatively increase the PM concentration in the Meghnaghat Air shed. The air quality modelling result shows that the cumulative industrial and power sector contribution from past, present, and future activities will result in a further increase of PM concentration in the Meghna air shed.

Along with the industrial growth, other PM-generating activities (traffic, small and medium air-polluting industrial sources, and urban & commercial activity) will be also contributing additional PM in the air-shed. Therefore, the cumulative contribution of PM in the Meghnaghat area from past, present, and future industry activities and development stressors is expected to lead to an exceedance of the PM threshold level. The cumulative impact is assessed to be high. The contribution of PM from PUC towards PM concentrations in the air shed is assessed to be low.

**Table 7-3: Predicted 24-Hourly Maximum Ground Level Concentration of PM10**

Monitoring Locations	Monitored Conc. of PM ( $\mu\text{g}/\text{m}^3$ )	Predicted 24 Hourly Max Concentration of PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )							
		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

Figure 7-3: PM Concentration in Air-shed- Cause and Effect Relationship



## 7.2.3 Concentration of NO<sub>2</sub>

### 7.2.3.1 Stressors and Impact

**PUC:** During the construction stage of the PUC, Heavy equipment such as excavators, payloaders, trucks, concrete mixers, lifting equipment, etc. will be deployed onsite. Emissions from this equipment can affect the ambient air quality of the surrounding areas. Exhaust emissions from the operation of machinery and equipment are likely to contribute to the air pollutant load, including but not limited to pollutants such as PM, NO<sub>x</sub>, SO<sub>2</sub>, and CO.

During the operational stage of the PUC, the source of NO<sub>x</sub> from the process is the ladle furnace and electric arc furnace. The process emission will be treated through a fume treatment plant. 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 plant will capture and treat fumes as discussed in Section 7.2.2.

Air quality modelling has been carried out to understand the impact of NO<sub>2</sub> from the proposed project (PUC) in the ESIA study. The proposed steel mill will contribute a maximum Ground Level Concentration (GLC) of 1.55 µg/m<sup>3</sup> (annual averaging time) of NO<sub>2</sub> to the airshed considering Tier 1 (NO<sub>2</sub>/NO<sub>x</sub> = 1). The annual predicted maximum NO<sub>2</sub> concentration was found as 1.55 µg /m<sup>3</sup> (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 NO<sub>2</sub> are presented in Table 7-4. The details of air quality modelling have been presented in Appendix A and B.

**Table 7-4: Results of Air Quality Modeling for NO<sub>2</sub> due to Proposed Steel Mill Operation**

Scenario	Max. Conc. (µg/m <sup>3</sup> )		Max. Conc. Location	APCR, 2022 <sup>a</sup> (µg/m <sup>3</sup> )	WHO, 2021 <sup>b</sup> (µg/m <sup>3</sup> )		% 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 <sup>3</sup> )- 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
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

<sup>a</sup>Schedule-1 (Ambient Air Quality Standards), Air Pollution Control Rules 2022

<sup>b</sup> WHO Global Air Quality Guideline Value 2021

Note: IT1- Interim Target 1, AQG- Air Quality Guideline

**Past and Present Activities:** The major air-polluting industries in the spatial boundaries are thermal power plants (gas-based and HFO-based), cement plants, particle board factories, ceramic industry,

and brick manufacturing units. Industry sector-wise contribution of NO<sub>2</sub> in the airshed has been discussed in the following section:

**Thermal power plant:** There are 10 operating gas-based power plants in the Meghna North Cluster. Combustion of fossil fuel (gas and oil) at high-temperature results in the generation of NO<sub>x</sub>. The emission of NO<sub>x</sub> from oil-based power plants is almost three times higher than gas-based power plants.

**Steel Plants:** There are two steel plants in the spatial boundary. The source of NO<sub>x</sub> from the process is the ladle furnace and electric arc furnace. It was observed that fugitive emissions from the plant.

**RFFAs:** Amongst the RFFAs, the one gas-based thermal power plant that has been proposed in Meghnaghat South Cluster will generate NO<sub>x</sub> during NG combustion at high temperatures.

**Stressors or Drivers:** As stated above, existing traffic load on the Dhaka Chittagong highway and other internal roads is quite high. The future industrial growth expected to increase the traffic load will also result in an increase in NO<sub>x</sub> emissions.

The contribution towards NO<sub>x</sub> in the air-shed due to PUC, air-polluting industries, and development activities along with their cause-effect relationship is graphically presented in Figure 7.6.

**Air quality modelling:** To assess the cumulative impact on NO<sub>2</sub> from the above-mentioned industry sectors and their contribution to the air shed has been assessed through a modelling exercise. Predicted GLC from industry sectors has been presented in Table 7.5. Details have been provided in Appendix B.

The air quality modelling study shows that the predicted contribution of NO<sub>2</sub> from the existing power plant varied from 2.27 µg/m<sup>3</sup> (minimum) i.e. only 2.27% of the monitored NO<sub>2</sub> concentration at AQ5 (Joshim Uddin saheb ar bari, 9no word Abdullahpur, Meghna, Cumilla) to 4.51 µg/m<sup>3</sup> (maximum) i.e. 53.23% of monitored NO<sub>2</sub> concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj).

The predicted contribution of NO<sub>2</sub> from the proposed power plant varied from 1.08 µg/m<sup>3</sup> (minimum) i.e. only 12.72% of the monitored NO<sub>2</sub> concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj) to 4.92 µg/m<sup>3</sup> (maximum) i.e. 17.2% of monitored NO<sub>2</sub> concentration at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhaber Char, Gazaria, Munshiganj).

The predicted contribution of NO<sub>2</sub> from proposed and existing power plant varied from 2.89 µg/m<sup>3</sup> (minimum) i.e. only 19.37% of the monitored NO<sub>2</sub> concentration at AQ5 (Joshim Uddin saheb ar bari, 9no word Abdullahpur, Meghna, Cumilla) to 5.97 µg/m<sup>3</sup> (maximum) i.e. 20.86% of monitored PM concentration at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhaber Char, Gazaria, Munshiganj).

The contribution of NO<sub>2</sub> from existing PVC plant varied from 0.72 µg/m<sup>3</sup> (minimum) i.e. 8.56% of the monitored NO<sub>2</sub> concentration at AQ6 (Amin's house, Jastitola, Imampur, Gazaria, Munshiganj) to 2.04 µg/m<sup>3</sup> (maximum) i.e. 12.43% of monitored NO<sub>2</sub> concentration at AQ1 (Hazi Umor Faruqe Khondokar's Hause, Boroikandi, vaterchar, Gazaria, Munshiganj).

The contribution of NO<sub>2</sub> from proposed Glass industry varied from 0.21 µg/m<sup>3</sup> (minimum) i.e. 2.43 % of the monitored NO<sub>2</sub> concentration at AQ6 to 1.70 µg/m<sup>3</sup> (maximum) i.e. 5.96% of monitored NO<sub>2</sub> concentration at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhaber Char, Gazaria, Munshiganj).

The air quality modelling study shows that the predicted contribution of NO<sub>2</sub> from proposed ceramic industries varied from 3.27 µg/m<sup>3</sup> (minimum) i.e. only 7.69% of the monitored NO<sub>2</sub> concentration at AQ4 (Project Site, Luterchar Answar Camp, CEZ, Meghna-Homna Road, Meghna, Cumilla) to 10.09 µg/m<sup>3</sup> (maximum) i.e. 61.5% of monitored NO<sub>2</sub> concentration at AQ1 (Hazi Umor Faruqe Khondokar's Hause,

Boroikandi, vaterchar, Gazaria, Munshiganj). The contribution of NO<sub>2</sub> from the PUC (Meghna Steel Industry) varied from 0.6 µg/m<sup>3</sup> (minimum) i.e. 7.08 % of the monitored NO<sub>2</sub> concentration at AQ6 to 8.5 µg/m<sup>3</sup> (maximum) i.e. 51.8% of monitored NO<sub>2</sub> concentration at AQ1 (Hazi Umor Faruqe Khondokar's Hause, Boroikandi, vaterchar, Gazaria, Munshiganj).

The contribution of NO<sub>2</sub> from existing and future industries including power plants, ceramic, PVC, and Glass has been predicted through modelling study. The modelling result reveals that the industrial and power sector will cumulatively result in increased NO<sub>2</sub> concentrations varying from 3.73 µg/m<sup>3</sup> (minimum) at AQ5 (Joshim Uddin saheb ar bari, 9 no word Abdullahpur, Meghna, Cumilla) to 8.45 µg/m<sup>3</sup> (maximum) at AQ2 (Jamia Faruqia Raujatul Ulum Madrasah, Roujatul Jannah shahi jame Masjid, Anarpura Mahmudbag, Bhaber 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 a 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. NO<sub>2</sub> contribution from road traffic has not been assessed due to the data limitation. It is assumed that road traffic has a significant NO<sub>2</sub> contribution. The model shows that the contribution of NO<sub>2</sub> from existing and proposed power plants, PVC, Ceramic, and glass industries on air quality monitoring locations varied from 3.73 µg/m<sup>3</sup> to 8.45 µg/m<sup>3</sup>. The maximum contribution of NO<sub>2</sub> from PUC is 8.5 µg/m<sup>3</sup> towards NO<sub>2</sub> concentrations in the air shed which is 10.6% of the national standard whereas 51.83% of air quality monitoring value.

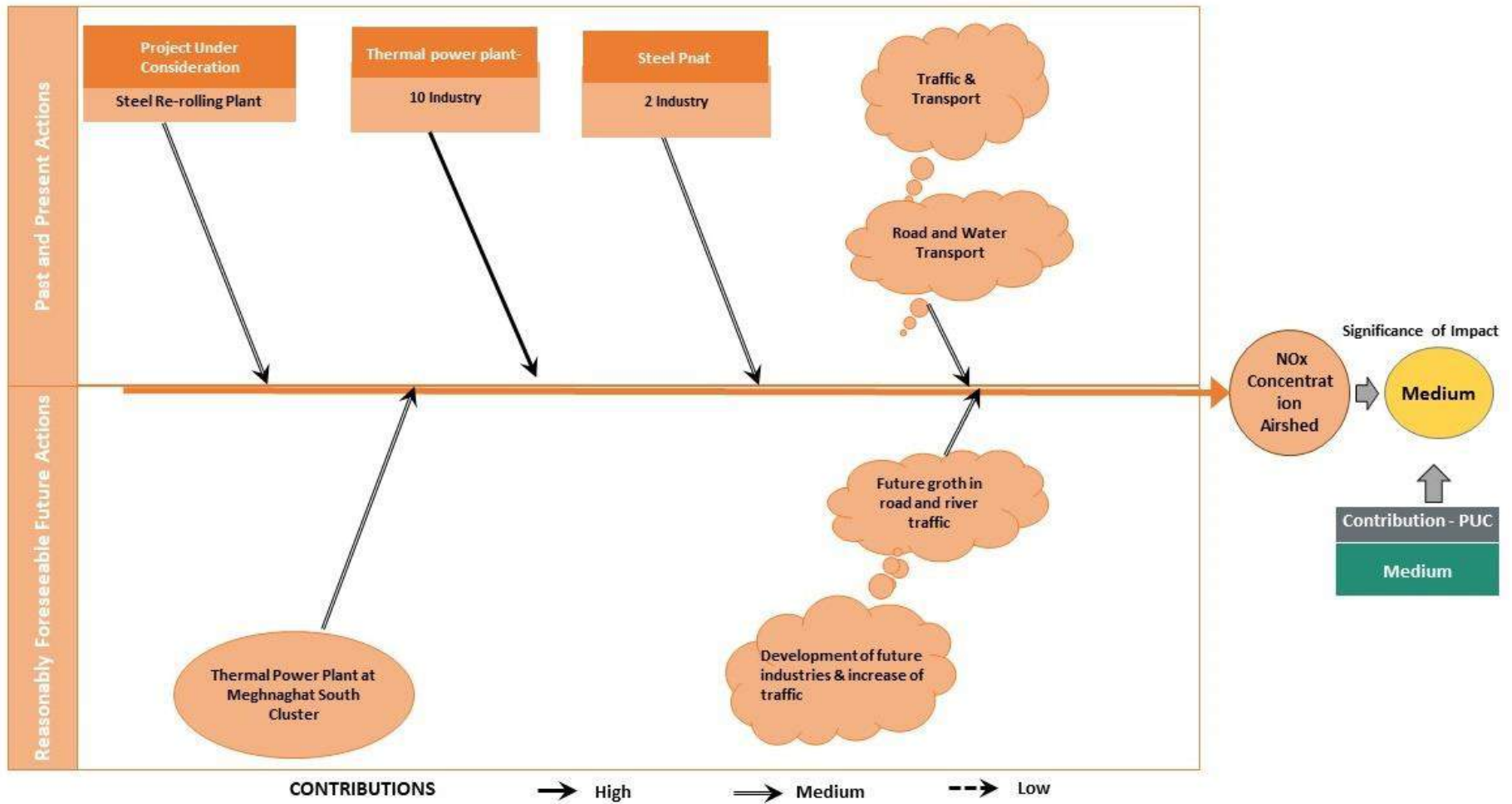
### **7.2.3.2 Significance of Cumulative Impact**

The existing NO<sub>x</sub> concentration in the Meghnaghat industrial area is within the threshold limits. The past, present, and future industrial activity along with external factors (rapid urban growth) will cumulatively impact the ambient air quality in terms of increasing the NO<sub>x</sub> concentration in the air-shed. However, the cumulative contribution of NO<sub>x</sub> in the Meghnaghat area from past, present, and future industry activities and development stressors is not expected to exceed the NO<sub>x</sub> threshold level. The cumulative impact is assessed to be moderate. The contribution of NO<sub>x</sub> from PUC is assessed to be medium.

**Table 7-5: Predicted 24-Hourly Maximum Ground Level Concentration of NO<sub>2</sub>**

Monitoring Locations	Monitored Conc. of NO <sub>2</sub> (µg/m <sup>3</sup> )	Predicted 24 Hourly Max Concentration of NO <sub>2</sub> (µg/m <sup>3</sup> )							
		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

Figure 7-4: NOx Concentration in Air-shed- Cause and Effect Relationship



## 7.3 Ground Water Resource

### 7.3.1 Baseline Condition

Groundwater is abundant in Bangladesh, and the aquifers are highly productive. Water tables vary across the country but are typically shallow at around 1–10 m below the ground surface. These factors have made groundwater an attractive and easily accessible resource. The increase in the amount of surface water pollution in the Meghna River forced the industrial areas and urban centers to increase their dependency on groundwater. Over-abstraction of groundwater in industrial areas is causing an unusual decline in groundwater levels.

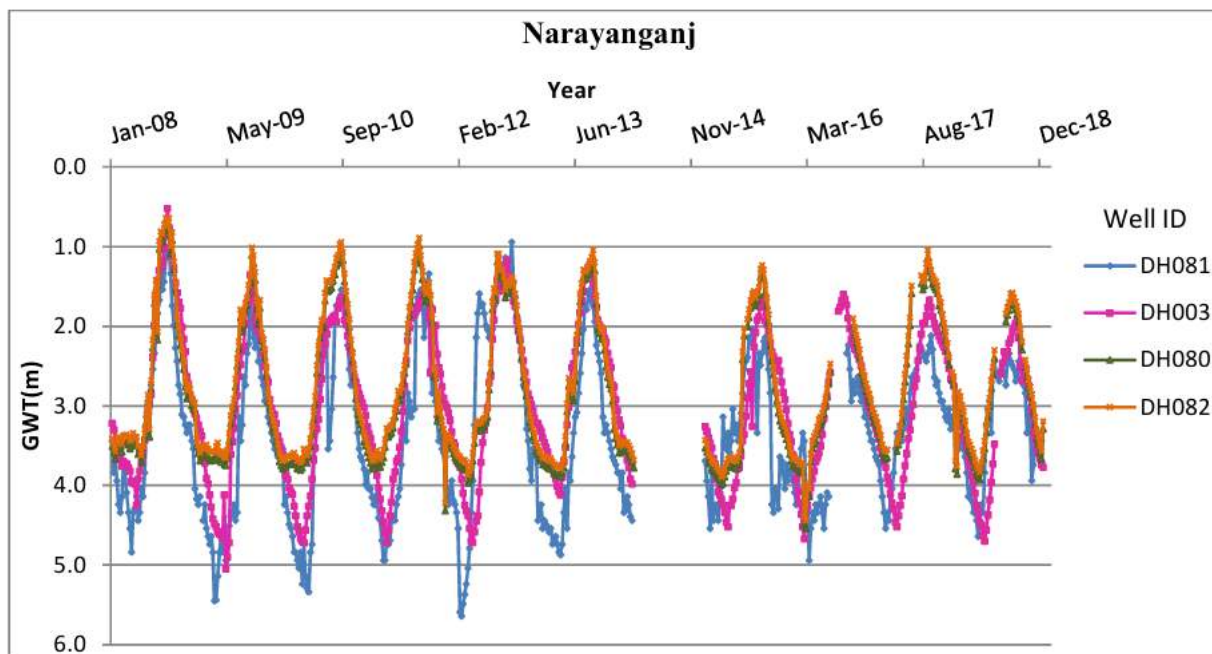
#### 7.3.1.1 Groundwater Level

The Bangladesh Water Development Board (BWDB) has groundwater monitoring wells within the study area and data was available for Narayanganj Sadar and Sonargaon Upazilas.

##### Narayanganj District

The hydrographs of the groundwater table show a decreasing trend in the dry period (December-February) and these show the lowest level in the pre-monsoon period (March-May) followed by a rapidly increasing trend in the monsoon period (June-August) and over again a gradual decrease in post-monsoon period (September-November). Seasonal fluctuation trends during the period of 2008 to 2018 are almost similar in all 4 wells DH081, DH003, DH080, and DH082 which are located in Arahazar, Narayanganj Sadar, Rupganj, and Sonargaon upazilas respectively. In these wells, GWT fluctuated between 0.52m to around 5.64m. Hydrographs of the Narayanganj district have been presented in Figure 7.5.

Figure 7-5: Hydrographs of GWT of Narayanganj District

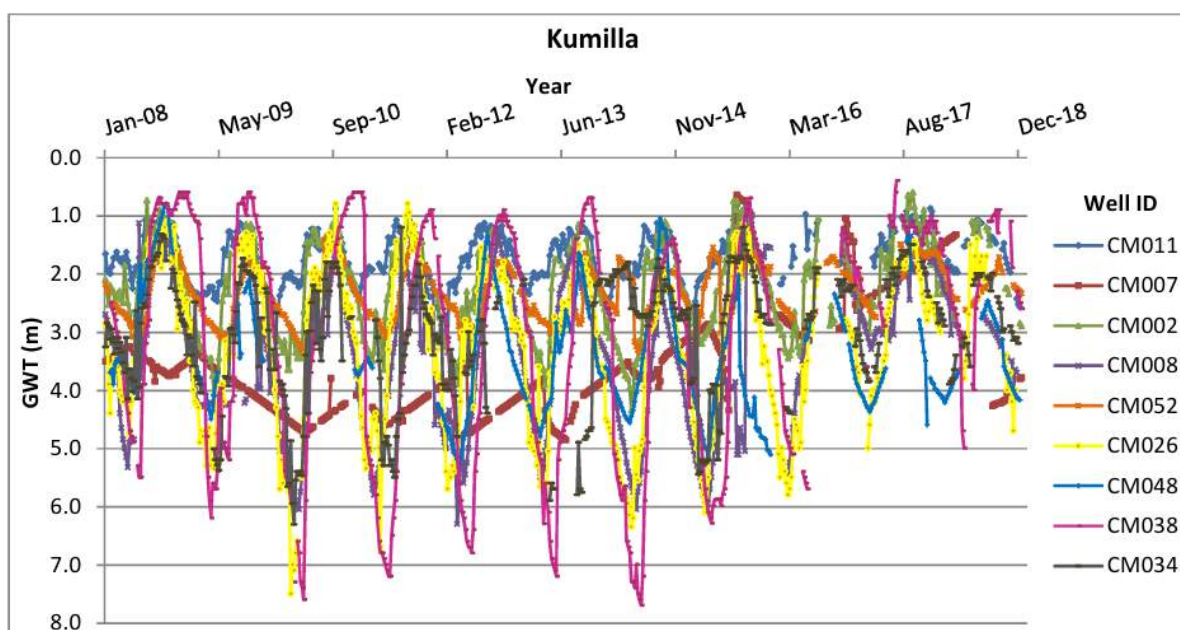


##### Cumilla District

The hydrographs of the groundwater table show a decreasing trend in the dry period (December-February) and these show the lowest level in the pre-monsoon period (March-May) followed by a rapidly increasing trend in the monsoon period (June-August) and over again a gradual decrease in post-monsoon period (September-November). Seasonal fluctuations are almost similar in 8 wells CM002,

CM008, CM011, CM052, CM026, CM048, CM038, and CM034 which are situated in Burichang, Chandina, Kumilla Sadar, Daudkandi, Debidwar, Homna, Laksam, and Muradnagar upazilas respectively. In these wells, GWT fluctuated between 0.59m to around 7.69m from the surface level of those areas. In well CM007 the water table was around 3.50m depth during the monsoons of 2008 but it didn't reach the static level during the monsoons of 2009 to 2013. Again in 2014 the GWT of well CM007 gradually increases, and it reaches around 2m depth during the monsoon of 2017. Well, CM007 was installed in the central area of Barura Upazila. This decline may be due to excessive extraction of groundwater and the recharge didn't reach that level in that period. Hydrographs of the Cumilla district have been presented in Figure 7.6.

