



Summit Meghnaghat II Power Company Limited (SMIIPCL)

Environmental and Social Impact Assessment Scoping Study of 589.750 (net) MW on Gas/ 541.220 (net) MW on Liquid Fuel of Combined Cycle Power Station: *Meghnaghat Power Hub, Narayanganj District, Bangladesh*

Final Scoping Report

November 2017

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**Environmental and Social
Impact Assessment Scoping
Study of 589.750 (net) MW on
Gas/ 541.220 (net) MW on
Liquid Fuel of Combined
Cycle Power Station:
Meghnaghat Power Hub,
Narayanganj District,
Bangladesh**

Final Scoping Report

Client		Project No			
Summit Meghnaghat II Power Company Limited (SMIIPCL)		0425523			
Project Summary		Date			
The Project, a 589.750 (net) MW on Gas/ 541.220 (net) MW on Liquid Fuel based combined cycle power station, will be constructed at Mouza: Char Ramjan Sonallah, Union: Pirijpur, Upazilla: Sonargaon of the district of Narayanganj.		27 November 2017			
ERM India Private Limited (ERM) was engaged to perform an environmental & social impact assessment study of the Project. This report presents environmental and social scoping study of the Project.		Approved by			
		 Neena Singh Partner ERM India Private Limited			
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0	Draft Scoping Report	DR, SD, SG	NC, SP	NS	11.11.2017
Revision	Description	By	Checked	Approved	Date
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ABBREVIATIONS

ADB	Asian Development Bank
BFIDC	Bangladesh Forest Industries Development Corporation
BFRI	Bangladesh Forest Research Institute
BMD	Bangladesh Meteorological Department
BNH	Bangladesh National Herbarium
BPC	Bangladesh Petroleum Corporation
BPDB	Bangladesh Power Development Board
BWDB	Bangladesh Water Development Board
CCO	Chief Compliance Officer
CCPP	Combine Cycle Power Plant
CEIA	Cumulative Environmental Impact Assessment
DC	Deputy Commissioner
DG	Diesel Generator
DoE	Department of Environment
DPHE	Department of Public Health Engineering
ECA	Environmental Conservation Act
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rules
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPFI	Equator Principles Financial Institution
EQS	Environmental Quality Standard
ERM	ERM India Private Limited
ESIA	Environmental and Social Impact Assessment
ETP	Effluent Treatment Plant
FD	Forest Department
FI	Financial Intermediaries
FNTP	First Notice to Proceed
FPIC	Free, Prior, and Informed Consent
FSA	Fuel Supply Agreement
GHG	Green House Gases
GIIP	Good International Industry Practice
GoB	Government of Bangladesh
GSA	Gas Supply Agreement
GSS	Grid Sub-station
GT	Gas Turbine
GT	Gas Turbine
GTCL	Gas Transmission Company Limited
HFL	High Flood Level
HRSG	Heat Recovery Steam Generator
HSD	High Speed Diesel
IA	Implementation Agreement
ICP	Informed Consultation Process
IEC	Important Environmental Components
IEE	Initial Environmental Examination
IFC	International Finance Corporation

ILO	International Labour Organisation
IP	Indigenous People
IPP	Indigenous Peoples Plan
IR	Involuntary Resettlement
LAC	Land Allocation Committee
LGED	Local Government Engineering Department
LILO	Line-in Line-out
LLA	Land Lease Agreement
LNG	Liquefied Natural Gas
LOI	Letter of Intent
MCR	Maximum Continuous Rating
MSL	Mean Sea Level
NEMAP	National Environment Management Action Plan
NFPA	National Fire Protection Association, USA
O&M	Operation and Maintenance
PGCB	Power Grid Company of Bangladesh
PPA	Power Purchase Agreement
PS	Performance Standards
PWD	Public Works Datum
REA	Rapid Environmental Assessment
RFI	Request for Information
RHD	Roads and Highways Department
RLNG	Regasified LNG
RP	Resettlement Plan
SCC	Site Clearance Certificate
SCL	Summit Corporation Limited
SIA	Social Impact Assessment
SMIIPCL	Summit Meghnaghat II Power Company Limited
SMPCCL	Summit Meghnaghat Power Company Limited
SPS	Safeguard Policy Statement
ST	Steam Turbine
STP	Sewage Treatment Plant
T/L	Transmission Line
ToR	Terms of Reference
WB	World Bank

1 INTRODUCTION

1.1 BACKGROUND

Summit Meghnaghat II Power Company Limited (*hereinafter referred to as "SMIIPCL" or the "Project Proponent" or the "client"*), a wholly owned subsidiary of Summit Corporation Limited ("*SCL*"), is proposing to set up a dual fuel fired combined cycle power project with net generation capacity 589.750 MW on Gas and 541.220 MW on Liquid Fuel at Meghnaghat Power Hub (*hereinafter referred to as the "project" or the "plant" or "Summit M-2"*), in Narayanganj District of Dhaka Division, Bangladesh. The project site is located approximately 40 km south-east of Dhaka on the right bank of River Meghna.

The project is at present in pre-construction planning stage. SMIIPCL has engaged ERM India Private Limited (*hereinafter referred to as "ERM"*) to perform environmental and social impact assessment (ESIA) study of the project.

This environmental and social scoping report has been prepared as part of the ESIA study of the project and presents ERM's approach to the study, which has been carefully considered in light of the available information on the project context, review of information available in public domain, and identification of likely significant environmental and social impacts that may arise during the project lifecycle.

The report has been based on the review of the preliminary project information, site reconnaissance study of the project influence area and through review of secondary environmental and socio-economic data available for the project site and surrounding areas. This report also includes preliminary air quality prediction results based on quantitative analysis for Summit M-2 as well as cumulatively for Meghnaghat Power Hub.

This report also defines the Terms of Reference (ToR) for the ESIA study, which will be carried out as a next step after finalisation of this study and will facilitate the Client to obtain environmental approval for the project construction from the Department of Environment (DoE), Government of Bangladesh. The ESIA study will also help to secure the commitment to finance for the project from international financial institutions.

1.2 PURPOSE AND OBJECTIVE OF THE STUDY

The overall objective of the environmental and social scoping assessment is to ensure that there is a focus on the issues that are most important for the project feasibility, planning, decision making and stakeholder interests. During the scoping study, potential interactions between the project,

environmental, ecological and human resources/ receptors are identified, and prioritised in terms of their potential to cause impacts of concern. The scoping exercise also has the benefit of identifying the areas which are not likely to be significantly affected by the development activities, and hence will need little further consideration or associated data gathering during the full scale ESIA.

The objectives of this Scoping assessment are, therefore, to:

- Identify the potentially significant environmental, ecological and social impacts and risks that will require further examination in the ESIA (scope-in);
- Identify the areas that are not likely to be significantly affected by the development of the project (scope-out) and not required to be considered during the ESIA study;
- Preliminarily assess the environmental and social impacts associated with the development of the project during construction, commissioning and operation phases;
- Identify the data gaps, further examination, studies and actions required in order to obtain the required data to complete the ESIA in conformity with Bangladesh local standards, International Finance Corporation (IFC) Performance Standards and Asian Development Bank (ADB) Safeguards requirements;
- Preliminary assessment of cumulative air quality impact due to existing and planned development in Meghnaghat Power Hub; and
- Flagging of critical issues in advance to the Client during design stage.

1.3

APPLICABLE REFERENCE FRAMEWORK

The applicable reference framework for this study includes:

- The Environment Conservation Act, 1995 and The Environment Conservation Rules, 1997 and amendments thereof by the Ministry of Environment and Forest, Government of Bangladesh;
- Other relevant Bangladeshi Laws, Rules and Regulations for environment, health, safety and social aspects;
- The IFC Performance Standards (2012) for Environmental and Social Sustainability;
 - The IFC General EHS Guidelines (2007);
 - The IFC/ WB Guidelines for Thermal Power Projects (2007);
 - IFC's stakeholder engagement handbook;
 - Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets;
- The ADB Safeguard Policy Statement (2009).

The administrative framework in details is discussed in *Section 3* of this report.

1.4 APPROACH AND METHODOLOGY

As the first step, a project screening and scoping exercise was undertaken to identify the parameters needed to be considered for the study and to outline the activities for collecting data on each parameter. Data pertaining to all facets of environment and social aspects *viz.* physical, ecological and socioeconomic environment were collected from the project site and surroundings through secondary sources and by site reconnaissance and consultations. The stepwise activities are detailed in the following subsections:

1.4.1 Screening and categorisation

Screening

ERM reviewed the project specific information provided by the Client, existing available data of neighbouring plant (*Summit M-1*), owned and operated by Summit Meghnaghat Power Company Limited (SMPCL) – a subsidiary of SCL, secondary information available in public domain with regard to the neighbouring projects within Meghnaghat Power Hub (such as ESIA study reports), and information available in public domain about the project site and surrounding areas. The screening process was undertaken to identify environmental, ecological, social and other sensitivities associated with the project. A review of the applicability of the reference framework with respect to the project was also undertaken as part of this screening phase.

The kick-off meeting was held in Dhaka on 15th September 2017 with the Client and ERM submitted request for information (RFI) as well as explained the requirements. Preliminary information was shared by the Client during the meeting and remaining information as per RFI was provided by October end. ERM then conducted a site visit on 4th and 5th October, 2017, which included a walkover of the site and associated/ common facilities along with limited consultations with local community and operations & maintenance (O&M) team of SMPCL. A meeting was also held at Land Office of Sonargaon Upazilla to understand the status of land and ownership.

Categorisation

ERM has categorised the project by following the DOE (DoE 1997), ADB (ADB 2009) and IFC (IFC 2012) categorisation criteria based on the screening assessment, site visit, environmental and social sensitivities and limited consultations. The project categorisation will now become a basis for the impact assessment, planning and implementation of mitigation, monitoring and reporting mechanisms for the project to meet the regulatory and potential lenders' requirement.

1.4.2 Scoping

Based on the project screening and categorisation, as well as inputs received from the Client, ERM initiated the environmental and social scoping process. As an outcome of the scoping exercise, ERM defined scope for the ESIA study,

which includes a detailed approach and methodology including field plan for environmental and social baseline data collection, impact identification, impact assessment and management plan.

1.4.3 *Reporting*

The outcome of the scoping study in this report includes:

- Site and surrounding area profile;
- Brief project description;
- Overview of local environmental and social requirements;
- Overview of potential lenders' requirements;
- Categorisation of the project;
- Key environmental and social issues/ risks;
- Preliminary cumulative air quality impact due to Meghnaghat Power Hub;
- Preliminary stakeholder mapping; and
- Draft ToR for the ESIA study.

1.5 *LIMITATIONS*

Uses of this report

The Client acknowledges that report provided by ERM in relation to the provision of Services is delivered to the Client solely for the Client's benefit. ERM, its officers, employees, contractors, and agents shall owe no duties, obligations or liabilities to any persons in connection with any use of or reliance on the project information provided by the Client. We make no warranties, express or implied, including without limitation, warranties as to merchantability or fitness for a particular purpose.

ERM is not engaged in social and environmental, health & safety consulting and reporting for the purposes of advertising, sales promotion, or endorsement of any client's interests, including raising investment capital or recommending investment decisions, or other publicity purposes. The Client acknowledges that the report prepared by ERM are for exclusive use of the Client and agrees that ERM's reports or correspondence will not be used or reproduced in full or in part for such promotional purposes, and may not be used or relied upon in any prospectus or offering circular. The client also agrees that none of its advertising, sales promotion, or other publicity matter containing any information obtained from these assessments or reports, either in parts or entirety, will make reference to ERM's trade name.

Nothing contained in this report shall be construed as a warranty or affirmation by ERM that the site and property described in the report are suitable collateral for any loan or that acquisition of such property by any lender through foreclosure proceedings or otherwise will not expose the lender to potential environmental or social liability.

The remainder of this report is structured as follows:

- *Section 2* provides a brief description of the project;
- *Section 3* provides an overview of relevant legislation and standards;
- *Section 4* presents the environmental and social baseline conditions;
- *Section 5* presents the outcome of project screening and categorisation;
- *Section 6* presents the preliminary stakeholder mapping;
- *Section 7* provides the key environmental, ecological and social risks of the project;
- *Section 8* sets out the proposed Terms of Reference for the ESIA study.

2.1 THE PROJECT

It has been understood that the project has received in-principle approval from the Bangladesh Power Development Board (BPDB) to set up dual fuel fired combined cycle power project at Meghnaghat Power Hub and total land available for the project is 14.28 acres, which is owned by the BPDB. This land parcel is part of the Meghnaghat Power Hub, for which land was acquired by BPDB way back in 1997-98. Land is developed with flood embankment.

The project will be based on regasified liquid natural gas (RLNG) and high speed diesel (HSD). The project will have 1 gas turbine (GT), 1 heat recovery steam generator (HRSG) and 1 steam turbine (ST) (i.e. 1+1+1 configuration). RLNG will be supplied by Petrobangla's nominated entity, whereas HSD will be supplied by Bangladesh Petroleum Corporation (BPC) at pontoon of existing *Summit M-1* project. HSD storage will be maintained at existing fuel tanks of *Summit M-1* project and will be supplied to *Summit M-2* project, if required. It is understood that the project will not require construction of new transmission line; however, it may require around 300-400 m power evacuation line to connect Power Grid Company of Bangladesh (PGCB) grid sub-station (GSS) to be situated on the Meghnaghat Power Hub site.

2.1.1 The Project Site

The project site is approximately 10 km (aerial distance) east of Narayanganj District headquarters and about 28 km (aerial distance) south-east of Dhaka (Division headquarters). General site location is shown in *Figure 2.1*.

The project site is located at Mouza: Char *Ramjan Sonaullah*, Union: *Pirijpur* of Sonargaon Upazilla in Narayanganj District as shown in *Figure 2.2*. The site is well connected by a dedicated access road to Meghnaghat Power Hub from the Dhaka-Chittagong Highway (N1).

2.1.2 Key Features of the Site and Surroundings

The project site is flat developed land and covers an area of 14.28 acres, owned by the BPDB. The site is fenced and earlier used as laydown area during construction of *Summit M-1* project. It was observed during the site visit that scrap material from previous construction activities is still lying on the site. Site photographs showing current status of the site are shown in *Figure 2.3*.

The Project site co-ordinates are as follows:

- NW corner: 23°36'36.73"N, 90°35'46.53"E
- NE corner: 23°36'37.31"N, 90°35'50.69"E
- SE corner: 23°36'24.10"N, 90°35'54.10"E
- SW corner: 23°36'23.56"N, 90°35'48.50"E

Figure 2.1 Project Location

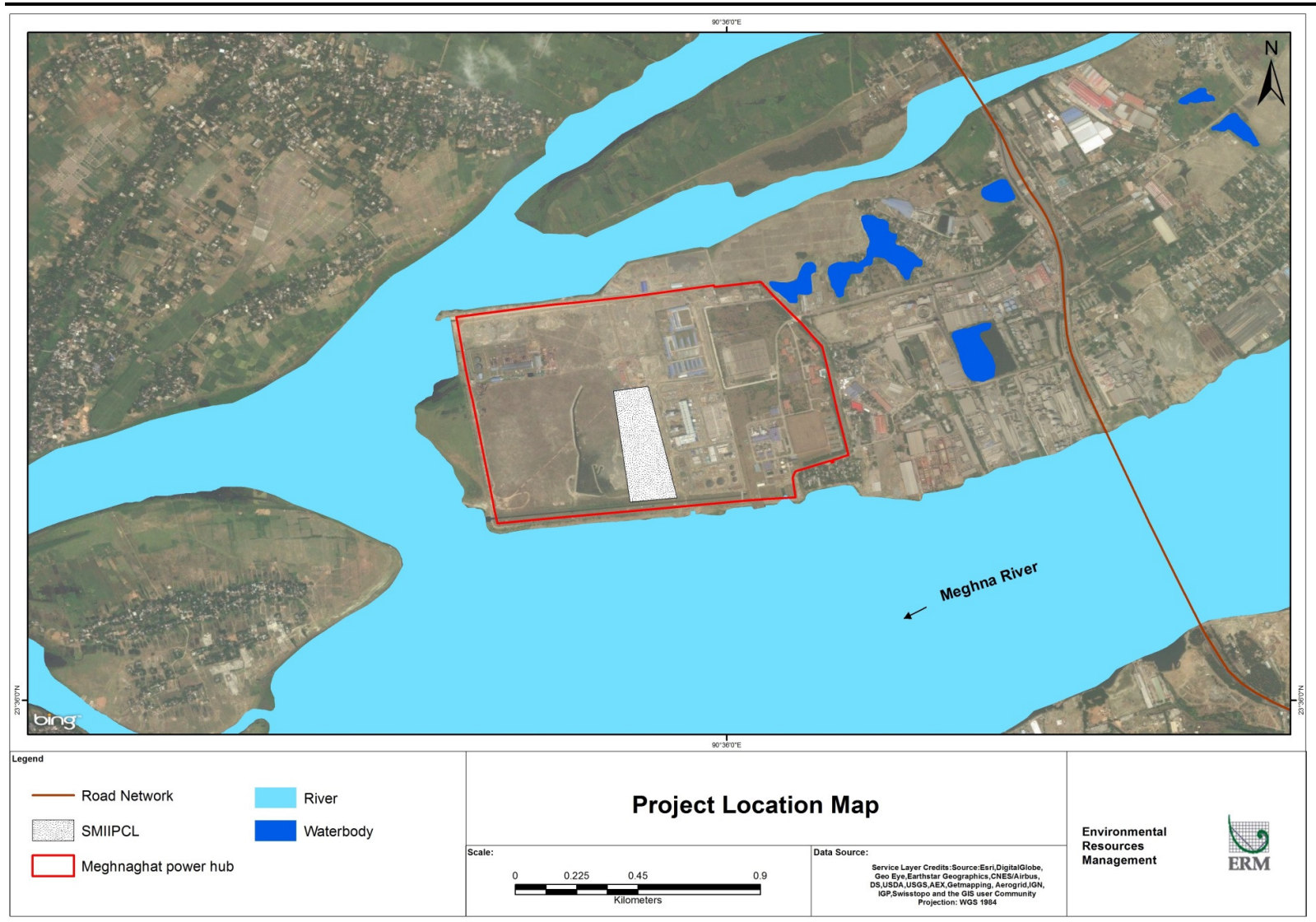


Figure 2.2 Regional Setting

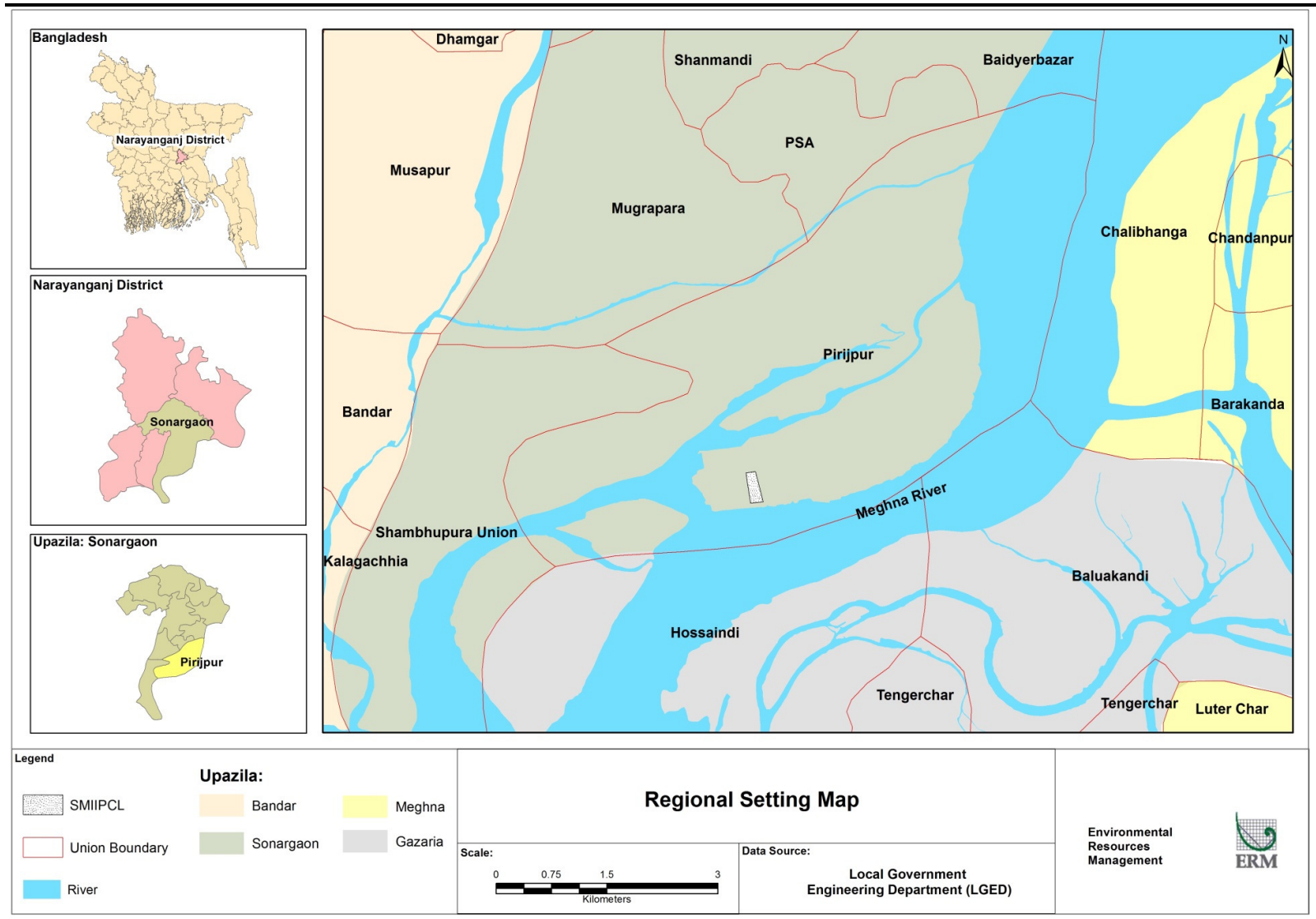


Figure 2.3 Site Photographs



Source: Site Visit (4th October 2017)

Salient features of the site and surrounding areas are given in *Table 2.1*.

Table 2.1 *Salient features of the site and surroundings*

S. No.	Particulars	Details
1	Site location	Mouza: Union: Pirijpur Upazilla: Sonargaon District: Narayanganj
2	Site topography	Generally plain with average elevation of 3 m above mean sea level
3	Site land use	Empty BPDB land with part of land used for storage of scrap material from previous construction activities in the area
4	Nearest highway	Dhaka – Chittagong highway (N1) : 1.5 km* east
5	Nearest railway station	Narayanganj railway junction : 9.3 km* west
6	Nearest airport	Hazrat Shahjalal International Airport, Dhaka: 32 km* west-north-west
7	Nearest waterbody	River Meghna: adjacent to project site from three sides (0.080 km south; 0.370 km north and 0.500 km west)
8	District headquarters	Narayanganj: 10 km* west
9	Upazilla headquarters	Sonargaon:
10	Nearest town/ city	Sonargaon
11	Nearest village	Settlement near approach road: 0.65 km* north-east Dudghata village: 0.95 km* north-west
12	Cultural Heritage/ Archaeologically important sites	Sonargaon: Tomb of Sultan Ghiasuddin, the shrines of Panjpirs and Shah Abdul Alla and a beautiful mosque at Galdi village (about 5 km* north) Idrakpur Fort: 9.5 km* south-west in Munshiganj
13	Protected areas as per Wildlife (Conservation and Security) Act, 2012	None, within 10 km radial zone (No forest land within Narayanganj and Mushiganj districts) ¹
14	Reserved and protected forests	None within 10 km radial zone
15	Ecologically critical area	Shitalakshya River: 9.2 km* west
16	Hills/ valleys	No hills and valleys within 10 km radial zone
17	Seismicity	Seismic zone II (z = 0.20)
18	Defence installations	None within 10 km radial zone

* Aerial distance

Layout of the land already under possession of the BPDB for the Meghnaghat Power Hub with demarcation of existing power projects, proposed power projects and land available for other utilities is presented in *Figure 2.4* and aerial view of the site is shown in *Figure 2.5*. Meghnaghat power hub is surrounded by Meghna River in the north, west and south directions, which also creates a buffer between the Meghnaghat power hub and nearby villages.

¹ <http://cis.moef.gov.bd/das/LinkPage/Dist-Wise-Forest-Land-2016.pdf>

Figure 2.4 Master Layout Plan of Meghnaghat Power Hub

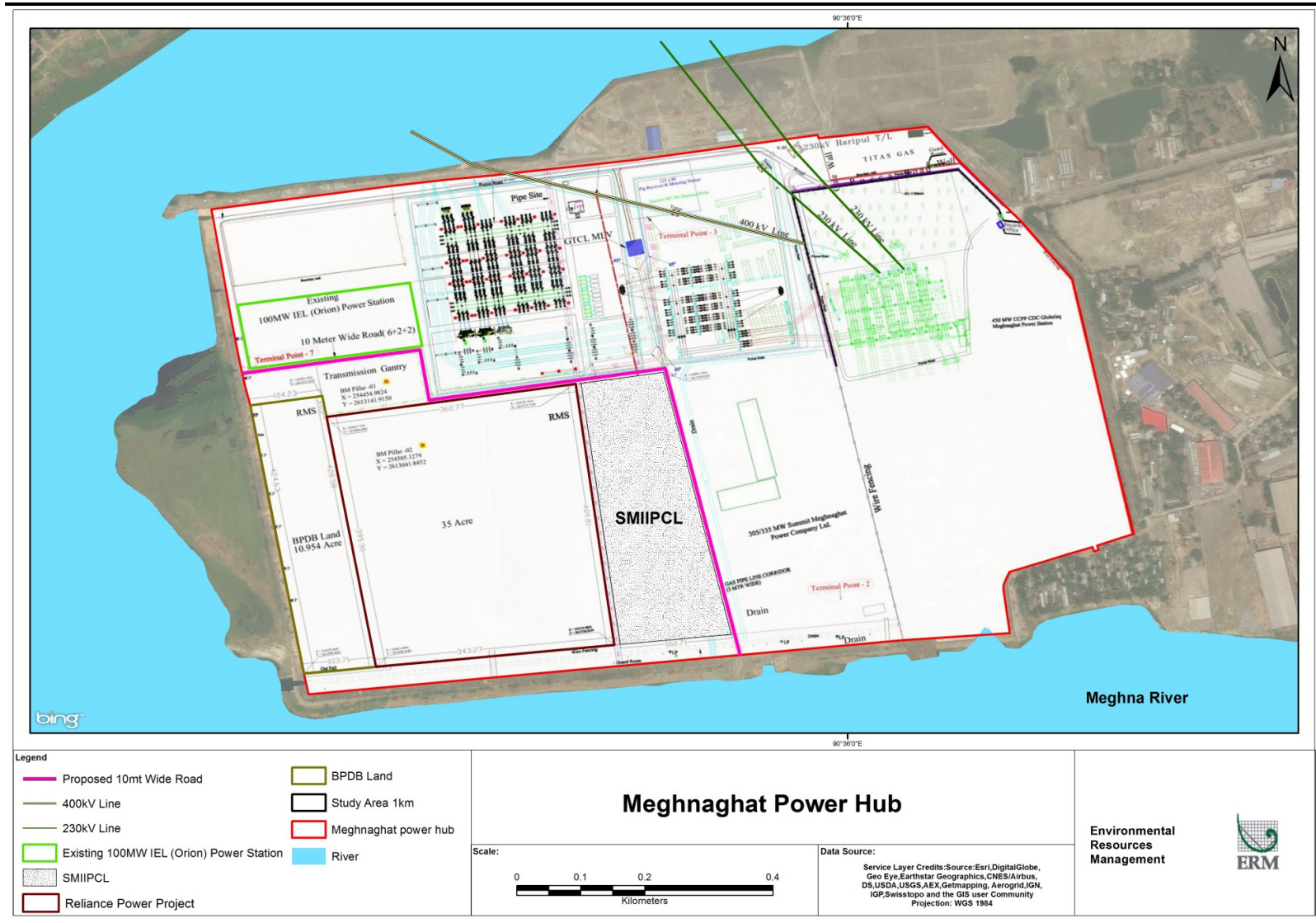


Figure 2.5 Aerial View of Meghnaghat Power Hub



Source: Google Earth Imagery Dated 12.01.2017 (Accessed on 31.10.2017)

2.1.3 Site Access

The project site is accessible from Dhaka-Chittagong highway (N1) near the Meghnaghat Toll Plaza through a dedicated access road of about 2.0 km. This access road was completed by the BPDB in August 1999. This access road has been raised to the same elevation as the Meghnaghat power hub using fill from the Meghna River. The inland waterway accessibility via Meghna River is also feasible for the project site and logistics purpose. Same had been used during the construction of existing projects within the power hub.

2.1.4 Other Industries

Meghnaghat Power Hub

The Meghnaghat Power Hub is currently having following power projects and utilities:

- 450 MW Meghnaghat Power Station (operational)
- 100 MW Orion Power Station (operational)
- 305/335 MW Summit Meghnaghat-I CCPP (operational)
- 230 kV PGCB Sub-station (operational)
- Gas supply pipelines for power hub and towards Siddhirganj (operational)
- Pig receiver and metering station (operational)
- 600 MW Summit Meghnaghat-II CCPP (proposed)
- 750 MW Reliance Power CCPP (proposed)
- 400 kV PGCB Sub-station (proposed)
- Pig receiver and metering station (proposed)

Meghnaghat-North Industrial Area

The Meghnaghat north industrial cluster is located on north bank of the Meghna River. It is located in the Sonargaon Upazila of Narayanganj district. Different industries in this cluster are listed in **Table 2.2**.

Table 2.2 Industries in Meghnaghat (N) Industrial Cluster

Power / Industrial Sectors	Number	Details
Power Plant	3	<ul style="list-style-type: none"> ▪ 100 MW Engine based Power Plant of Orion Group ▪ 337 MW Dual Fuel CCPP of Summit Group ▪ 450 MW Meghna CCPP of Pendakar Energy
Steel Mill	1	<ul style="list-style-type: none"> ▪ Tanveer Steel Mill
Paper Mill	5	<ul style="list-style-type: none"> ▪ Basundhara Paper Mill Unit-1 ▪ Basundhara Paper Mill Unit-2 ▪ Magura Paper Mill ▪ Multi Paper Mill ▪ Tanveer Paper Mill
Cement Plant	5	<ul style="list-style-type: none"> ▪ Tiger Cement Plant Unit 1 ▪ Tiger Cement Plant Unit 2 ▪ Holcim Cement Plant Unit 1 ▪ Holcim Cement Plant Unit 2 ▪ Fresh Cement Plant

Power / Industrial Sectors	Number	Details
Textile / RMG Unit	-	
Shipyards	3	<ul style="list-style-type: none"> ▪ Ananda Shipyards ▪ Islampur Shipyards ▪ Meghna Shipbuilding & Dockyard
Food Processing Unit	2	<ul style="list-style-type: none"> ▪ Meghna Group of Industry ▪ Abdul Monem Sugar Refinery
Chemical Industry	2	<ul style="list-style-type: none"> ▪ Meghna Chemicals ▪ Meghna Group of Industry
Others	-	
TOTAL	21	

Power Plants

As stated earlier, presently there are three operating power plants in this cluster with total capacity of 887 MW. These three power plants are operated by natural gas, high speed diesel (HSD) and heavy furnace oil (HFO). Type and capacity of plant is presented in **Table 2.3**.

Table 2.3 *Power Plants in Meghnaghat North Industrial Cluster*

Sl. No.	Name & Capacity	Location	Operator	Fuel Used	Cooling System
1	100 MW Engine based Power Plant	Meghnaghat Power Hub	Orion Power Meghnaghat Ltd.	HFO	-
2	337 MW Dual Fuel CCPP	Meghnaghat Power Hub	Summit Meghna Power Co. Ltd	Natural gas/ HSD	Once through cooling system
3	450 MW Meghna CCPP	Meghnaghat Power Hub	Power Tech, Pendekar	Natural gas	Once through cooling system

Major air emissions from gas based power plant include NO_x and CO whereas for oil based power plant it is NO_x, SO_x, CO and PM. Both combined cycle power plants in this region are using river water for cooling, DM water intake and other water uses. The combined cycle power plants require large quantities of cooling water. Both the plants have once through cooling systems and cooling water is discharged into the Meghna River usually from a single point of discharge.

Industries

Prominent type of industries located in this industrial includes cluster cement plants, pulp and paper mills, ship building yards and food processing industries mostly of the Meghna Group of Industries.

Cement Plants

The Meghnaghat north industrial cluster has 5 cement grinding mills owned by three different companies (*Holcim, Meghna Group and Madina Group*). All these units are located adjacent to each other. Raw material is generally transported through ships and unloaded at the jetties and transported to storage silos through conveyor belts. Major emissions from the cement plants is of PM. Emissions from raw material storage areas and from milling, packing and storage of cement from such units have been mitigated through

installation of bag filters at adequate locations. Consultation with local people revealed that PM from clinker and fly ash unloading facilities regularly creates dust nuisance and health related problems for the local communities.

Food Processing Industries

Meghna Group of Industries, a private industrial group in Bangladesh has set up various food processing units in the Meghnaghat region. These units are mainly located on western side of Dhaka-Chittagong road and along the eastern part of this industrial cluster. Major source of pollution from these industries is from process wastewaters. The units located in this cluster are:

Table 2.4 *Meghna Group of Industries – Units in Meghnaghat*

Units	Product
Tanveer Food Ltd.	Powder Milk, Spices
United Sugar Mills Ltd.	Sugar
Janata Flour and Dal Mills Ltd.	Flours and Pulses
Tanveer Oil Ltd.	Refined Soybean, Palm Oil and Dalda
United Mineral Water & Piety Industries Ltd.	Piety Bottles, Mineral Water
United Feeds Ltd.	Poultry and Fish Food
Tanveer Food Ltd.	Tea
Sonargaon Salt Ltd.	Salt
Surma Mustard Oil Mills Ltd	Mustard Oil

Pulp & Paper Industries

There are four operating pulp and paper mills in this region while a fifth unit is presently under construction. Capacity of the plant and information on pollution load from these units could not be gathered during the present stage of the study. The consultation with local people revealed that pulp is mostly imported and waste /recycled paper is also used in making of pulp. Major pollution from these industries is from process effluents.

Chemical Industry

Meghna Group has a chemical plant within this cluster; however information on type of chemicals manufactured / processed in this plant could not be established at this stage of the study. Consultation with locals reveals that discharge of effluent from chemical industry and pulp and paper mills causes of periodic fish kills in the Meghna River.

Shipbuilding Units

There are two ship building units (*Ananda and Islampur Shipyards*) located in the western part of the Meghnaghat North industrial cluster. Emission from these units primarily include PM and VOCs. High noise levels are also generated from these units.

Steel Rerolling Mill

There is only one small steel re-rolling mill located adjacent to Dhaka-Chittagong Highway. Major emission from this unit includes PM and NOx.

Meghnaghat-South Industrial Area

Meghnaghat south industrial cluster is located on the south bank of Meghna River. It is located in Gazaria Upazila of Munshiganj district. Different industries in this cluster are listed in **Table 2.5**.

Table 2.5 *Industries in Meghnaghat (S) Industrial Cluster*

Power / Industrial Sectors	Number	Details
Power Plant	-	
Steel Mill	-	
Paper Mill	-	
Cement Plant	1	▪ Anwar Cement Plant
Textile / RMG Unit	2	▪ Esquire Colour Coating Mill ▪ Esquire Accessories
Shipyards	2	▪ T K Shipyards ▪ Khan Brother Shipbuilding
Particle Board Factory	1	▪ Super Board Mills Ltd.
Chemical Industry	1	▪ Samuda Chemicals
Oil Depots / Tank Farm	1	▪ Rupsha Tank Farm
Others	-	
TOTAL	8	

Power Plants

No power plants are located within this cluster.

Industries

Prominent industry types located in this cluster include cement plants, ship building units and textile and garment industries.

Ship Building Units

There are two ship building units (*Khan Brothers Shipyards and Samuda Shipyards*) located within this industrial cluster. Major pollution from these units is in the form of fugitive dust and VOCs from use of paints. High noise levels are also generated from these units.

Particle Board Factories

There is a particle board manufacturing unit of T.K. (Samuda) Group located in this cluster. Major pollution is from fugitive emissions from industrial processes. Local people complained about regular dust nuisance.

Chemical Industries

The T.K Group has a chemical plant within this cluster. However at present information on type of chemical manufactured / processed here was not available for review.

Cement Plant

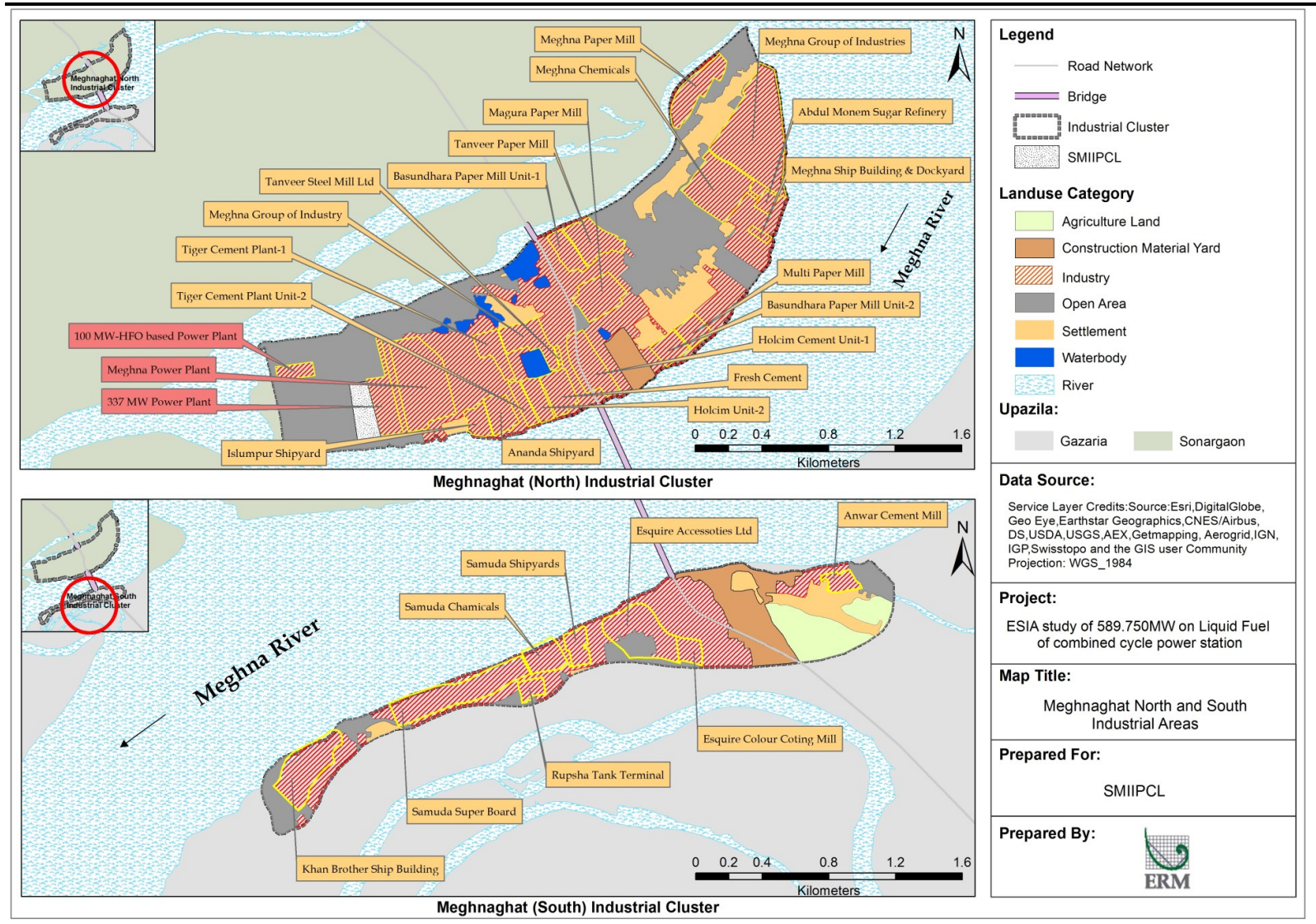
One cement grinding unit (*Anwar Cement Mill*) is also located in this industrial cluster. Major emission from the unit is of PM.

Garment & Textile Industry

Two textile and garment units (*Esco Colour Coating Mill and Esquire Accessories*) are also located in this industrial cluster. Process effluents are the principal source of pollution from these units.

The industries present in Meghnaghat (North) and Meghnaghat (South) industrial areas are presented in **Figure 2.6**.

Figure 2.6 Map showing Industries in Meghnaghat-North and Meghnaghat-South Industrial Areas



2.2 KEY PROJECT COMPONENTS

2.2.1 Power Plant

The main power block of the plant will consist of one dual fuel GT, one ST and one HRSG along with bypass and exhaust stacks. The plant will be constructed to have a maximum continuous rating (MCR) capacity output of 589.750 (net) MW on Gas/ 541.220 (net) MW on Liquid Fuel, at the high voltage side of the outgoing terminals of the 400 kV transformer corrected to the reference conditions at 0.80 power factor (lag).

Key components of Summit M-2 project will be as follows:

- Gas Turbine;
- Heat Recovery Steam Generator;
- Steam Turbine;
- Steam Turbine Condenser;
- Fuel Gas Compression and Conditioning System;
- Water System including cooling water system;
- Electrical System;
- Connection from Summit M-2 switch yard to PGCB sub-station;
- Air Conditioning and Ventilation System;
- Control and Instrumentation System;
- RMS for natural gas compression and conditioning;
- Natural gas pipeline from Valve Station to the RMS of the plant;
- Water intake structure;
- Effluent Treatment Plant (ETP);
- Sewage Treatment Plant (STP); and
- Cooling water discharge channel/ pipeline.

Tentative plant layout with general arrangement of equipment is shown in *Figure 2.7*.

2.2.2 Fuel Transportation and Supply

Regasified LNG

A regasified LNG supply and treatment system to deliver gas will be installed in the vicinity of the plant to meet the required gas quality and pressure specified by the GT manufacturer. Gas specification as per the IEC contract has been provided in *Table 2.6*.

Table 2.6 Gas Specification

Constituent	Composition for Performance Guarantee (% by Volume)
Methane	97.33
Ethane	1.72
Propane	0.35
Butane-N	0.06
Butane-I	0.08
Other	0.08
Carbon monoxide	-

Constituent	Composition for Performance Guarantee (% by Volume)
Carbon dioxide	0.11
Hydrogen sulphide	-
Air	-
Hydrogen	-
Oxygen	-
Nitrogen	0.30
Water	-
Low heating value (LHV), kJ/kg	49,506
High heating value (HHV), kJ/kg	54,668

Note: Total sulphur content may be in some cases 48mg/m³

Source: SMIIPCL (Extracted from IEC contract)

Liquid fuel

HSD will be supplied by BPC through its nominated vessels at the existing pontoon of Summit M-1 project located on the River Meghna at the south-eastern corner of the Summit M-1 project. The project is not intended to develop a separate system for HSD storage within the site. It has been planned that HSD storage will be maintained at existing fuel tanks of Summit M-1 project and will be supplied to Summit M-2 project, if required. Summit M-1 project is having storage facility of about 24,000 m³ of liquid fuel, which includes 2 tanks of 7,000 m³ capacity and 5 tanks of 2,000 m³ capacity. HSD supply arrangement of Summit M-1 project is shown in *Figure 2.8*. HSD specifications as per the IEC contract are shown in *Table 2.7*.

Table 2.7 HSD Specification

Test	Method	Limit
Density at 15 °C, Kg/L	ASTM D 1298	Min. 0.820 Max. 0.870
Colour, ASTM	ASTM D 1500	Max. 3.0
Neutralization Value:		
Strong Acid No, mg KOH/gm	ASTM D 664	Nil
Total Acid No, mg KOH/gm	ASTM D 974	Max. 0.2
Ash, % mass	ASTM D 482	Max. 0.01
Carbon Residue (Conradson) On 10% bottom, % wt.	ASTM D 189	Max. 0.2
Cetane Number	ASTM D 613	Min. 45
Cetane Index Calculated)	ASTM D 976	Min. 45
Pour point, °C	ASTM D 97	Max. 9 (Winter)** Max.12 (Summer)**
Copper Strip Corrosion (3 hours at 100 °C)	ASTM D 130	Max. No. 1
Flash point, PM(cc) / Abel,°C	ASTM D 93/ IP 170	Min. 32
Kinematic viscosity at 38 °C, cst	ASTM D 445	Max. 9.0
Sulphur total, % mass	ASTM D 4294	Max. 0.25
Sediment, % mass	ASTM D 473	Max.-0.01
Water content, % vol.	ASTM D 95	Max. 0.1
Distillation: 90 % vol. recovery, °C	ASTM D 86	Max. 375
Sediments and particulates for light distillate)	Total	Max. 20.0
	d < 10 µm	Max. 18.0
	10 ≤ d ≤ 25µm	Max. 2.0
	d > 25 µm	Max. 0
Ash	D482 / ISO6245 DIN51575 / DIN EN 2645	Max. -100
Vanadium	DIN 51790 ASTM D 3605	0.4 to 0.99
Lead	DIN 51790	Max. 1

Test	Method	Limit
Zinc	ASTM D 3605	Max. 2.0
	DIN 51790	
	ASTM D 3605	
Total of Sodium + Potassium	DIN 51790	< 1
	ASTM D 3605	
Nitrogen (FBN = Fuel Bound Nitrogen)	ASTM D 4629	Max. 0.015
Sulphur	D3246/D5453/ ISO6326	Max. 0.25
Acid Number	D664	Max. 0.1
Calorific Value Kcal/Kg		Max. 10280

Note:

* [Fuel oil will be tested by the Company, to confirm compliance with the above specification. The test result will be attached with this Agreement]

** Winter shall be the period from November to February (both months inclusive) and rest of the months of the year shall be deemed as Summer.

Source: SMIIPCL (Extracted from IEC Contract)

2.2.3 *Power Evacuation*

PGCB is currently having a 230 kV grid sub-station within the Meghnaghat power hub, which is supporting the existing power plants. In order to cater the need of proposed power plants within the Meghnaghat power hub, PGCB has planned to set up a 400 kV grid sub-station and land for the 400 kV GSS is already earmarked by the BPDB. The 400 kV transmission line (T/L) network (Madunaghat T/L and Aminbazar T/L) are already completed and currently connected with the 230 kV GSS. Proposed 400kV GSS is close to the project boundary of Summit M-2 and therefore will not require construction of new transmission line; however, it will require around 300-400 m power evacuation line for connecting to the 400 kV GSS.

In case of any delay in the completion of 400 kV GSS, it has been planned to have temporary connection with the 400 kV existing T/L as a line-in line-out (LILO) arrangement.

Figure 2.7 Tentative Plant Layout

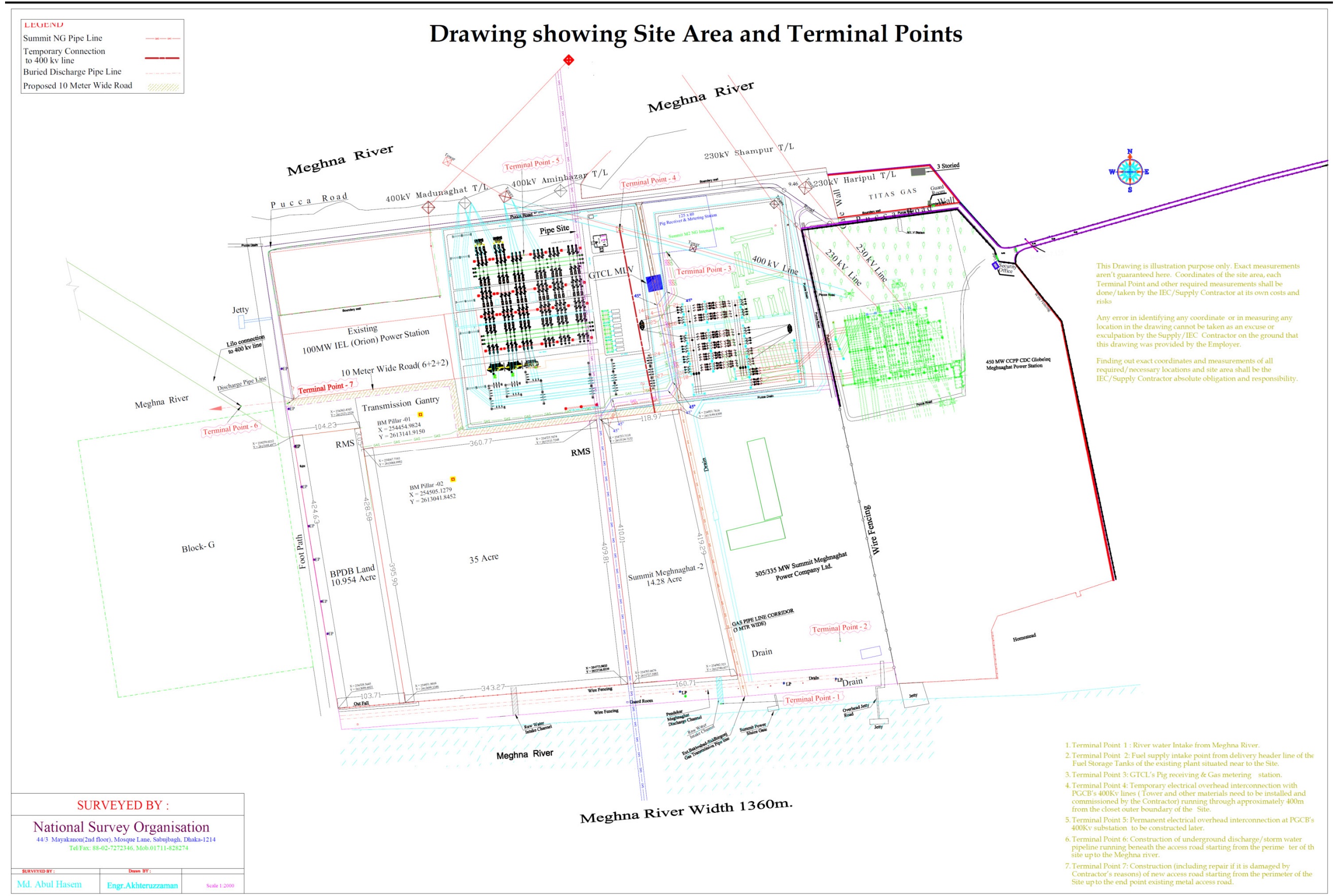
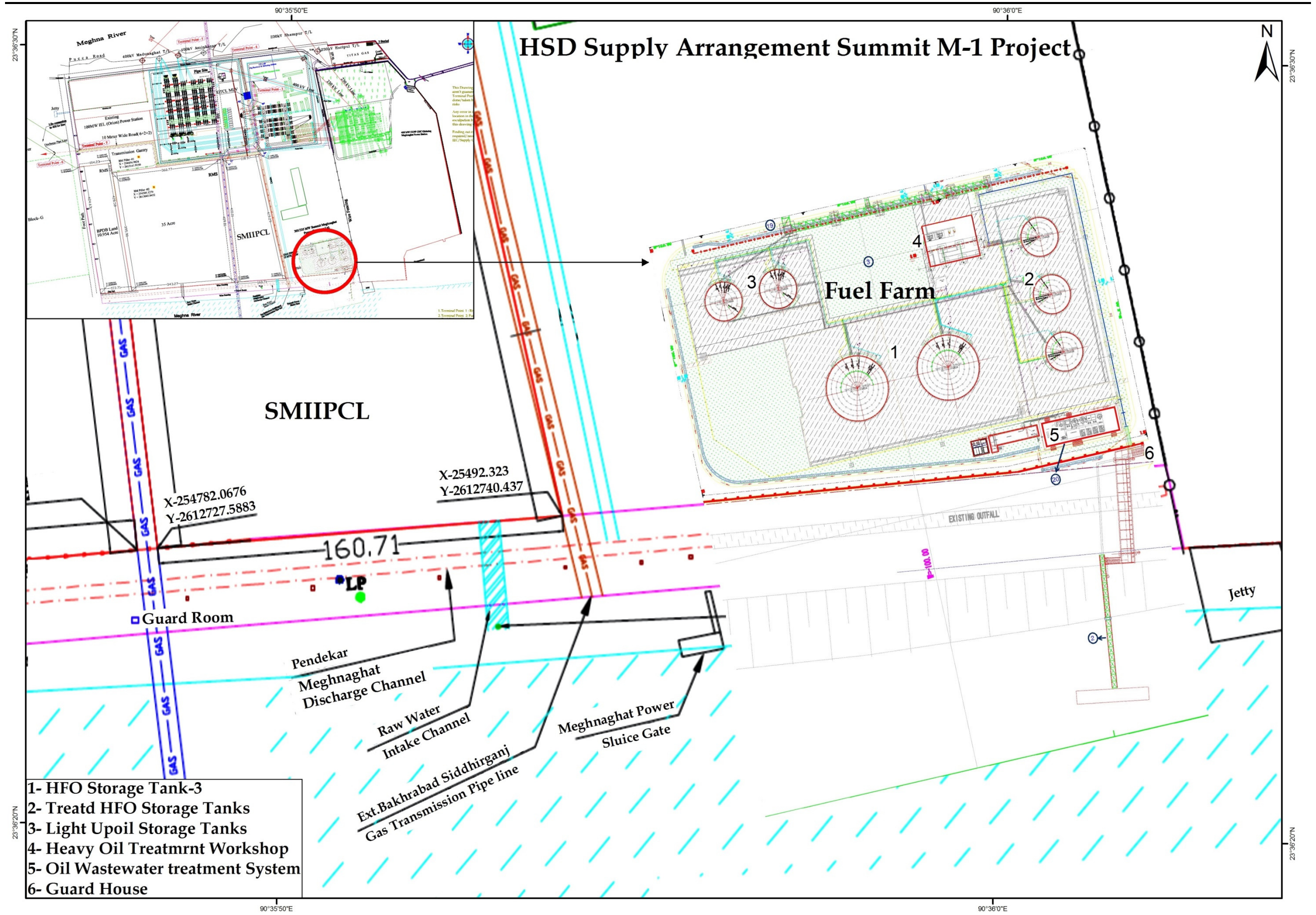


Figure 2.8 HSD Supply Arrangement of Summit M-1 Project



2.3 RESOURCES REQUIREMENT

2.3.1 Land

Land available for setting up the plant is about 14.28 acres, which is currently owned by the BPDB and will be leased to SMIIPCL after execution of land lease agreement (LLA). Necessary infrastructure such as access road, transmission line/s, natural gas pipelines, fuel unloading facility, fuel storage tank farm are already existing within power hub. In addition to that gas receiving station and 400 kV grid sub-station of PGCB are also planned to be developed by the respective government agencies responsible for fuel supply and power evacuation. Additional land requirement during construction stage will include laydown area, construction camp/s and temporary jetty for heavy lifts and materials. **Table 2.8** provides a summary of the land requirement for various components of the project for both the construction and operation phase.