Figure 7-6: Hydrographs of GWT of Cumilla District



### 7.3.2 Stressors and Impacts

**PUC:** As discussed, in Section 4.1.3, approximately 56.9 m<sup>3</sup>/day of water during the construction stage will be sourced from groundwater. During the operational stage, cooling water will be sourced from the river; however, the domestic water requirement during the operational stage is 50 m<sup>3</sup>/day, and the same will be sourced from groundwater. The potential impact of the PUC on groundwater resources is assessed to be low.

**Past and Present Projects:** The most water-intensive industries in the spatial boundary is gas gas-based thermal power plants, paper manufacturing, and food processing plants. Thermal power, the major water requirement is cooling water, and the same has been sourced from the Meghna River. Domestic water requirements for other industries have been sourced from groundwater.

**Pulp & Paper and Food Processing Industries:** Paper manufacturing and food processing are the most water-intensive industrial activities in the Meghnaghat industrial region. There are 13 paper & pulp industries presently operating in Meghnaghat and the water requirement of such units is as high as 75 to 100 liters of water/kg of paper produced. 12 food processing units are also operating within the Meghnaghat industrial area. These units are abstracting groundwater both for industrial requirements as well as their domestic uses.

**Other industries:** Other major industries like chemical plants, textiles, steel mills, and ceramics require some process water or cooling water; domestic water is sourced from groundwater, beverage and

mineral water, food processing, textiles, RMG, and other manufacturing industries. The proposed industries would also require process, cooling water, and domestic water. The required water is likely to be sourced from the groundwater.

Cement Industry: Other prominent industrial sectors in the Meghnaghat area are cement plants, which do not require any form of process water. The water requirement is low and will be met from the groundwater sources.

RFFAs: The list of RFFAs indicates that gas-based power plants, cement plants, and food processing industries are planned in the three existing industry clusters. In the CuEZ, planned industries like beverage and mineral water, food processing, textiles, RMG, and other manufacturing industries. The proposed industries would also require processed water, cooling water, and domestic water. The required water is likely to be sourced from the groundwater.

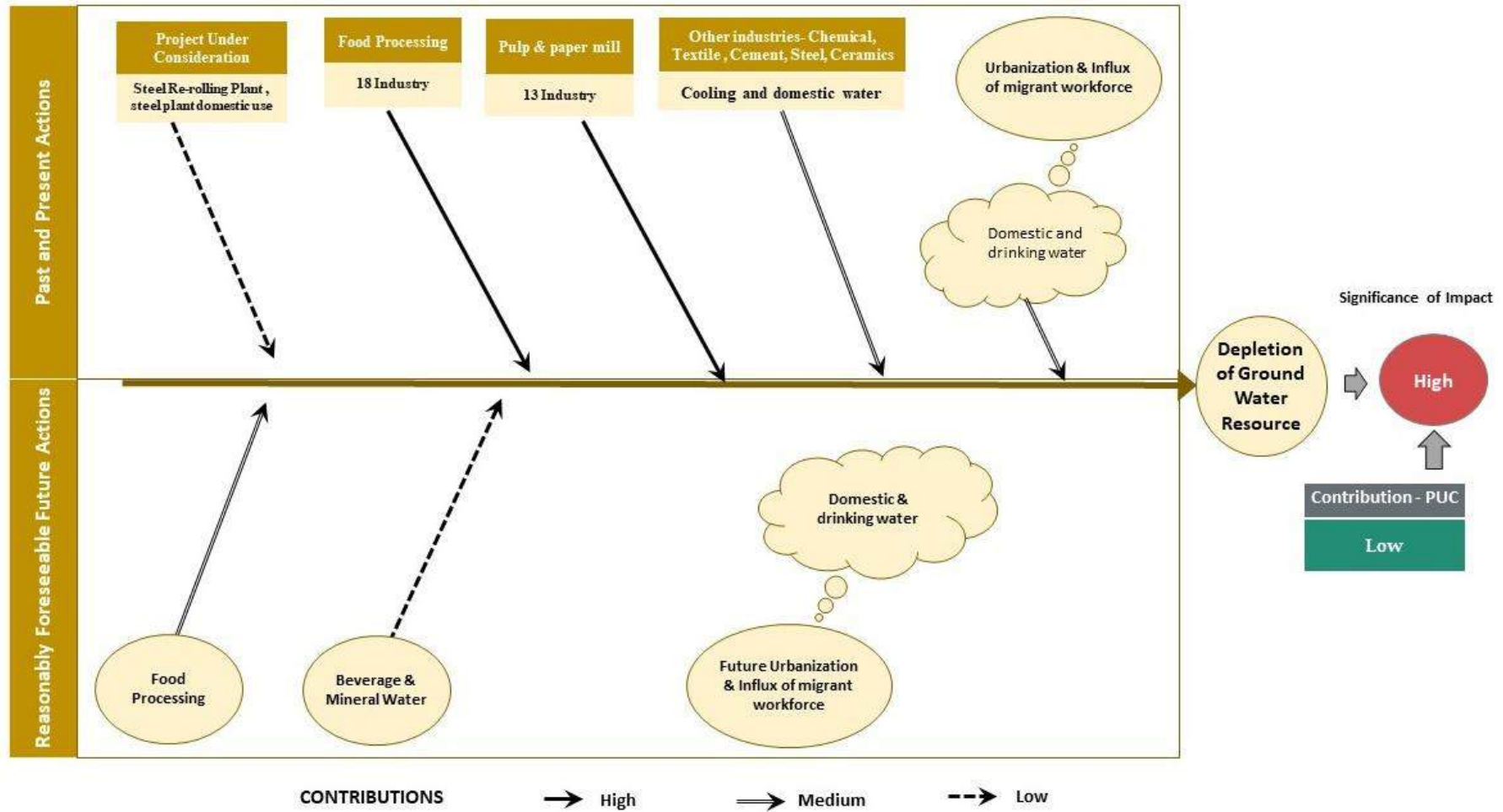
Stressors: Future industrialization process is likely to increase the influx of migrant workers in this region. Water demand for domestic needs will increase and will be sourced from groundwater. Presently, potable needs are mostly being met from groundwater sources and future growth is likely to exert further pressure on this already stressed VEC.

The contribution towards depletion of groundwater due to different industrial and development stressors along with their cause-effect relationship is graphically presented in Figure 7.7.

### **7.3.3 Significance of Cumulative Impact**

The groundwater table over the years in and around the industrial area has progressively declined due to stresses exerted by past industrial activities. The resource is presently unregulated and the existing abstraction rates are higher than the replenishment rates. Past industrial activity, PUC, and future industrial activity are expected to result in further depletion of groundwater resources in the future. The cumulative impact on the depletion of groundwater resources is assessed to be high. The contribution of groundwater depletion from PUC is assessed to be low.

Figure 7-7: Depletion of Groundwater Resource- Cause and Effect Relationship



## 7.4 Surface Water Quality

### 7.4.1 Baseline Condition

Meghna River flows through the Meghnaghat Industrial area. The north and south industrial clusters in Meghnaghat have developed along the banks of this river. Meghnaghat South-South and CuEZ have been developed around the Meghnaghat minor channel. The river originates in Bangladesh through the joining of the Surma and Kushiara rivers originating from Meghalaya, India. River water is used for industrial cooling and process water. The rivers serve as a sink for treated effluents from industries including thermal discharges from power plants which mostly have once-through cooling systems. The river is also used for the transport of raw materials and finished products and construction materials. The river supports aquatic ecosystems and fish propagation.

Pollution of surface waters is considered one of the most serious problems in industrial and urban areas. The water quality of the river is of particular importance not only for ecological and commercial reasons but also for concerns regarding safe drinking water supply and suitability for industrial use and domestic use.

The quality of surface water was assessed through primary monitoring under the ESIA study as well as through a collection of secondary data from various sources.

MRMSL ESIA: The surface water quality monitoring in the Meghana was carried out in two locations during ESIA for the period.

Dissolved Oxygen (DO): 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): 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.

A total of eight surface water quality samples were collected from the Meghna River Branch in September 2022 under the Environmental Impact Assessment of Meghna Re-Rolling and Steel Mills Ltd. Based on the monitoring, BOD concentrations in the surface water samples were in the range between 0.5 mg/l to 15 mg/l. DO concentrations in the surface water samples were in the range between 6.8 mg/l to 7.9 mg/l. COD concentrations in the surface water samples were in the range between 58 mg/l to 74 mg/l. pH concentrations in the surface water samples were in the range of 6.8 to 7.9. TDS concentrations in the surface water samples were in the range between 46 mg/l to 60 mg/l. TSS concentrations in the surface water samples were in the range between 9 mg/l to 24 mg/l. Chloride concentrations in the surface water samples were in the range between 206 mg/l to 243 mg/l. Iron concentrations in the surface water samples were Nil.

A total of four surface water quality samples were collected from the Meghna River in 2020 under the Environmental and Social Impact Assessment Report for the Proposed 600MW Combined Cycle Power Plant at Sonargaon, Narayanganj, Bangladesh. Based on the monitoring, BOD concentrations in the surface water samples were in the range between <2.0 mg/l to 5 mg/l. DO concentrations in the surface water samples were in the range between 5.0 mg/l to 6.4 mg/l. COD concentrations in the surface water samples were in the range between 8 mg/l to 56 mg/l. TDS concentrations in the surface water samples were in the range between 40 mg/l to 180 mg/l. Aluminum concentrations in the surface water samples were in the range between 0.05 mg/l to 0.302 mg/l. Cadmium concentrations in the surface water samples were <0.001 mg/l. Copper concentrations in the surface water samples were in the range between 0.03 mg/l to 0.08 mg/l. Chromium concentrations in the surface water samples were <0.01 mg/l. Nickel concentrations in the surface water samples were in the range between 0.01 mg/l to 0.08 mg/l. Zinc concentrations in the surface water samples were 0.08 mg/l.

## 7.4.2 Concentration of DO & BOD

### 7.4.2.1 Stressors and Impacts

Pulp and paper mills: The major stressors on water quality in the Meghna River are pulp and paper mills. There are 13 operating pulp and paper mills using imported pulp and waste-paper as raw materials. The wastewater generated from the paper manufacturing process has a high organic load. The BOD load of untreated wastewater from pulp and paper mills varies from 90–150 mg/L, and the treated load varies from 30–50 mg/L. All the plants have installed ETPs to treat their plant effluent; however, it was reported during consultation with local communities that at times the effluents are discharged into the river without any treatment, which results in fish kills in the Meghna River. The organic load from pulp and paper mills is considered to be high.

Food Processing Plants: A number of small and large-scale food processing units are also located within the Meghnaghat industrial area. These food processing units are generating a large volume of wastewater with a high BOD. All the units have ETP to treat the wastewater and meet the discharge standard. Their contribution to the organic load in the river is expected to be high.

Thermal Power Plants: The thermal power plants, on the other hand, do not directly contribute towards the addition of any significant organic load in the river. The discharge from the power plants is mostly from cooling tower blow down, boiler blow down and DM plant rejects. This wastewater will be treated in ETP and then discharged into the river. Such treated waste streams usually do not have any high organic load. The domestic wastewater (sewage) generated from the residential area of the power hub will be treated through an STP/septic tank and soak pit and the possibility of untreated sewage being discharged into the river is low.

RFFA: The RFFA list indicates in the existing industry cluster and CuEZ that gas-based power plants, food processing units, pharmaceuticals, and textile industries have been proposed. Effluent and sewage from the proposed industries are likely to be treated through ETP and STP, or septic and soak pits. The potential impact on surface water quality is assessed as low.

It was observed that certain areas have been developed for future industries. Considering the industrial pattern and demand in the local market, pulp and paper, tissue paper, PVC plants, flour mills, petrochemicals, ceramic factories, etc., are likely to be set up. The waste streams from the different units of the industrial clusters are expected to have a high BOD.

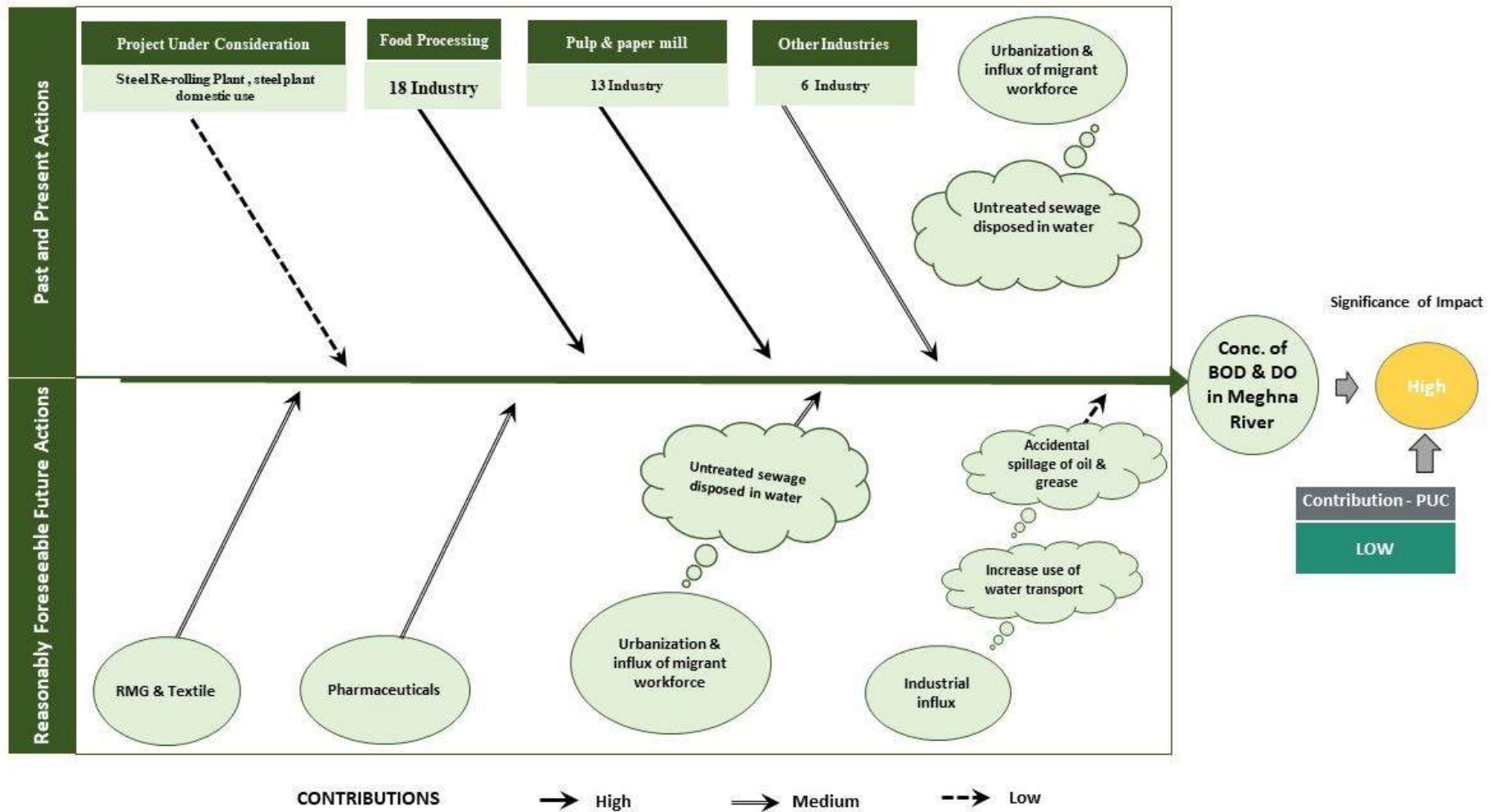
Stressors: In the Meghnaghat industrial region there are no large urban centers or the slumification effect has not been observed. Meghnaghat still retains its inherent rural character. However untreated domestic wastewater from existing residential areas is directly being discharged into the river.

The contribution towards the addition of organic load in the river waters due to different industrial and development stressors along with their cause-effect relationship is graphically presented in Figure 7.8.

### 7.4.2.2 Significance of Cumulative Impact

The contribution of organic load in the Meghna River from past activities (industrial and external factors) is not significant. The existing BOD level in the river water is within the threshold limit for Class D waters (i.e., propagation of wildlife and fisheries). The concentration of DO in the river was well above the threshold limit for Class D waters. The increase in BOD in the river has a potential negative impact on DO. However, the organic load in the river water was good, and the concentration of DO was good. The past, present, and future development activity, along with external factors (rapid urban growth), will cumulatively impact the surface water quality in terms of increasing the BOD levels in the river. The cumulative impact is assessed to be medium. The direct contribution of any organic load from the PUC (three terminals) is assessed to be low.

Figure 7-8: Surface Water Quality (DO and BOD)- Cause and Effect Relationship



### 7.4.3 Concentration of Toxic Metals

#### 7.4.3.1 Stressors and Impacts

The baseline condition of the surface water quality revealed that the concentration of toxic metals (Pb, Cr, and Cd) was below detectable limits. However, it was reported in the sediments. The presence of toxic metals in the sediment is likely to have accumulated from past industrial activities. The possible contributors vary from power plants to industries such as pulp and paper mills, shipyards, chemical factories, etc.

PUC: The proposed project would not require any processed water. Only cooling water would be required. The cooling blowdown water will be treated in ETP. Proper functioning of the cooling systems in PUC requires the treatment of cooling water against corrosion of the equipment, scaling, and micro and macro-fouling. The presence of chromium is reported in the chemical used for the treatment of cooling water. Therefore, the discharge of cooling blowdown water from the PUC is possibly contributing towards the Chromium concentration in river water and sediment.

Past and Present activities: The existing industries like pulp and paper mills, shipyards, and chemical factories. The potential impact of these industries has been discussed in the following sections.

Pulp and Paper: Paper manufacturing is the key contributor in this regard. There are 13 pulp and paper mills in the Meghnaghat industrial region using imported pulp and waste paper as raw material. Large volumes (75-100 lit/ kg of paper) of effluent are generated from the pulp and paper mills. The liquid effluent has heavy metals (in the forms of Pb and Zn) and other organic toxicants. The discharge of effluent into the river adds to the toxic metal concentration in the river water and sediment.

Shipyards: There are seven operating shipyards in the Meghnaghat industrial area. Waste streams from the shipyard (due to paint dilution and the use of degreasing solvents) generally contain toxic heavy metals like copper, zinc, and nickel. Discharge of this effluent in the river is possibly contributing towards toxic metal concentration in the Meghna River.

Chemical Plants: There are five chemical complexes in the Meghnaghat Industrial area. The type of chemical handled, or process followed cannot be ascertained at this stage. However, it was reported by the local people that the periodical release of effluent from the chemical plants caused massive fish kills in the Meghna River. The nature of the toxic metals contained in the effluent is not clearly established through this study. However, contributions from the chemical sector toward the presence of toxic metals in the river and sediments are assessed to be high.

Thermal power plants: Proper functioning of the cooling systems in power plants requires the treatment of cooling water against corrosion of the equipment, scaling, and micro and macro-fouling. The presence of chromium is reported in the chemical used for the treatment of cooling water. Therefore, the discharge of cooling blowdown water from the existing and proposed plants is possibly contributing towards the Chromium concentration in river water and sediment.