Table 2.8 Break-up of Land Requirement for the Project and Associated Facilities

Project Component	Required Land Area (In acres)	Current Status of Land	Proposed Mode of Land Acquisition
Power Plant	14.28	Under Possession of BPDB and SMIIPCL will apply for allocation.	The land will be obtained under a land lease agreement (LLA) for 25 years covering the entire period of Implementation Agreement.
Approach Road	0	Under Possession of BPDB	BPDB will grant SMIIPCL the right to the non-exclusive, free and unfettered use of the Access road throughout the term of the LLA.
Gas Supply Line	0	Under Possession of BPDB	The RoW for gas pipeline from project boundary to Valve Station of Petrobangla nominated company will be obtained through a Land Lease Agreement with BPDB.
Transmission Line	0	Owned by PGCB	A 400 kV sub-station of PGCB is planned to be constructed within power hub. Hence there will be no land requirement for transmission line for connecting to the Grid. The project will require about 300 – 400 m length of power evacuation line.
HSD Supply System	0	Under possession of SMPCL	No additional land is required as SMPCL is already having HSD unloading facility and tank farm of about 24,000 m ³ capacity for HSD storage. BPC will use the SMPCL facility to deliver the HSD.
HSD pipe line (From SMPCL tank farm to Summit M-2 site)	0	Under possession of BPDB and SMPCL	Summit M-2 project site is adjacent to Summit M-1 project and a natural gas pipeline corridor of about 10 m is located between the two projects. The RoW will be granted by BPDB/ Petrobangla to SMIIPCL for the same.

Project Component	Required Land Area (In acres)	Current Status of Land	Proposed Mode of Land Acquisition
Water Intake, pump house and water pipeline	0	Land is under possession of BPDB and Meghnaghat Power Project	The RoW for water intake will be obtained through a Land Lease Agreement with BPDB for water intake pontoon at Meghna River and a RoW from 450 MW Meghnaghat Power Project, to use the embankment and crossing of land used for discharge channel, respectively.
Water discharge pipeline	0	Land is under possession of BPDB.	The discharge channel is planned to be constructed along the site access road of 10 m width, which will be obtained through a land lease agreement with the BPDB.
Laydown Area (Construction Phase)	6.2	Land is under possession of BPDB and SMPCL	Within the power hub in government land and this will be leased to the Project.
Worker Accommodation (Construction Phase)	3.2	Land is under possession of BPDB	60-70% of the labour will be locally employed. A small worker accommodation for migrant workers including expatriates will be established within the Meghnaghat power hub.
Total	23.68		

2.3.2

Fuel

Regasified LNG

Total gas requirement for the project is about 70,904 kg/hr @ 100% load, which will be supplied by from national gas grid pipeline of Gas Transmission Company Limited (GTCL) – a company of Petrobangla. Summit M-2 will connect to common point of delivery of GTCL to be constructed within the Meghnaghat power hub by a high pressure gas transmission system (underground) comprised of approximately 200 – 300 m long pipeline and as per design to be operated at maximum operating pressure of 1000 psig. This pipeline will provide a safe and efficient method for transporting gas. A Regulating and Metering Station (“RMS”) will be installed by the Company to control the gas flow to the Plant. The interface between GTCL and the project will be at the RMS. The gas received from GTCL will be regulated at the site to ensure its suitability for the GT. The gas regulation station will include two 100% gas compressors, a filter, a pressure control valve and a flow control valve with full NFPA (National Fire Protection Association, United States of America) fire protection system.

It is to be noted that a new gas pipeline for RLNG supply to the Meghnaghat Power Hub is planned to be constructed by GTCL. The new gas transmission pipeline between Kutumbapur in Comilla and Meghnaghat in Narayanganj will provide natural gas to the commissioned and proposed power plants, which include Summit M1 project, which is currently running by HSD due to

gas supply constraint. As per the media reports, the project was scheduled to start from July 2017 and expected to complete by June 2020.

Liquid fuel (HSD)

HSD will be supplied by BPC through its nominated vessels at the existing pontoon of Summit M-1 project located on the River Meghna at the south-eastern corner of the Summit M-1 project. Total liquid fuel requirement for the project is about 74,870 kg/hr @ 100% load. Based on the current liquid fuel requirement of Summit M-1 project and additional liquid fuel requirement of Summit M-2 project, the storage capacity will be adequate for 7 days storage @ 80% load.

2.3.3 Water

The water requirement for the construction phase of the Project will be met from Meghna River and/or borewell. Peak water demand during this phase will be about 800 m³/day, which will be used for civil works construction and mechanical and electrical works including hydrotest, flushing and commissioning as well as for dust suppression and domestic usage. The potable water requirement during the construction phase will be provided by the IEC contractor. The contractor will ensure that the quality of drinking water is compliant with the applicable drinking water standards (Schedule 4 of ECR, 1997).

Water requirement during operation phase of the project will be primarily for cooling water and “make up” water requirements. Peak water demand during this phase will be about 1,000 m³/day. Project will have a pump house on pontoon on the river for abstraction of raw water. The potable water requirement during the operation phase will be met either through river water or through groundwater abstraction for which a bore well will be installed. Necessary permission for installation and abstraction of groundwater will be required from Upazilla Parishad. A potable water treatment plant will be installed so that quality of drinking water is compliant with the applicable drinking water standards (Schedule 4 of ECR, 1997).

2.3.4 Auxiliary Power

Power requirement during the construction phase will be met through supply from local power distribution company. In addition to that power back-up will be provided by diesel generator (DG) sets. Average electricity requirement during this phase will be about 3 MWh.

During operation phase, auxiliary power consumption at full load will be approximately 3.5% of the gross generation capacity of the plant. During the start-up of the plant auxiliary power will be taken from grid and after synchronisation, same will be available from the plant.

2.3.5 Manpower

During the peak construction phase, the project will require about 800 personnel. A site camp will be provided for EPC contractor/ subcontractor personnel. It is reported that majority of unskilled and semi-skilled workforce will be engaged from neighbouring areas and this will reduce the requirement of housing arrangement for these workers.

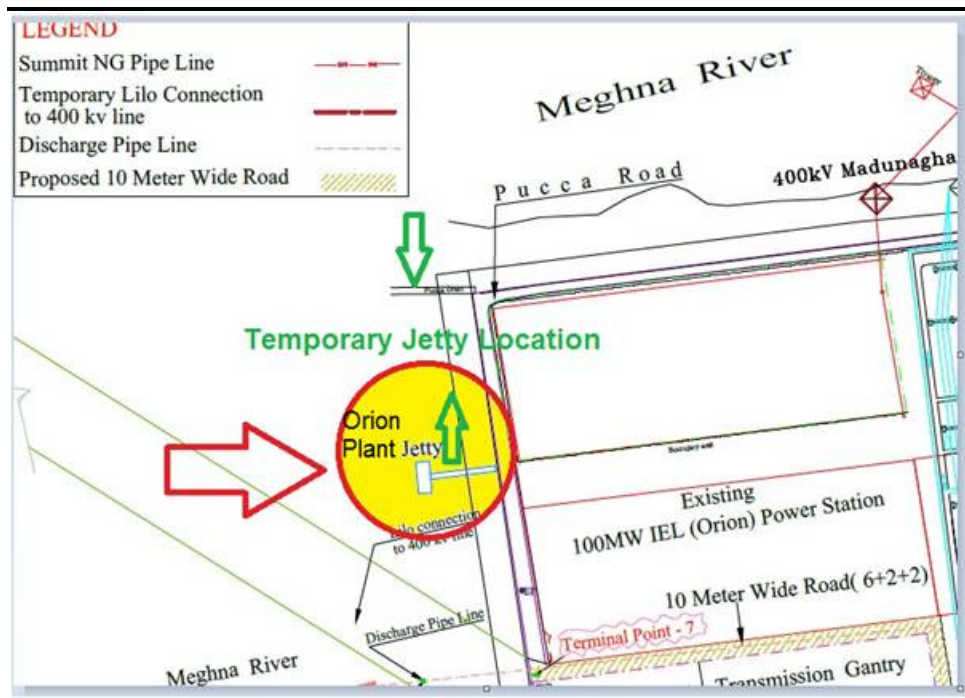
During the operation phase, manpower requirement will be between 60 to 75 personnel. A dormitory will be provided for O&M team within the project site.

2.3.6 Logistics during Construction Phase

Civil construction materials like cement, steel, reinforcement, sand, gravel etc. will be transported to site by using existing access road as well as waterway. Majority of machinery and equipment (heavy lifts) will be transported to site by using waterway. A temporary jetty is planned to be constructed near the outfall location of Summit M-1 project for bulk material handling.

Aggregates, sand and cement etc. will be procured locally. Main steel will be procured from China/India/South Korea or any other country. Secondary steel/reinforcement /fabrication shall be from Bangladesh or from any other country.

Figure 2.9 Map Showing Temporary Jetty Location



Source: SMIIPCL

2.3.7 Laydown Areas and Staff Camp

Laydown area during the construction phase as well as construction camp will be located within 500 m from the project site and break-up of area requirement for various purposes are presented below:

Table 2.9 Laydown and Camp Area Requirement

S. No.	Particular	Area (sq. m.)
1	Laydown area, covered stores, contractor's office	25,000
2	Contractor's staff camp	3,000
3	Workers camp	10,000
Total Area Requirement		38,000

Source: SMIIPCL

2.4 PROJECT SCHEDULE

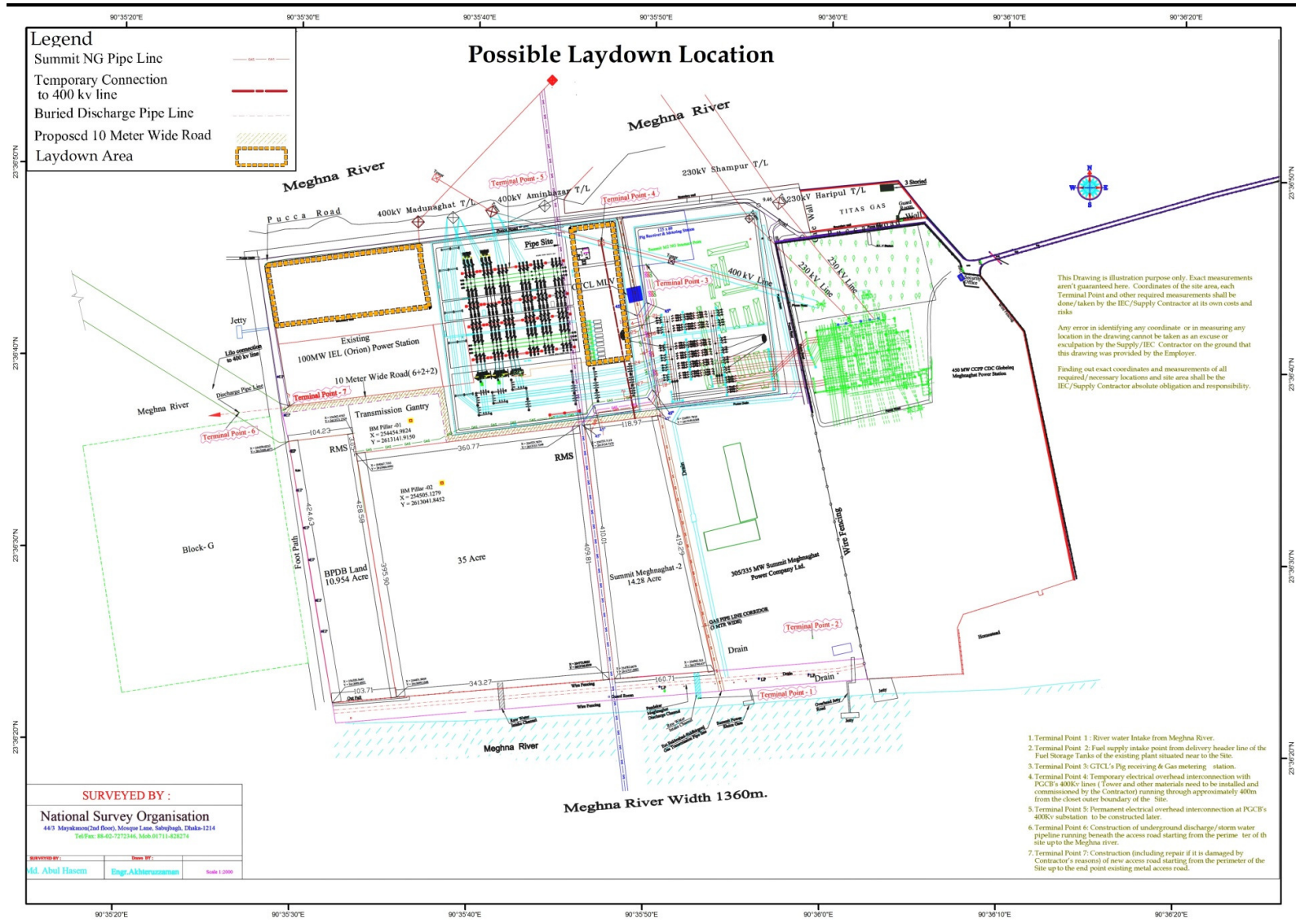
The construction and commissioning schedule of the project from first notice to proceed (FNTP) to commissioning of combined cycle operations is about 30 months. Key milestones of the project schedule are presented below:

Table 2.10 Tentative Project Construction Schedule

S. No.	Activity	Month (from FNTP)
1	Site preparation	0 - 9
2	Gas Turbine building foundation	8 - 11
3	Gas Turbine building	10 - 20
4	GTG foundation	7 - 12
5	GT installation	15 - 20
6	BOP equip for Simple Cycle	7 - 18
7	Steam Turbine building foundation	12 - 15
8	Steam Turbine building	12 - 23
9	STG foundation	10 - 16
10	HRSG foundation	9 - 13
11	HRSG installation	13 - 24
12	BOP for Combined Cycle	13 - 24
13	Combined cycle commissioning	25 - 30

Source: SMIIPCL

Figure 2.10 Map showing Areas Available for Laydown and Camps within Meghnaghat Power Hub



3.1 INTRODUCTION

This chapter addressed the environmental and social risks of the proposed project and its associated components and protects and helps in conservation of the environment from any adverse impacts as per specified regulations, policy and guidelines of Government of Bangladesh (GoB). Potential Lenders' of the Project also have their own set of requirements - ADB Safeguard Policy Statement, 2009 and the IFC's Performance Standards – to which any project funded by them must operate.

This section focuses on the legal and administrative framework under the purview of which the Project will fall and the scoping study will be governed; they are namely:

- Bangladesh national and local, legal and institutional framework
- ADB Safeguard Policy Statement, 2009
- IFC Performance Standards (2012) and EHS Guidelines

3.2 ENVIRONMENT-RELATED POLICIES IN BANGLADESH

The GOB has developed a policy framework that requires environmental issues to be incorporated into economic development planning. The Key tenets of the various applicable policies are detailed in the following subsections based upon legislation currently in force.

3.2.1 National Environmental Policy, 1992

The Bangladesh National Environmental Policy, approved in May 1992, sets out the basic framework for environmental action together with a set of broad sectoral action guidelines. Key elements of the Policy are:

- Maintaining ecological balance and ensuring sustainable development of the country through protection, conservation and improvement of the environment;
- Protecting the country from natural disasters;
- Identifying and regulating all activities that pollute and destroy the environment;
- Ensuring environment-friendly development in all sectors;
- Ensuring sustainable and environmentally sound management of the natural resources; and
- Promoting active association, as far as possible, with all international initiatives related to environment.

The Environmental Policy of 1992 requires specific actions with respect to the industrial sector which are as follows:

- To phase-in corrective measures in polluting industries;
- To conduct Environmental Impact Assessments (“EIAs”) for all new public and private industrial developments;

- To ban, or find environmentally sound alternatives for, the production of goods that cause environmental pollution; and
- To minimize waste and ensure sustainable use of resources by industry.

The policy also states that EIA's should be conducted before projects are undertaken and the DOE is directed to review and approve all Environmental Impact Assessments.

3.2.2 *National Environment Management Action Plan, 1995*

The National Environmental Management Action Plan (NEMAP) is a wide-ranging and multi-faceted plan, which builds on and extends the statements, set out in the National Environmental Policy. NEMAP was developed to address issues and management requirements related to the environment during the period 1995 to 2005; it also sets out the framework within which the recommendations of the National Conservation Strategy are to be implemented. NEMAP was developed to achieve the following broad objectives:

- Identification of key environmental issues affecting Bangladesh;
- Identification of actions necessary to halt or reduce the rate of environmental degradation;
- Improvement of the natural environment;
- Conservation of habitats and bio-diversity;
- Promotion of sustainable development; and
- Improvement of the quality of life of the people.

To attain the above mentioned objectives, the plan groups all the relevant necessary actions under four headings, namely: *institutional*, *sectoral*, *location-specific* and *long-term issues*.

The *institutional* aspects reflect the need of inter-sectoral cooperation to tackle environmental problems which need new and appropriate institutional mechanisms at national and local levels. The *sectoral* action reflects the way the Ministries and agencies are organized and makes it easier to identify the agency to carry out the recommended actions. The *location-specific* action focuses particularly on acute environmental problems at local levels that need to be addressed on a priority basis. The *long-term* actions include environmental degradation to such degree that might become even more serious and threatening, if cognizance is not taken immediately.

3.2.3 *National Conservation Strategy, 1992*

The National Conservation Strategy, 1992, provides recommendations for sustainable development of the industrial sector. The key aspects of the strategy are as follows:

- All industries shall be subject to an EIA and the adoption of pollution prevention/control technologies shall be enforced;
- Hazardous or toxic materials/wastes shall not be imported as raw materials for industry;

- Import of appropriate and environmentally-sound technology shall be ensured; and
- Dependence on imported technology and machinery should gradually be reduced in favour of sustainable local skills and resources.

3.2.4 Other Policies relevant to Environment

Additional Bangladesh policies, their key features and applicability to the subject Project are detailed in *Table 3.1*.

Table 3.1 Policies relevant to Environment

Policy	Key Features	Applicability
The National Forest Policy, 1994	<ul style="list-style-type: none"> • Afforestation of 20% land • Bio-diversity of the existing degraded forests • Strengthening of the agricultural sector • Control of Global warming, desertification • Control of trade in wild birds and animals • Prevention of illegal occupation of the forested land, tree felling and hunting of wild animals 	Not applicable, as no diversion of forest land is involved in the Project.
National Land Transport Policy, 2004	<ul style="list-style-type: none"> • All new roads and major improvements will be subjected to an EIA • Funding will be provided for mitigation measures • The Government will publish environmental standards for new roads and new design standards addressing environmental issues 	Not applicable as the existing approach road to the Power Hub will be used for the Project and no new approach road construction is necessary.
The National Water Policy, 1999	<ul style="list-style-type: none"> • Protection, restoration and enhancement of water resources • Protection of water quality, including strengthening regulations concerning agrochemicals and industrial effluent • Sanitation and potable water • Fish and fisheries • Participation of local communities in all water sector development 	<p>Applicable for the preservation of water quality in the project area.</p> <p>Applicable, as water for cooling is to be drawn from the Meghna River with discharge of hot water in to the river. The river course will also be used for transport construction material.</p>
National Landuse Policy, 2001	<ul style="list-style-type: none"> • Deals with several land uses including: agriculture (crop production, fishery and livestock), housing, forestry, industrialization, railways and roads, tea and rubber • Identifies land use constraints in all these sectors 	Not applicable, as landuse of the Project site is industrial and owned by BPDB.
Draft Wetland Policy, 1998	<ul style="list-style-type: none"> • Establishment of principles for the sustainable use of wetland resources • Maintenance of the existing level of biological diversity • Maintenance of the functions and values of wetlands • Promotion and recognition of the value of 	Not directly applicable, however may be applicable once the draft policy is finalised.

Policy	Key Features	Applicability
	wetland functions in resource management and economic development	
National Fisheries Policy, 1998	<ul style="list-style-type: none"> • Preservation, management and exploitation of fisheries resources in inland open water • Fish cultivation and management in inland closed water. • Prawn and fish cultivation in coastal areas • Preservation, management and exploitation of sea fishery resources 	Applicable for conservation of fishes in the Meghna River
The Energy Policy, 1996	<ul style="list-style-type: none"> • Provides for utilization of energy for sustainable economic growth, supply to different zones of the country, development of the indigenous energy source and environmentally sound sustainable energy development programmes • Highlights the importance of EIA's for any new energy development project 	Applicable as subject Project is a Power Plant
The Power Policy, 1995	<ul style="list-style-type: none"> • Is an integral part of the Energy Policy and deals with policy statement on demand forecast, long term planning and project implementation, investment terms, fuels and technologies, load management, institutional issues, private sector participation, technology transfer and research programme, environmental policy and legal issues 	Applicable as subject Project is a Power Plant
Industrial Policy, 1999	<ul style="list-style-type: none"> • Deals with industrial development, direct foreign investments, investment by public and private sector, introduction of new appropriate technology, women's participation, infrastructure development and environmentally sound industrial development 	Applicable as the Project is industrial development and likely to attract investment from lenders.

3.3 ENVIRONMENT AND SOCIAL RELATED LEGISLATIONS IN BANGLADESH

The main Acts and Regulations guiding environmental protection and conservation in Bangladesh are outlined in the following subsections and *Table 3.2*.

3.3.1 *The Environment Conservation Act, 1995 (subsequent amendments in 2000 and 2002)*

The provisions of the Act authorize the Director General of Department of Environment ("DOE") to undertake any activity that is deemed fit and necessary to conserve and enhance the quality of environment and to control, prevent and mitigate pollution. The main highlights of the act are:

- Declaration of Ecologically Critical Areas;
- Obtaining Environmental Clearance Certificate;
- Regulation with respect to vehicles emitting smoke harmful for the environment;
- Regulation of development activities from environmental perspective;

- Promulgation of standards for quality of air, water, noise, and soils for different areas and for different purposes;
- Promulgation of acceptable limits for discharging and emitting waste; and
- Formulation of environmental guidelines relating to control and mitigation of environmental pollution, conservation and improvement of environment.

3.3.2 *Environment Conservation Rules (ECR), 1997 (subsequent amendments in 2002 and 2003)*

The Environment Conservation Rules, 1997 are the first set of rules promulgated under the Environment Conservation Act, 1995. These Rules provide for, inter alia, the following:

- The National Environmental Quality Standards (“EQS”) for ambient air, surface water, groundwater, drinking water, industrial effluents, emissions, noise and vehicular exhaust;
- Categorization of industries, development projects and other activities on the basis of actual (for existing industries/development projects/activities) and anticipated (for proposed industries/development projects/activities) pollution load;
- Procedure for obtaining environmental clearance;
- Requirements for undertaking IEE and EIA’s as well as formulating EMP’s according to categories of industries/development projects/activities; and
- Procedure for damage-claim by persons affected or likely to be affected due to polluting activities or activities causing hindrance to normal civic life.

Depending upon the location, size and severity of pollution loads, projects/activities have been classified in ECR, 1997 into four categories: *Green, Orange A, Orange B* and *Red* respectively as nil, minor, medium and severe impacts on important environmental components (“IECs”).

3.3.3 *Acquisition and Requisition of Immovable Property Ordinance, 1982*

The basic principles behind compensation of property in Bangladesh are founded in Articles 42 and 47 of the Constitution (1972). The current legislation for governing land acquisition in Bangladesh is the “Acquisition and Requisition of Immovable Property Ordinance (ARIPO), 1982 and amended in 1983, 1993 and 1994. Key features of the ordinance are as follows:

- This Ordinance provides the Deputy Commissioner (DC) with the power to initiate the acquisition or requisition of any property in any locality within his district that is likely to be needed for a public purpose or in the public interest.
- It describes the entire procedure of notice and intimations prior to acquisition of any property and process and timeframes for raising objections.
- Section 8 deals with matters to be considered in determining compensation which is based on the market value of the property at the date of publication of the notice under section-3.
- It defines the role and authority of Divisional Commissioner in decision making, compensation issues and in case of dispute. Among the matters to be considered in determining compensation are the following:
 - The damage that may be sustained by the person interested, by reason of the taking of standing crops or trees which may be on the property at the time of taking possession thereof by the Deputy Commissioner,

- The damage that may be sustained by reason of the acquisition injuriously affecting his other properties, movable or immovable, in any other matter, or his earnings; and
- If in consequence of the acquisition of the property, the person interested is likely to be compelled to change his residence or place of business, the reasonable expenses, if any, incidental to such change; In terms of compensation, the Ordinance explicitly states that the DC, when determining compensation, shall neither consider any disinclination of the person to part with the property, nor any increase in the value of the property to be acquired likely to accrue from the use of it after it has been acquired.
- The Ordinance also covers the case of temporary acquisition of property for a public purpose or in the public interest.

The 7(1)(b) makes provision for apportionment of the compensation among all the persons interested in the property. Further, Section 10A makes specific provision for payment of compensation to bargadar (share cultivators).

Section-18 deals with requisition of property which is required for temporarily for a public purpose. Section 20 deals with the award of the compensation for requisition of the property under section 18. The amount of compensation payable for the requisition of any property consist of a recurring payment in respect of the period of requisition (equal to rent of lease that would be revised in every two years) and other associated damages such as expenses on account of vacating, expenses on account of re-occupying the property, and damages other than wear and tear, caused to the property during the period of requisition. Section 23 makes provision for protection of the property to prevent deterioration and to ensure proper maintenance of the requisitioned property.

Note: It is understood that land available for setting up the plant is currently owned by the BPDB and will be leased to SMIPCL after execution of land lease agreement (LLA). So land is not likely to be acquired under the above regulation for the present project.

3.3.4

Administrative and Regulatory Guidelines and Instructions

In addition to the provisions in the law, the land acquisition process is regulated by certain administrative instructions and procedural requirements. The most important of these are summarised here.

- In 1976, the Government constituted a Land Allocation Committees (DLACs) at the district, divisional and central levels to control what was regarded as too lavish taking of land for public purposes. The committees were charged with ensuring 'the most rigid measures of economy in the use of land for purposes other than agriculture.'
- The DLACs are chaired by the District Commissioner and have seven other members. These members include Executive Engineers of the Roads and Highways (R&H) Department, the Public Works Department, and the Civil

Surgeon. They are entrusted with land allocation within the district not exceeding two acres.

- The Divisional LACs are chaired by the Divisional Commissioner and have technical representation at the Superintending Engineer and Deputy Director level. These committees consider land acquisition cases involving between two and five acres of land. All cases of more than five acres go to the Central Land Allocation Committee (CLAC). This committee is chaired by the Minister of Land Administration and has technical representation at the Secretary level. In 1989, the Government ordered that in all cases involving the acquisition of land exceeding 10 *bighas*, the President would have to give consent.

3.3.5 *Other Relevant National Legal Instruments for the Project*

Table 3.2 presents an outline of other National legal instruments that will have relevance to the proposed Project with respect to the social and environmental considerations.

Table 3.2 National Legal Instruments relevant to the Project

Act/ Rule/ Law/ Ordinance	Enforcement Agency – Ministry/ Authority	Key Features	Applicability to Proposed Project
The Environment Conservation Act, 1995 and subsequent amendments in 2000 and 2002	Department of Environment Ministry of Environment and Forests,	<ul style="list-style-type: none"> Define Applicability of environmental clearance Regulation of development activities from environmental perspective Framing applicable limits for emissions and effluents Framing of standards for air, water and noise quality Formulation of guidelines relating to control and mitigation of environmental pollution, conservation and improvement of environment Declaration of Ecologically critical areas 	Applicable
Environmental Conservation Rules, 1997 and subsequent amendments in 2002 and 2003	Department of Environment Ministry of Environment and Forests	<ul style="list-style-type: none"> Declaration of Ecologically critical areas Requirement of environmental clearance certificate for various categories of projects Requirement of IEE/EIA as per category Renewal of the environmental clearance certificate within 30 days after the expiry Provides standards for quality of air, water and sound and acceptable limits for emissions/discharges from vehicles and other sources 	Applicable Projects falls under Red Category and require environmental clearance
Environment Court Act, 2000 and subsequent amendments in 2002	Ministry of Environment and Forests and Judiciary	<ul style="list-style-type: none"> GOB has given highest priority to environment pollution Passed 'Environment Court Act, 2000 for completing environment related legal proceedings effectively 	Applicable for completing environmental legal requirements effectively
The Vehicle Act, 1927; The Motor Vehicles Ordinance, 1983; and The Bengal Motor Vehicle Rules, 1940	Bangladesh Road Transport Authority	<ul style="list-style-type: none"> Exhaust emissions Vehicular air and noise pollution Road/traffic safety Vehicle Licensing and Registration Fitness of Motor Vehicles Parking by-laws. 	Applicable for proposed Project in relation to road transport
The Removal of Wrecks and Obstructions in inland Navigable Water Ways Rules 1973	Bangladesh Water Transport Authority	<ul style="list-style-type: none"> Removal of wrecks and obstructions in inland navigable waterways 	Applicable as Meghna River-inland navigable waterway will be used for transport of equipment for the Project
Water Supply and Sanitation Act, 1996	Ministry of Local Government, Rural Development and	<ul style="list-style-type: none"> Management and Control of water supply and sanitation in urban areas. 	Not directly applicable, however, indirectly applicable when considering water usage

Act/ Rule/ Law/ Ordinance	Enforcement Agency – Ministry/ Authority	Key Features	Applicability to Proposed Project
	Cooperatives		management and sanitation facilities for the project
The Ground Water Management Ordinance, 1985	Upazila Parishad	<ul style="list-style-type: none"> • Management of ground water resources • Installation of tube-wells at any place after license from Upazila Parishad only 	Proposed Project will use surface water source however, should groundwater also be required then licenses will need to be obtained prior to installation of any tube-wells.
The Forest Act, 1927 and subsequent amendments in 1982 and 1989	Ministry of Environment and Forests	<ul style="list-style-type: none"> • Categorization of forests as reserve, protected and village forests • Permission is required for use of forest land for any non-forest purposes 	Not applicable as proposed Project is not on forest land
The Private Forests Ordinance Act, 1959	Regional Forest Officer, Forest Department	<ul style="list-style-type: none"> • Conservation of private forests and for the afforestation on wastelands 	Not applicable
Bangladesh Wild Life (Preservation) Act, 1974	Ministry of Environment and Forest; Bangladesh Wild Life Advisory Board	<ul style="list-style-type: none"> • Preservation of Wildlife Sanctuaries, Parks, and Reserves 	Not applicable as the Project study area does not have any wildlife areas
National Biodiversity Strategy and Action Plan (2004)	Ministry of Environment and Forest Bangladesh Wild Life Advisory Board	<ul style="list-style-type: none"> • Conserve, and restore the biodiversity of the country for well-being of the present and future generations • Maintain and improve environmental stability for ecosystems • Ensure preservation of the unique biological heritage of the nation for the benefit of the present and future generations • Guarantee the safe passage and conservation of globally endangered migratory species, especially birds and mammals in the country • Stop introduction of invasive alien species, genetically modified organisms and living modified organisms 	Applicable for conservation of biodiversity in the study area
National Water Bodies Protection Act, 2000	Town development authority/Municipalities	<ul style="list-style-type: none"> • The characterization of water bodies as rivers, canals, tanks or flood plains identified in the master plans formulated under the laws establishing municipalities in division and district towns shall not be changed without approval of concerned ministry 	Applicable due to the proximity to and use of surface water bodies
The Protection and	Ministry of Fisheries and	<ul style="list-style-type: none"> • Protection and conservation of fish in Government owned 	Applicable for the conservation of

Act/ Rule/ Law/ Ordinance	Enforcement Agency – Ministry/ Authority	Key Features	Applicability to Proposed Project
Conservation of Fish Act 1950 and subsequent amendments in 1982	Livestock	water bodies	fish as the intake and outfall point will be the Meghna River
The Embankment and Drainage Act 1952	Ministry of Water Resources	<ul style="list-style-type: none"> An Act to consolidate the laws relating to embankment and drainage and to make better provision for the construction, maintenance, management, removal and control of embankments and water courses for the better drainage of lands and for their protection from floods, erosion and other damage by water 	Applicable due to the site location
Antiquities Act, 1968	Ministry of Cultural Affairs	<ul style="list-style-type: none"> This legislation governs preservation of the national cultural heritage, protects and controls ancient monuments, regulates antiquities as well as the maintenance, conservation and restoration of protected sites and monuments, controls planning, exploration and excavation of archaeological sites 	Not applicable as the study area reportedly does not have any likely cultural heritage or ancient monuments of national or international significance. However in case, any such evidence of archaeological findings arise, the Project will need to act in consonance to the Act
The Acquisition and Requisition of Immovable Property Ordinance 1982 and subsequent amendments in 1994, 1995 and 2004	Ministry of Land	<ul style="list-style-type: none"> Current GOB Act and Guidelines, relating to acquisition and requisition of land 	Not applicable
Administrative and Regulatory Guidelines and Instructions for Land Acquisition	Ministry of Land	<ul style="list-style-type: none"> Regulation of land acquisition process by certain administrative instructions and procedural requirements 	Not applicable
The Building Construction Act 1952 and subsequent amendments	Ministry of Housing and Public Works	<ul style="list-style-type: none"> This act provide for prevention of haphazard construction of building and excavation of tanks which are likely to interfere with the planning of certain areas in Bangladesh 	Applicable
The Factories Act, 1965 Bangladesh Labour Law, 2006 and amendment 2013	Ministry of Labour	<ul style="list-style-type: none"> This Act pertains to the occupational rights and safety of factory workers and the provision of a comfortable work environment and reasonable working conditions 	Applicable
Ozone Depleting Substances (Control) Rules, 2004	Ministry of Environment and Forests	<ul style="list-style-type: none"> Ban on the use of Ozone depleting substances Phasing out of Ozone depleting substances 	Applicable
Noise Pollution (Control) Rules 2006	Ministry of Environment and Forests	<ul style="list-style-type: none"> Prevention of Noise pollution Standards for noise levels 	Applicable

Sources: Websites of DOE, Legislative and Parliamentary Affairs Division: Bangladesh Laws and Bangladesh Board of Investment: Business laws

3.4

ADMINISTRATIVE SETUP RELATED TO ENVIRONMENT IN BANGLADESH

The Ministry of Environment & Forest (“MoEF”) is the nodal agency in the administrative structure of the GOB, for overseeing all environmental matters relating to national environmental policy and regulatory issues in the country. The MoEF oversees the activities of the following technical/implementing agencies:

- Department of Environment (“DOE”);
- Forest Department (“FD”);
- Bangladesh Forest Industries Development Corporation (“BFIDC”);
- Bangladesh Forest Research Institute (“BFRI”); and
- Bangladesh National Herbarium (“BNH”).

Other Related Organizations

There are several other organisations under the administrative framework which would govern social and environmental functions related to the proposed Project, namely:

- Forest Department;
- Ministry of Land: Land reform and land acquisition directorate;
- Ministry of water resources: Bangladesh Water Development Board; and
- Local Government Engineering Department (LGED).

3.4.2

Department of Environment (“DOE”)

The DOE has been placed under the MoEF as its technical wing and is statutorily responsible for the implementation of the *Environment Conservation Act, 1995*. The Department was created in 1989, to ensure sustainable development and to conserve and manage the environment of Bangladesh. The principal activities of the DOE are:

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

Environmental Clearance Process

As mentioned in the *Section 3.3.2*, ECR has classified projects to be assessed by the DOE in four categories based on the severity of impacts on IECs:

- Green: Nil;
- Orange A: minor;

- Orange B: medium; and
- Red: severe.

The applicability of environmental clearance and the process in Bangladesh is described in *Figure 3.1*. The EIA process consists of three stages, screening, IEE, and detailed EIA:

- Projects categorized as *Green* and *Orange-A* requires no IEE or EIA for environmental clearance however, the proponent has to submit an application in a prescribed format along with specified documents;
- Projects categorized as *Orange-B* require an IEE to be submitted to the DOE along with an application in a prescribed format and other specified documents; and
- *Red* category projects require both IEE and EIA. An IEE is required for the location clearance and an EIA is required for the environmental clearance.

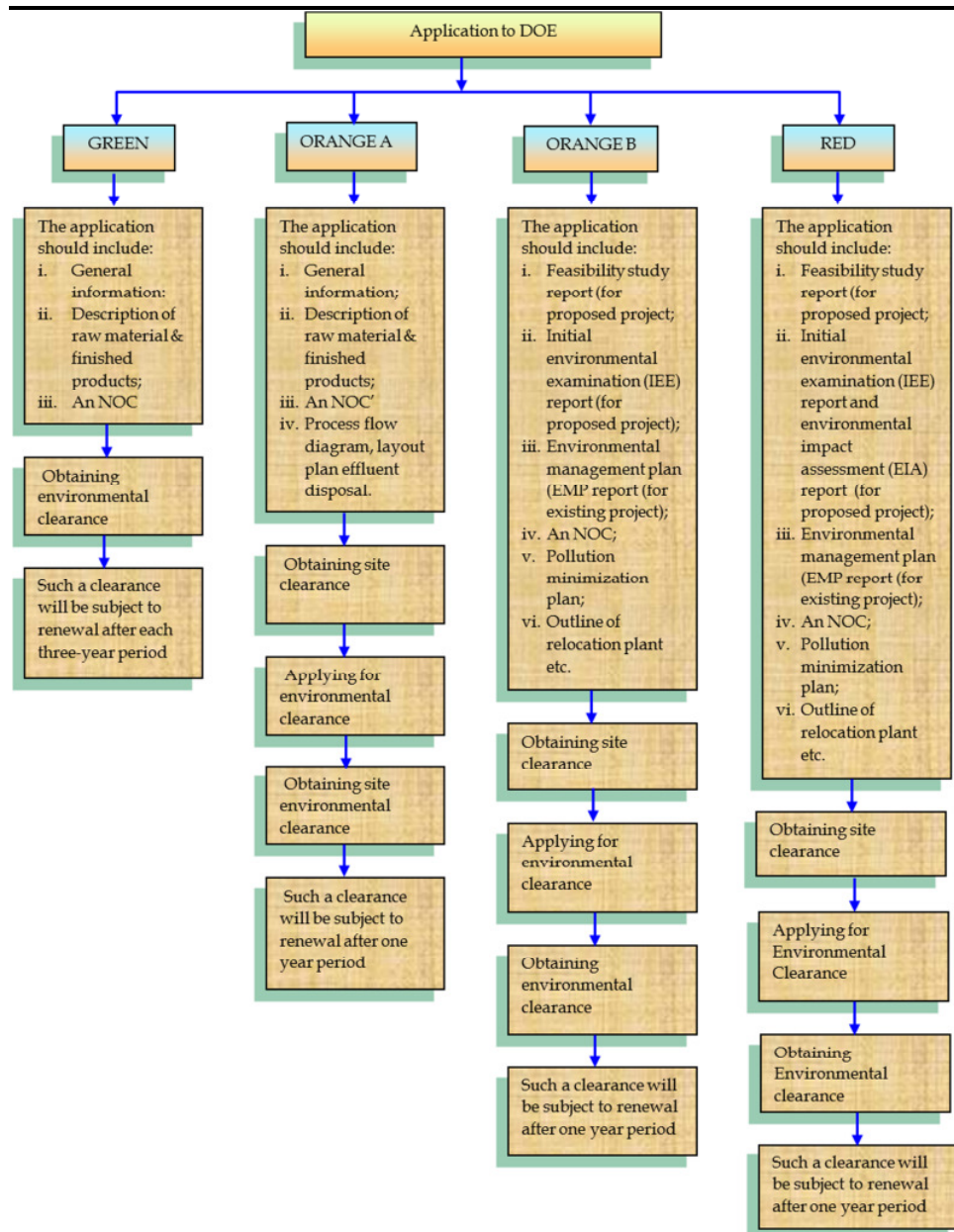
As per the *ECR 1997*, power plants and the subject Project fall under the *Red* category as they fall within the following:

- *Item 6:* power plants;

The process for obtaining an Environmental Clearance Certificate (ECC) for the proposed Project is outlined in *Figure 3.2*

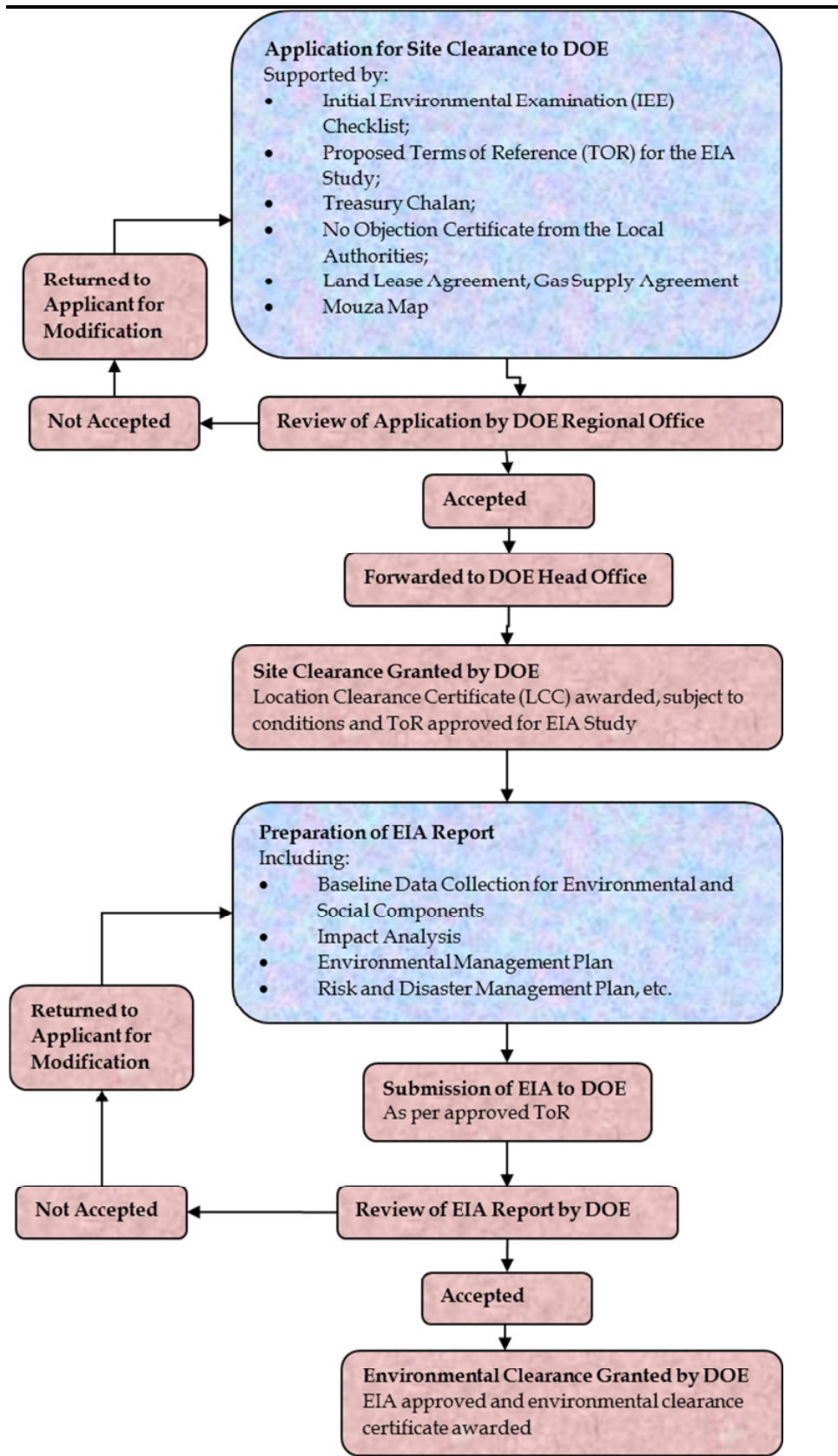
Figure 3.1

DOE Environmental Clearance Applicability and Procedure



Source: Adapted from DOE

Figure 3.2 Flow Chart of EIA Process Applicable to the Proposed Project



Source: Adapted from DOE

3.4.3 Status of Project Approval from DOE

The Project will apply for the site clearance after obtaining the letter of intent (LOI) from the BPDB and environmental clearance after signing of finalized Project agreements (such as LLA, IA, GSA, FSA etc.) with the regulatory authorities.

The ESIA Report, which will be prepared for the potential lenders to fulfil the safeguard requirements, will be updated as and if necessary in accordance with the terms of reference (TOR) issued to be issued by the DOE and then submitted to the DOE for obtaining environmental clearance.

3.5 PROJECT RELEVANT INTERNATIONAL TREATIES AND CONVENTIONS

Bangladesh is party to a number (30)¹ of international environmental convention, treaties and agreements. The Project relevant international treaties and conventions relevant to the project signed, ratified and in the process of ratification by Bangladesh are detailed in *Table 3.3*.

Table 3.3 Project Relevant International Treaties and Conventions

Environment Related International Convention and Treaties	Status
International Plant Protection Convention (Rome, 1951.)	01.09.78 (ratified)
International Convention for the Prevention of Pollution of the Sea by Oil (London, 1954 (as amended on 11 April 1962 and 21 October 1969.)	28.12.81 (entry into force)
Plant Protection Agreement for the South East Asia and Pacific Region (as amended) (Rome, 1956.)	04.12.74 (accessed) (entry into force)
International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (Brussels, 1969.)	04.02.82 (entry into force)
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971) ("Ramsar Convention").	20.04.92 (ratified)
Convention Concerning the Protection of the World Cultural and natural Heritage (Paris, 1972.)	03.08.83 (accepted) 03.11.83 (ratified)
Convention on International Trade in Endangered Species of Wild Fauna and flora (Washington, 1973.) ("CITES Convention")	18.02.82 (ratified)
United Nations Convention on the Law of the Sea (Montego Bay, 1982.)	10.12.82 (ratified)
Vienna Convention for the Protection of the Ozone Layer (Vienna, 1985.)	02.08.90 (accessed) 31.10.90 (entry into force)
Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal 1987.)	02.08.90 31.10.90 (accessed) (entry into force)
London Amendment to the Montreal Protocol on substances that Deplete the Ozone Layer (London, 1990)	18.03.94 (accessed) 16.06.94 (entry into force)
Copenhagen Amendment to the Montreal protocol on Substances that Deplete the Ozone Layer, Copenhagen, 1992	27.11.2000 (accepted) 26.2.2001 (entry into force)
Montreal Amendment of the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1997	27.7.2001 (Accepted) 26.10.2001 (Entry into force)
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989.)	01.04.93 (accessed)
International Convention on Oil Pollution Preparedness, Response and Cooperation (London, 1990.)	30.01.90 (signed) In the process of ratification

(1) ¹ Department of Environment, Bangladesh

Environment Related International Convention and Treaties	Status
United Nations Framework Convention on Climate Change, (New York, 1992.)	09.06.92 (signed) 15.04.94 (ratified)
Convention on Biological Diversity, (Rio De Janeiro, 1992.)	05.06.92 (signed) 03.05.94 (ratified)
International Convention to Combat Desertification, (Paris 1994.)	14.10.94 (signed) 26.01.1996 (ratification) 26.12.1996 (entry into force)
Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, (Geneva, 1976.)	03.10.79 (accessed) (entry into force)
Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982 (New York, 1994.)	28.07.96 (signed)
Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (Paris, 1993.)	14.01.93 (signed)
Convention on persistent Organic Pollutants, Stockholm	23.5.2001 (signed) 12.03.2007 (ratified)
Kyoto protocol to the United Nations Framework Convention on Climate Change	21.8.2001 (accessed)

Source: DOE, Bangladesh

3.6 INTERNATIONAL SAFEGUARD REQUIREMENTS

As understood from SMIPCL, financing sources and financial support for the Project is being explored from the multi-lateral financial, such as the IFC, the ADB, and the EPFIs as well as from the export credit agencies of the countries where major pieces of equipment for the Project will be sourced. This support from the multi-lateral financial institutions/ export credit agencies also linked with the adherence of international best practices and environmental and social safeguard requirements of the lenders. The following subsections outline the key environmental and social requirements of the ADB and the IFC, applicable to the Project.

3.6.1 ADB's Safeguard Policy Statement, 2009

In July 2009, ADB's Board of Directors approved the new Safeguard Policy Statement (SPS) governing the environmental and social safeguards of ADB's operations. The SPS builds upon ADB's previous safeguard policies on the Environment, Involuntary Resettlement, and Indigenous Peoples, and brings them into one consolidated policy framework with enhanced consistency and coherence, and more comprehensively addresses environmental and social impacts and risks. The SPS also provides a platform for participation by affected people and other stakeholders in the project design and implementation.

The SPS applies to all ADB-financed and/or ADB-administered projects and their components, regardless of the source of financing, including investment projects funded by a loan; and/or a grant; and/or other means, such as equity and/or guarantees. ADB works with borrowers and clients to put into practice the requirements of SPS.

The SPS supersedes ADB's Involuntary Resettlement Policy (1995), Policy on Indigenous Peoples (1998), and Environment Policy (2002). In accordance with the SPS, these previous policies apply to all projects and tranches of multi-tranche financing facility projects that were reviewed by ADB's management before 20 January 2010.

The objectives of ADB's safeguards are to:

- avoid adverse impacts of projects on the environment and affected people, where possible;
- minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- assist borrowers and clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- Environmental safeguards;
- Involuntary Resettlement safeguards; and
- Indigenous Peoples safeguards.

To help borrowers and clients and their projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that borrowers and clients are required to meet in addressing environmental and social impacts and risks. These safeguard requirements are as follows:

- Safeguard Requirements 1: Environment (Appendix 1 of SPS);
- Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS);
- Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS); and
- Safeguard Requirements 4: Special Requirements for Different Finance Modalities (Appendix 4 of SPS).

In addition, ADB does not finance activities on the prohibited investment activities list (Appendix 5 of SPS). Furthermore, ADB does not finance projects that do not comply with its safeguard policy statement, nor does it finance projects that do not comply with the host country's social and environmental laws and regulations, including those laws implementing host country obligations under international law.

Consultation and Disclosure requirements of ADB

ADB's *Safeguard Policy and Public Communications Policy (2011)* sets out disclosure requirements for various ADB activities, including safeguard requirement. Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS); and Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS) sets out the need for meaningful consultation and information disclosure during project preparation and operation to the affected population and other stakeholders. Key requirements include:

- Information Disclosure: The borrower/client will submit the following documents to ADB for disclosure on ADB's website as per the applicability with respect to the Project:

- Draft EIA including draft EMP;
 - Final EIA/IEE;
 - Updated EIA/IEE and corrective action plan;
 - Environmental Monitoring Reports.
 - Resettlement Plan (“RP”)
 - Indigenous Peoples Plan (“IPP”)
- Information disclosure to affected people or stakeholders: The borrower/client will provide relevant environmental information in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.
 - Consultation and Participation: The borrower/client will carry out meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation.
 - Timing and Frequency for consultation and participation: Meaningful consultation begins early in the project preparation stage and is carried out on an on-going basis throughout the project cycle,

3.6.2 *ADB Project Categorisation*

The SPS, 2009 further outlines a classification system for the categorization of projects. The classification tentatively occurs at the project identification stage, during the initial screening of anticipated impacts. However, classification is an on-going process, and the classification can be changed at any time with the concurrence of the Chief Compliance Officer (CCO), as more detailed information becomes available and a project proceeds.

Environment

A project’s environment category is determined by the category of its most environmentally sensitive component, including direct, indirect, induced, and cumulative impacts. Each proposed project is scrutinized as to its type, location, scale, sensitivity and the magnitude of its potential environmental impacts. The level of detail and comprehensiveness of the EIA or IEE are commensurate with the significance of the potential impacts and risks.

A proposed project is assigned to one of the following categories depending on the significance of the potential environmental impacts and risks:

- *Category A:* A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An EIA, including an environmental management plan (“EMP”), is required;
- *Category B:* A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category ‘A’ projects. An IEE, including an EMP, is required;
- *Category C:* A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed; and

- *Category FI*: A proposed project is classified as category FI if it involves the investment of ADB funds to, or through, a financial intermediary (paragraphs 53–58).

Involuntary Resettlement

A project's involuntary resettlement category is determined by the category of its most sensitive component in terms of involuntary resettlement impacts. The involuntary resettlement impacts of an ADB-supported project are considered significant if 200 or more persons will experience major impacts, which are defined as (i) being physically displaced from housing, or (ii) losing 10% or more of their productive assets (income generating). The level of detail and comprehensiveness of the resettlement plan are commensurate with the significance of the potential impacts and risks. A project is assigned to one of the following categories depending on the significance of the probable involuntary resettlement impacts:

- *Category A*: A proposed project is classified as category A if it is likely to have significant involuntary resettlement impacts. A resettlement plan, including assessment of social impacts, is required;
- *Category B*: A proposed project is classified as category B if it includes involuntary resettlement impacts that are not deemed significant. A resettlement plan, including assessment of social impacts, is required;
- *Category C*: A proposed project is classified as category C if it has no involuntary resettlement impacts. No further action is required; and
- *Category FI*: A proposed project is classified as category FI if it involves the investment of ADB funds to, or through, a financial intermediary (*paragraphs 53–58*).

Indigenous Peoples

ADB also screen all projects to determine whether or not they have potential impacts on Indigenous Peoples¹. For projects with impacts on Indigenous Peoples, an Indigenous Peoples Plan needs to be prepared. The degree of impacts is determined by evaluating (i) the magnitude of the impact on Indigenous Peoples' customary rights of use and access to land and natural resources; socio-economic status; cultural and communal integrity; health,

¹ As per the working definition of indigenous peoples by ADB, two significant characteristics of indigenous peoples would be:

- descent from population groups present in a given area, most often before modern states or territories were created and before modern borders were defined; and
- maintenance of cultural and social identities; and social, economic, cultural, and political institutions separate from mainstream or dominant societies and cultures. In some cases, over recent centuries, tribal groups or cultural minorities have migrated into areas to which they are not indigenous, but have established a presence and continue to maintain a definite and separate social and cultural identity and related social institutions. In such cases, the second identifying characteristic would carry greater weight.

Additional characteristics often ascribed to indigenous peoples include

- self-identification and identification by others as being part of a distinct indigenous cultural group, and the display of a desire to preserve that cultural identity;
- a linguistic identity different from that of the dominant society;
- social, cultural, economic, and political traditions and institutions distinct from the dominant culture;
- economic systems oriented more toward traditional systems of production than mainstream systems; and
- unique ties and attachments to traditional habitats and ancestral territories and natural resources in these habitats and territories.