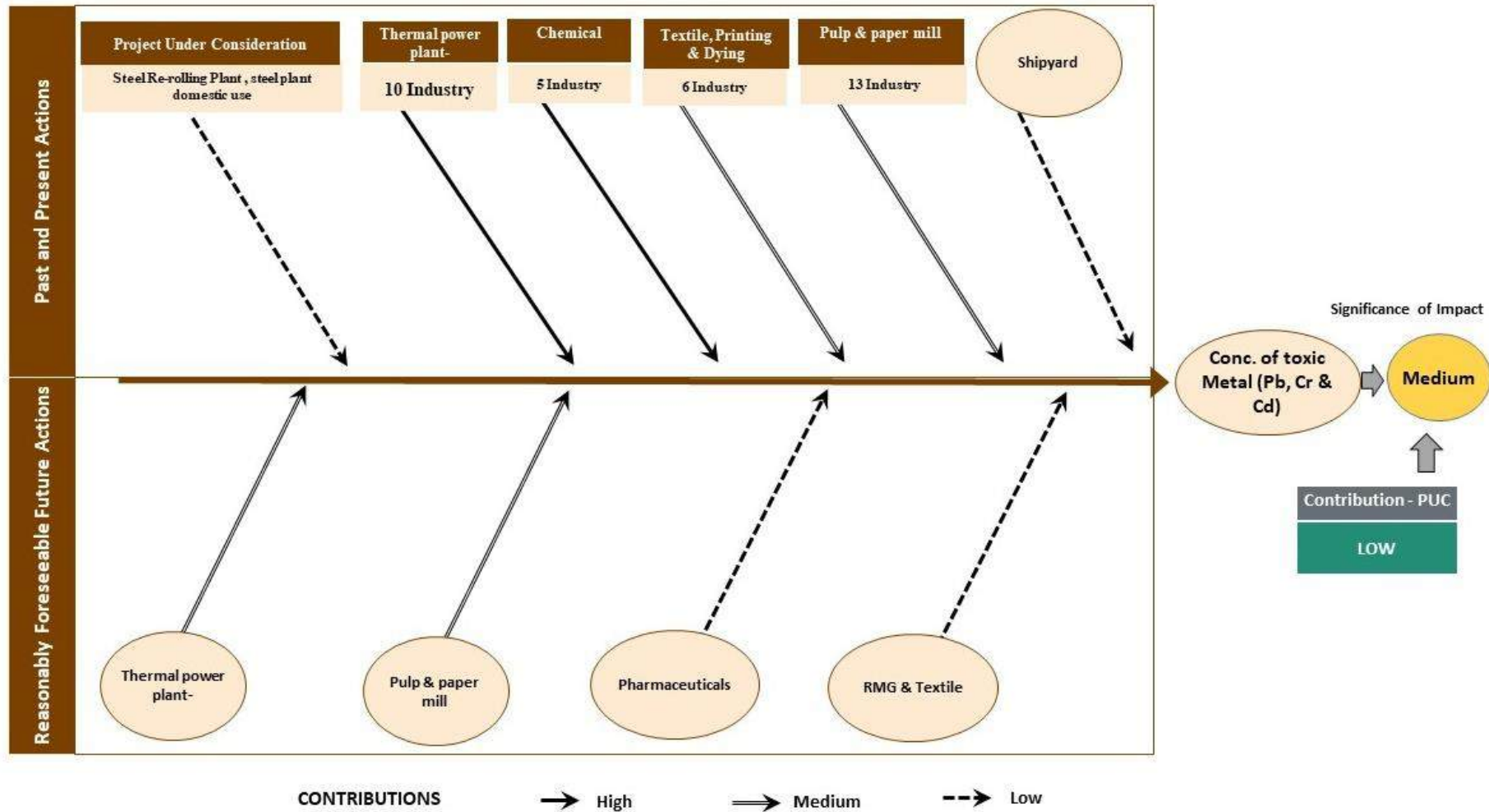
RFFA: The RFFA list indicates in the existing industry cluster and CuEZ that gas-based power plants, food processing units, pharmaceuticals, and textile industries have been proposed. It was observed that certain areas have been developed for future industries. Considering the industrial pattern and demand in the local market, pulp and paper, etc., are likely to be set up. These RFFA are expected to contribute towards the release of toxic metals in the river in the future.

The contribution towards toxic metals in the river water due to different industrial stressors along with their cause-effect relationship is graphically presented in Figure 7.9.

### **7.4.3.2 Significance of Cumulative Impact**

Toxic metals concentrations in the river sediments have been detected especially for metals such as Cr, Cd, and Pb. However, the recorded concentrations were found to be below the threshold limit. The past, present, and future industrial activities are cumulatively adding to the toxic metal concentrations in the river water and sediment. The cumulative impact is assessed to be medium. However, the contribution from PUC towards the toxic metal concentration in the Meghna River waters is assessed to be low.

Figure 7-9: Surface Water Quality (Toxic Metals)- Cause and Effect Relationship



## 7.5 Migratory Bird Species

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). Almost all the 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 Lawping (*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 of least concern (LC) according to the IUCN Red List of Bangladesh (2015) and the 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.

### Migratory Avian Species

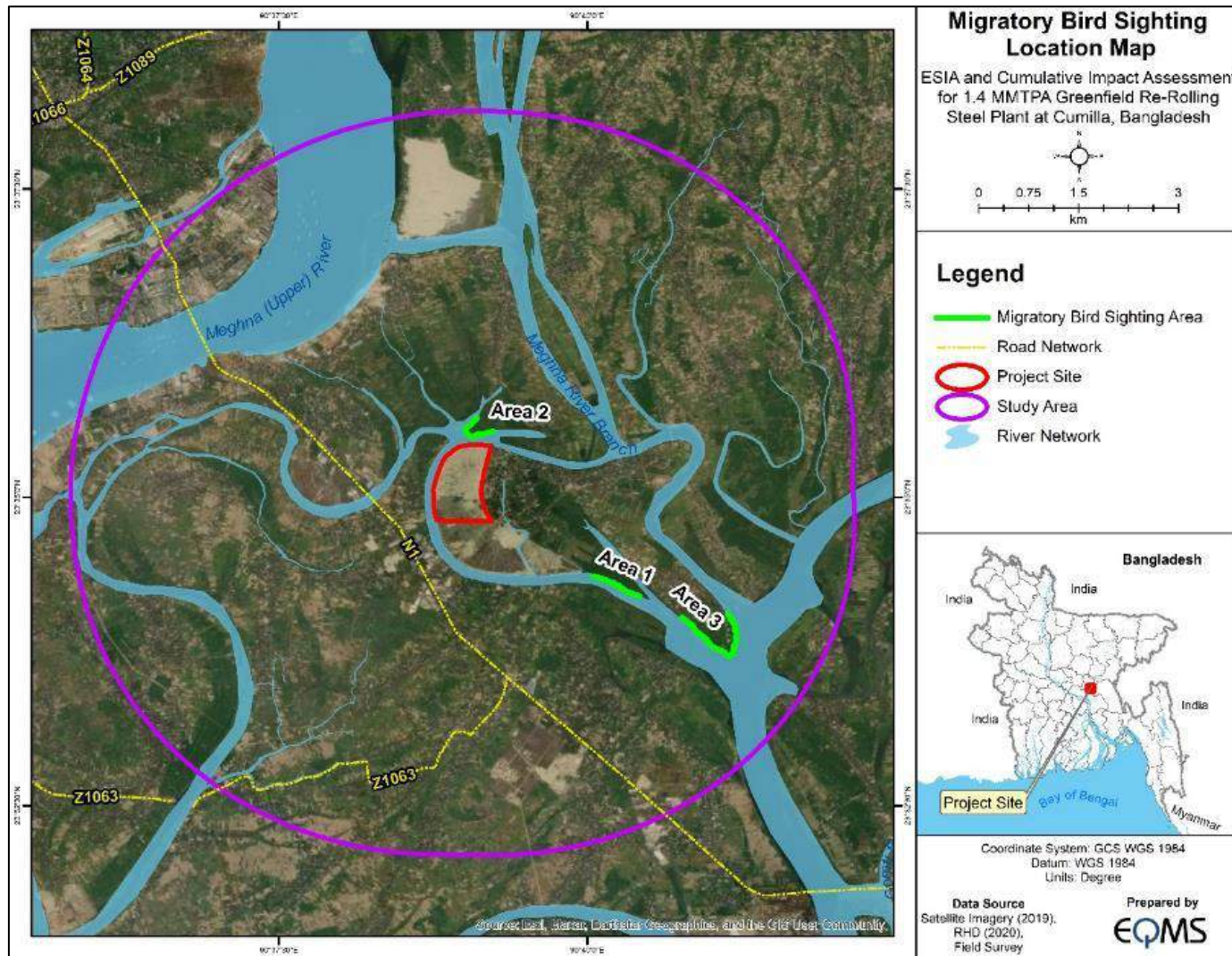
A total of Eight (08) Migratory birds were observed during the field visit of February 2024, within the Project AOI. All the migratory avian species recorded in the study area are Least Concern (LC) according to both the IUCN Red List of Threatened Species of Bangladesh 2015, and Global IUCN Red List 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 is also found in 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 the Meghna branch river adjacent to the project site. A map of the migratory bird sighting area (based on Primary survey and secondary information) has been presented in Figure 7-10.

Figure 7-10: Migratory Bird Sighting Area Present in the AOI



Source: EQMS Field Survey, February 2024

## 7.5.1 Stressors and Impacts

PUC: The construction and operation of the PUC would generate noise and illumination. The noise and illumination have the potential to affect important behaviors such as foraging, breeding, and resting. The baseline condition revealed that migratory birds and other aquatic birds were mostly reported in Meghna Minor channels, marshy areas, and agricultural land. The noise and illumination generated from the PUC have a potential impact on the foraging of migratory birds near the PUC. The potential impact on the diversity of these species is assessed as low.

### Past and Present Activities:

Habitat modification: As discussed in Section 7.1.1, agricultural land, marshy land, and wetlands have been converted into industrial and residential areas. The agricultural land, marshy land, and wetland provide habitat for the birds as well as migratory bird species. The past and present industries and expansion of human settlement have been developed on agricultural land, marshy land, and wetlands. Habitat modification has a potential impact on the habitat of the habitat of migratory birds and aquatic bird species. The potential impact on bird's habitat degradation is assessed to be medium.

Noise and illumination: noise and illumination from the existing industries and traffic (road and river transport) have the potential to affect important behaviours such as foraging, breeding, and resting. The potential impact on the diversity of endangered and migratory bird species is assessed as medium.

Surface water quality: As discussed in Section 7.4.2, surface water quality may be degraded due to the discharge of treated and untreated effluent and sewage from past and present projects and activities. The degradation of surface water quality has the potential to have an impact on aquatic ecology and ultimately have a negative impact on the food base of aquatic bird species.

RFFA: The RFFA list indicates in the existing industry cluster and CuEZ that the number of industries has been planned in all four industry clusters. The proposed industries have a potential impact on habitat degradation (land use change) and noise and illumination during construction and operational stages. The potential impact on bird's habitat degradation is assessed to be medium.

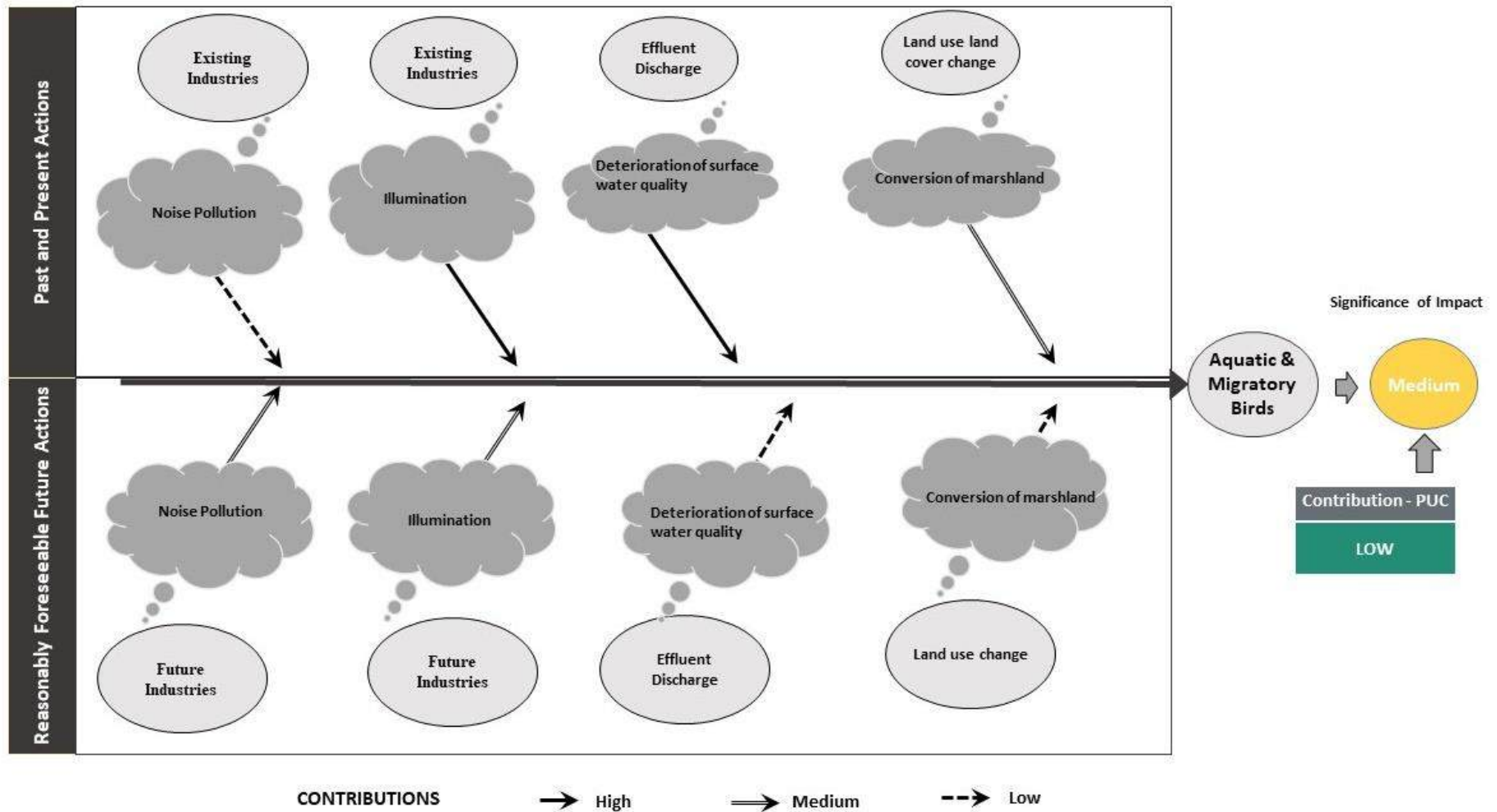
Influx of Labor: The various construction activities, existing, proposed, and future projects would require a large number of workers. The workforce may reside in the labour camp near the project sites. There is a potential threat to capture or hunt the protected bird species. The potential impact on the diversity of endangered and migratory bird species is assessed to be low.

The potential impact on aquatic and migratory bird species due to PUC and past, present, and future industries and activities, along with their cause-and-effect relationship, is graphically presented in Figure 7.11.

## 7.5.2 Significance of Cumulative Impact

The habitat degradation, noise, artificial illumination, surface water quality, and influx of workforce in the Meghnaghat industrial area, with aquatic and migratory bird species prevailing within the impact zone, have a potential impact on the diversity of these species that is assessed to be medium. The contribution of the potential impact of the diversity of endangered and migratory bird species from PUC is assessed to be low.

Figure 7-11: Aquatic and Migratory Birds Habitat- Cause and Effect Relationship



## 7.6 Social Well-being

### 7.6.1 Baseline Condition

Social Wellbeing has been selected as a VEC because of its intrinsic importance in human life. It is an end state in which basic human needs are met and people are able to coexist in communities. This end state is characterized by equal access to the basic needs of services (water, food, shelter, sanitation, etc).

The Meghnaghat industrial area, in Narayanganj and Cumilla district. As per the Population and Housing Census, 2011 industrial area is characterized by a total population of 1,716,813 individuals and 3,70,423 households.

Industrialization and economic development of a region create demands for new housing or more housing space for the workforce. This encourages local residents for rapid construction of new houses. The rapid development of housing and other infrastructure often produces a variety of discontinuous unplanned developments giving rise to a slum like effects with insufficient living areas, and improper civic infrastructure.

Stakeholder consultations revealed that with the progress of industrialization, most of the people converted their agricultural land into low-cost residential structures. The low-wage-earning workers preferred such slum-like dwelling units rather than 'affordable housing' with all the proper basic amenities. Slum-like growth due to the migrant workforce can further be established by reviewing the sudden abnormal growth of Kutcha houses. In an effort to construct low-cost residential structures, proper sanitation facilities, and adequate drainage systems are often neglected or compromised.

### 7.6.2 Stressors and Impact

PUC: CuEZ has a provision of a residential colony for the PUC workers and working population in the economic zone. During the construction phase, the workforce is likely to be stayed in the in the labour colony in the project site or the nearby villages. Labour influx during the construction stage has a potential impact on social well-being.

Past and Present Activities: Meghnaghat is comparatively a new habitat of industrial development and has the scope to accommodate further industrialization. Development has always taken place along the banks of the river – Meghna being one of the major rivers of Bangladesh has provided ample opportunity for industrial development in this region. The industrial concentration is mainly in sectors like cement, pulp & paper, shipyards, chemicals, power, and food processing. In the Meghnaghat industrial area. It was observed labour influx as the industries do not prefer to hire local community people as workers; however, no slums have been identified in the region. Meghnaghat still retains its rural physical features. Makeshift housing arrangements have been observed at some locations, but it is scattered and not clustered as a slum. The region also reports of cluster villages where displaced people due to riverbank erosion have been resettled on government land. This region faces inadequacy of basic services. Current industrialization in the region has not triggered slum growth but has shown traces of slumification (slum-like growth).

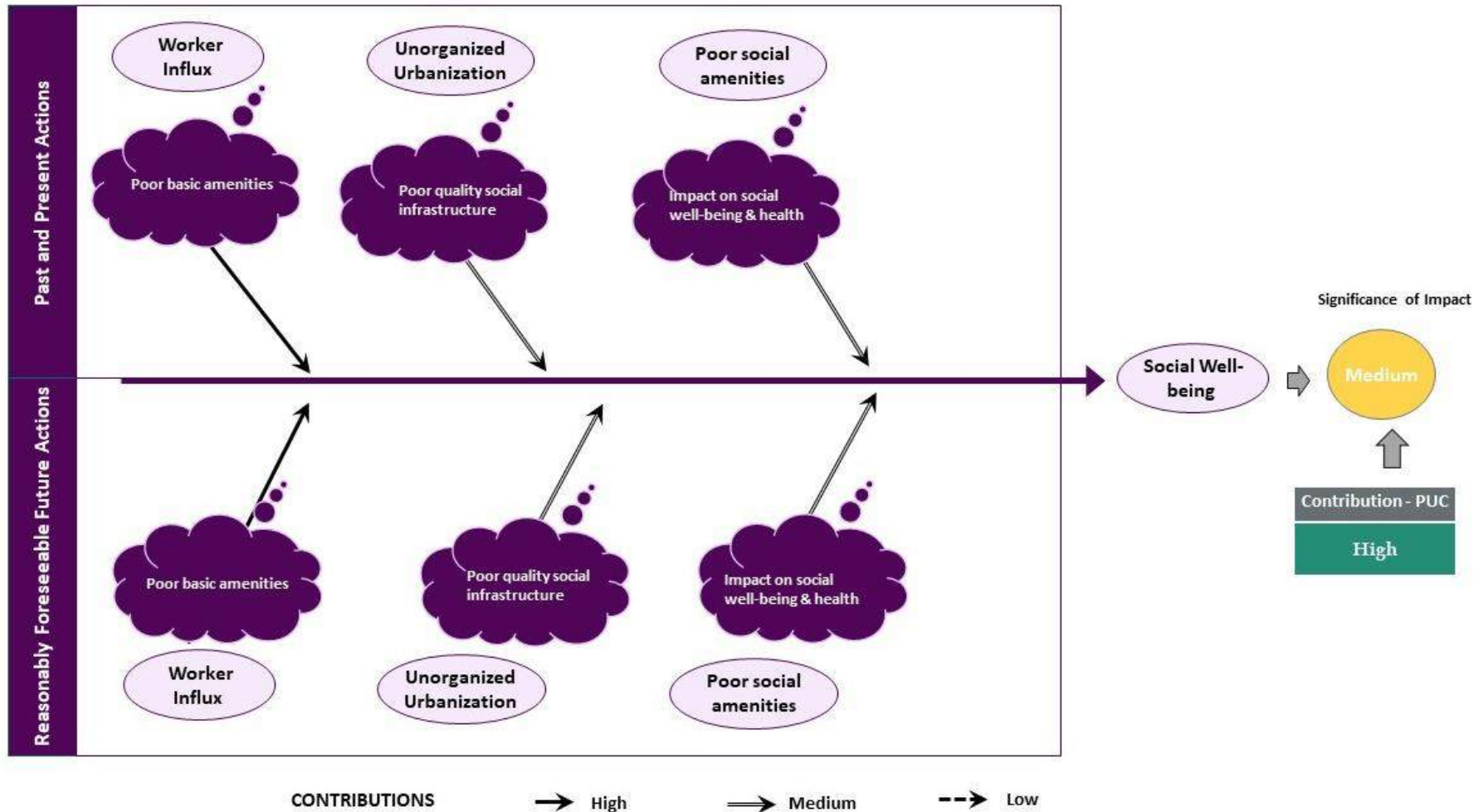
RFFAs: The RFFA list indicates in the existing industry cluster and CuEZ that the number of industries has been planned in all four industry clusters. The growth of other industries will also facilitate the expansion of service sector activities. This will result in an influx of both skilled and unskilled workforce in the region. Altogether this may lead to slumification in the near future. Migration of a low wage-earning workforce will contribute towards unorganized, unplanned growth of housing structures with inadequate civic infrastructure and will eventually deteriorate the living conditions of the people.