(Source: Policy on Indigenous Peoples, ADB)

education, livelihood systems, and social security status; or indigenous knowledge; and (ii) the vulnerability of the affected Indigenous Peoples.

Indigenous people's or ethnic minorities' issues are likely to be significant when it is established that groups in the project area have one or more of the following attributes: (i) self-identification or identification by others as a distinct cultural group; (ii) a display of a desire to preserve such cultural identity; (iii) a linguistic identity distinct from that of the dominant society; (iv) distinct social, economic, and political traditions and institutions; (v) an economic system oriented more toward a traditional system of production; and (vi) a unique tie with and attachment to traditional habitat and ancestral territory and its natural resources; such groups are found to exhibit historical, socioeconomic, political, or demographic vulnerability; project intervention will be (positively or negatively) affecting one of these areas: customary rights to (ancestral) land and natural resources; their socioeconomic status; their health, education, livelihood, and social security status; indigenous people's knowledge; the project involves new construction, rehabilitation or expansion of large-scale infrastructure; or such interventions as water supply, sanitation, education, health, nutrition, or social protection target indigenous people; the project is located within or nearby the habitat of indigenous people; and/or project impacts are potentially long term, or irreversible or permanent, affecting a substantial portion of the indigenous community or the community as a whole.

A project is assigned to one of the following categories depending on the significance of the probable impact on the indigenous peoples:

Category	Impact	Actions Required
Category-A	Expected to have significant impact	Both IPP and SIA are required
Category-B	Expected to have limited impact	Both IPP and SIA are Required. A specific action favourable to indigenous peoples/ethnic minority is required and addressed through a specific provision in RRP and in related plans such as a resettlement action plan, a gender action plan, or a general community participatory plan.
Category-C	Not expected to have any impact on ethnic minority	No specific action required.

Annexure A, B and C have screened the Summit M-2 project in accordance to the requirements of the above standards. Based on the information made available, the project is categorised as follows:

- Category A for Environmental Assessment – thus requiring an ESIA and Management Plan;
- Category B for Involuntary Resettlement: The land will be obtained by the Project Proponent through land lease agreement from BPDB. No land acquisition will take place for the proposed project. During scoping visit

no evidence of any form of land related dependence (homestead area or livelihood) was observed at the site location.

- Category C for Indigenous Peoples: The project is not expected to have any impact on designated indigenous peoples.

3.6.3 IFC Performance Standards

The Performance Standards (“PS”) (January 2012) established by IFC stipulates that the Project shall meet certain requirements throughout the life cycle of an investment by IFC or other relevant financial institution such as other DFIs (eg DEG, FMO) or commercial banks, which have adopted the *Equator Principles*.

A brief description of the Performance standards is provided in *Table 3.4*.

Table 3.4 IFC Performance Standards

Performance Standards	Specific Areas
Performance Standard 1:	Assessment and Management of Environmental and Social Risks and Impacts
Performance Standard 2	Labour and Working Conditions
Performance Standard 3	Resource Efficiency and Pollution Prevention
Performance Standard 4	Community Health, Safety and Security
Performance Standard 5	Land Acquisition and Involuntary Resettlement
Performance Standard 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources
Performance Standard 7	Indigenous Peoples
Performance Standard 8	Cultural Heritage

IFC Performance Standards, January 2012

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

Following sub-sections tries to provide the requirements of the specific PS, so as to set up the context for matching the requirements of these PS during the various stages of the life cycle of the Project.

PS 1: Assessment and Management of Environmental and Social Risks and Impacts

The *PS 1* requires Social and Environmental Assessment and Management Systems for managing social and environmental performance throughout the life cycle of this Project and runs through all subsequent PSs. The main elements of *PS 1* include:

- A Social and Environmental Assessment to understand the social and environmental impacts and risks;
- A Management Program for mitigating the impacts and minimizing the risks identified in the assessment;
- Establishing and ensuring organizational capacity and requisite trainings to the staff to implement the Management Programme;

- Identification and engagement with range of stakeholders that may be interested in their actions;
- Development and implementation of Stakeholder Engagement Plan that is scaled to the project risks and impacts and development stage and tailored to the characteristics and interests of the Affected Communities;
- Engagement and consultation with the affected communities, subject to identified risks and adverse impacts from a project;
- Informed Consultation and Participation (“ICP”) process for projects with potentially significant adverse impacts on affected communities;
- For projects with adverse impacts to Indigenous Peoples, requirement to engage them in a process of ICP and in certain circumstances requirement to obtain their Free, Prior, and Informed Consent (FPIC);
- Implementation and maintenance of procedure for external communications to receive and register external communications from the public, and their Redressal;
- Adequate monitoring and reporting systems to measure and report the effectiveness of the Management Programs.

The social and environmental performance is a continuous process to be initiated by the management and would involve communication between the organisation, its workers and local communities directly affected by the Project. The PS requires that Project proponent initiate regular assessment of the potential social and environmental risks and impacts and consistently tries to mitigate and manage strategy on an ongoing basis.

PS 2: Labour and Working Conditions

The economic growth through employment creation and income generation is recognised and balanced protecting the basic rights of workers. *PS 2* is guided by the various conventions of International Labour Organization (“ILO”) and outlines the minimum requirements of working conditions, protection to the workforce (including issues of child and forced labour) and ensuring occupational health and safety of both its ‘employees’ as well as ‘non employees’ working through contractors. The PS requires:

- Establishment of a sound worker-management relationship;
- Encouraging equal opportunity and fair treatment of workers;
- Promoting compliance with national labour and employment laws;
- Management of accommodation services with provision of basic services;
- Promoting healthy and safe working conditions for workers; and
- Analysis of alternatives for retrenchment prior to implementing any collective dismissals.

PS 2 requires project proponents to conduct its activities in a manner consistent with the four core labour standards (child labour, forced labour, non-discrimination, and freedom of association and collective bargaining). In addition, *PS 2* also addresses other areas such as working conditions and terms of employment, retrenchment, and occupational health and safety issues.

Some of these requirements refer to the applicable national law. Whereas national law establishes standards that are less stringent than those in *PS 2*, or are silent, the project proponent is expected to meet the requirements of *PS 2*.

PS 3: Resource Efficiency and Pollution Prevention

PS 3 outline a project level approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices with objectives to:

- avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from activities;
- promote more sustainable use of resources, including energy and water; and
- reduce project-related greenhouse gas (“GHG”) emissions.

Key requirements of *PS3* are to consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention principles and techniques that are best suited to avoid or where avoidance is not possible, minimize adverse impacts on human health and the environment during the entire project life-cycle. In addition, a project need to follow good international industry practice (“GIIP”), as reflected in various internationally recognised sources including the World Bank Group Environmental, Health and Safety Guidelines.

PS 4: Community, Health, Safety and Security

PS 4 concentrates on the responsibility that must be undertaken by the client to avoid or minimize the risks and impacts to the community’s health, safety and security that may arise from project activities. *PS 4* requires a project to evaluate risks and impacts to the health and safety of the affected community during the Project life cycle and establish measures to avoid minimize and reduce risks and impacts from the Project.

A project needs to evaluate the risks and impacts to the health and safety of the Affected Communities during the project life-cycle and require establishing preventive and controlling measures consistent with good international industry practice (“GIIP”), such as in the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) or other internationally recognized sources.

PS 4 recognises that project activities, equipment, and infrastructure often bring benefits to communities including employment, ecosystem services, and opportunities for economic development. However, projects can also increase the potential for community exposure to risks and impacts arising from equipment accidents, structural failures, and releases of hazardous materials.

The performance standard details out project proponents responsibility to avoid or minimise the possible risks and impacts to community health, safety and security that may arise from project activities.

PS 5: Land Acquisition and Involuntary Resettlement

The objectives of this PS are to:

- avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs;
- avoid forced eviction;
- anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost, and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected;
- improve, or restore, the livelihoods and standards of living of displaced persons;
- improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

PS 5 require a project to consider various processes and systems to avoid /minimise social and economic impacts related to land acquisition and resettlement.

This PS applies to physical or economic displacement resulting from the following types of land transactions:

- Land rights or land use rights acquired through expropriation or other compulsory procedures in accordance with the legal system of the host country;
- Land rights or land use rights acquired through negotiated settlements with property owners or those with legal rights to the land if failure to reach settlement would have resulted in expropriation or other compulsory procedures;
- Project situations where involuntary restrictions on land use and access to natural resources cause a community or groups within a community to lose access to resource usage where they have traditional or recognizable usage rights;
- Certain project situations requiring evictions of people occupying land without formal, traditional, or recognizable usage rights;⁸ or
- Restriction on access to land or use of other resources including communal property and natural resources such as marine and aquatic resources, timber and non-timber forest products, freshwater, medicinal plants, hunting and gathering grounds and grazing and cropping areas.⁹

This PS does not apply to resettlement resulting from voluntary land transactions (i.e., market transactions in which the seller is not obliged to sell and the buyer cannot resort to expropriation or other compulsory procedures sanctioned by the legal system of the host country if negotiations fail). It also does not apply to impacts on livelihoods where the project is not changing the land use of the affected groups or communities.

PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

PS 6 aims at protecting and conserving biodiversity, maintaining ecosystem services, the variety of life in all its forms, including genetic, species and ecosystem diversity and its ability to change and evolve, is fundamental to sustainable development. The objectives of this PS are to:

- protect and conserve biodiversity;

- maintain the benefits from ecosystem services; and
- promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

The components of biodiversity, as defined in the *Convention on Biological Diversity*, include ecosystems and habitats, species and communities, and genes and genomes, all of which have social, economic, cultural and scientific importance. This PS addresses how clients can avoid or mitigate threats to biodiversity arising from their operations as well as incorporate sustainable management of renewable natural resources¹.

PS 6 recognises that protecting and conserving biodiversity—the variety of life in all its forms, including genetic, species and ecosystem diversity—and its ability to change and evolve, is fundamental to sustainable development. It reflects the objectives of the *Convention on Biological Diversity* to conserve biological diversity and promote use of renewable natural resources in a sustainable manner.

For the purposes of implementation of this PS, habitats are divided into modified, natural and critical. Critical habitats are a subset of modified or natural habitats. For the protection and conservation of biodiversity, the mitigation hierarchy includes biodiversity offsets, which may be considered only after appropriate avoidance, minimization, and restoration measures have been applied. A biodiversity offset should be designed and implemented to achieve measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however, a net gain is required in critical habitats. The design of a biodiversity offset must adhere to the “like-for-like or better” principle and must be carried out in

PS 7: Indigenous Peoples

PS 7 acknowledges the possibility of vulnerability of indigenous people² owing to their culture, beliefs, institutions and living standards, and that it may further get compromised by one or other project activity throughout the life cycle of the project. The PS underlines the requirement of avoiding / minimizing adverse impacts on indigenous people in a project area, respecting the local culture and customs, fostering good relationship and ensuring that development benefits are provided to improve their standard of living and livelihoods.

¹ Given the complexity in predicting project impacts on biodiversity and ecosystem services over the long term, the client should adopt a practice of adaptive management in which the implementation of mitigation and management measures are responsive to changing conditions and the results of monitoring throughout the project’s lifecycle.

² There is no universally accepted definition of “Indigenous Peoples.” Indigenous Peoples may be referred to in different countries by such terms as “Indigenous ethnic minorities,” “aboriginals,” “hill tribes,” “minority nationalities,” “scheduled tribes,” “first nations,” or “tribal groups.” 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. It may also apply to communities or groups that have lost collective attachment to distinct habitats or ancestral territories in the project area, occurring within the concerned group members’ lifetime, because of forced severance, conflict, government resettlement programs, dispossession of their lands, natural disasters, or incorporation of such territories into an urban area.

PS 7 recognises that Indigenous Peoples, as social groups with identities that are distinct from dominant groups in national societies, are often among the most marginalised and vulnerable segments of the population. The term “indigenous people” is more clearly defined in the IFC Guidance Note for PS 7.

The requirements of PS 7 do not apply to the Summit M-2 project as:

- There are no impacts on lands and natural resources subject to traditional ownership or under customary use;
- The project does not entail any relocation of Indigenous Peoples from lands and natural resources subject to traditional ownership or under customary use;
- The project does not entail any impacts on critical cultural heritage;
- The project does not entail the use of cultural heritage, including knowledge, innovations or practices of Indigenous Peoples for commercial purposes.

PS 8: Cultural Heritage

PS 8 aims to protect the irreplaceable cultural heritage and to guide clients on protecting cultural heritage in the course of their business operations. In addition, the requirements of this PS on a project’s use of cultural heritage are based in part on standards set by the *Convention on Biological Diversity*.

PS 8 recognises the importance of cultural heritage with an objective to:

- Protect cultural heritage from the adverse impacts of project activities and support its preservation; and
- Promote the equitable sharing of benefits from the use of cultural heritage in business activities.

The PS requires the project proponent to comply with relevant national law on the protection of cultural heritage, including national law implementing the host country’s obligations under the *Convention Concerning the Protection of the World Cultural and Natural Heritage* and other relevant international law.

The requirements of this Performance Standard do not apply to the Summit M-2 project as the land and natural resource footprints do not impact any cultural heritage sites of local, national or international significance and protection.

3.6.4 IFC Project Categorization

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

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

IFC therefore categorises project primarily according to the significance and nature of impacts. IFC defines the project's area of influence as the primary project site(s) and related facilities that the client (including its contractors) develops or controls; associated facilities that are not funded as part of the project (funding may be provided separately by a client or a third party including the government), and whose viability and existence depend exclusively on the project and whose goods or services are essential for the successful operation of a project; areas potentially impacted by cumulative impacts from further planned development of a project; and areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location. The area of influence does not include potential impacts that would occur without a project or independently of a project.

3.6.5 *IFC EHS Guidelines*

The *Environmental, Health, and Safety (EHS) General Guidelines*¹ (April 30, 2007) will be applicable for this Project. In addition to that, IFC's Sector specific *EHS Guidelines for Thermal Power Plants*² (December 19, 2008) will also apply.

3.7 *APPLICABLE EHS STANDARDS*

The Project shall have to comply with Bangladesh environmental, health and safety laws and World Bank Group Guidelines with special attention to comply with the Bangladesh (GOB Environmental Conservation Rule 1997) and World Bank Group requirements regarding air emissions (December 2008).

Therefore, the EHS standards as stipulated in ECR 1997 and amendments thereof as well as in the IFC EHS guidelines (General and Thermal Power Plant specific) for air quality, surface and ground water quality, ambient noise levels, emissions and effluent discharge will be applicable.

(1)¹
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/\\$FILE/Final+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+General+EHS+Guidelines.pdf)

(2)²
http://www1.ifc.org/wps/wcm/connect/dfb6a60048855a21852cd76a6515bb18/FINAL_Thermal%2BPower.pdf?MOD=AJPERES&id=1323162579734

The ADB SPS policy Statement 2009 (SPS) also states, "During the design, construction, and operation of the project the borrower/client will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects." For this purpose IFC EHS guidelines are recommended.

3.8 APPLICABLE ENVIRONMENTAL STANDARDS

The relevant environmental standards (national as well as international) for thermal power plants as applicable to the proposed Project are presented in the following tables:

Table 3.5 Stack Emission Limits

Parameter	Unit	Bangladesh*	World Bank**
PM ₁₀	mg/Nm ³	150	50 (liquid fuel)
SO ₂		-	N/A (natural gas)
		-	Use less than 0.5% sulphur fuel (liquid fuel)
NO _x	mg/Nm ³	-	N/A (natural gas)
	mg/Nm ³	40 ppm	152 (74 ppm) – liquid fuel
Dry Gas, Excess O ₂ content	%		51 (25 ppm) – natural gas
	%		15 (natural gas)
			15 (liquid fuel)

Note:

* Schedule 11 (Standards for Gaseous Emission from Industries or Projects) of the Environmental Conservation Rules, 1997.

** Emission Guidelines for Combustion Turbines, WB/IFC EHS Guidelines for Thermal Power Plants (Source: EU (LCP Directive 2001/80/EC October 23 2001), EU (Liquid Fuel Quality Directive 1999/32/EC, 2005/33/EC), US (NSPS for Stationary Combustion Turbines, Final Rule – July 6, 2006).

█ Represents the standard values applicable to the Project.

Table 3.6 Ambient Air Quality Standards

Parameter	Bangladesh**		WHO***	
	24 hourly (µg/m ³)	Annual (µg/m ³)	24 hourly (µg/m ³)	Annual (µg/m ³)
SPM	200	-	-	-
PM ₁₀	150	50	50	20
PM _{2.5}	65	15	25	10
SO ₂	365	80	20	-
NO _x	-	100	-	40
CO*	10,000	-	10,000	-

Note:

* CO standard is 8-hourly only.

** The Bangladesh National Ambient Air Quality Standards have been taken from the Environmental Conservation Rules, 1997 which was amended on 19th July 2005 vide S.R.O. No. 220-Law /2005.

*** WHO Ambient Air Quality Guideline Values (2005 and 2000), which are also being referred in the World Bank and IFC's General EHS Guidelines (2007)

█ Represents the standard values applicable to the Project.

As per the WB/IFC General EHS guidelines, ambient air quality results need to be compared with the relevant ambient air quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO air quality guidelines or other internationally recognised sources, such as the United States National Ambient Air Quality Standards and the relevant European Council Directives. Since, Bangladesh has its own national ambient air quality standards, these local standards are considered as the applicable standard for the project.

Table 3.7 Effluent Standards/ Guidelines

Parameter	Unit	Bangladesh*	WB/IFC**
pH	-	6-9	6-9
Total Suspended Solids (TSS)	mg/l	150	50
Oil and grease	mg/l	10	10
Total residual chlorine	mg/l	-	0.2
Chromium (total)	mg/l	0.5	0.5
Copper	mg/l	0.5	0.5
Iron	mg/l	2.0	1.0
Zinc	mg/l	5.0	1.0
Lead	mg/l	0.1	0.5
Cadmium	mg/l	0.5	0.1
Mercury	mg/l	0.01	0.005
Arsenic	mg/l	0.2	0.5
Temperature increase at the edge of the mixing zone	°C	40 (summer) 45 (winter)	Site specific requirement to be established by the EA. Elevated temperature areas due to discharge of once-through cooling water (e.g., 1 Celsius above, 2 Celsius above, 3 Celsius above ambient water temperature) should be minimized by adjusting intake and outfall design through the project specific EA depending on the sensitive aquatic ecosystems around the discharge point.

Note:

* Schedule 10 (Standards for Waste from Industrial Units or Projects Waste) of the Environmental Conservation Rules, 1997.

** Effluent Guidelines, WB/IFC EHS Guidelines for Thermal Power Plants.

█ Represents the standard values applicable to the Project.

Table 3.8 Standards for Sewage Discharge

Parameter	Unit	Standard Limit (Bangladesh)*
BOD	mg/l	40
Nitrate	mg/l	250
Phosphate	mg/l	35
Suspended Solid	mg/l	100
Temperature	°C	30
Coliform	No./100 ml	1000

Parameter	Unit	Standard Limit (Bangladesh)*
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Notes :

(1) This limit shall be applicable to discharges into surface and inland waters bodies.
(2) Sewage shall be chlorinated before final discharge.
* Schedule 9 (Standards for Sewage Discharge) of the Environmental Conservation Rules, 1997

Table 3.9 Noise Level Standards/ Guidelines

Category of Area/ Receptor	Bangladesh*		WHO***	
	Day (dB(A))	Night (dB(A))	Day (dB(A))	Night (dB(A))
Silent Zone	45	35	55	45
Residential Area	55	45	55	45
Mixed Area	60	50	-	-
Commercial Area	70	60	70	70
Industrial Area	75	70	70	70

Note:

- * The Bangladesh National Ambient Noise Standards have been taken from Schedule 4 (Standards for Sound) of the Environmental Conservation Rules, 1997.
 - ** Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.
 - *** As per IFC EHS noise level guidelines, Noise impacts should not exceed the levels presented in the above table or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.
 - **** In Bangladesh standard day time is defined from 6.00 to 21.00 hrs and night time is from 21.00 to 6:00 hrs, whereas in WHO guidelines, day time is defined from 7.00 to 22.00 hrs and night time is from 22.00 to 7:00 hrs.
- Represents the standard values applicable to the Project.

It is evident from the above tables that except noise level standards, the WB/IFC guidelines are more stringent than the local standards. The Project needs to comply with the Bangladesh environmental, health and safety laws and World Bank Group Guidelines. Hence, it is mandatory for the Project to meet the stringent standards, as per applicability.

4.1 INTRODUCTION

This section describes the existing environmental and social baseline of the study area which include the proposed Project site and in a 10 km radial area around the proposed project site. This includes relevant components of physical, biological and socio-economic environment.

The purposes of describing the environmental settings of the study area are:

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

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

4.2 PROJECT INFLUENCE AREA

The Area of Influence (AOI) of the Project comprises of the Project Site and the surrounding area, where influence of the Project activities is anticipated. The areas likely to be affected by the Project and its associated activities may include:

- The project activities and facilities that are directly owned, operated or managed by the project proponent (including by contractors) and that are components of the project, such as the power plant, gas pipeline, water pipelines and transmission line to the power grid sub-station;
- Impacts from unplanned but predictable developments caused by the project that may occur later or at a related location such as increase in traffic on the approach road;
- Impacts on biodiversity or on ecosystem services upon which affected communities' livelihoods are dependent;
- Associated facilities, that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable; and
- Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted i.e. existing 337 MW Duel Fuel CCPP of Summit Meghna Power Co. Ltd, , 450 MW Meghna CCPP of Power Tech, Pendekar and 100 MW Engine based Power Plant of Orion

Power Meghnaghat Ltd. and proposed 750 MW CCPP of Reliance Bangladesh LNG and Power Limited.

Further to this, the AOI with respect to the environmental and social resources was considered based on the following reach¹ of impacts:

Air Quality

- Gaseous pollutants (e.g. NO_x and SO₂) and fine particulate matter (PM₁₀ and PM_{2.5})—typically up to 2-2.5 km from operations;²
- Cumulative impact of air pollutants emission from existing power plants and proposed power plants at Meghnaghat Power Hub.; and
- Dust fall –typically up to 200 m from construction activities.

Noise

- Noise impact area (defined as the area over which an increase in environmental noise levels due to the project can be detected) –typically 500 m from operations and 100 m from the access roads; and
- Cumulative impact of noise generation from proposed power plant and existing power plants in Meghnaghat Power Hub.

Water

- Surface water body –typically 200 - 500 m upstream and downstream of water intake point and within 500 – 700 m upstream and downstream of discharge point.
- Other Surface water bodies within 2-2.5 km of the project footprint
- Ground water in 1-2 km radius of project footprint.

Flora and Fauna (Terrestrial and Aquatic)

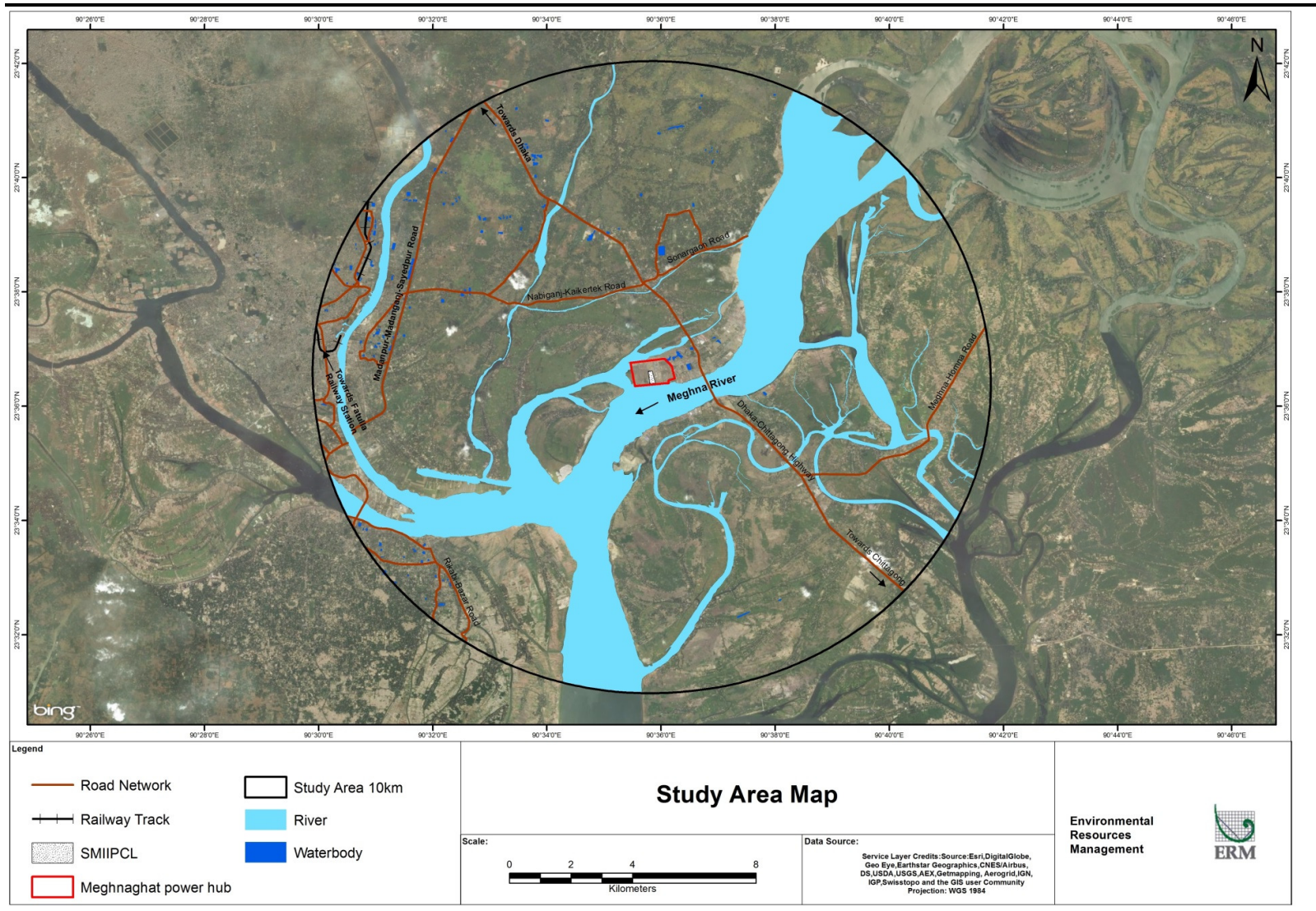
- The direct footprint of the project comprising the project site.
- The areas immediately adjacent to the project footprint within which a zone of ecological disturbance is created through increased dust, human presence and project related activities (e.g., trampling, water intake/outfall, transportation). This kind of disturbance has been estimated to occur within the project footprint and surrounding areas of about 500 m to 1 km from the activity areas.

Based on the above the AOI for environmental studies is limited to 5 km from the Project site. However, as per DoE guidelines for the study area of 10 km has been considered in this study, with focus on immediate vicinity of the Project site.

¹ Distance based on ERM's experience with similar projects

² The air quality dispersion modelling results also indicated that the maximum ground level concentration in all cases will occur between 1.5 to 2.0 km from the project site.

Figure 4.1 Study Area Map (10 Km Radius)



4.3 PHYSICAL ENVIRONMENT

4.3.1 Land use

The land use and cover of the project site and Meghnaghat Industrial area have been studied using Satellite Imagery and subsequently ground truthing during the field surveys.

Land Use – Project Site

The proposed power plant will be constructed on Meghnaghat Power Hub. The existing land that will be used for the proposed power plant project is a Govt. Khas Land. The land is currently vacant and has been leased out by the BPDB.

Land Use – Meghnaghat (North) Industrial Area

Meghnaghat industrial area was mainly developed on a riverine island. The total area under Meghnaghat north industrial cluster is 6.5 sq. km. The predominant land use is industrial land- 55.7% of the total industrial area. The other major land use is open area -26.1%. This open area is likely to be used for future industrial development. This is followed by settlement 9.0%, construction material handling site 4.2%, agricultural land- 2.5% and waterbody 2.1%. The land use and land cover is presented in **Table 4.1** and **Figure 4.2**.

Table 4.1 Land Use & Land Cover of Meghnaghat North Industrial Area

Sl. No.	Land Use Category	Area (sq. km)	Percentage
1	Waterbody	0.14	2.1
2	Settlement	0.59	9
3	Road	0.03	0.4
4	Open area	1.70	26.1
5	Industry	3.62	55.7
6	Construction Mat. Handling site	0.27	4.2
7	Agricultural land	0.16	2.5
	Total	6.50	100

4.3.2 Soil Quality

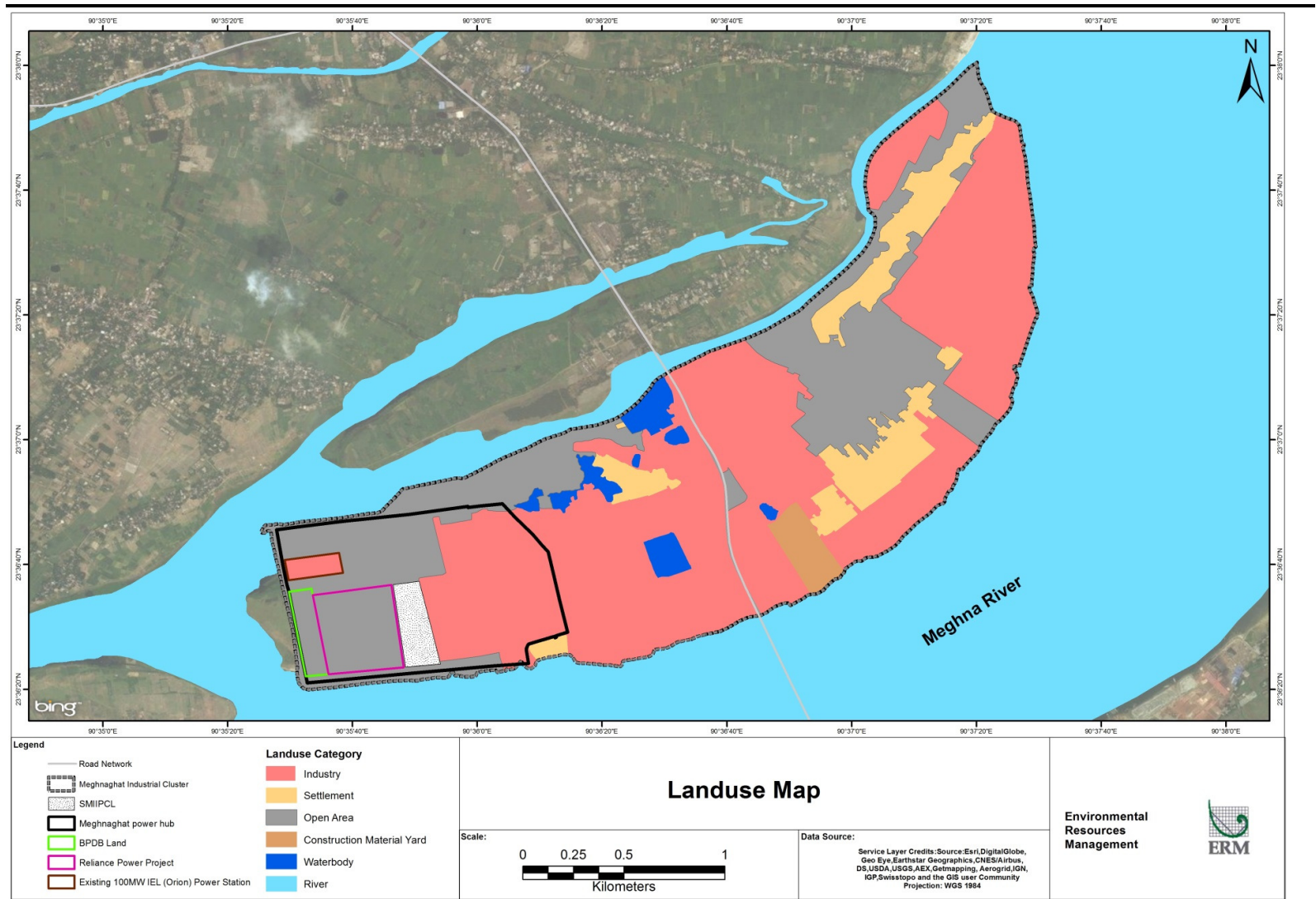
The soil quality of the proposed project site and project influence area is assessed through secondary soil quality monitoring data (*Ref: ESIA Report for Reliance Meghnaghat 750 MW CCPP, 2016*). As part of this study, soil quality was monitored in four (4) locations, including the vacant land of Meghnaghat Power Hub. Other locations were Mugrapara (northern side of the Power Hub- approx. 3 km); Jamaldi (southern side of Power Hub- approx. 2.5 km) and Char Balaki (south-eastern side - approx. 2.5 km from Power Hub).

The soils in the area are slightly basic in nature with pH values ranging from 7.22-7.33; except Jamaldi, -the soil is slightly acidic (pH: 6.95). Electrical conductivity values in the samples varied from 12.5 to 225.2µS/cm. Nitrates in all the four soil samples were found to be from 2.11 (Power Hub area) to 12.45 (Jamaldi) mg/kg. The Manganese ranged from 8.55 (Char Balaki) – 375.5

(Mograpara) mg/kg. Phosphate levels were observed to be 43.21 - 147.37 mg/kg. The concentration of iron was varied from 0.083 to 1.58%.

Concentration of Lead ranges from untraceable in Char Balakito 11.0 in Mograpara. The other heavy metals like Cadmium and Chromium were found to be untraceable and ranging from 2.6 (in Char Balaki) to 29.6 (in Jamaldi) respectively. The Cation exchange capacity of soil samples ranges from 0.92 to 11.0meq/100gm. Arsenic found in the soil sample ranges from 0.29 to 2.56 mg/kg.

Figure 4.2 Land use / Land cover Map of Meghnaghat (N) Industrial Area

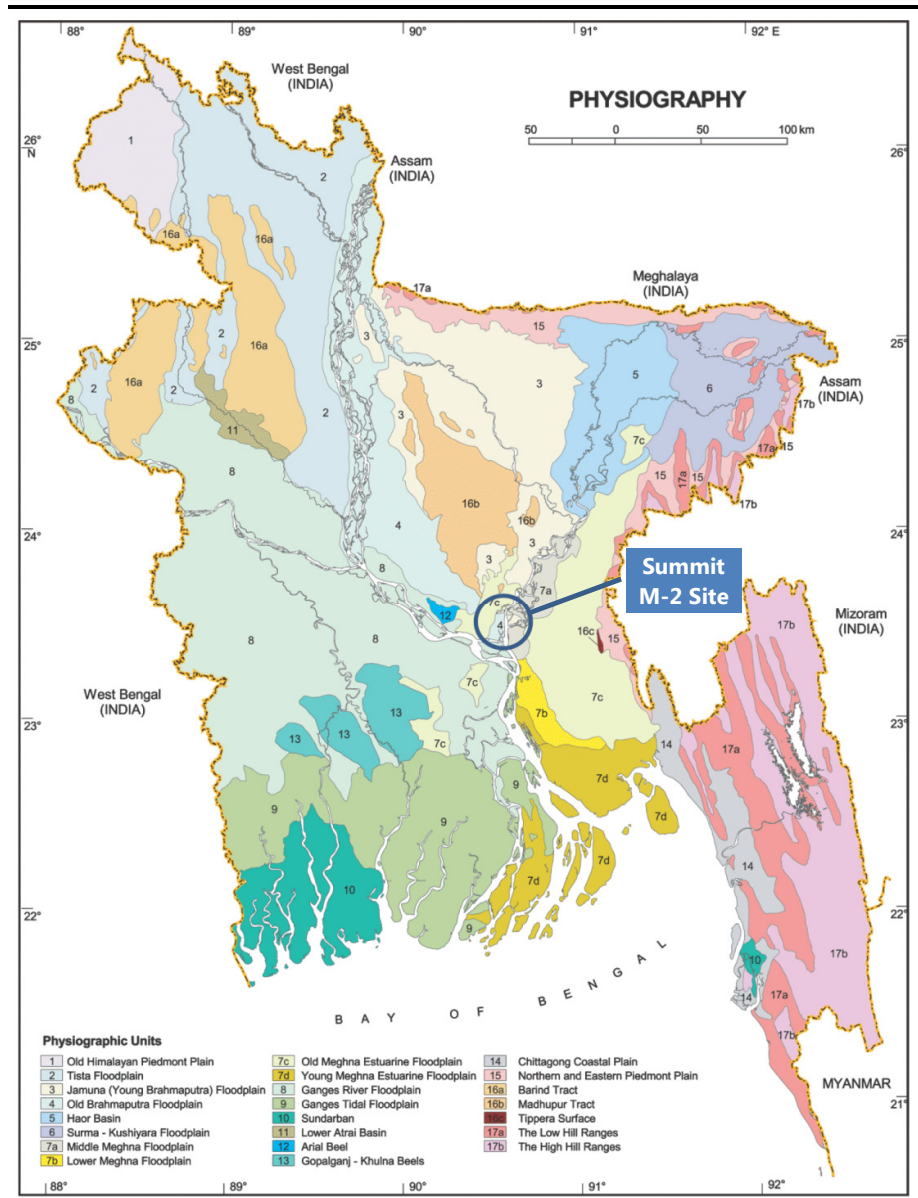


[Source: GIS mapping and interpretation of satellite imagery and supplemented with findings from the ground truthing surveys conducted during the site reconnaissance study]

4.3.3 Physiography

Proposed project site belongs to the Old Brahmaputra Floodplain area of the National Classification. Soils of the area are grey, loamy on the ridges and grey to dark grey clayey in the basins. Grey sands to loamy sands with compact silty topsoil, occupying areas of old Brahmaputra char. Dominant general type is Non calcareous Grey Floodplain soils. The physiographic map of Bangladesh is presented in *Figure 4.3*.

Figure 4.3 Physiographic Map of Bangladesh



Source: Soil Research Development Institute (SRDI), 1997

4.3.4 Topography

The proposed project and study area (10km around the proposed project site) is predominantly a flat terrain with elevation of 5 m above mean sea level. The proposed project site is also a flat terrain and its gentle slope is towards east;

i.e. towards Meghna River. The topography map of Bangladesh is presented in *Figure 4.4*.

Figure 4.4 *Topography Map of the Bangladesh*



Source: Surface Water Monitoring Center

4.3.5 Geology

The landforms of Bangladesh can be divided into three major classes: (i) the northern and eastern hills, (ii) the Pleistocene terraces, and (iii) the Holocene floodplains. The Holocene floodplain deposits cover most of the surface area of present-day Bangladesh. According to geographic and geomorphic distribution, the Holocene floodplains are divided in four classes: (a) piedmont plains, (b) meander floodplains, (c) tidal floodplains, and (d)

estuarine floodplains. The proposed project site is located in meander floodplains.

The proposed project site was developed by fill material to raise the site elevation to a point approximately one meter above the 200-year flood line. The site is underlain by several hundred meters of alluvial sediments. The surface is covered by two metres of alluvial silt, which is underlain by approximately 0.3 meters of silty sand and sand. This surface material lies above horizontally bedded clay and sand (MEP, 1997).

4.3.6 *Hydrology, Drainage and Flooding*

Hydrology

The Meghna River originates inside Bangladesh by the joining of the Surma and Kushiya rivers originating from the hilly regions of eastern India. The name is properly applied to a channel of the Old Brahmaputra downstream from Bhairab Bazar, after it has received the Surma (Barak) River. Flowing almost due south, the Meghna receives the combined waters of the Padma and Jamuna (the name of the Brahmaputra in Bangladesh) rivers near Chandpur. Down to Chandpur, Meghna is hydrographically referred to as the Upper Meghna and after the Padma joins, it is referred to as the Lower Meghna. Flowing a course of about 260 km it enters the Bay of Bengal by four principal mouths—Tetulia, Shahbazpur, Hatia, and Bamni rivers. The proposed site is about 30 km North of Chandipur, in the upper Meghna zone.

Drainage in the Study Area

The study area falls within the watershed of Meghna River. The main channel of Meghna River flows northeast to south west within the study area at a nearest distance of 0.5 km south of the proposed site. The minor channel of Meghna River flows north-east to south-west at a distance of 0.25 km towards north of the proposed site. The proposed site has flat terrain; however, the gentle slope of the site is towards west, i.e. Meghna minor channel. Drainage map of the study area is presented in following figure.

Water Resource & Availability

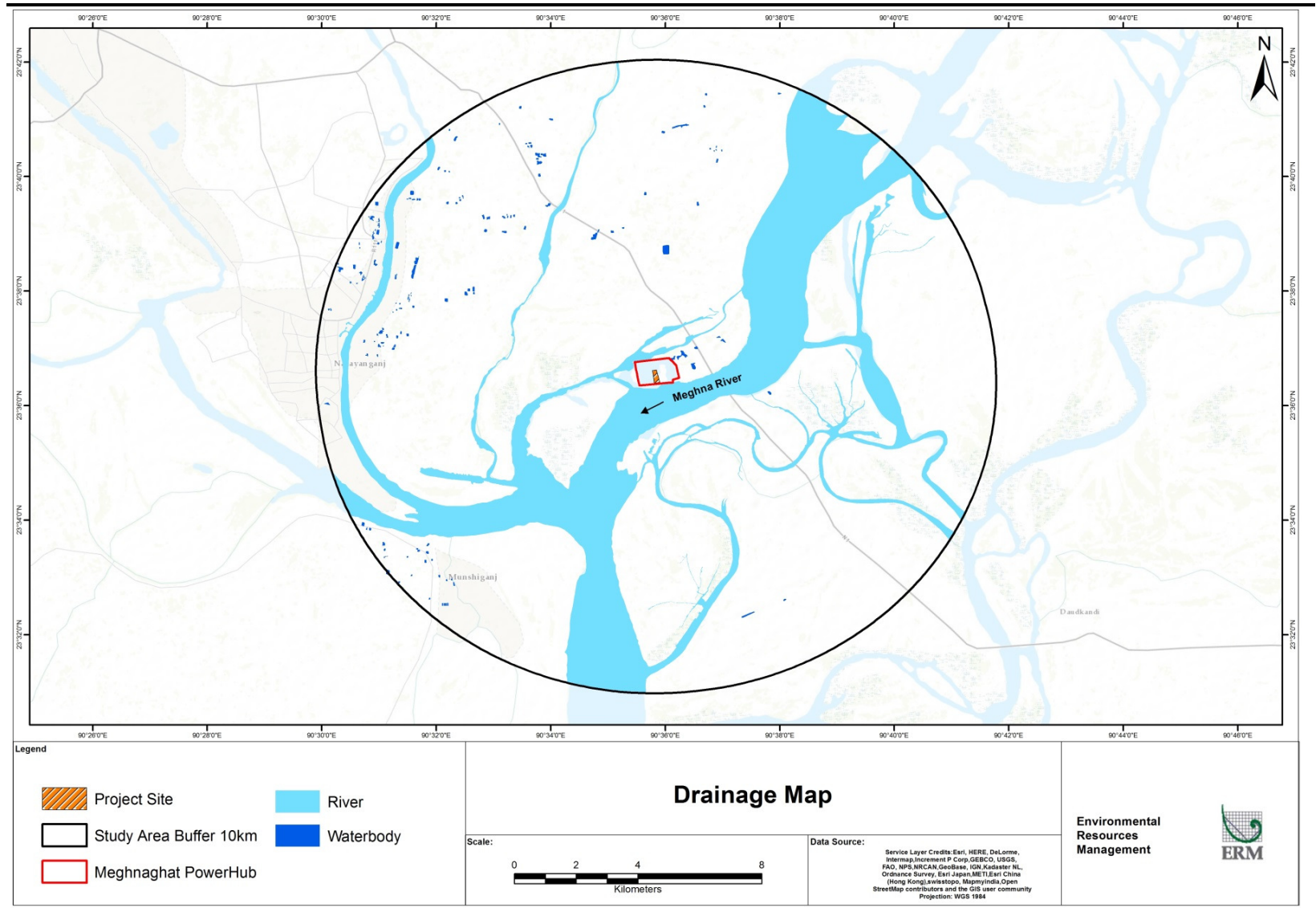
The river water in the Meghnaghat Industrial is used for industrial cooling and process water. The rivers serve as a sink for treated effluents from industries including thermal discharges from power plants which mostly have once through cooling systems.

Figure 4.5 Geological Map of Bangladesh



Source: Ministry of Power, Energy and Mineral Resources (http://www.gsb.gov.bd/rvedr/index.php?option=com_content&view=article&id=11&Itemid=12)

Figure 4.6 Drainage Map of the Study Area



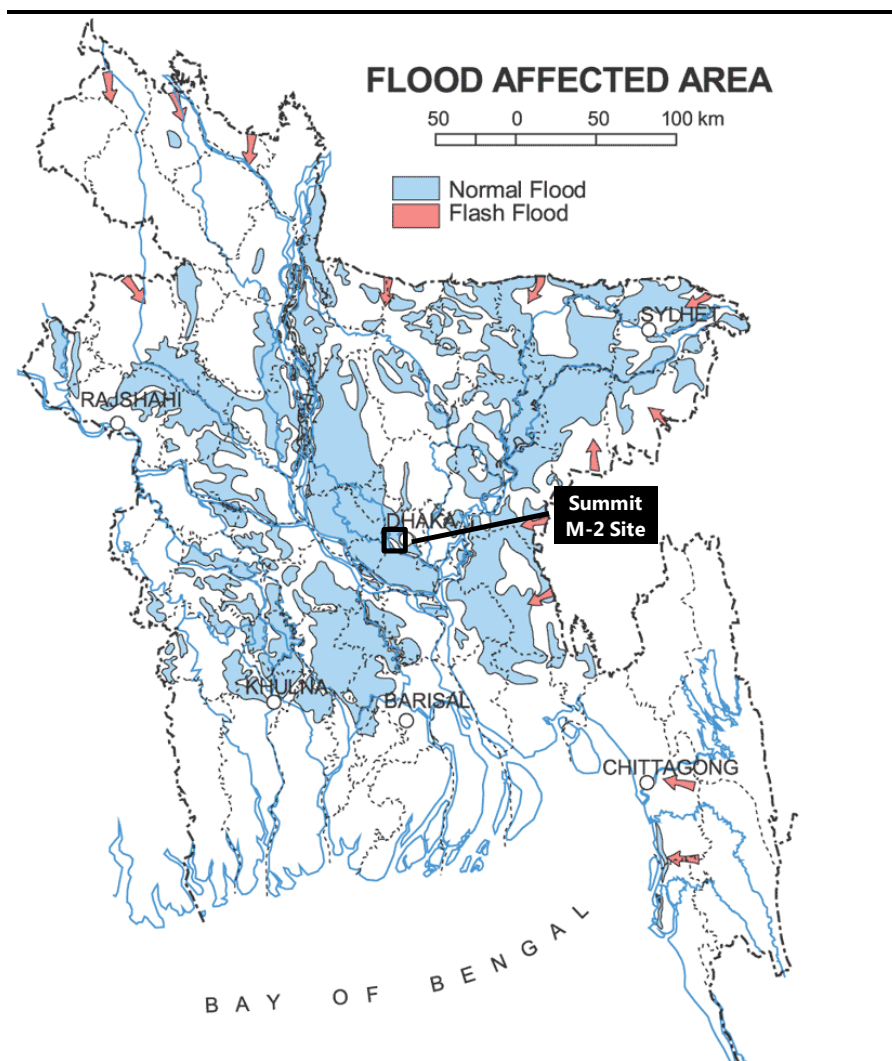
The river is also used for transport of raw material and finished products and construction material. The river supports aquatic ecosystem and fish propagation.

Flooding

The maximum discharge of Meghna River at Bhairab Bazar Station was observed as 13400 m³/sec in 1995 and 10572 m³/sec in 2004. There has been a declining trend in the maximum discharge levels over the years, though the minimum discharge has remained almost same. Meghna is a wide river and water is available throughout the year for consumptive uses of industry as well as for river transport and fish propagation.

Every year near about one-fifth of Bangladesh undergoes flood during the monsoon season. A flood season in Bangladesh may start as early as May and can continue until November. Five floods during the last fifty years were extensive and devastating and these are the floods of 1955, 1974, 1987, 1988, and 1998. The flood affected area of Bangladesh is presented in **Figure 4.7**.

Figure 4.7 Flood Affected Areas of Bangladesh



Source: Bangladesh Water Development Board

Meghna carries huge amount of water from the precipitation over large area of the Ganga-Brahmaputra-Meghna (GBM) basin. About 80% of the annual rainfall of Bangladesh occurs during monsoon season between June to September. The major cause of the monsoon flood relies on the intensity, duration and magnitude of the rainfall in the GBM basin.

A comparison of floods in major rivers in 2007 with other major floods of recent past in 2004, 1998 and 1988 was conducted. Water level data from Bhariab Bazar gauge station in the Meghna River is presented in following table.

Table 4.2 Summary of Flood study (2007, 2004, 1998 and 1988) in Meghna Rover

Parameter	2007	2004	1998	1988
Danger Level in meters above PWD datum	6.25	6.25	6.25	6.25
Date of crossing Danger Level at rising stage	30.07.07 & 12.09.07	11.07.04	20.07.98	06.07.88 & 14.08.88
Date of crossing Danger Level at falling stage	21.08.07 & 25.09.07	18.08.04	25.09.98	05.08.88 & 27.09.88
Height of peak flood level in meter above Danger Level	0.69	1.53	1.08	1.41
Duration of flood in days above Danger Level	37	38	67	75

The magnitude of water level above danger level in the Meghna River during 2007 was almost half of it during 2004. The most severe flood in terms of magnitude occurred in this basin during 1988 and 2004. Also, during 1998 the magnitude of the peak flood in this basin was much higher than that of 2007. In 2007 and 1988, the first flood wave entered into Meghna basin in the last week of July. In 1988 and 2007, flood was observed in the Meghna river basin of Bangladesh much earlier (at the beginning of July) than in 2007, while in 1998, the first flood wave was observed in the middle of July. Duration of floods in the Meghna river basin of Bangladesh in 2007 is similar to that of 2004. Although the long lasting flood was observed in this basin in 1988 and it was twice the duration of flood in 2007. In 1998, the duration of flood in the Meghna river basin of Bangladesh was less than 1988 but has much higher than in 2007 and 2004. In general the Meghna River basin more affected due to flood during the month of July based on the past flood level data.

BPDB had developed the Meghnaghat Power Hub; the site was elevated to one meter above the 200 year highest flood level (HFL), which is +8.0 m Public Works Datum (PWD) or +7.54 m above the mean sea level (MSL). The highest flood levels in the project area were recorded at the Meghna Ferryghat gauge station (1.5 kilometres south-east of the project site) during the monsoons of 1998, 1988, and 1974 when flood elevations of +6.76 metres, +6.55 metres, and +6.19 metres PWD were respectively noted (*EIA, Meghnaghat Power Project, 2001*).

4.3.7 *Surface Water Quality*

Pollution of surface waters is considered as 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 collection of secondary data from various sources.

Ambient water temperature: The ambient water temperature varied from 19.8°C to 24.4°C (during January 2016) and 25.3°C to 28°C (during March 2016) along the industrial zone of the Meghna river. Higher temperatures were observed at a minor channel of the Meghna River during both winter and early summer. Major temperature difference was not observed in the cooling water outfall points of the thermal plants.

Dissolved Oxygen (DO): DO varied from 5.9 to 6.5 mg/L (during January 2016) and 1.6 to 6.4 mg/L (during March 2016) along the industrial zone of Meghna river. The DO level at the sampling locations is much above the critical level of 4 mg/L.

Biochemical oxygen demand (BOD): BOD level at all sampling location was <2 mg/L in both the season, except for in minor channel of Meghna river, where it was recorded as 142 mg/L and 89 mg/L during winter and early summer respectively ; possibly due to discharge of industrial effluents from paper mills in the minor stream. The BOD level at all the sampling locations are much below the standard for Class 'D' water (< 6 mg/l Country Standard for Class D Waters – used by fisheries)

Toxic Metal (Pb, Cr & Cd): Cd (<0.001 mg/L), Cr (<0.01 mg/L) and Pb (<0.005 mg/L) was recorded in low concentration all the sampling locations.

Surface Water quality Trends

Comparative analysis of monitoring data, BWDB data (2001-2009) and other scientific research data recorded in Meghna River is shown in **Table 4.3**.

Table 4.3 *Comparative Analysis of Surface Water Data of Meghna River*

Parameters	Meghna River CEIA Study, 2016 (Summer) ^{#1}	Meghna River CEIA Study, 2016 (Winter) ^{#1}	ESIA for CCPP at Meghnaghat, (2012) ^{#2}	ESIA Reliance Meghnaghat 750 MW, 2016 ^{#3}	Regular Monitoring by Summit Power, April 2016
Temperature (°C)	25.3-28.0	19.8 to 24.4	31.8 to 32.5	27.3 to 27.5	
pH	6.3-6.8	6.77 to 6.82	6.5 to 6.7	7.8 to 7.26	6.96
DO (mg/L)	1.6-6.4	5.9 to 6.5	5.9 to 6.6	5.0 to 8.0	3.52
TDS (mg/L)	118-615	86 to 120	54 - 72	37 to 38	83.2
COD (mg/L)	<4-293.6	<4	< 5 to 5.7	21.8 to 33.2	23.5

Source:

#1 – Cumulative Environmental Impact Assessment (CEIA) Study Report for Siddhirganj and Meghnaghat Power Hubs, prepared by ERM for Power Cell, Power Division Government of Bangladesh, September 2016

#2 ESIA Study Report for 305-350MW Dual Fuel Combined Cycle Power Plant Project at Meghnaghat, Narayanganj, prepared by SGS India Private Limited for Summit Meghnaghat Power Company Limited

#3 - ESIA Study Report for Reliance Meghnaghat 750 MW Combined Cycle Power Plant, prepared by Adroit Environment Consultants, Bangladesh for Reliance Bangladesh LNG and Power Limited, March 2017

4.3.8 Ground Water Resource and Quality

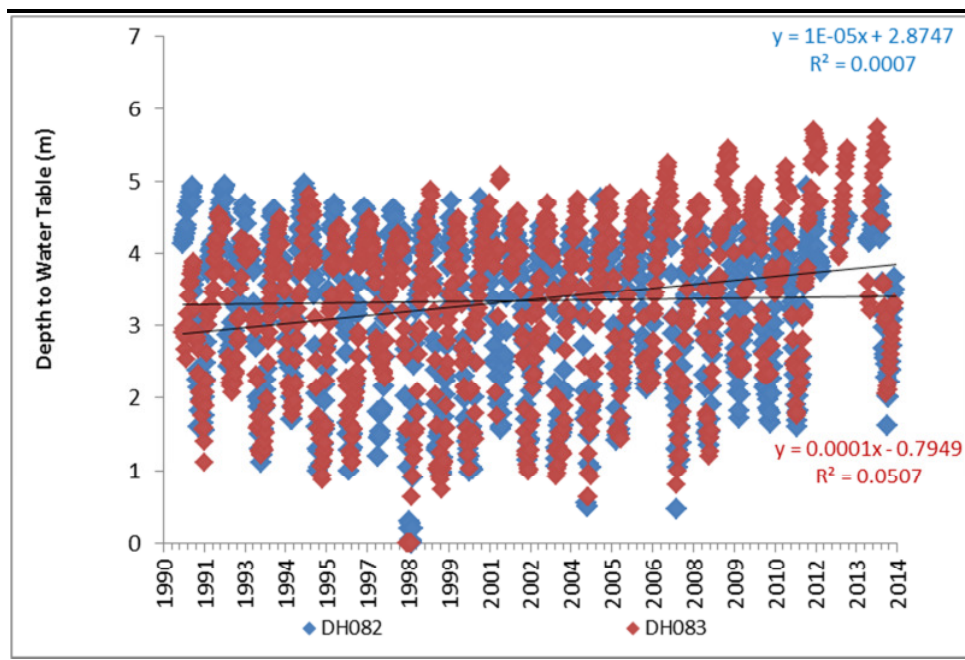
Ground Water Resource

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. Over abstraction of ground water in the industrial area is causing unusual declining of ground water level.