The contribution towards the deterioration of social well-being from different industrial development stressors along with their cause-effect relationship is graphically presented in Figure 7.12.

### **7.6.3 Significance of Impact**

Low-cost housing growth has shown a rapidly increasing trend in the last two decades (from 8.96% in 1991 to 65.86% in 2011) amongst the three Unions of Pirojpur, Baluakandi and Hossaindi housing the Meghnaghat industrial area. Inadequate sanitation facility is another feature of low-cost housing. The census data illustrates that there has been an increase in the number of sanitary latrines – but the percentage of water-sealed latrines (25.3%) is significantly lower than non-water-sealed latrines (57.2%). The situation which has not yet resulted in slumification can very lead to unplanned slum growths, with further advancements of industrialization, if planned actions are not taken. This can impact the quality of life of community people and thus their social well-being. The cumulative impact from past present and future stressors is assessed to have a medium impact on the social wellbeing of the community. The cumulative impact of social well-being is assessed to be medium and contribution from PUC is low.

Figure 7-12: Social Well-beings - Cause and Effect Relationship



## 7.7 Community Health and Safety

Community health is assessed as a VEC in the present study because of its importance in the socio-economic well-being of the local community and its interactions with other VECs. Respiratory diseases are a key indicator to study the health of the community in Meghnaghat as reportedly there has been a significant increase in the incidences of respiratory diseases in this region.

### 7.7.1 Baseline Condition

Community health is considered a valuable environmental component (VEC) for this Cumulative Environmental Impact Assessment (CEIA) study due to its interactions with the current environmental conditions in the Meghnaghat Industrial areas. Several polluting industries operate in these industrial zones, potentially deteriorating the health status of the surrounding communities. The effect of industrial pollution on community health in both industrial areas is briefly discussed in the following sections.

According to stakeholder engagement with local health people, industrial pollution has impacted the health conditions of the local population. Commonly reported diseases include respiratory problems, skin diseases, and diarrhoea. Government health data indicates that in the year 2015, around 1,118. Water-borne diseases such as typhoid, jaundice, and diarrhoea are also prevalent within industrial areas. The living conditions of both local residents and migrants are poor, as highlighted in the previous section.

### 7.7.2 Stressors and Impacts

*PUC:* As discussed in Section 7.2.2 and Section 7.2.3, PUC, has a potential impact on ambient air quality during the construction and operational stage of the project. Degradation of ambient quality has a potential impact on community health and safety.

*Past and Present Activities:* There are a number of air-polluting industries like power plants (Gas-based and oil-based), and cement plants that are presently operating in the Meghnaghat industrial area.

Air pollutants like PM (PM<sub>2.5</sub> and PM<sub>10</sub>), NO<sub>x</sub>, and SO<sub>2</sub> are being generated from the existing industrial activity. Vehicular emissions from major arterial roads and internal roads are also releasing air pollutants like PM, NO<sub>x</sub>, and CO. The continuous emissions from industries and traffic have impacted the air quality of the area. However, the condition of the Meghna air shed appears much better given its present carrying capacity and the natural process available for pollution abatement. The concentration of PM (PM<sub>2.5</sub> and PM<sub>10</sub>) is well within the threshold limit, i.e. NAAQS for Bangladesh. The NO<sub>x</sub> levels in the region are also low and within the NAAQS.

The health status of this industrial region reveals that the rate of respiratory diseases among the communities residing in this area is low. The percentage of patients admitted to hospitals with respiratory diseases (2.31%) is almost similar to the national average (2.88%), considering the national average to be the threshold limit. It also reported that death due to respiratory disease in this area was 2.04% out of total admitted patients in 2015.

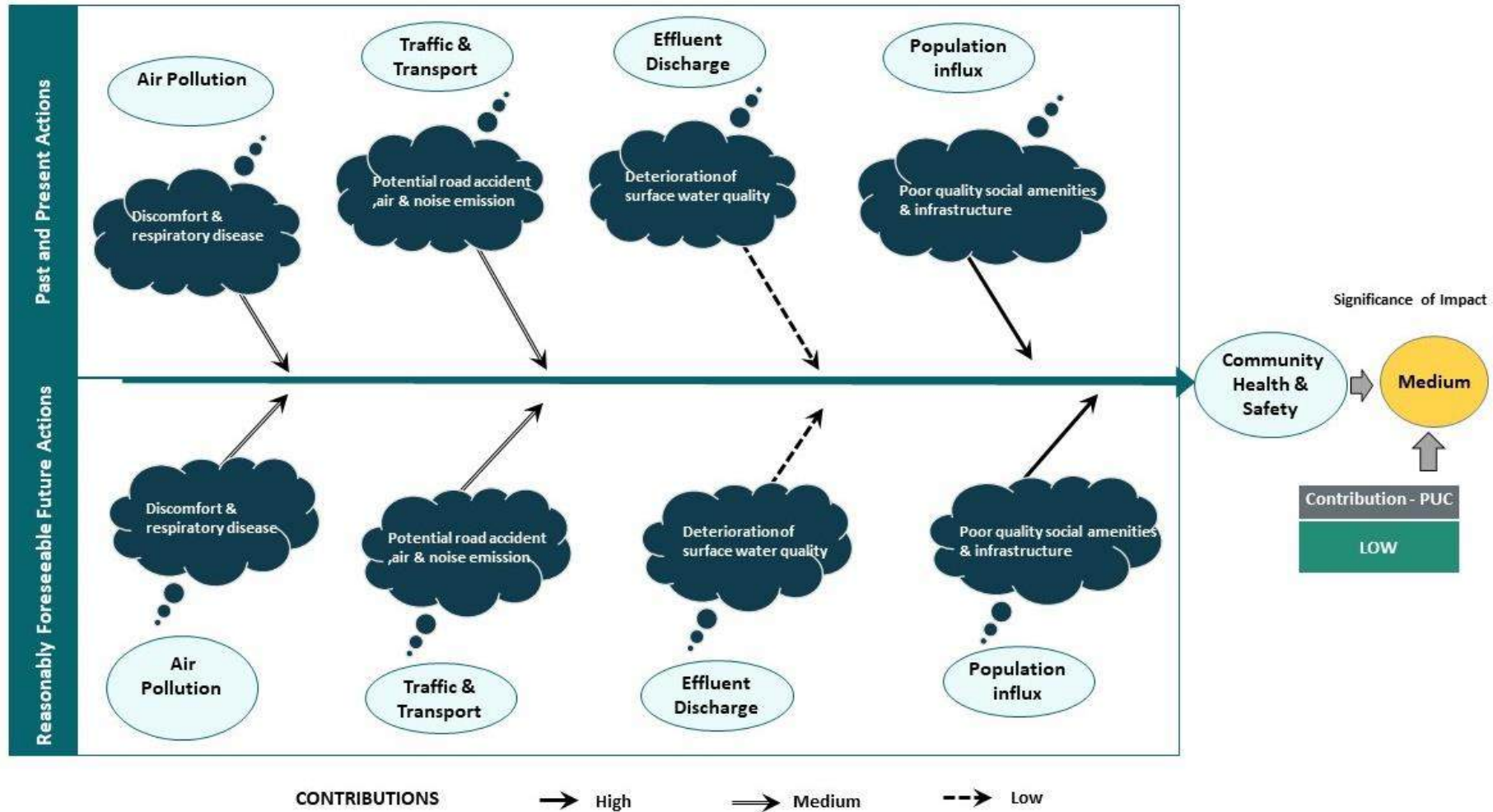
*RFFAs:* The list of RFFAs indicates that certain air-polluting industries like cement plants, steel mills, and power plants are likely to be set up in the Meghnaghat industrial area. Development stressors like traffic load will also be increased due to further urbanization and industrial growth. Therefore, emissions from these industries and traffic are expected to cumulatively add to levels of PM and NO<sub>x</sub> in the regional air shed and potentially impact the health of surrounding communities.

The contribution towards the deterioration of community health from different industrial development stressors along with their cause-effect relationship is graphically presented in Figure 7.13.

### **7.7.3 Significance of Impacts**

The operation of present and future industries is expected to aggravate the existing situation and possibly adds to increased incidences of respiratory diseases reported from this region. The combined effect of industrial and development stressors is expected to cumulatively impact the community health in Meghnaghat. The potential cumulative impact was assessed to be medium. The PUC will be contributing is assessed to be Low.

Figure 7-13: Community Health and Safety - Cause and Effect Relationship



## 7.8 Livelihood (Land-based and Fisherman)

The VEC interaction and effect diagram (Figure 5.2) indicated that the PUC and other industries, along with other development projects, have the potential to have a negative impact on surface water quality, which will ultimately affect fish availability in the concerned river stretches. Industrialization and urbanization have an impact on land use, especially the conversion of agricultural land to industrial land use. Land use changes have a potential impact on the economic displacement of landowners and land users.

### 7.8.1 Baseline Condition

The industrialization and commercial activities in the Meghnaghat industrial areas have led to a significant shift in occupational patterns. Agricultural activities, which were once predominant, have taken a backseat, and people have been compelled to explore different business opportunities generated by urbanization and industrial growth. The agricultural land cover, which was 80.72 sq. km in the year 2000, has decreased to 60.78 sq. km in 2024, marking a 24.69% reduction over two decades. In Meghnaghat Industrial some individuals have started working in industries, agriculture continues to be a crucial livelihood for a significant portion of the community, especially in the rural areas surrounding the Meghnaghat Industrial area.

### 7.8.2 Stressors and Impacts

Land use change: Industrialisation and commercial activities Meghnaghat industrial areas created a mass transit in the occupational pattern. Agricultural activity had taken a backseat long back and people were more interested in taking up different business opportunities generated due to urbanization and industrial growth. In Meghnaghat although some people have now started working in industries but agriculture still continues to be a key livelihood for a large section of the community (especially in rural areas surrounding the Meghnaghat Industrial area). Land use changes occur in the Meghnaghat industrial area due to industrialization and urbanization. Land use change from PUC, past, present, and future industrial activities and developmental activities potential to have a negative impact on land-based livelihood.

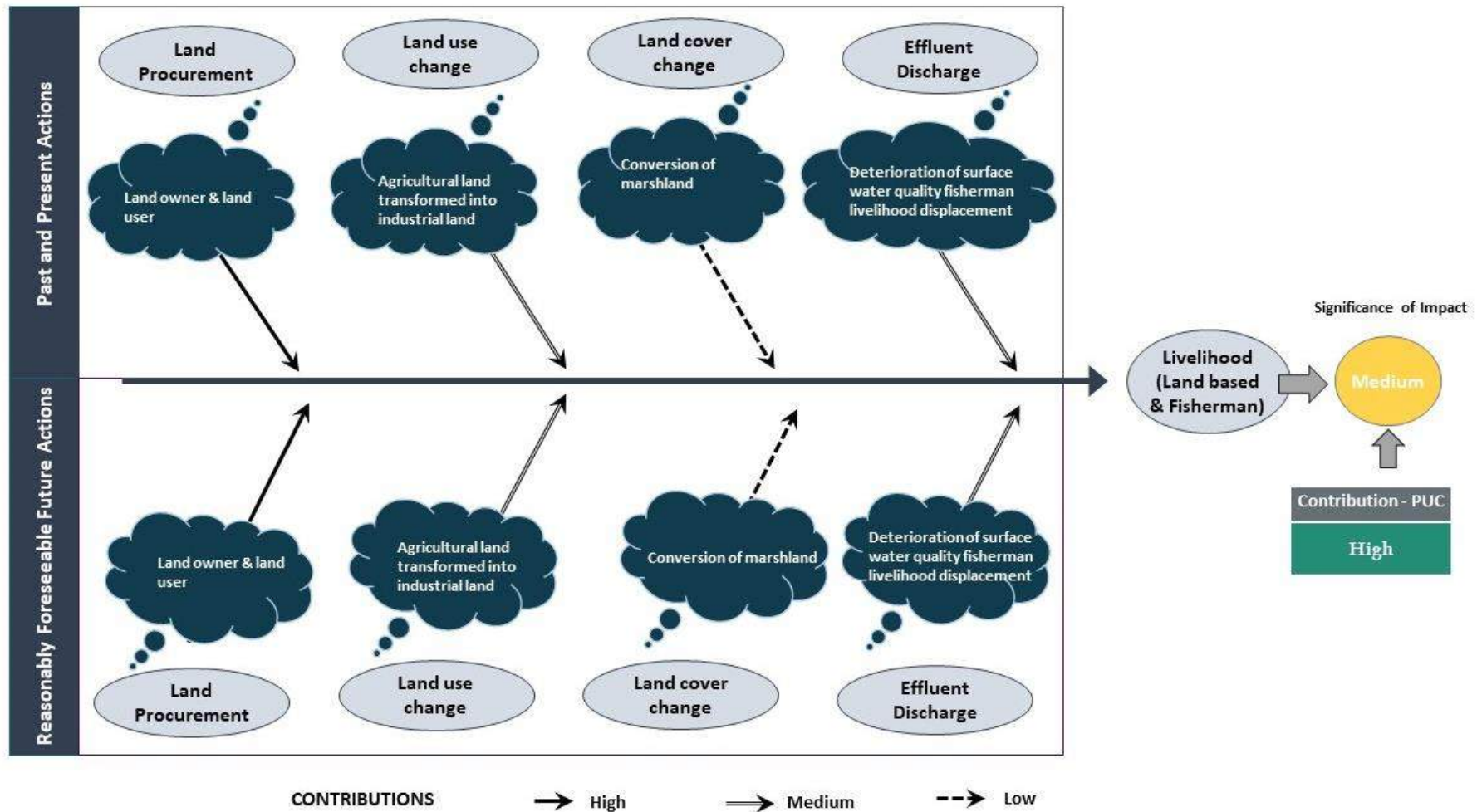
River water quality: The potential source of impact on water quality from PUC, past, present, and future projects and activities in the river stretch have been discussed in Section 7.4.1, and Section 7.4.2. The potential cumulative impact on river water quality is assessed to be medium. The pollution of river water quality has a potential negative impact on the primary productivity of the ecosystem, which will ultimately affect the fish diversity and fish catch.

Vessel Movement: Small motorized and non-motorized boats have been used. Generally, they use passive gear, especially gillnets. The gear used extends over very long distances from the boat, sometimes more than 1 km. The movements of passenger vessels and vessels used for carrying construction materials may overrun fishing gear, causing partial or total damage to the gear deployed. This may incur an additional cost for fishermen. In the central Cluster, the operations will increase in frequency as well as nighttime navigation. This may have increased conflicts.

### 7.8.3 Significance of Cumulative Impact

The land use change, river water pollution, and movement of vessels in the Meghana River have a potential impact on fish catch and damage to fish gear, which ultimately has an effect on the livelihood of the fishermen that is assessed to be medium. The contribution of fish land from PUC is assessed to be low.

Figure 7-14: Livelihood (Land-based and Fisherman) - Cause and Effect Relationship



## 8 RECOMMENDATIONS AND CONCLUSIONS

### 8.1 Summary of Cumulative Impacts

The cumulative impact assessment of the selected VECs has clearly indicated that there is a level of stress on the VECs not only due to the proposed terminals under PUC but also due to other industries and developmental projects, which were studied. A summary of cumulative impacts is presented in **Table 8.1**.

### 8.2 Management Measures

In order to reduce further adverse impacts on the VECs as well as to mitigate some of the impacts, which were identified as key differentiators, the following recommendations have been provided for better environmental and social management. The management of cumulative impacts is being proposed at two levels:

- **Project Specific:** The responsibility for the management of cumulative impacts on the VECs for the PUC will be entirely on project developers.
- **Cluster Specific:** The cumulative impacts on the VECs in the entire CIA spatial could be managed through collaborative efforts from other project developers, local communities, and government and public authorities.

The management approaches discussed in Table 8.1 vary across sub-basins with respect to the level of conformance to international best practices. The proposed time frame for implementation of the various actions ranges from immediate (within six months), short-term (1-3 years), medium-term (3-5 years), and long-term (5+ years).

Table 8-1: Cumulative Impact Mitigation Measure

VEC	Specific conclusion from cumulative impact assessment	Key Issues	Management Measures		Key Performance Indicator	Timeframe	Actor / Agencies	Source of Fund
			Project specific	Spatial Boundary				
Land use change	The cumulative impact of land use change in terms of loss of agricultural land and wetland is assessed as high and the PUC contribution as low.	<ul style="list-style-type: none"> <li>▪ There is no land use plan for the Meghnaghat industrial area.</li> <li>▪ No industrial zoning plan is available for the Meghnaghat regions.</li> <li>▪ The Meghnaghat North cluster is relatively slightly better planned (in particular the power plants complex), However, unplanned mixed-use development has occurred in the other industry cluster.</li> <li>▪ CuEZ has well planned with a centralized system of CETP CSTP</li> </ul>	<ul style="list-style-type: none"> <li>▪ CuEZ has planned to develop the residential area of the operation workforce within the economic zone and the same accommodation facility will be used by the PUC workforce.</li> <li>▪ Provision of Central ETP and STP for the entire economic zone.</li> <li>▪ PUC and CuEZ should plan for greenbelt in consultation with DoE</li> </ul>	<p>Zonal land use planning for future expansion of industries, residential areas, and commercial areas. Some of the key components that need to be covered include:</p> <ul style="list-style-type: none"> <li>• Zoning of industrial units, residential areas, and commercial areas;</li> <li>• Control of polluting industries in the new industrial areas or re-developed industrial areas through land use control (unplanned growth of polluting industries can be regulated/discouraged through a land use zoning approval process).</li> <li>• Dedicated road networks for industrial clusters;</li> <li>• Provision of dedicated sites for hazardous and solid waste disposal;</li> <li>• Provision of common treatment facilities for small and medium-scale industries with homogenous effluent qualities.</li> <li>• Adequate space provision for vehicle parking, laydown areas, greenbelt, and associated infrastructure;</li> </ul>	Land use plan considering all environmental and social sensitivities	Short Term	LGED & Union Parishads	LGED and Funding Agency
				<ul style="list-style-type: none"> <li>• Plan implementation through responsible agencies</li> </ul>	Number of new industries in the planned area	Medium term	Union Parishads	LGED
				<ul style="list-style-type: none"> <li>▪ Integration of requirements under proposed zoning control with DoE's site clearance process</li> </ul>	EC condition	Continuous activity	DoE	-
Air quality	The cumulative impact of air quality in terms of concentration of PM and NOx is assessed as high and medium respectively and	<ul style="list-style-type: none"> <li>▪ No regional monitoring stations for either the industrial areas.</li> <li>▪ Project-specific limited environmental monitoring being carried out during EIA Studies and</li> </ul>	<p><u>Construction stage:</u></p> <ul style="list-style-type: none"> <li>▪ Dust suppression at construction site and site access road;</li> <li>▪ Covered storage for construction materials;</li> <li>▪ Diesel operated machinery &amp; equipment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Preparation of a program for regional air quality monitoring including the provision of infrastructure and manpower requirement</li> </ul>	A monitoring program with due consideration of regional pollution sources and receptors.	Immediate	DoE	DoE
			<ul style="list-style-type: none"> <li>▪ Setting up a <i>Regional Monitoring Lab</i>, hiring of manpower and other resources.</li> </ul>	Monitoring laboratory with adequate facilities.	Short Term	DoE	MoEFCC / External	

VEC	Specific conclusion from cumulative impact assessment	Key Issues	Management Measures		Key Performance Indicator	Timeframe	Actor / Agencies	Source of Fund
			Project specific	Spatial Boundary				
	the PUC contribution as low.	subsequently during periodic compliance monitoring- it is usually limited to power plant premises and is not representative of the regional air shed.	and vehicles used during construction activity is having fit certificate; <ul style="list-style-type: none"> <li>▪ DG set with proper stack heights;</li> <li>▪ Periodic ambient air quality monitoring in the area of influent of terminals.</li> </ul> <u>Operational stage:</u> <ul style="list-style-type: none"> <li>▪ The fume plant is designed for the treatment of fumes produced during the operation of the Electric Arc Furnace (EAF).</li> <li>▪ Stack and ambient air quality monitoring as per EC condition</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regular regional air quality monitoring and disclosure of cumulative data on monitoring at a regional level</li> <li>▪ Periodical review of the regional monitoring program and tracking of cumulative indicators by the task force. Based on the review of regional monitoring data, the task force (if required) can inform MoEF / DoE to consider appropriate steps to regulate industries by linking it with the issue of Environmental Clearance or decisions about new industries or industrial mix.</li> </ul>	Monitoring as per plan and disclosure of information.	Continuous activity	DoE	Funding Agency / DoE
					Pollution trends and quality of the environment.	Continuous activity	Task Force	MoEFCC
Groundwater resources	The cumulative impact of groundwater resources on groundwater depletion rate is assessed to be medium and the PUC contribution is low.	<ul style="list-style-type: none"> <li>▪ Industries are mostly dependent on groundwater. Decreasing trends in groundwater levels in both the industrial area.</li> <li>▪ Process of groundwater abstraction is currently not regulated</li> <li>▪ Local communities raised concerns about falls in groundwater levels.</li> </ul>	<u>Construction stage:</u> <ul style="list-style-type: none"> <li>▪ Minimize the groundwater use only for domestic and drinking water purposes.</li> <li>▪ Construction water should be sourced from surface water.</li> <li>▪ Maintain the water use record.</li> <li>▪ Obtain groundwater withdrawal permission from the concerned authority.</li> </ul> <u>Operational stage:</u> <ul style="list-style-type: none"> <li>▪ Cooling water will be sourced from the river;</li> <li>▪ Domestic and drinking water from groundwater;</li> </ul>	<ul style="list-style-type: none"> <li>▪ Issuance of directive related to mandatory permission required for the abstraction of groundwater from Upazila Parishads under the Ground Water Management Ordinance and also the introduction of a cess for use of water.</li> </ul>	Issuance of directive in respect of groundwater abstraction	Immediate	Department of Public Health Engineering (DPHE) / Upazila Parishads	DPHE
				<ul style="list-style-type: none"> <li>▪ Integration of mandatory groundwater clearance requirements with the EC/EC Renewal Process.</li> </ul>	Compliance with the directive	Immediate	DoE	-
				<ul style="list-style-type: none"> <li>▪ Regular monitoring of groundwater table; defining groundwater potential zones (excellent, good moderate, poor, very poor); formulation of a plan for setting up permissible limits for the different user categories</li> </ul>	Annual groundwater depletion/replenishment rates.	Short Term	DPHE / Bangladesh Water Development Board (BWDB)	DPHE/ BWDB

VEC	Specific conclusion from cumulative impact assessment	Key Issues	Management Measures		Key Performance Indicator	Timeframe	Actor / Agencies	Source of Fund
			Project specific	Spatial Boundary				
Surface water quality	The cumulative impact of surface water quality in terms of concentration of DO, BOD, and toxic metals is assessed as medium the PUC contribution is low.	<ul style="list-style-type: none"> <li>Water quality of the Meghana River has been degraded over time due to the discharge of industrial effluent and sewage.</li> </ul>	<u>Construction stage;</u> <ul style="list-style-type: none"> <li>Treat the domestic wastewater through a septic tank and soak-pit</li> <li>Channelize the surface runoff from the construction site to the sedimentation tank;</li> </ul>	<ul style="list-style-type: none"> <li>Preparation of a program for regional water quality monitoring including the provision of infrastructure and manpower requirement</li> </ul>	A monitoring program with due consideration of regional pollution sources and receptors.	Immediate	DoE	DoE
			<u>Operational Stage</u> <ul style="list-style-type: none"> <li>Effluent and sewage will be treated through CETP and CSTP respectively;</li> <li>Treated water will be reused for cooling makeup and gardening purposes;</li> <li>Plant will be operated in zero liquid discharge mode</li> </ul>	<ul style="list-style-type: none"> <li>Setting up a <i>Regional Monitoring Lab</i>, hiring of manpower and other resources.</li> </ul>	Monitoring laboratory with adequate facilities.	Short Term	DoE	MoEFCC / External Funding Agency
				<ul style="list-style-type: none"> <li>Regular regional water quality monitoring and disclosure of cumulative data on monitoring at a regional level</li> </ul>	Monitoring as per plan and disclosure of information.	Continuous activity	DoE	Funding Agency /DoE
				<ul style="list-style-type: none"> <li>Periodical review of the regional monitoring program and tracking of cumulative indicators by the task force. Based on the review of regional monitoring data, the task force (if required) can inform MoEFCC / DoE to consider appropriate steps to regulate industries by linking it with the issue of Environmental Clearance or decisions about new industries or industrial mix.</li> </ul>	Pollution trends and quality of the environment.	Continuous activity	Task Force	MoEFCC
Migratory bird species	The cumulative impact of migratory birds and aquatic bird species is assessed as medium the PUC contribution is low.	<ul style="list-style-type: none"> <li>Loss of habitat;</li> <li>Environmental pollution</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of pollution control measures suggested during the construction and operational phase of the project;</li> <li>Awareness among the workforce regarding the conservation of bird species;</li> <li>Directional illumination at the construction site.</li> </ul>	<ul style="list-style-type: none"> <li>Land use planning and implementation as suggested in the land use section,</li> </ul>	Maintain the inland surface waterbody and marshy areas	Medium term	Union Parishads	LGED
				<ul style="list-style-type: none"> <li>Environmental pollution control (surface water quality) as suggested in the surface water quality section.</li> </ul>	Pollution trends and quality of the environment.	Continuous activity	DoE	DoE
				<ul style="list-style-type: none"> <li>Periodical monitoring of bird species with special emphasis on endangered and migratory birds.</li> </ul>	Number of migratory bird species	continuous	Wildlife wing of Forest Dept.	Forest Dept.
				<ul style="list-style-type: none"> <li>Awareness generation amongst the local people and workforce regarding the conservation importance of biodiversity.</li> </ul>	Number of awareness meetings	continuous	Wildlife wing of Forest Dept./ NGO	Forest Dept.
Social well beings	The cumulative impact of social well-being is assessed to be	<ul style="list-style-type: none"> <li>Considerable section of the population lives in slums and informal settlements</li> </ul>	<u>Constructing stage;</u> <ul style="list-style-type: none"> <li>Provision of labor colony with proper drinking water,</li> </ul>	<ul style="list-style-type: none"> <li>Participatory planning improvement of Slum Infrastructure Improvement (sanitation facility, safe drinking</li> </ul>	Availability of recent information on the poverty status of slum population and slum-like growth areas	Short Term	Local Government Engineering Department (LGED)	External Funding Agency

VEC	Specific conclusion from cumulative impact assessment	Key Issues	Management Measures		Key Performance Indicator	Timeframe	Actor / Agencies	Source of Fund
			Project specific	Spatial Boundary				
	medium and contribution from PUC is low.	<p>characterized by poor living conditions.</p> <ul style="list-style-type: none"> <li>Rapid unplanned urban growth lacks proper infrastructure like sanitation, drinking water facilities, solid waste disposal facilities, drainage, etc.</li> </ul>	<p>drainage system, sanitation</p> <p><u>Operational stage:</u></p> <ul style="list-style-type: none"> <li>Residential facility for the operational workforce with the CuEZ will have all amenities and infrastructure.</li> </ul>	<p>water) in the industrial of Meghnaghat</p> <ul style="list-style-type: none"> <li>Program implementation</li> <li>Monitoring SIP implementation to ensure that environmental concerns are addressed</li> </ul>	<p>Periodic monitoring of plan implementation</p> <p><i>Slum Infrastructure Improvement-</i> access to improved sanitation facilities, safe drinking water</p>	<p>Continuous</p> <p>Continuous</p>	<p>LGED</p> <p>LGED</p>	<p>External Funding Agency</p> <p>LGED</p>
Community health and safety	The cumulative impact of community health and safety is assessed to be medium and contribution from PUC is low	<ul style="list-style-type: none"> <li>Unplanned industrialization and urbanization cause poor living conditions and increase of diseases -respiratory</li> </ul>	<ul style="list-style-type: none"> <li>Project-specific air pollution control measures as suggested under the air quality section.</li> <li>Project-specific River water pollution control measures as suggested under the surface water quality section.</li> <li>External stakeholder grievance system</li> </ul>	<ul style="list-style-type: none"> <li>Project-specific air pollution control measures as suggested under the air quality section.</li> <li>Project-specific River water pollution control measures as suggested under the surface water quality section.</li> <li>External stakeholder grievance system</li> </ul>	Regional air quality	Continuous	DoE	DoE
Livelihood (land-based and fisherman)	The cumulative impact of Livelihood (land-based and fisherman) is assessed to be medium and contribution from PUC is low	Unemployment of the agriculture workforce; Decrease of fish catch	<ul style="list-style-type: none"> <li>Job and economic opportunity for the land losers and land users;</li> <li>CSR activity in the AOI of the industry</li> </ul>	<ul style="list-style-type: none"> <li>Job and economic opportunity for the local people, especially project-affected families, and unemployed youths;</li> <li>Job-based training for the local youth</li> <li>Regional-level fishery study focusing on fish species, endangered fish species, trends in fish yield and species composition, fishermen's livelihood, and fish conservation</li> <li>Regional-level CSR plan, involving all the operating industries</li> <li>External stakeholder grievance system</li> </ul>	Number of jobs and economic opportunities created for the local people	Continuous	Union Parishads	Operating and future industries.

### 8.3 Monitoring

A plan has been developed for monitoring the measures that have been recommended as part of the CIA. This plan tracks the progress of the program/actions during the implementation phase and accordingly informs agencies that are responsible for implementation/supervision.

Principally the monitoring will entail:

- Collection of data on the implementation of activities and outputs, according to the indicators specified in the recommended action plan;
- Collecting data on the delivery of results and impacts according to the indicators identified in the monitoring framework and evaluation programs to be able to follow an adaptive management approach to initiate any changes (if required) to the programs that have been proposed as part of the CIA Study;

The monitoring plan is presented in Table 8.2

**Table 8-2: Monitoring Plan**

VEC	Key Performance Indicator	Timeframe	Responsibility for Supervision
Land use	Land use plan considering all environmental and social sensitivities	During the formulation of the study (Draft / Final)	LGED & Union Parishads
Air quality	Air quality pollution trend in the Meghnaghat industrial area	Continuous monitoring	DoE
Groundwater resources	Groundwater depletion rate in the Meghnaghat region	Continuous monitoring	DPHE
Surface water quality	Water quality pollution trend in Meghana River	Quarterly	DoE
Migratory bird species	Diversity index of the bird species in Meghnaghat region	Pre-monsoon and winter seasons	Forest Department
Social well beings	Number of households having water-sealed latrines and safe drinking facilities	Annually	LGED & Union Parishads
Community health and safety	Number of air-borne disease cases in the Meghnaghat region	Annually	Health Dept.
Livelihood (land-based and fisherman)	Number of local people get the job and job-related training	Annually	Union Parishads

## REFERENCE

1. Agrawala, S., Ota, T., Ahmed, A.U., Smith, J. and Aalst, M.V. (2003) Development and Climate Change in Bangladesh: Focus on Coastal Flooding and the Sunderbans. Organization for Economic Co-Operation and Development (OECD), Paris.
2. BARC (Bangladesh Agricultural Research Council), 2000 (modification on 20 May 2021). Map of Flood Prone Areas in Bangladesh. BARC/UNDP/FAO GIS Project, BGD/95/006. Available in: <https://data.humdata.org/dataset/bangladesh-hazards?#data-resources-0>
3. Cruz, R.V., Harasawa, H., Lal, M., Wu, S., Anokhin, Y., Punsalmaa, B., Honda, Y., Jafari, M., Li, C. and Huu Ninh, N. (2007) Climate Change 2007: Impacts, Adaptation and Vulnerability. Edited by Parry, M.L., et al., Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, 469-506.
4. Environmental and Social Impact Assessment of Comilla Economic Zone Limited, Volume I: Executive Summary, September 2023 (Updated).
5. Environmental and Social Impact Assessment of Comilla Economic Zone Limited, Volume II: Main Report, September 2023 (Updated).
6. Environmental and Social Impact Assessment of Comilla Economic Zone Limited, Volume III: Annexure, September 2023 (Updated).
7. Environmental Impact Assessment (EIA) of Meghna Re-Rolling and Steel Mills Ltd. Final Report September 2022.
8. ESIA Report for Proposed 600MW Combined Cycle Power Plant at Sonargaon, Narayanganj, Bangladesh. Final Draft (for Disclosure), March 2022.
9. IFC (2013). Good Practice Note: Cumulative Impact Assessment and Management - Guidance for the Private Sector in Emerging Markets (August 2013). Accessed at: [http://www.ifc.org/wps/wcm/connect/3aebf50041c11f8383ba8700caa2aa08/IFC\\_GoodPracticeHandbook\\_CumulativeImpactAssessment.pdf?MOD=AJPERES](http://www.ifc.org/wps/wcm/connect/3aebf50041c11f8383ba8700caa2aa08/IFC_GoodPracticeHandbook_CumulativeImpactAssessment.pdf?MOD=AJPERES) Accessed on 2/12/2013.
10. IPCC (2007). Summary for Policymakers, in Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, et al., Editors. 2007, Cambridge University Press: Cambridge. p. 1000
11. Rahman, A. and M. Alam, (2003). Mainstreaming Adaptation to Climate Change in Least Developed Countries (LDCs): Bangladesh Country Case Study. IIED Working Paper, 2003(2).
12. Reid, H., and A. Sims, Up in smoke? Asia and the Pacific. 2007, Up in Smoke Working Group on Climate Change and Development. p. 92.

# APPENDICES

## APPENDIX A

### Appendix A: Emission Source

#### Appendix A-1: Emission Sources for PM10

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	[m]	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	[m³]	Volume of the open pit (OPEN_PIT only)												
Emission_Rate	[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]	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 =	[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]	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	[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	Height	Diam	Exit_Vel	Exit_Temp	Release_Type	Emission_Rate	Num_Coords	X1	Y1	
				[m]	[m]	[m]	[m/s]	[K]				[m]	[m]	
POINT	STCK1	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254384.09	2613240.87	
POINT	STCK2	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254387.79	2613241.25	
POINT	STCK3	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254384.03	2613245.52	
POINT	STCK4	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254387.18	2613245.61	
POINT	STCK5	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254383.84	2613250.54	
POINT	STCK6	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254386.82	2613251.09	
POINT	STCK7	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254441.33	2613248.07	
POINT	STCK8	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254444.03	2613248.65	
POINT	STCK9	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254440.90	2613252.65	
POINT	STCK10	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254443.71	2613252.80	
POINT	STCK11	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254440.59	2613257.03	
POINT	STCK12	100 MW HFO based engine power pl		7	30	0.9	20	653	VERTICAL	0.73	1	254443.29	2613257.15	
POINT	STCK13	SMIIPCL 583 MW Dual Fuel CCPP (I		7	75	4.85	20	373	VERTICAL	2.87	1	254801.13	2612907.11	
POINT	STCK14	Relience 2X750 MW CCPP (Stack-1)		7	70	6.3	25	670	VERTICAL	2.52	1	254462.81	2612808.29	
POINT	STCK15	Relience 2X750 MW CCPP (Stack-2)		7	70	6.3	25	670	VERTICAL	2.52	1	254504.89	2612817.21	
POINT	STCK16	450 MW CCPP Meghnaghat Power P		1.33	60	5.7	20	374	VERTICAL	2.52	1	254960.61	2613046.02	
POINT	STCK17	450 MW CCPP Meghnaghat Power P		7.46	60	5.7	20	374	VERTICAL	2.52	1	254971.94	2612986.78	
POINT	STCK18	337 MW Dual Fuel CCPP (Stack-1)		7	75	5.5	20	410	VERTICAL	2.52	1	255231.94	2612896.50	
POINT	STCK19	337 MW Dual Fuel CCPP (Stack-2)		7	75	5.5	20	410	VERTICAL	2.52	1	255259.80	2612904.04	
POINT	STCK20	UMPL 600 MW CCPP		7	75	7.4	20.2	364.4	VERTICAL	2.52	1	254138.98	2613929.23	
POINT	STCK21	Meghna PVC Plant Incinerator Stack		3.45	50	0.8	8.05	328	VERTICAL	4.04	1	257168.76	2614433.35	
POINT	STCK22	Meghna PVC Plant HTM Boiler Stack		6.71	46	1.5	9	443	VERTICAL	0.21	1	257455.00	2614472.00	
POINT	STCK23	Meghna PVC Plant HTM Boiler Stack		6.7	46	1.5	9	443	VERTICAL	0.21	1	257451.00	2614465.00	
POINT	STCK24	Meghna Glass Industry		8.69	80	6.7	7	723.15	VERTICAL	0.05	1	260145.42	2609135.22	
POINT	STCK25	Meghna Steel FTP Stack		9.82	45	6.5	15.59	517.3	VERTICAL	3.7	1	259977.79	2610431.58	
POINT	STCK26	Meghna Steel RHF Stack		7.12	65	3.7	10	673	VERTICAL	1.3	1	260081.25	2610165.18	
POINT	STCK27	Proposed 660 MW Majesty Power, J		5.27	65	6	20	410	VERTICAL	2.52	1	256731.11	2611961.33	
POINT	STCK28	Proposed 250 MW Power Plant in Me		7.86	65	6	20	410	VERTICAL	2.52	1	259835.31	2610036.27	
POINT	STCK29	Proposed Ceramic Industry in Hosain		3.21	10	0.48	9.83	469.77	VERTICAL	0.054	1	254622.27	2610294.03	
POINT	STCK30	Proposed Tiles & Ceramic Industry in		5.11	10	0.5	9.83	469.77	VERTICAL	0.054	1	260842.51	2609366.63	

Appendix A-2: Emission Sources for NO<sub>2</sub>

**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	[m]	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 <sup>3</sup> ]	Volume of the open pit (OPEN PIT only)
Emission_Rate	[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]	Plume Height or Building Height for LINE_VOLUME source
PlumeWidth	[m]	Plume width for LINE_VOLUME source
LineVolume_Type		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 =	[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]	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	[m]	Barrier properties HW1, DW1, HW2, DW2 for RLINEXT sources
Rdepression	[m]	Depression properties Depth, Wtop, Wbottom for RLINEXT sources

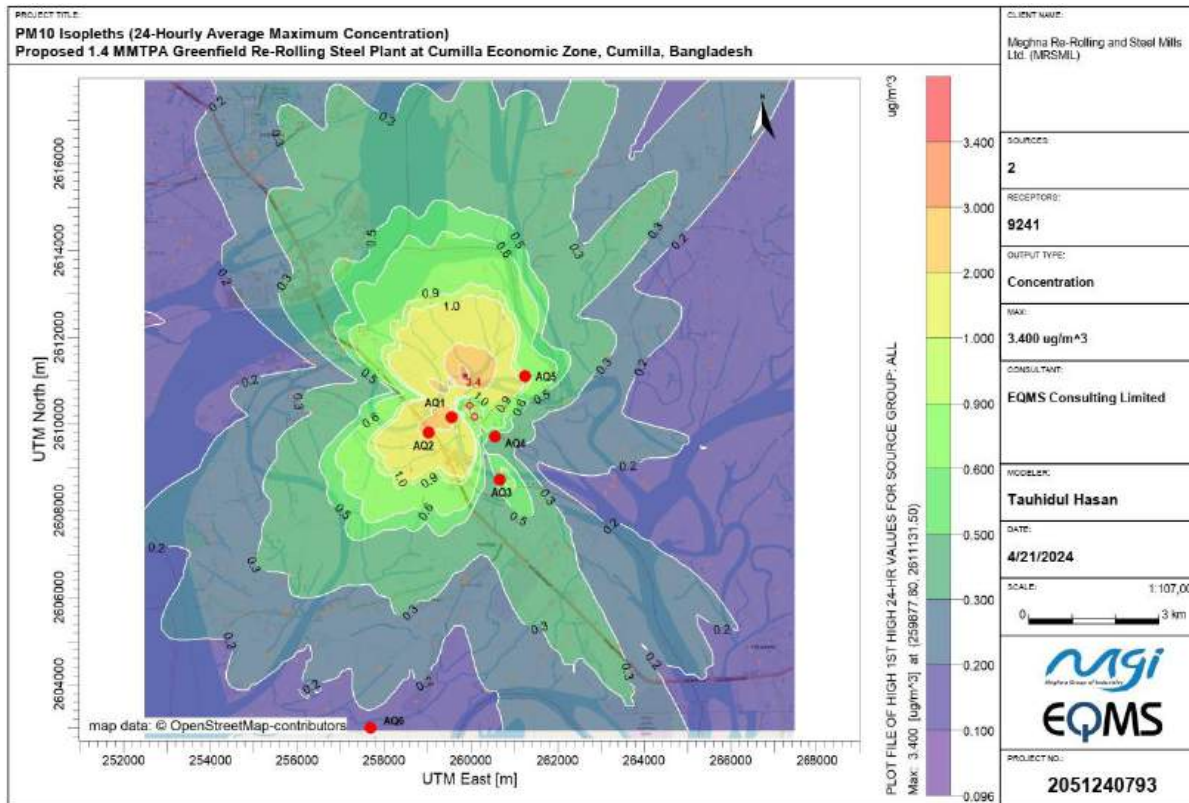
NOTE: you may keep adding additional coordinate pairs for an AREA\_POLY or LINE\_VOLUME sources, be sure to add the headers as well (eg. X5, Y5, etc)