Ground Water Level in the Study Area

The Bangladesh Water Development Board (BWDB) has ground water monitoring wells in Sonargaon Upazilas. The monitored data is graphically represented in Figure 4.8.

Figure 4.8 Water Table Variations in Sonargaon Upazila Monitoring Wells

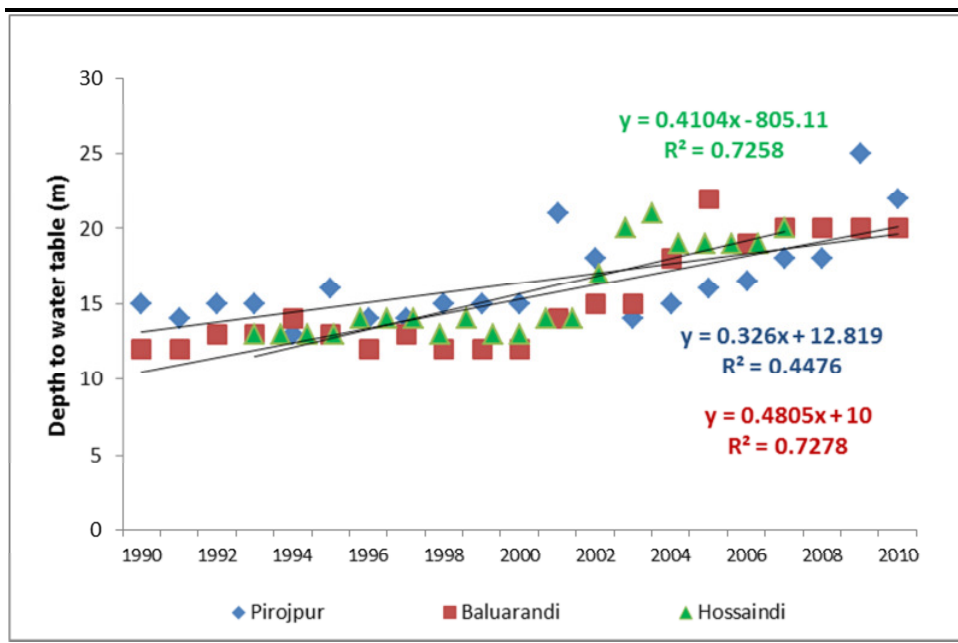


Source: Plotted from BWDB data for station id DH082 and DH083 for Sonargaon Upazila

From the analysis of the graphs it is evident that there is seasonal variation in the water table and the water table decreases in the dry months of December to April. From equations it is evident that the water table has gradually gone deeper over the years in Upazila.

Further in this regard, more specific information for locations within Meghnaghat industrial areas was obtained from Department of Public Health Engineering (DPHE). The data collected from their permanent monitoring wells over a period spanning well over two decades (1989-2011) is graphically represented in Figure 4.9.

Figure 4.9 Water Table Variations in Monitoring Wells of DPHE in Meghnaghat Area



Source: Plotted from DPHE data for Monitoring Wells in Meghnaghat Area

Analysis of the comprehensive data set collected from BWDB and DPHE for Meghnaghat industrial area, presents a clear trend of a gradual decline in the water table over the years. The declining water tables can be attributed to the increasing utilisation of ground water by industries as well as domestic use.

Ground Water Quality

Ground water samples were collected from eight (8) locations in Meghnaghat Industrial area and targeted parameters were monitored in CEIA study.

Reference was also made to few EIA studies namely *EIA Study of the 330-335 MW CCPP project at Meghnaghat in 2012* carried out in the Meghnaghat industrial area for referring to previous data ground water quality.

Comparative analysis of secondary data monitoring data is presented in **Table 4.4**

Table 4.4 Comparative Analysis and Inferences – Meghnaghat

Parameters	Units	CEIA Study, 2016 (Meghnaghat Area) #1	ESIA for 300-350 MW Dual Fuel CCPP at Meghnaghat, 2012 #2	Regular Monitoring, Summit Power, April 2016	Standards - ECR 97
Colour	Hazen	<10	10-20	-	15
Odour	---	Unobjectionable	Odourless	-	Odourless
pH at 25°C	---	6.63 – 6.95	7.2 – 7.4	8.2	6.5 -8.5
Turbidity	N.T.U.	<10 -16.4	0.89 – 4.52	0.23	10
Total Dissolved Solids	mg/l	394 - 590	296 - 508	560.25	1000
Fluoride (as F)	mg/l	0.64 -0.79	0.32 – 0.48	-	1.0
Iron (as Fe)	mg/l	<0.05 – 2.91	0.15 – 0.40	ND	0.3

Parameters	Units	CEIA Study, 2016 (Meghnaghat Area) #1	ESIA for 300-350 MW Dual Fuel CCPP at Meghnaghat, 2012 #2	Regular Monitoring, Summit Power, April 2016	Standards - ECR 97
Nitrate (as NO ₃)	mg/l	<0.5 – 3.04	1.07 – 3.42	ND	10
Cadmium (as Cd)	mg/l	<0.001	<0.005	-	0.005
Lead (as Pb)	mg/l	<0.005	0.02 - 0.04	ND	0.05
Arsenic (as As)	mg/l	<0.01	<0.005 – 0.11	0.0076	0.05
Total Chromium (as Cr)	mg/l	<0.01	< 0.01	-	0.05
Faecal Coliform	/100ml	Absent	-	-	-
Total Coliform Organism	MPN/100 ml	<1.8 - 94	-	-	-

Source:

#1 – Cumulative Environmental Impact Assessment (CEIA) Study Report for Siddhirganj and Meghnaghat Power Hubs, prepared by ERM for Power Cell, Power Division Government of Bangladesh, September 2016

#2 ESIA Study Report for 305-350MW Dual Fuel Combined Cycle Power Plant Project at Meghnaghat, Narayanganj, prepared by SGS India Private Limited for Summit Meghnaghat Power Company Limited

From the table, it can be observed that all the parameters are within the standard values of ECR 97 and it can be assumed that the ground water quality was satisfactory for drinking.

4.3.9 Meteorology

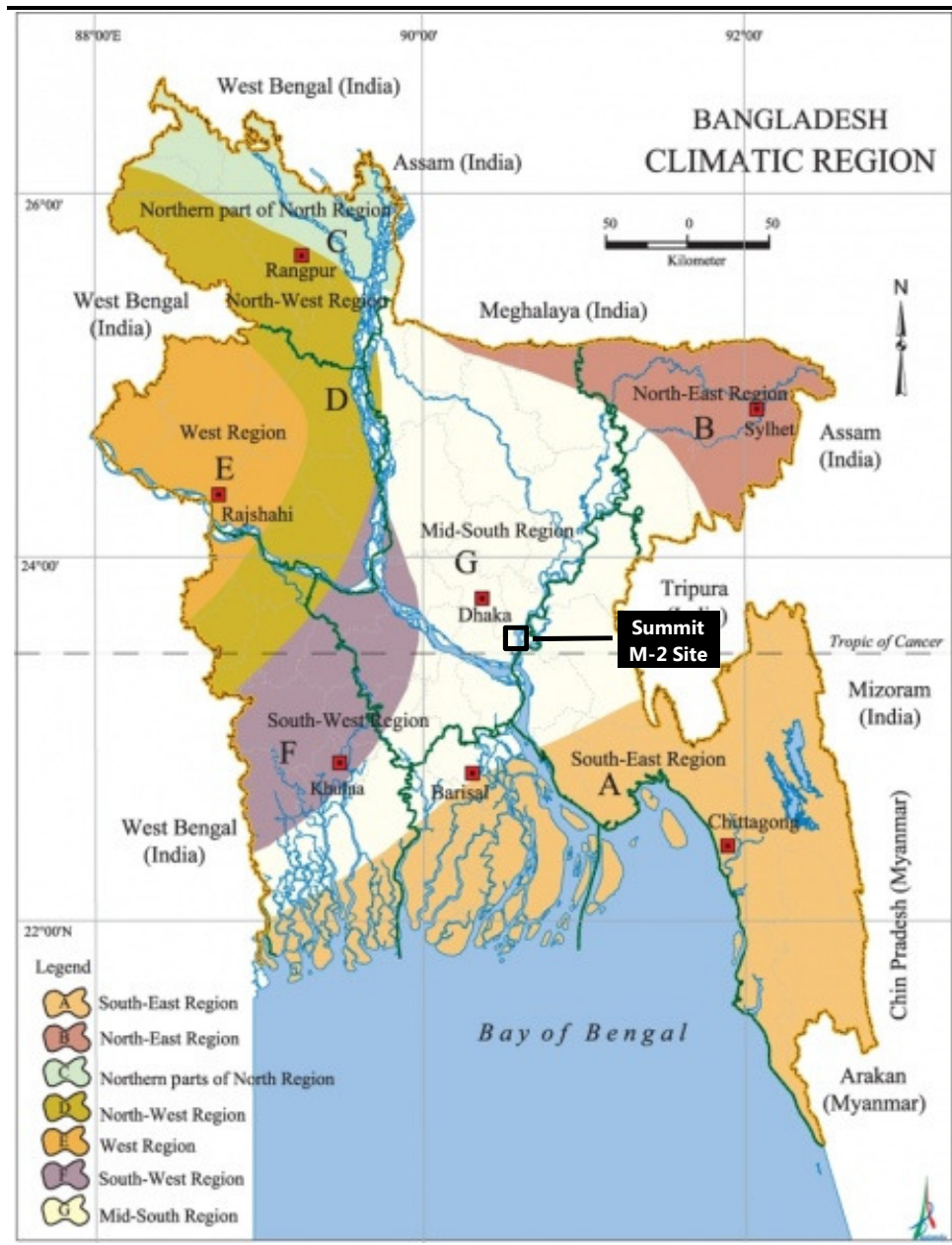
4.3.10 Climate

Bangladesh is located in the tropical monsoon region and its climate is characterised by high temperature, heavy rainfall, often excessive humidity, and fairly marked seasonal variations. From the climatic point of view, three distinct seasons can be recognised in Bangladesh - the cool dry season from November through February, the pre-monsoon hot season from March through May, and the rainy monsoon season which lasts from June through September. January is the coolest month with temperatures averaging near 26°C and April the warmest with temperatures from 33 to 36°C. Most places receive more than 1,525 mm of rain a year, and areas near the hills receive 5,080 mm. Most rains occur during the monsoon (June-September) and little in winter (November-February). Moderate rains also reported in the months of March, April and October.

Climatic sub-regions of Bangladesh are presented in **Figure 4.10** and as per the same, the Narayanganj District falls in the Mid-South Zone. The nearest Bangladesh Meteorological Department (BMD) ¹ meteorological station is at Dhaka City, which is about 25 km north of the Project site. The climatic conditions as recorded at Dhaka therefore can be considered applicable for the Project. To assess the climatic conditions of the area, climatology data has been obtained from Bangladesh Meteorological Department (BMD) for the period 1966 – 2011.

(1) ¹ Bangladesh Meteorological Department is the authorised Government organisation for all meteorological activities in Bangladesh. It maintains a network of surface and upper air observatories, radar and satellite stations, agro-meteorological observatories, geomagnetic and seismological observatories and meteorological telecommunication system.

Figure 4.10 Climatic Sub-regions of Bangladesh

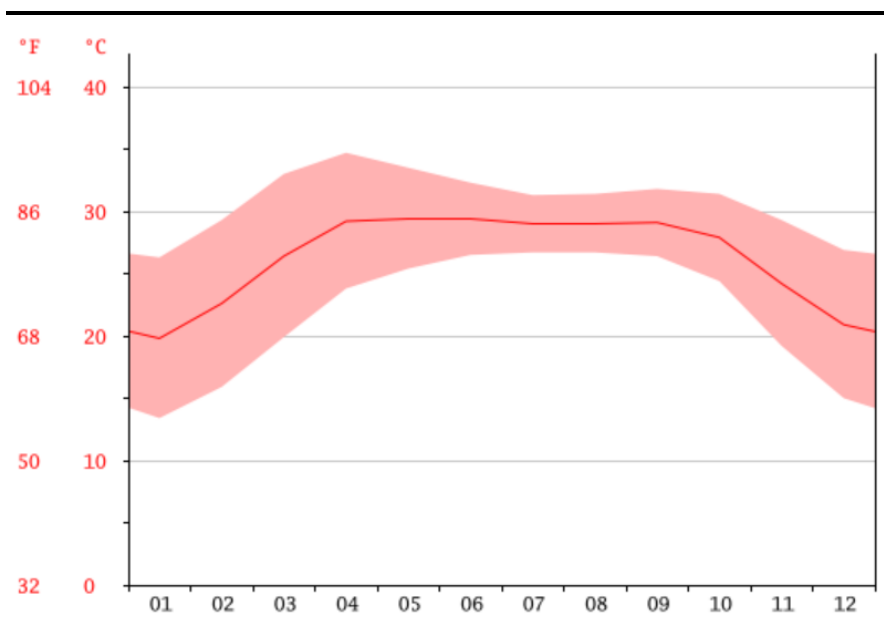


Source: Maps of Bangladesh [<https://mapofbangladesh.blogspot.in/2012/01/climate-climatic-sub-regions.html>]

Temperature

The mean monthly maximum and mean monthly minimum recorded over a period of 1961 to 2016 shows that mean monthly maximum temperature is experienced in May (29.4°C) and the mean monthly minimum temperature is experienced in January (19.8°C). The monthly temperature is presented in Table 4.5 and Figure 4.11.

Figure 4.11 Graphical Representation - Temperature, Humidity & Rainfall at Dhaka



[Source: Bangladesh Meteorological Department, Dhaka Station]

Table 4.5 Climatic Data of the Dhaka Station (2016)

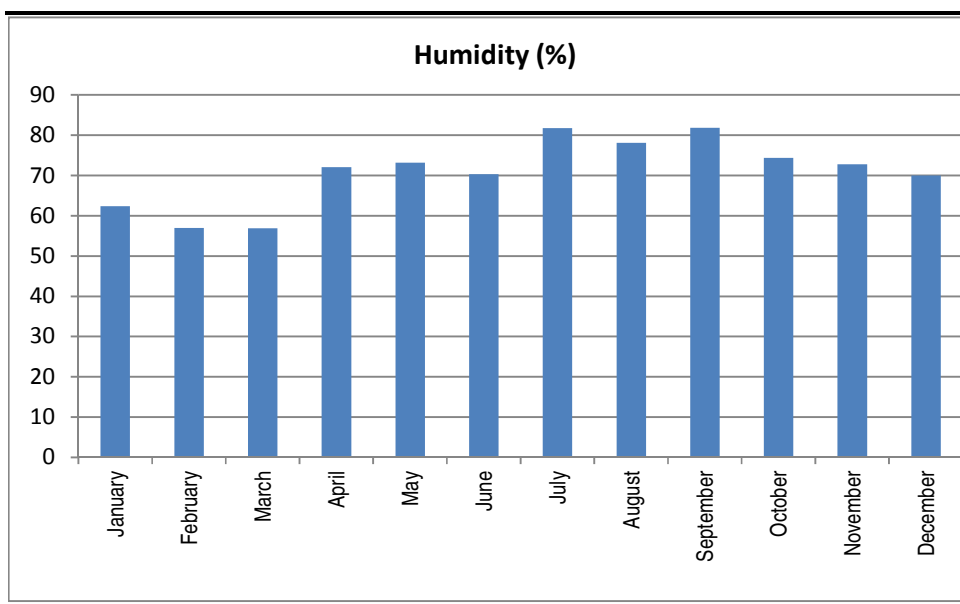
Month	Avg. Temperature (°C)	Rainfall (mm)	Humidity (%)	Wind Speed (km/h)
January	19.8	9	62.4	1.7
February	22.6	20	57.0	1.2
March	26.4	54	56.9	3.7
April	29.2	149	72.1	4.4
May	29.4	245	73.2	3.8
June	29.4	373	70.3	3.1
July	29.0	374	81.7	2.4
August	29.0	335	78.1	2.1
September	29.1	253	81.9	0.9
October	27.9	153	74.3	0.9
November	24.2	34	72.8	0.9
December	20.9	5	70.0	1.2

[Source: Bangladesh Meteorological Department, Dhaka Station]

Humidity

The relative average humidity varied between 56.9% (March) to 81.9% (September). The monthly relative humidity is presented in Table 4.5.

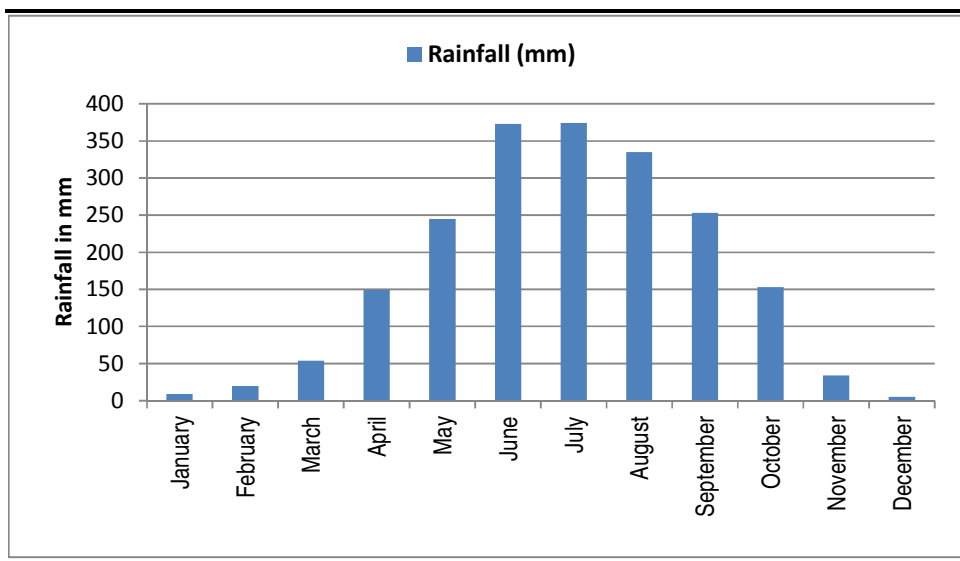
Figure 4.12 Monthly Humidity



Rainfall

Average annual rainfall in the Narayanganj district is about 2000 mm. January-March and November-December received very little rainfall. Rainfall was highest in June and July (373 and 374 mm respectively), followed by August (335.1mm), May (245 mm) and September (253 mm). The average monthly variation of rainfall is presented in **Figure 4.13**.

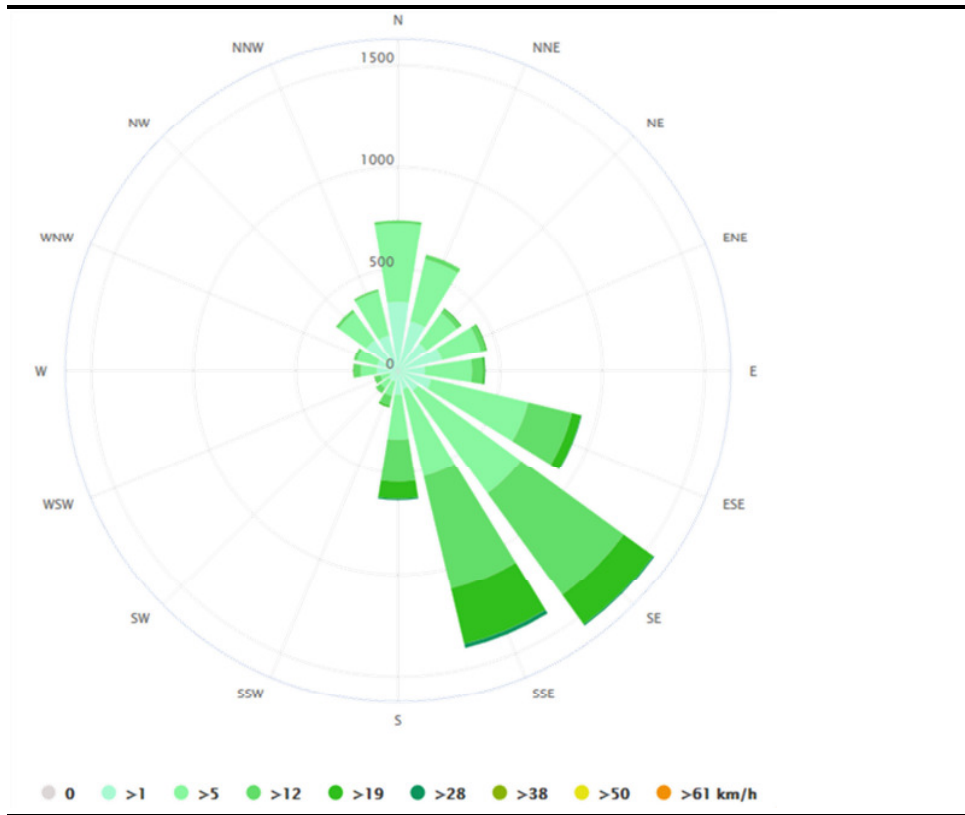
Figure 4.13 Monthly Rainfall



Wind Speed and Direction

The wind speed varied from 0.9 km/hr to 4.4 km/hr. The average wind speed during the period was 2.2 km/hr. The predominant wind direction of the study period is from south-east. Windrose diagram is presented in **Figure 4.14**.

Figure 4.14 Wind Rose of Dhaka Station

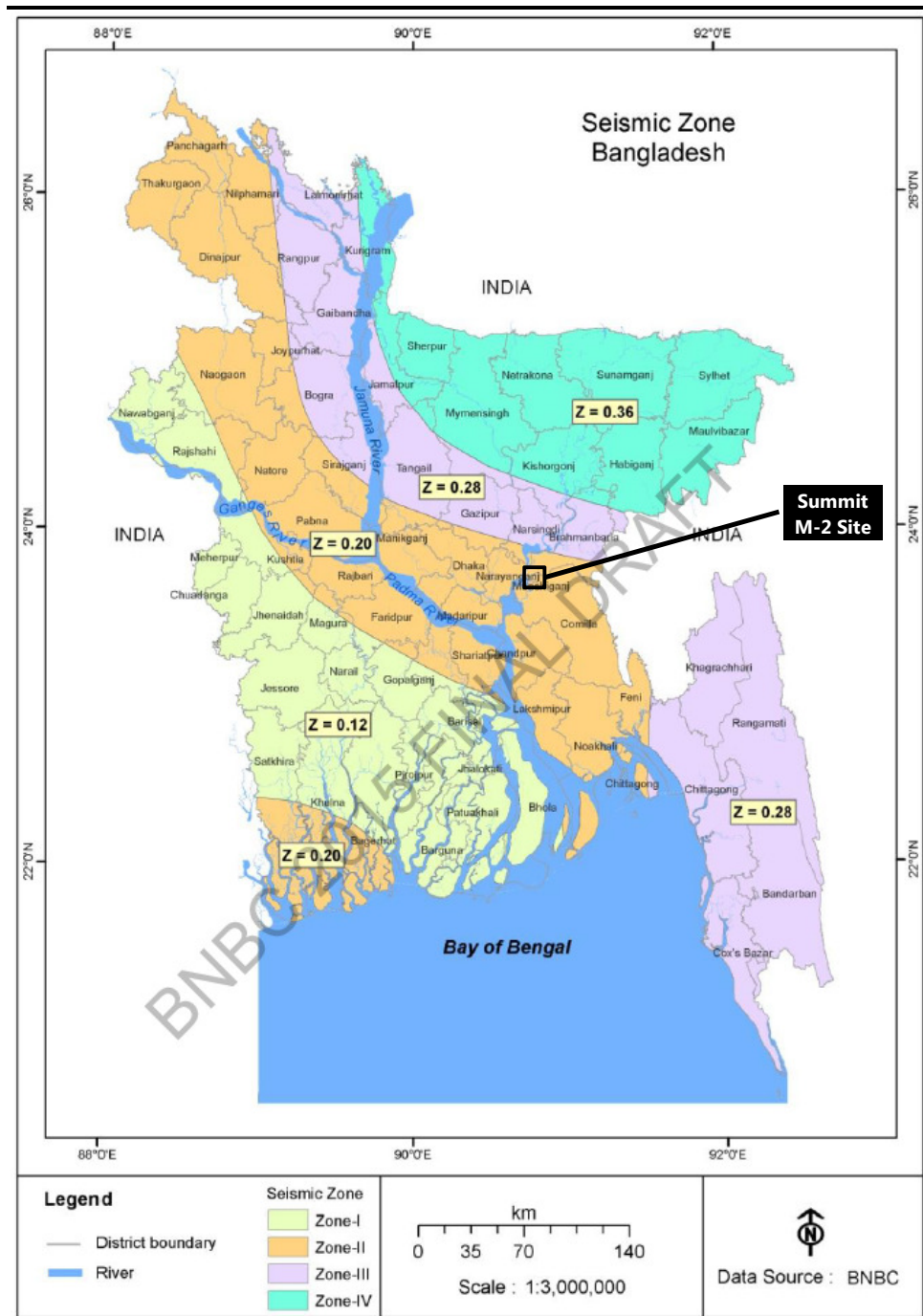


4.3.11 Natural Hazards

Earthquakes

As per the Seismic Zoning Map of Bangladesh, the country is divided into four seismic zones and the design strength of buildings is stipulated in each seismic zone. The project site and study area is located in Seismic Zone II resulting in a basic seismic coefficient z of 0.20 (Figure 4.15). The Zone-II includes the greater districts of Dinajpur, Bogra, Dhaka, Narayanganj and Chittagong, where earthquake shock of maximum intensity of VIII of the Modified Mercalli Scale is possible.