Type	ID	Desc	SourceID_Prefix	Base_Elev	Height	Diam	Exit_Vel	Exit_Temp	Emission_Rate	Num_Coords	X1	Y1
				[m]	[m]	[m]	[m/s]	[K]			[m]	[m]
POINT	STCK1	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254384.09	2613240.87
POINT	STCK2	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254387.79	2613241.25
POINT	STCK3	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254384.03	2613245.52
POINT	STCK4	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254387.18	2613245.61
POINT	STCK5	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254383.84	2613250.84
POINT	STCK6	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254386.82	2613251.09
POINT	STCK7	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254441.33	2613248.07
POINT	STCK8	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254444.03	2613248.65
POINT	STCK9	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254440.90	2613252.65
POINT	STCK10	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254443.71	2613252.80
POINT	STCK11	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254440.59	2613257.03
POINT	STCK12	100 MW HFO based engine power pl		7	30	0.9	20	653		2	254443.29	2613257.15
POINT	STCK13	SMIPCL 583 MW Dual Fuel CCPP (1		7	75	4.85	20	373		14.7	254801.13	2612907.11
POINT	STCK14	Relience 2X750 MW CCPP (Stack-1)		7	70	6.3	25	670		31.37	254462.81	2612808.29
POINT	STCK15	Relience 2X750 MW CCPP (Stack-2)		7	70	6.3	25	670		31.37	254504.89	2612817.21
POINT	STCK16	450 MW CCPP Meghnaghat Power F		1.33	60	5.7	20	374		17.8	254960.61	2613046.02
POINT	STCK17	450 MW CCPP Meghnaghat Power F		7.46	60	5.7	20	374		17.8	254971.94	2612986.78
POINT	STCK18	337 MW Dual Fuel CCPP (Stack-1)		7	75	5.5	20	410		23.8	255231.94	2612896.50
POINT	STCK19	337 MW Dual Fuel CCPP (Stack-2)		7	75	5.5	20	410		23.8	255259.80	2612904.04
POINT	STCK20	UMPL 600 MW CCPP		7	75	7.4	20.2	364.4		41	254138.98	2613929.23
POINT	STCK21	Meghna PVC Plant Incinerator Stack		3.45	50	0.8	8.05	328		0.722	257168.76	2614433.35
POINT	STCK22	Meghna PVC Plant HTM Boiler Stack		6.71	46	1.5	9	443		1.578	257455.00	2614472.00
POINT	STCK23	Meghna PVC Plant HTM Boiler Stack		6.7	46	1.5	9	443		1.578	257451.00	2614465.00
POINT	STCK24	Meghna Glass Industry		8.69	80	6.7	7	723.15		6.707	260145.42	2609135.22
POINT	STCK25	Meghna Steel FTP Stack		9.82	45	6.5	15.59	517.3		15.3	259977.79	2610431.58
POINT	STCK26	Meghna Steel RHF Stack		7.12	65	3.7	10	673		1.79	260081.25	2610165.18
POINT	STCK27	Proposed 660 MW Majesty Power, J		5.27	65	6	20	410		23.8	256731.11	2611961.33
POINT	STCK28	Proposed 250 MW Power Plant in Me		7.86	65	6	20	410		23.8	259835.31	2610036.27
POINT	STCK29	Proposed Ceramic Industry in Hosain		3.21	10	0.48	9.83	469.77		0.109	254622.27	2610294.03
POINT	STCK30	Proposed Tiles & Ceramic Industry in		5.11	10	0.5	9.83	469.77		0.109	260842.51	2609366.63
POINT	STCK31	Meghna PVC EDC Cracker Stack		6.7	36.9	1.37	8.2	451		1.571	257181.66	2614442.86
POINT	STCK32	Meghna PVC EDC/VCM Boiler Stack		6.7	30	1.25	8	393		0.731	257348.41	2614554.01
POINT	STCK33	Meghna PVC EDC/VCM Boiler Stack		6.7	30	1.25	8	393		0.731	257354.77	2614562.75
POINT	STCK34	Meghna PVC EDC/VCM Boiler Stack		6.7	40	11.76	8	373		3.928	257482.92	2615278.85

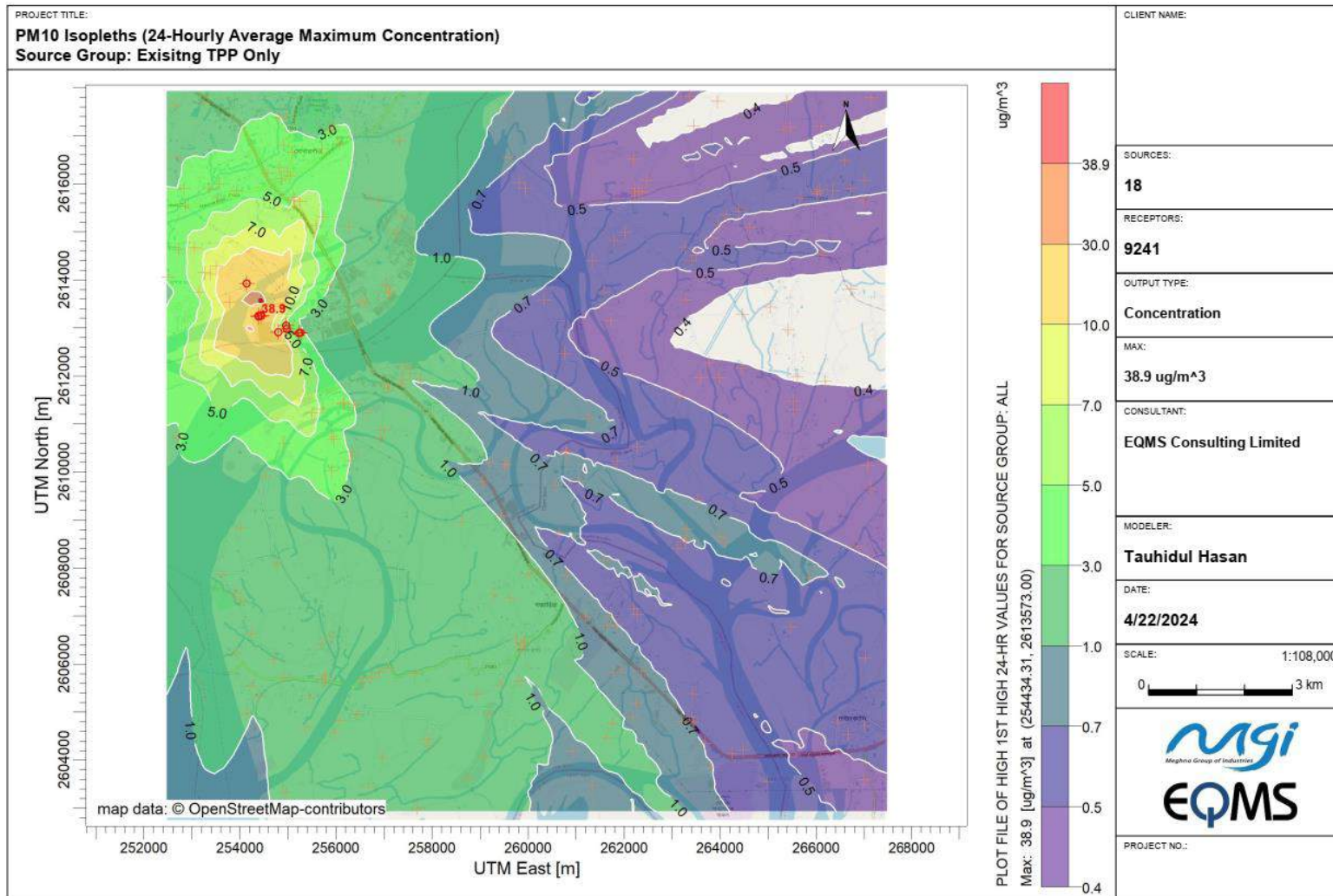
## APPENDIX B

### Appendix B: ISOPLETHS

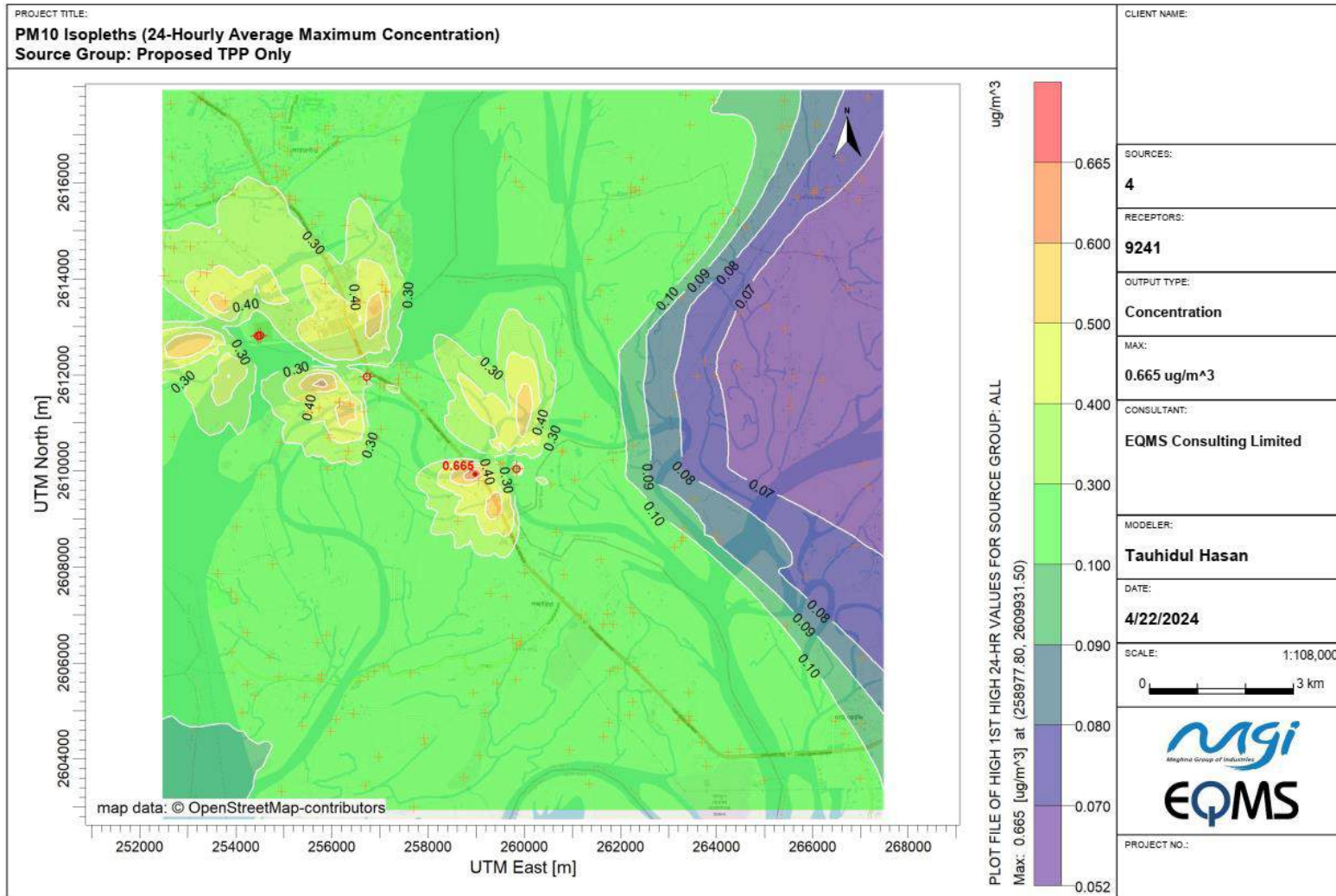
#### Appendix B-1: Isopleths of 24-Hourly Maximum PM<sub>10</sub> GLC – Proposed Meghna Steel Plant



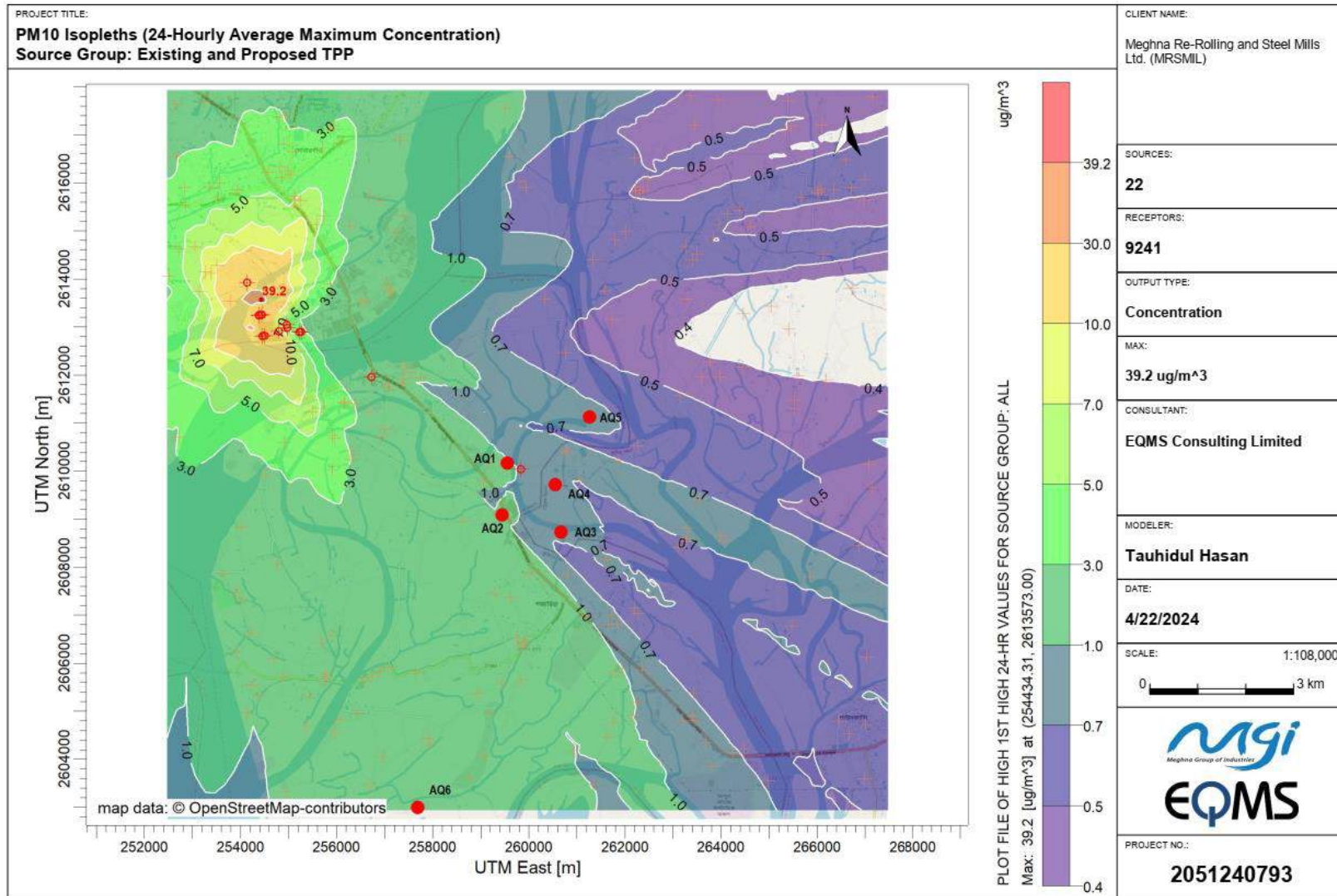
Appendix B-2: Isoleths of 24-Hourly Maximum PM10 GLC – Existing (Thermal Power Plants)



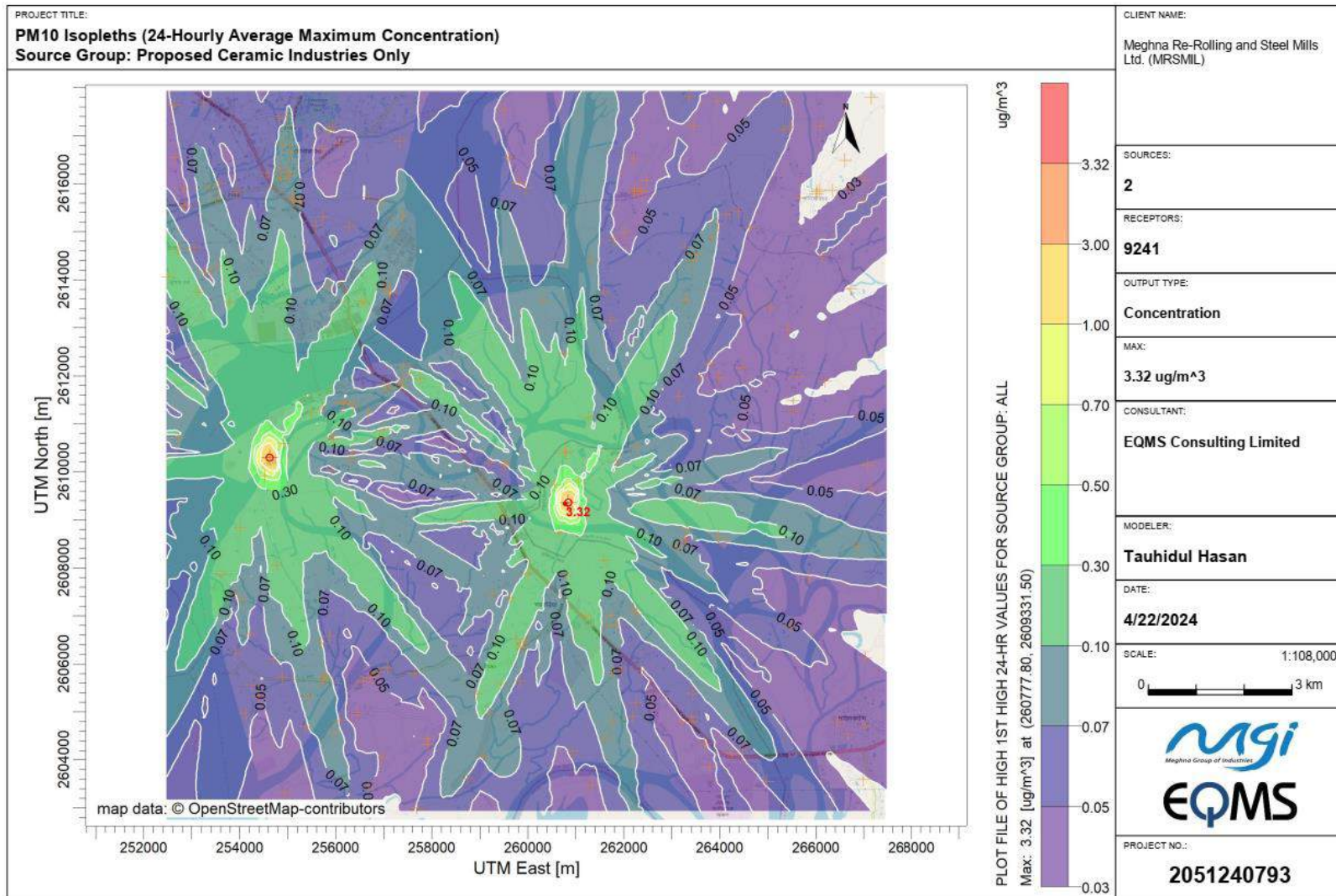
**Appendix B-3: Isoleths of 24-Hourly Maximum PM<sub>10</sub> GLC – Proposed (Thermal Power Plants)**



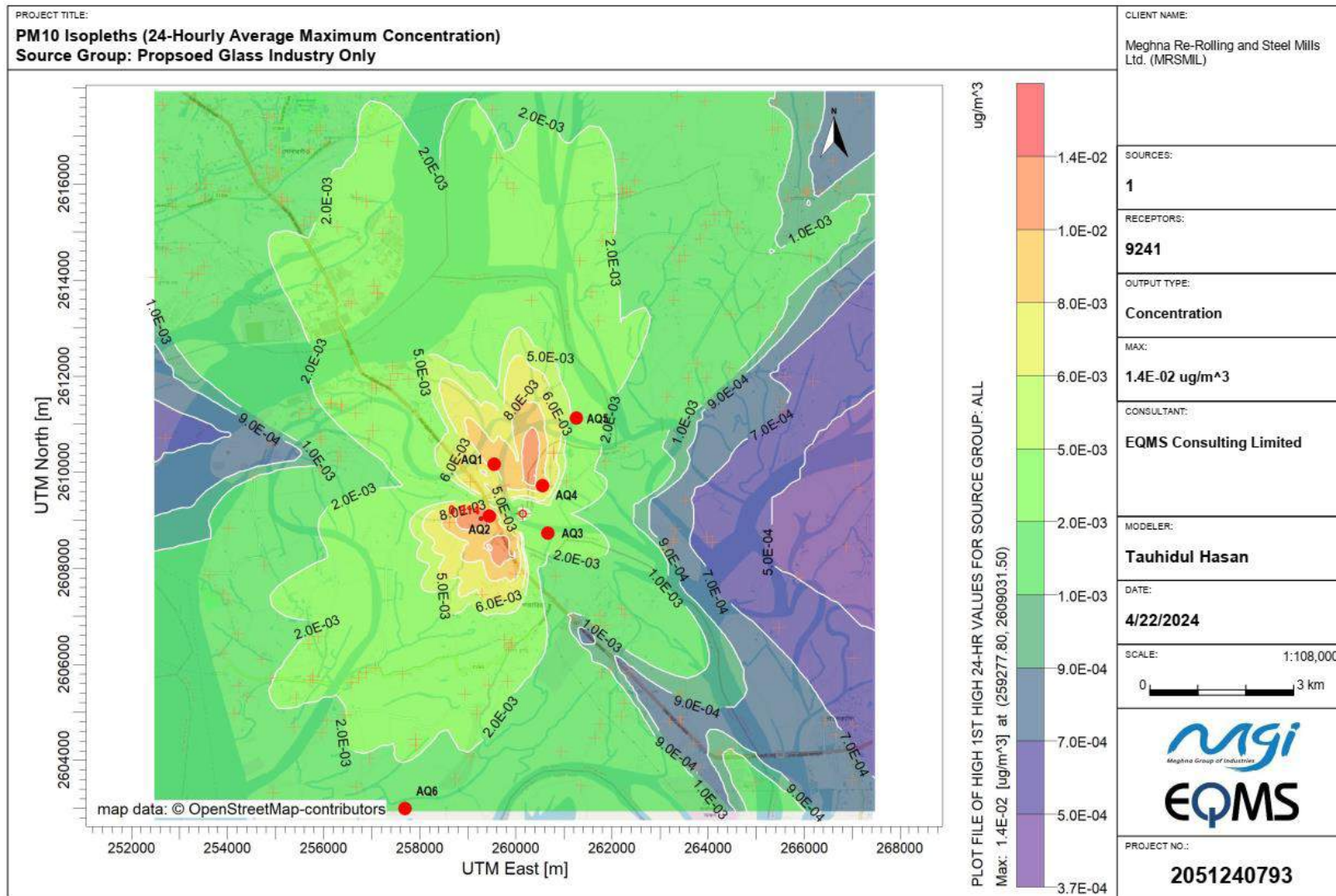
**Appendix B-4: Isoleths of 24-Hourly Maximum PM<sub>10</sub> GLC – Proposed and Existing (Thermal Power Plants)**



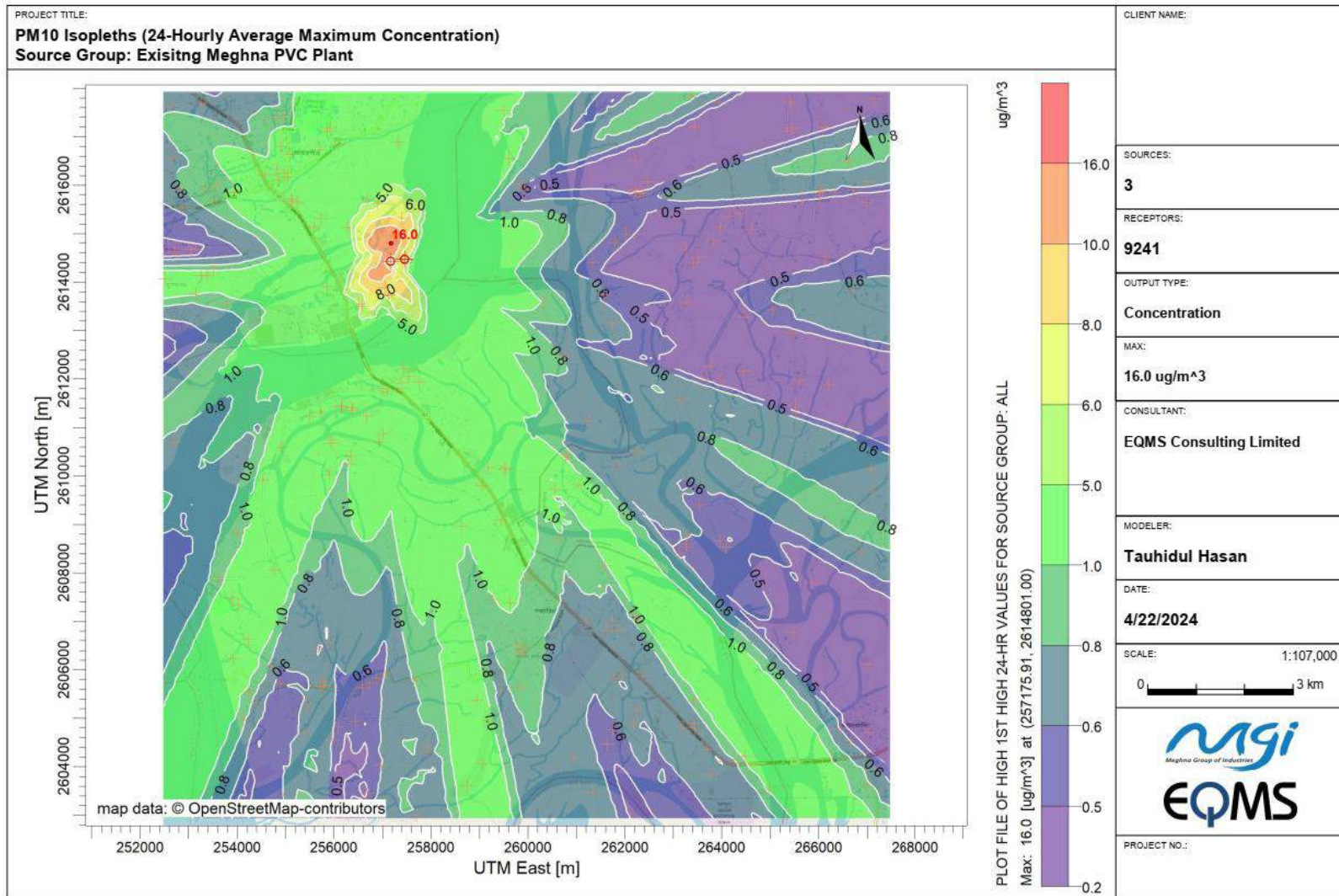
**Appendix B-5: Isoleths of 24-Hourly Maximum PM<sub>10</sub> GLC – Proposed Ceramic Industries**



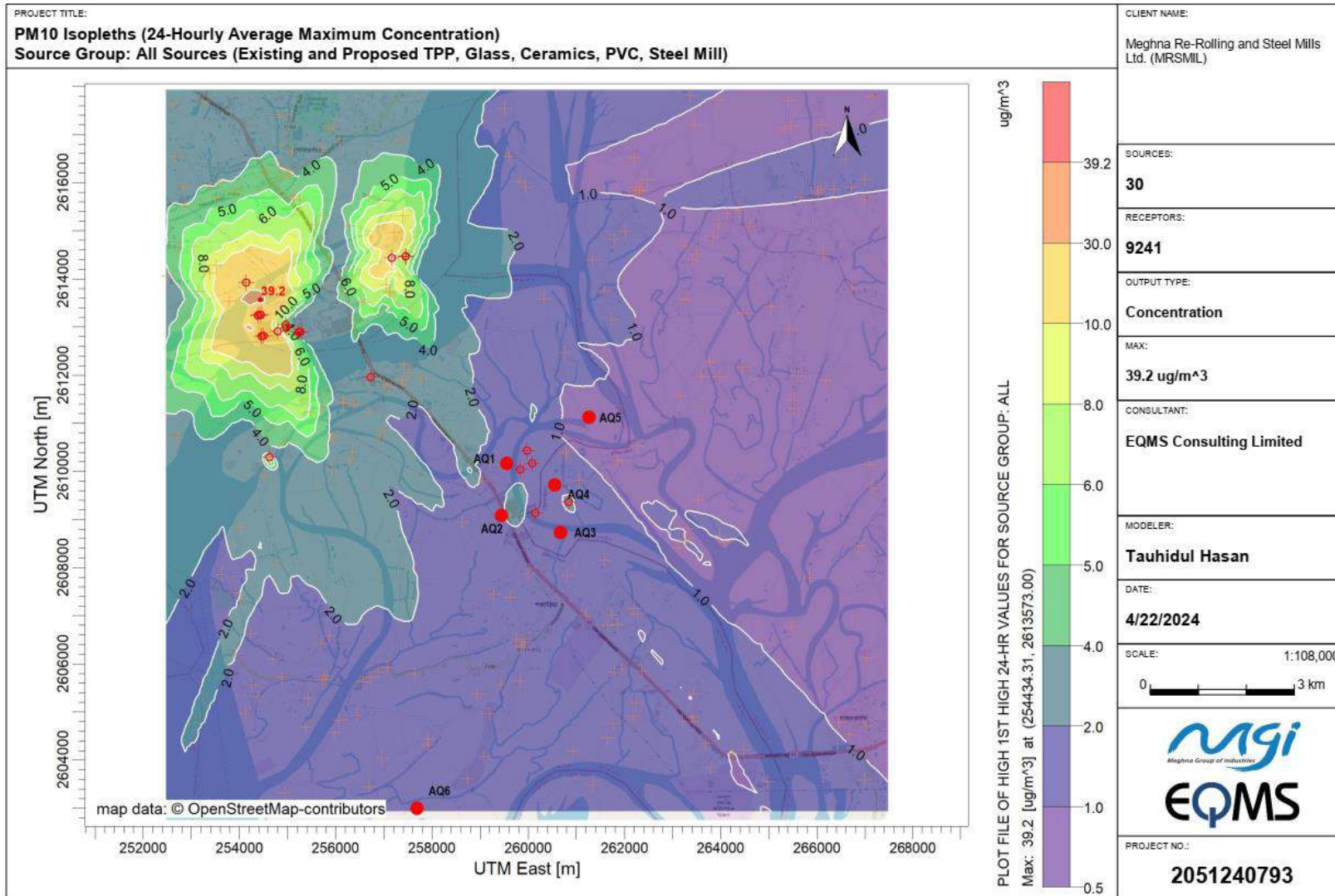
Appendix B-6: Isoleths of 24-Hourly Maximum PM<sub>10</sub> GLC – Proposed Glass Industry



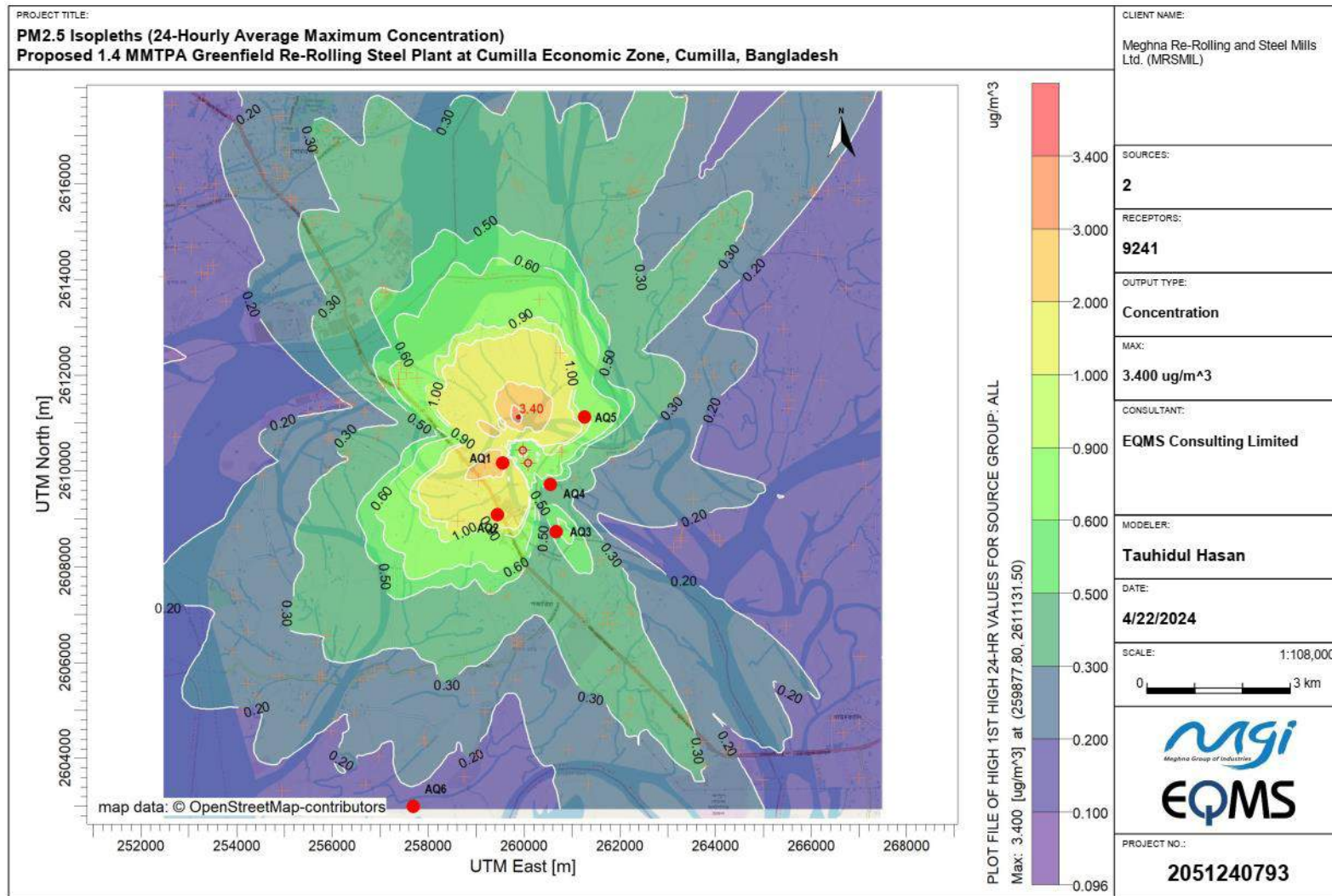
**Appendix B-7: Isoleths of 24-Hourly Maximum PM<sub>10</sub> GLC – Existing PVC Industry**



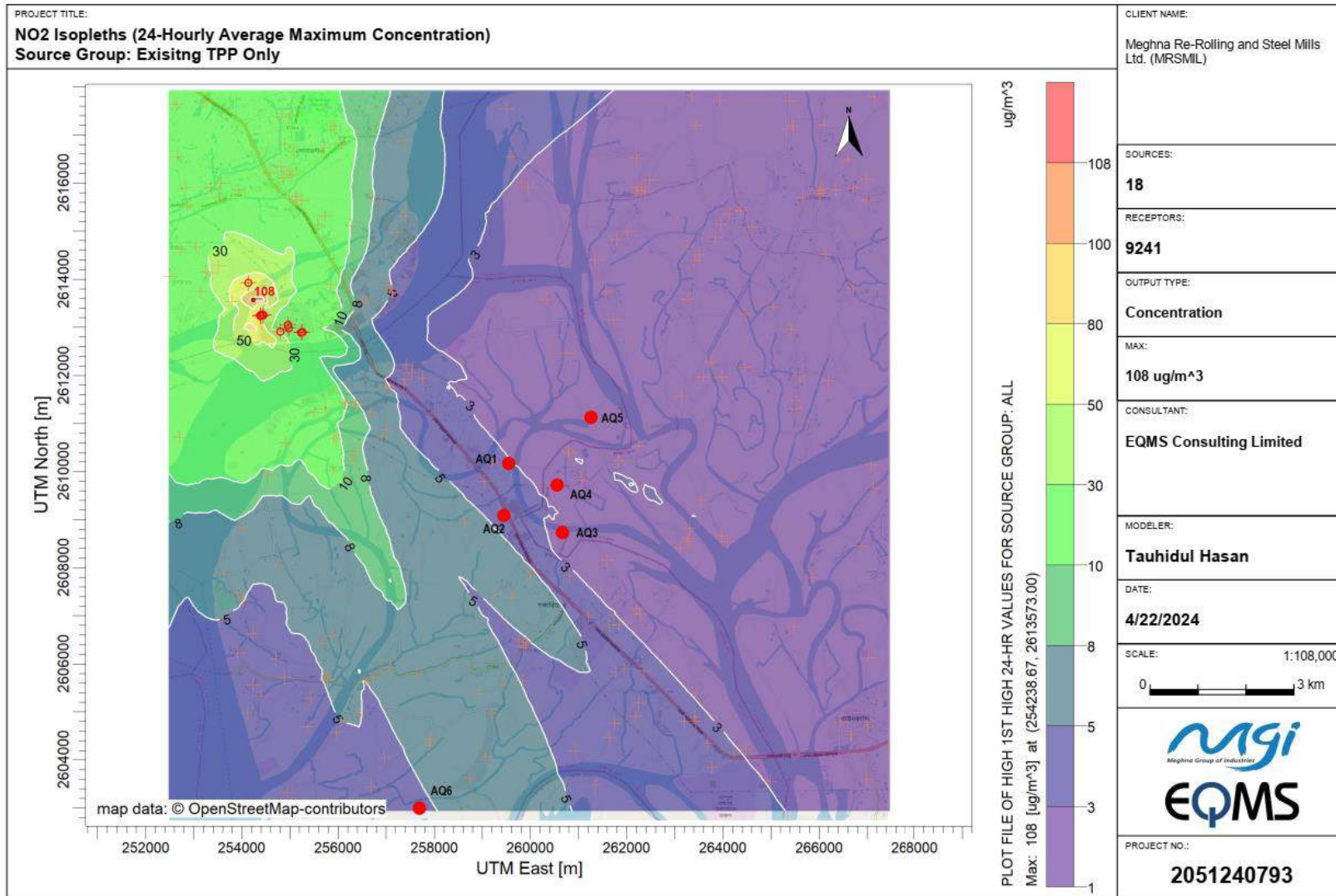
Appendix B-8: Isoleths of 24-Hourly Maximum PM<sub>10</sub> GLC – All Industries (Existing and Proposed TPP, Glass, Ceramic, Steel, PVC)



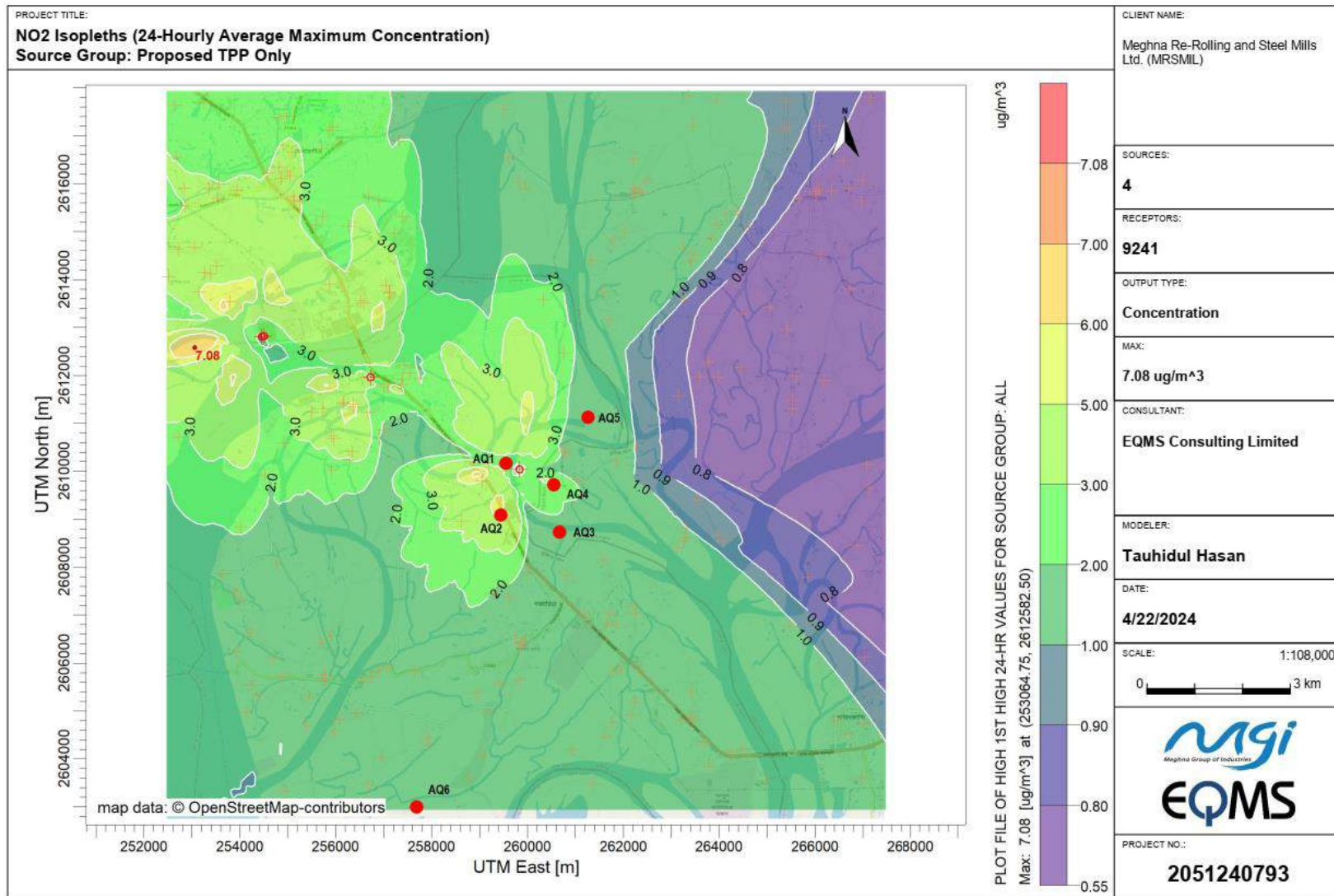
**Appendix B-9: Isoleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Proposed Meghna Steel Mill**



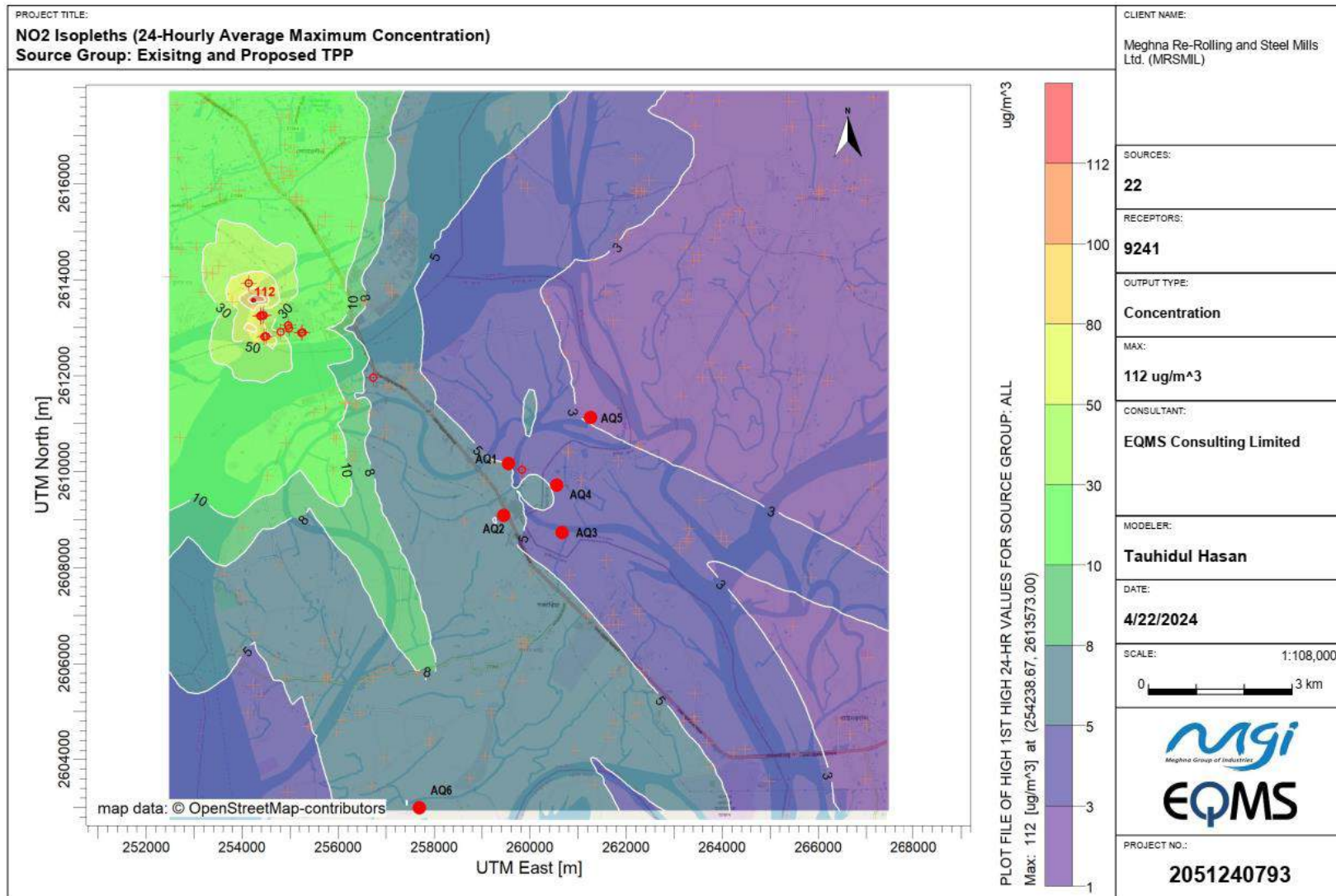
**Appendix B-10: Isoleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Existing (Thermal Power Plants)**



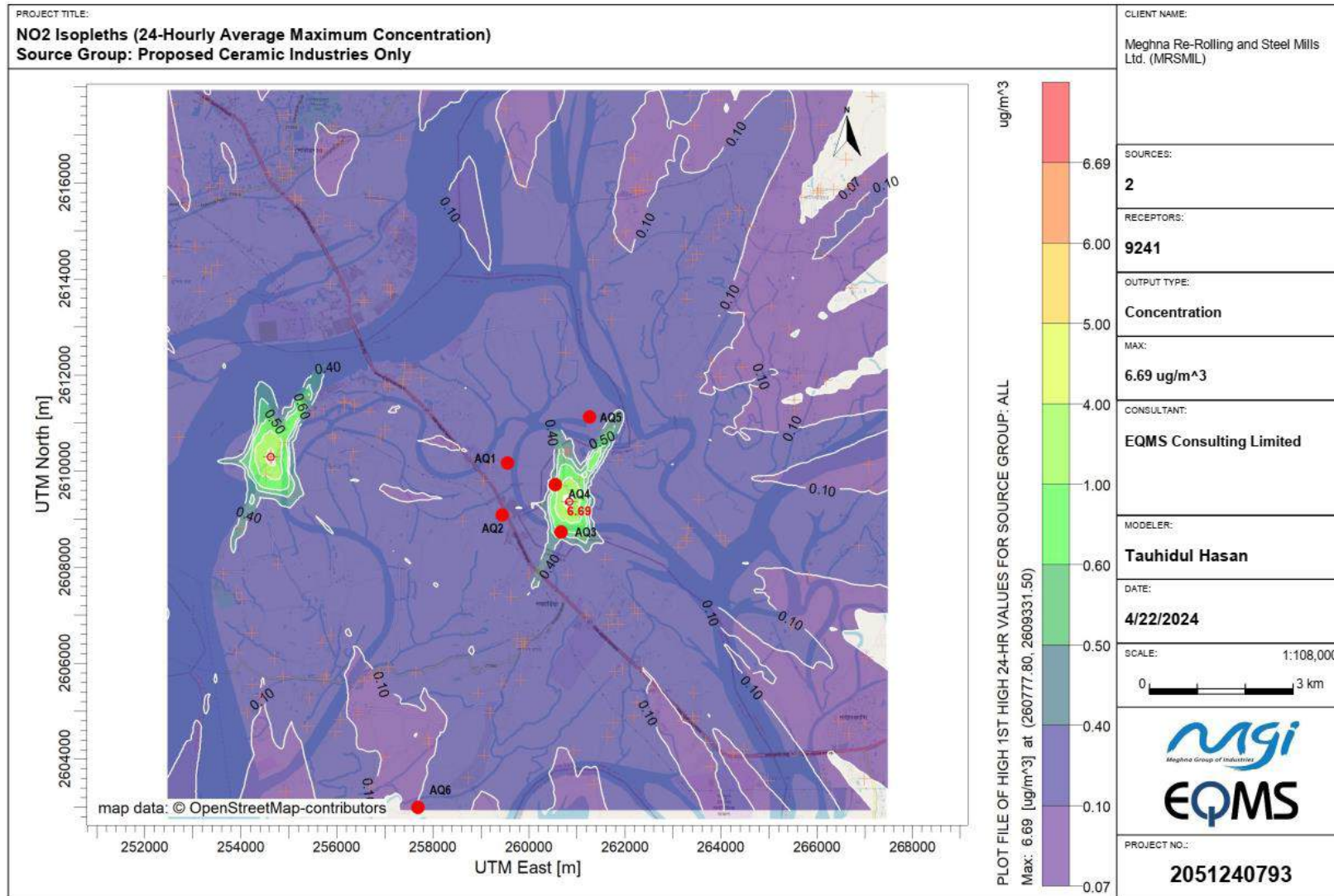
Appendix B-11: Isoleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Proposed (Thermal Power Plants)



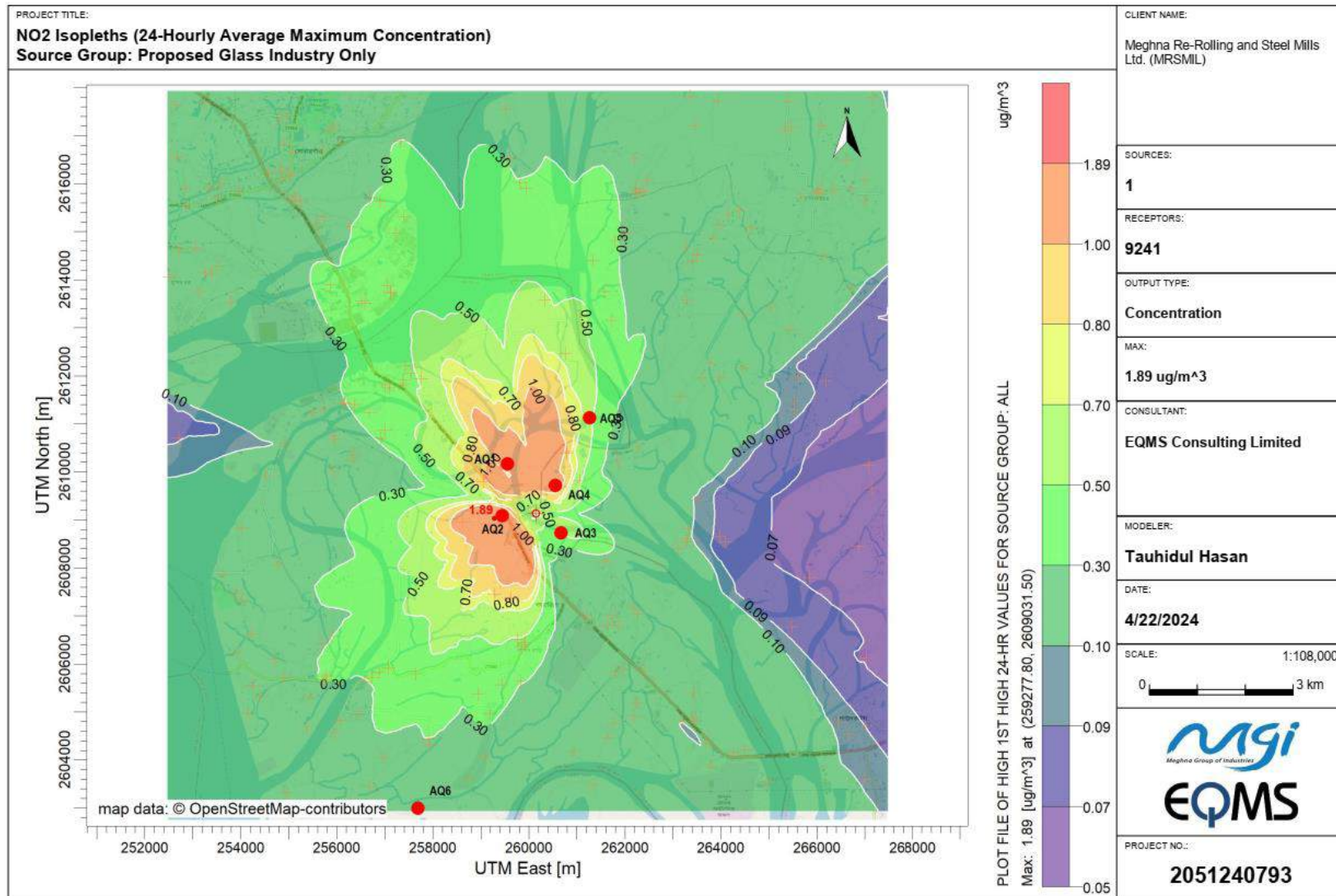
**Appendix B-12: Isoleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Proposed and Existing (Thermal Power Plants)**



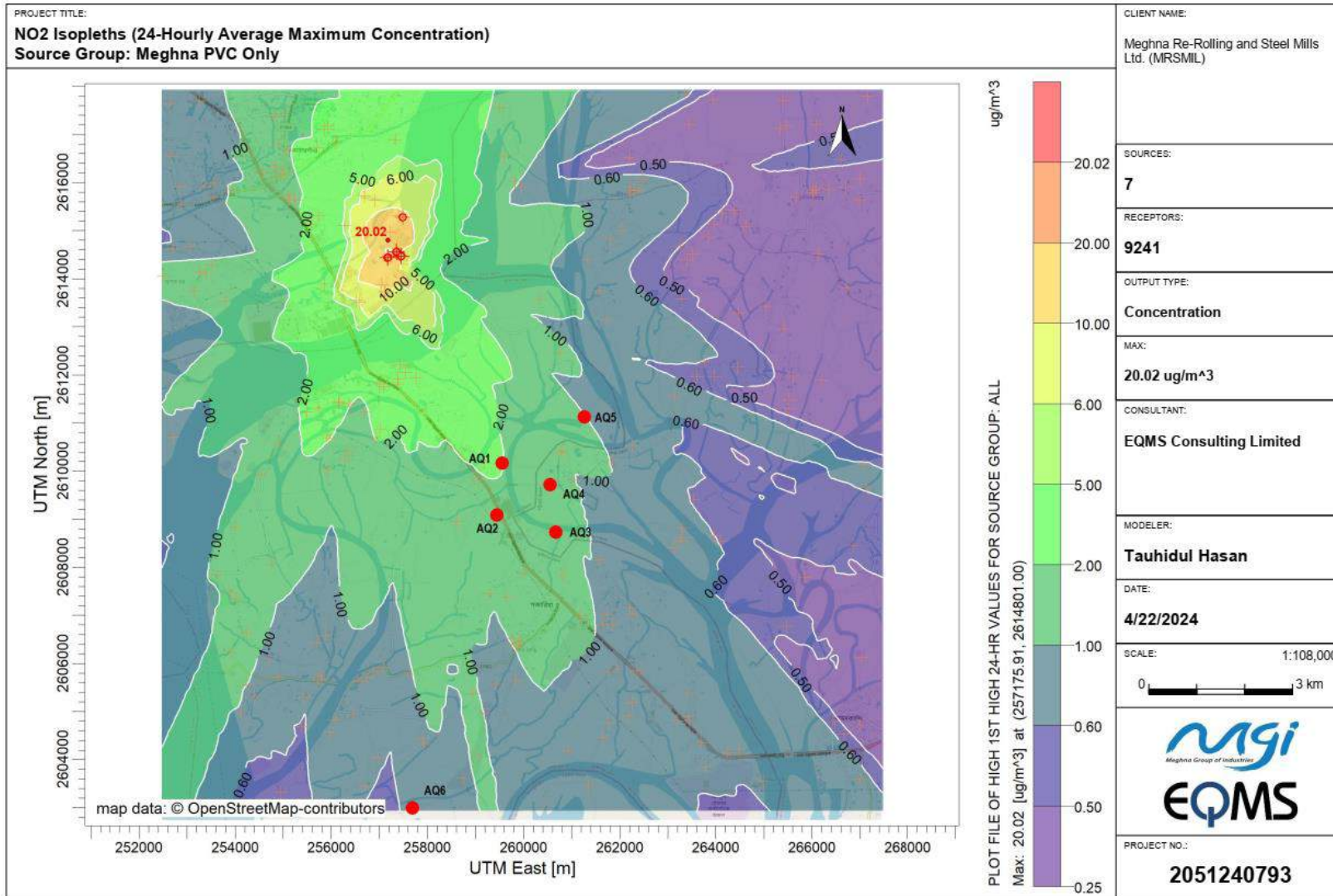
Appendix B-13: Isoleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Proposed Ceramic Industries



Appendix B-14: Isoleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Proposed Glass Industry



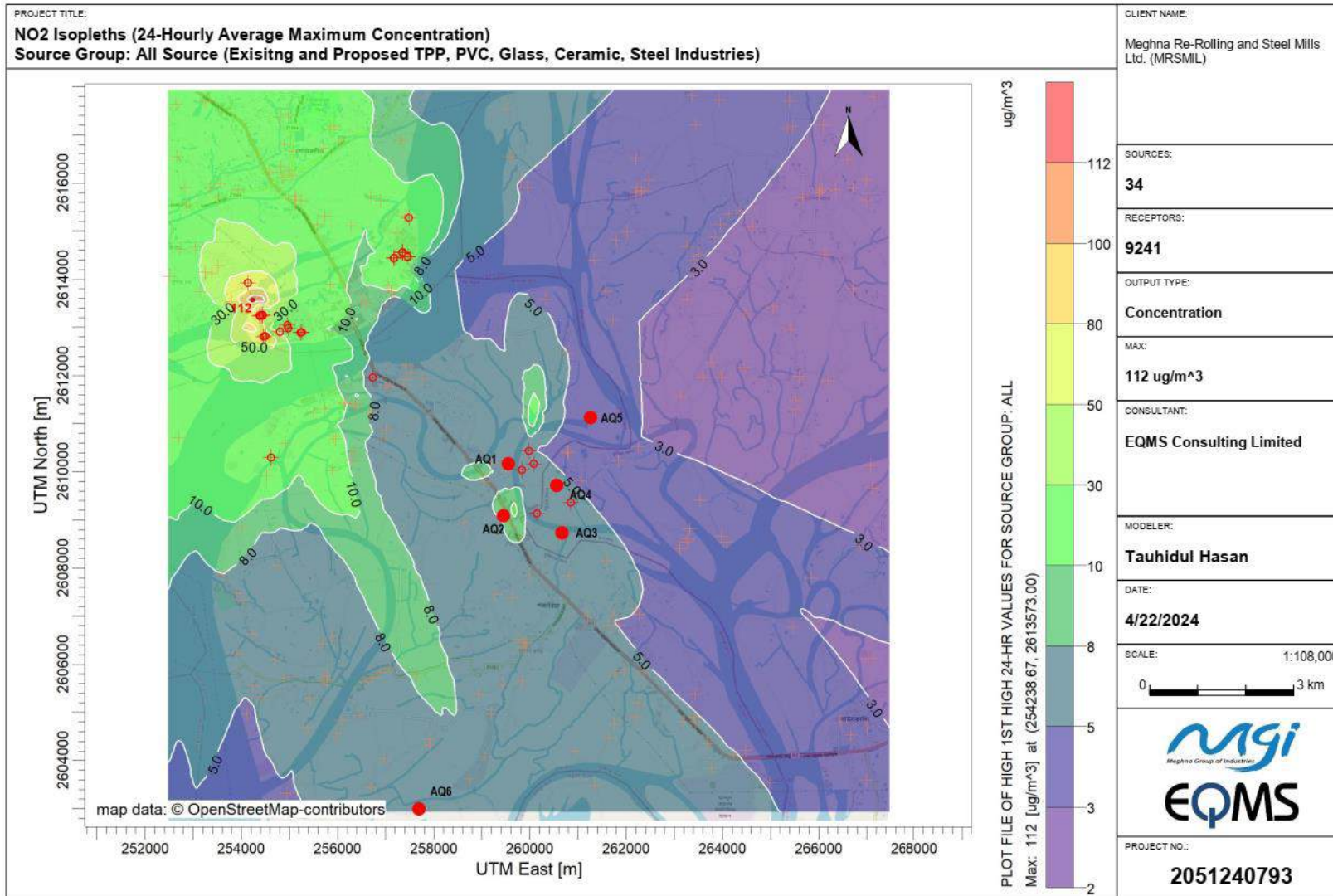
Appendix B-15: Isoleths of 24-Hourly Maximum NO<sub>2</sub> GLC – Existing PVC Industry



**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh

**Appendix B-16: Isoleths of 24-Hourly Maximum NO<sub>2</sub> GLC – All Industries (Existing and Proposed TPP, Glass, Ceramic, Steel, PVC)**



**Draft Report**

Cumulative Impact Assessment for 1.4 MMTPA Greenfield Re-Rolling Steel Plant at Cumilla Economic Zone, Cumilla, Bangladesh