Figure 4.15 Earthquake Zone Map of Bangladesh



Source: Geological Survey of Bangladesh (GSB) and Bangladesh National Building Code, Final Draft 2015, prepared by Housing and Building Research Institute

Cyclones

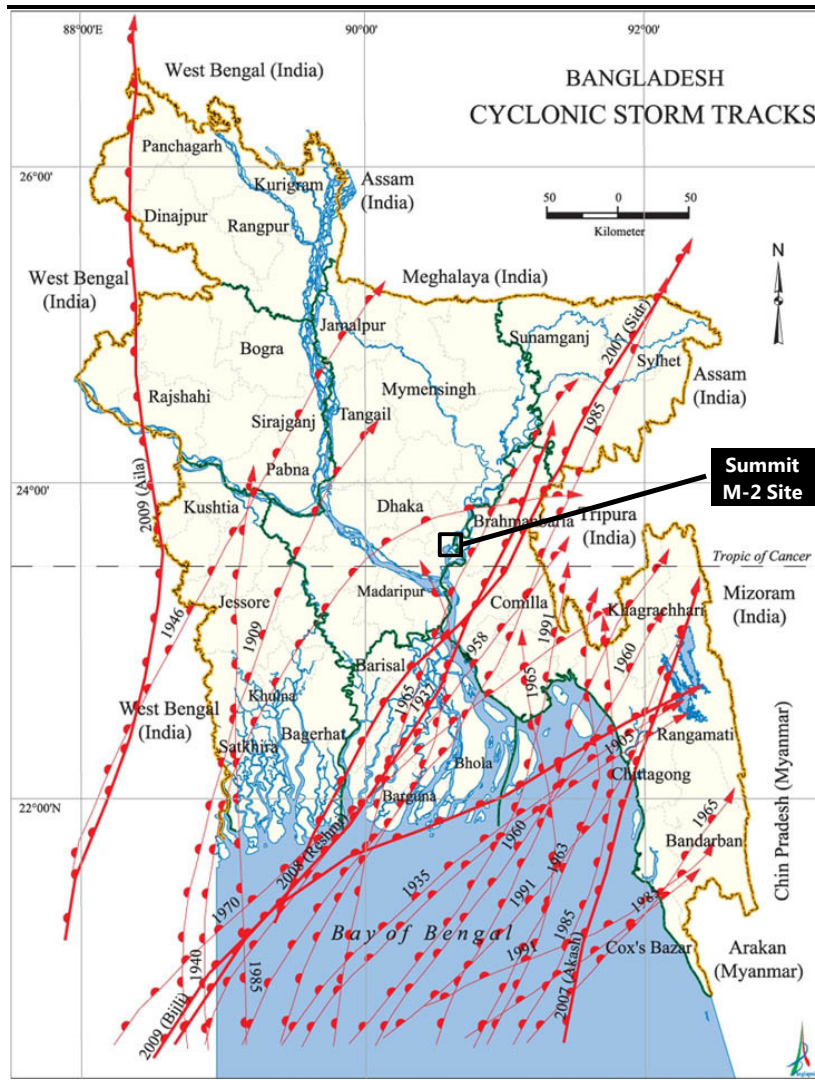
Devastating cyclones hit the coastal areas of Bangladesh almost every year usually accompanied by high-speed winds, sometimes reaching 250 km/hr or more and 3-10m high waves, causing extensive damage to life, property and livestock. Because of the funnel shaped coast, Bangladesh repeatedly becomes the landing ground of cyclones formed in the Bay of Bengal. These cyclones occur in two seasons, April-May and October-November – i.e. before and after

the monsoon. The cyclonic storm tracks in Bangladesh have been shown in **Figure 4.16**. The proposed project site is away from coastal area and cyclonic risk is very less.

Cyclones in Bangladesh are presently classified according to their intensity and the following nomenclature is in use:

- depression (winds upto 62 km/hr);
- cyclonic storm (winds from 63 to 87 km/hr);
- severe cyclonic storm (winds from 88 to 118 km/hr); and
- very severe cyclonic storm of hurricane intensity (winds above 118 km/hr).

Figure 4.16 Cyclonic Storm Tracks in Bangladesh

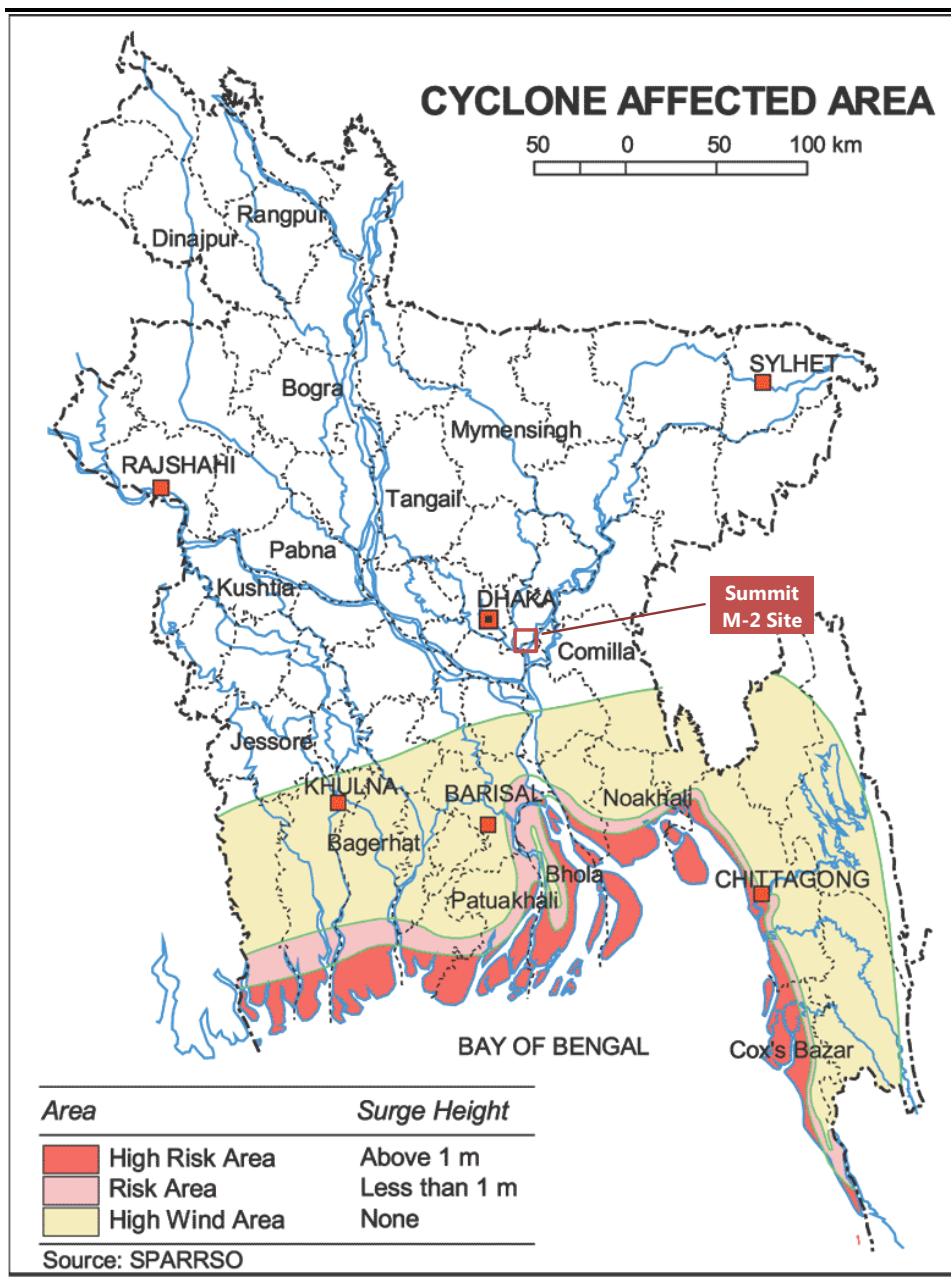


Source: Banglapedia [<http://en.banglapedia.org/index.php?title=Cyclone>]

Storm Surge

Figure 4.17 shows cyclone affected areas of Bangladesh. From the figure it is very clear that many areas of Meghnaghat area has no risk.

Figure 4.17 Cyclone Affected Area Map of Bangladesh



Source: Bangladesh Space Research and Remote Sensing Organisation (SPARRSO)
 Maps of Bangladesh
[\[https://mapofbangladesh.blogspot.in/2011/10/cyclone-affected-area-bangladesh.html\]](https://mapofbangladesh.blogspot.in/2011/10/cyclone-affected-area-bangladesh.html)

Floods

Every year near about one-fifth of Bangladesh undergoes flood during the monsoon season. A flood season in Bangladesh may start as early as May and can continue until November.

Floods of Bangladesh can be divided into three categories: (i) monsoon flood - seasonal, increases slowly and decreases slowly, inundate vast areas and causes huge loss to the life and property; (ii) flash flood-from sudden torrential flows, following a brief intense rainstorm or the bursting of a natural

or manmade dam or levee; and (iii) tidal flood - short duration, height is generally 3-6m, prevents inland flood drainage.

Figure 4.7 shows the flood affected areas of Bangladesh. The Meghnaghat industrial area is not prone to flooding. The Project site is also not affected by flood waters. In order to avoid any flooding event, BPDB had developed the Meghnaghat Power Hub; the site was elevated to one meter above the 200 year highest flood level (HFL), which is +8.0 m Public Works Datum (PWD) or +7.54 m above the mean sea level (MSL). The highest flood levels in the project area were recorded at the Meghna Ferryghat gauge station (1.5 kilometres south-east of the project site) during the monsoons of 1998, 1988, and 1974 when flood elevations of +6.76 metres, +6.55 metres, and +6.19 metres PWD were respectively noted (EIA, Meghnaghat Power Project, 2001).

4.3.12 Air Environment

To understand the present condition in the Meghnaghat area, secondary data on air quality was collected. Ambient air quality monitoring results of various studies representing different seasons are presented below:

ESIA Study of Reliance Power Project, Meghnaghat

Ambient air quality monitoring was conducted from September to December 2016 at six locations, which are shown in Figure 4.18. The results indicated that almost all the parameters were within the national limits except the PM_{2.5} and PM₁₀ crossed the national standard on 23rd and 24th of November 2016 at 2 monitoring locations (Gowal Gaon and Vati Balaki). It was an exception and may be occurred due to any incidental reason. The NO_x is the main concern to this power project and have been measured within a range of 3-17 µg/m³ in different locations throughout the monitoring period.

Figure 4.18 Ambient Air Quality Monitoring Locations of Reliance Power Project

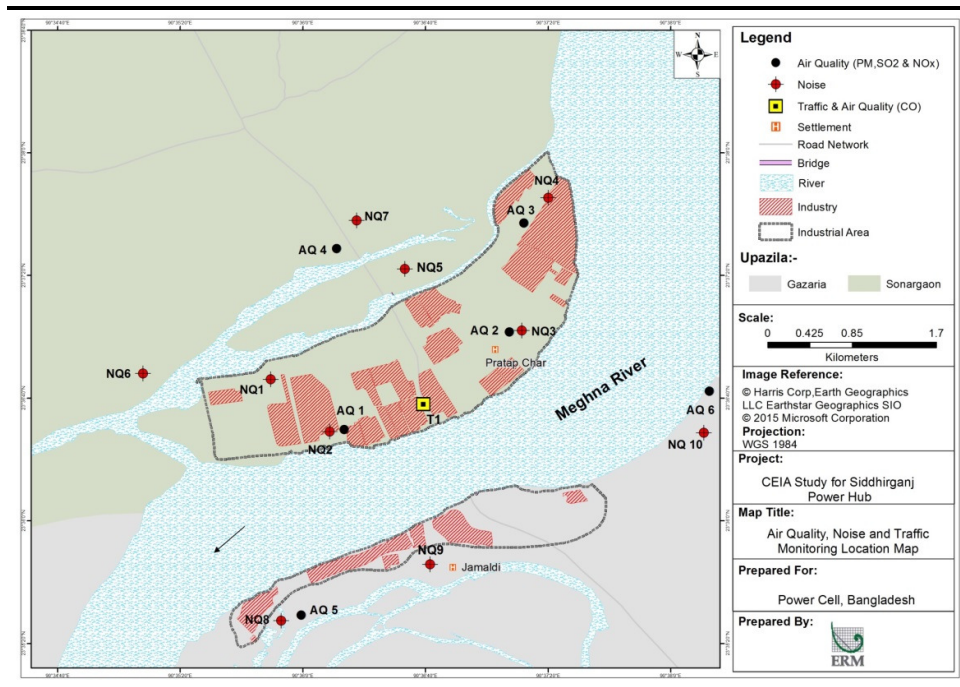


Source: ESIA Study of Reliance Power Project at Meghnaghat (2017)

CEIA Study of Meghnaghat Industrial Area

Ambient air quality monitoring was conducted from February to March 2016 at six locations, which are shown in Figure 4.19.

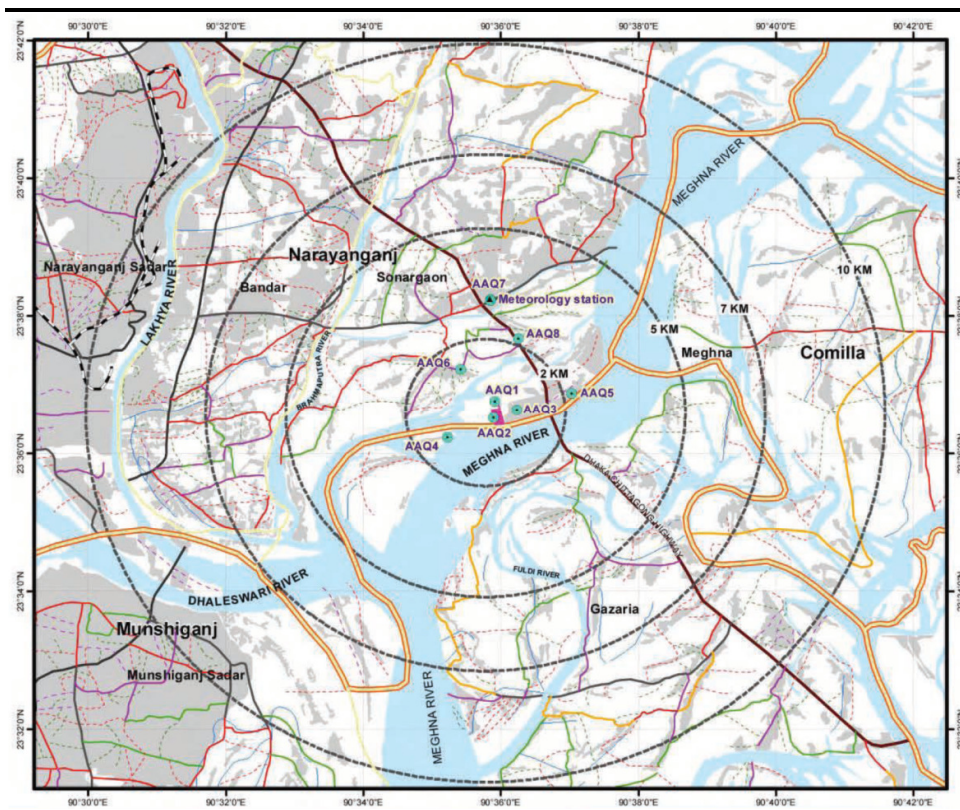
Figure 4.19 Map showing AQ Monitoring Locations - CEIA Study of Meghnaghat Region



Source: CEIA Study of Meghnaghat Industrial Area (2016)

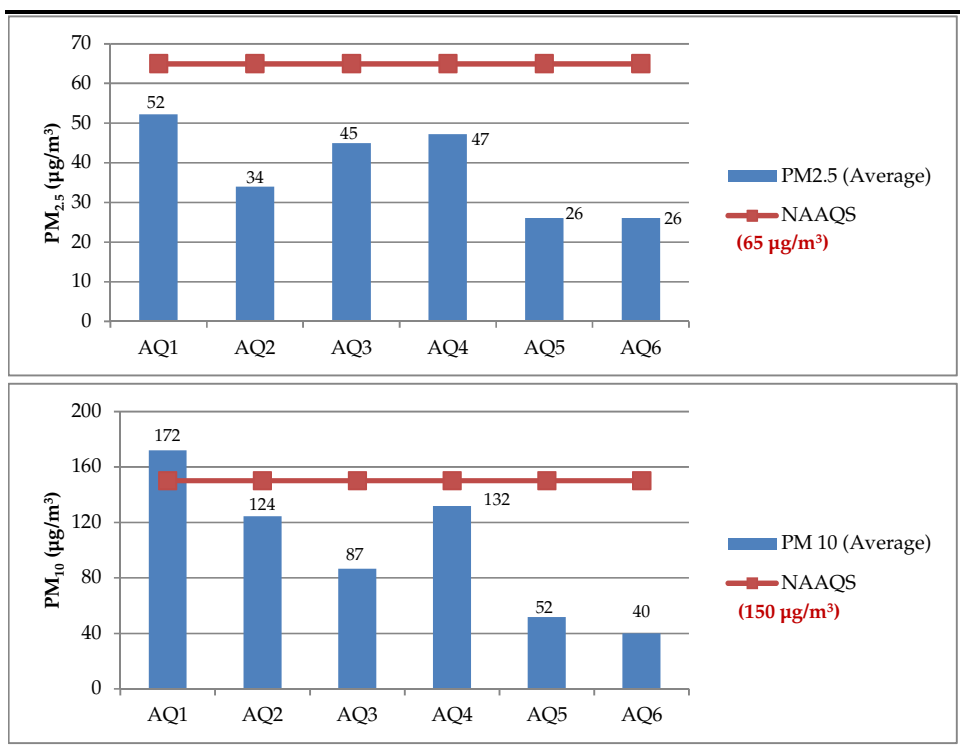
Particulate Matter (PM₁₀ and PM_{2.5}): The PM concentrations in Meghnaghat Industrial area were well within the NAAQS. The concentration of PM_{2.5} and PM₁₀ varied from 20.5 µg/m³ to 58.3 µg/m³ and 38.5 µg/m³ to 185.3 µg/m³ respectively; only at one of the locations (Islampur), the concentration of PM₁₀ was higher than NAAQS, indicative of localised contribution from cement plant and other external factors like traffic. The station wise average PM concentration is presented in *Figure 4.21*.

Figure 4.20 AQ Monitoring Network - ESIA Study of Summit M1 Project



Source: ESIA Study Report of Summit M1 Project (2012)

Figure 4.21 Station wise PM_{2.5} and PM₁₀ Concentrations in Meghnaghat Industrial Area

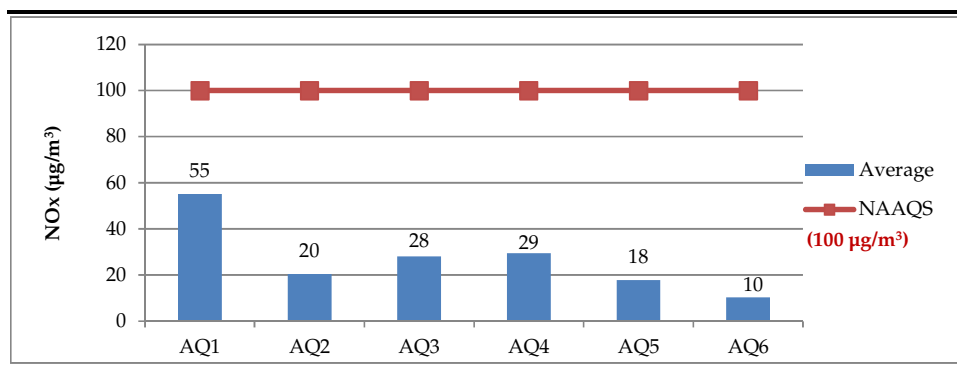


Trend of PM Concentration: The ambient air quality data monitored during 2012 in Meghnaghat Industrial area (Source: ESIA of 305-350MW Dual Fuel Combined Cycle Power Plant Project at Meghnaghat) reveals that PM₁₀ concentrations were well below the NAAQS; i.e. less than 50 µg/m³, except for at one location near the Power Hub. The general trend clearly shows that PM concentration over the period has been increased.

NOx: The concentration of NOx in Meghnaghat industrial region varied from 9.4 µg/m³ to 52.3 µg/m³. In general, the NOx concentrations were not exceeding the NAAQS, however, at only one location (Islampur, close to the Meghnaghat Power Hub) NOx concentration were found to be higher in comparison to other locations (primarily due to contribution from the Meghnaghat Power hub). The location wise average NOx concentrations for the Meghnaghat area are presented in *Figure 4.22*.

Trend of NOx Concentration: The ambient air quality data monitored in this region during 2012 (Source: ESIA of 305-350 MW Dual Fuel CCPP at Meghnaghat) indicates that that NOx concentration was well below the NAAQS; i.e. less than 100 µg/m³ (annual average). The general trend clearly shows that NOx concentration over the period has increased.

Figure 4.22 Location wise NOx Concentrations in the Meghnaghat Industrial Area



SO₂: The concentration of SO₂ was varied from 3.5 µg/m³ to 23.59 µg/m³. The Concentration of SO₂ at all locations was observed to be within the prescribed NAAQS limits of 365µg/m³.

Table 4.6 Comparative Analysis of Air Quality in Meghnaghat Area

Parameter	Regular Monitoring carried out by Summit, Jan 2017	Reliance Power, ESIA Study (Sep – Dec 2016)	CEIA Study, 2016 (Meghnaghat Area)	ESIA Study of Summit of Summit M1 Project (Mar – Jun 2012)	National Standards (ECR, 97)
PM ₁₀ (µg /m ³)	21.3 to 118.8	28.6 – 197	34.1 - 167	9.1 – 280.1	150 (24-hr)
PM _{2.5} (µg /m ³)	14.8 to 55.9	17 – 90.2	22.7 – 41.1	7.3 – 40.1	65 (24-hr)
SOx (µg /m ³)	2.0 to 25.0	4.1 – 13.1	3.5 – 23.59	<4.0 – 10.7	365 (24-hr)
NOx (µg /m ³)	4.0 to 50.3	4.8 – 15.7	9.4 – 52.30	4.9 – 34.8	100 (Annual)

The results clearly indicate that the airshed is non-degraded and most of the pollutants (except particulate matter at few locations close to the industrial

sources like cement plants and near the roads) were observed meeting the applicable national standards.

4.3.13 *Noise Environment*

The major noise generating sources for both industrial regions have been identified as industrial activities, commercial and anthropogenic activities and traffic plying along transport corridors. Industries generating high noise levels include power plants, cement plants, etc. For such industries the noise generation sources are generally housed within industrial buildings and equipped with acoustic control measures. Other industries like shipyards act as noise generation sources from open work areas. In addition the noise from the traffic plying on the major arterial roads (like Dhaka Chittagong Highway) and other internal roads is also contributing to the overall noise in the region.

Meghnaghat Industrial Area

The day time level varies from 51.9 dB(A) to 61.8 dB(A), which was well within National Ambient Noise Standard for industrial area 75 dB(A). The night time level varied from 44.8 dB(A) to 56.5 dB(A), which also well within National Standard for industrial area 70 dB(A).

However, on comparison with Ambient Noise Standards for Mixed Zone, at three locations the monitored noise levels were found to exceed both Day Time [60 dB(A)] whereas at six locations the noise levels were found to exceed the Night Time [50 dB(A)] Noise Standards.

4.4 *ECOLOGICAL ENVIRONMENT*

Terrestrial Ecosystem

The industrial zones and their adjacent areas have been significantly altered due to continued industrial development in these areas. The industrial area and their surroundings have no natural forests.

Vegetation:

Terrestrial flora is mostly recorded on homestead lands and along the river bank. In Meghnaghat industrial area, most of the industries also have no greenbelt plantation, except for the 450 MW Meghna Power Plant of Pendekar Energy.

Common plants species recorded in the industrial areas were Mango (*Mangifera indica*), Jackfruit (*Artocarpus heterophylla*), Coconut (*Cocos nucifera*), Siris (*Albizzia labbek*), Khejur (*Phoenix sylvestris*), Piyara (*Psidium guajava*), Amra (*Spondias mangifera*), Tentul (*Tamarindus indica*), Arjun (*Terminalia arjuna*), Madar (*Erythrina indica*), etc.

Fauna:

The modified habitat like agricultural land, homestead area, fallow land, ditches, etc. provides typical environment for terrestrial fauna. The faunal diversity in the industrial area was poor. Among the mammalian species, small animals are represented by mongoose, jackal, civet, squirrel, rats, mice, bats, etc. The avifauna is represented by maynas, dove, pigeon, barbet, owl, kite, drongo, woodpecker, flycatcher, crows, babbler, oriole, sunbird, sparrow, bee-eater, lapwing, etc. The reptiles are represented by common grass snake, krait, green tree snake, rat snake, cat snake, etc.

Aquatic Ecosystem

Meghna River: The aquatic habitat of the Meghna River is highly stressed but the biotic diversity is good. Consultation with local communities revealed that effluent discharged from chemical and pulp & paper industries periodically caused fish kills in the river.

Fish Species and Commercial Fishing

Meghna River: A fish study in Meghna River conducted during 2013-14¹ reported of the availability of 25 species of fishes. It was also reported that the hilsa fish occurrence has decreased in the Meghna River. About 15 endangered and threatened fish species were reported in the Meghnaghat region. These are *Notopterus Chitala* (Chital), *Labeo calbasu* (Kalbasu), *Labeo gonius* (Gonia), *Osteobrama cotio* (Dhela), *Rita rita* (Rita), *Ompok Pabda* (Pabda), *Channa Marulius* (Gajal/Gagar), *Puntius sarana* (Sarputi), *Rasbora rasbora* (Darkina), *Silonia Silondia* (Silong), *Bagarius bagarius* (Baghair), *Chaca chaca* (Chaga), *Chanda nama* (Nama chanda), *Badis badis* (Napit Koi), *Macrognathus aral* (Tara Baim)²

Fish and fisheries have been playing a vital role; not only in providing food security to the Bangladeshis but also in shaping the economy of Bangladesh. Consultation with local people and review of various study reports indicates towards earning opportunities in the fishery sector as well as prevalence of subsistence fishing.

Fishing: A wide range of fish species are caught from the Meghna River. Their variations are also dependent on the season. Usually, late monsoon (September-October) is the peak time for fishing. In that period water starts to recede. Juvenile and adult fishes also come to the main river from the adjacent floodplain areas. Again, fish species and their amount of catch usually differ from gear to gear. The most common fish species of this river are Rui, Katla, Ayre, Hilsa, Kalbasu, Bacha, Chewa, Gharua, Kaski, Chapila, Kajoli, Prawn, Eel, Puti, Boal, etc. Chewa, Puti, Rui, Katla, Ayre, Boal, Kaski, Bacha, Kajoli,.

¹ Fisheries Study at Meghna River (adjacent and around the power plant site) December 2013 to February 2014; Environmental Quality and Management System (EQMS)

² ESIA Study for 305-350MW Dual Fuel Combined Cycle Power plant project at Meghnaghat, Narayanganj

Ecological Health of the River

To understand the ecological health of the river, biomonitoring (plankton and benthos) survey data was analysed which was carried out in winter (Jan 2016) and early summer (March 2016), under CEIA study.

Status of Meghna River

Plankton:

Winter season: A total of 14 species of phytoplankton and 8 species of zooplanktons were recorded in the Meghna River.

Early summer season: 12 species of phyto-plankton and 8 species of zooplanktons were recorded. However at the minor channel of Meghna river, only three species of phyto-plankton and one species of zooplankton was recorded.

Benthos:

Winter season: Total 5 species of benthos were recorded in the Meghna River.

Early summer season: Total 5 species of benthos were recorded in the Meghna River.

Diversity Index: The diversity indices of Meghna river is presented **Table 4.7**. The diversity index indicates that ecological health of the Meghna River was moderate to good. The ecological health of Sitalakhya was poor and practically no lifeform was recorded in the major stretches of the river during the lean season.

Table 4.7 *Species Diversity Indices of Meghna River*

Winter	BM-1	BM-2	BM-3	BM-4	BM-5	BM-6	BM-7
Phytoplankton	1.497	0.935	0.365	1.497	0.241	0.863	0.93
Zooplankton	1.386	1.082	0.283	0.207	0.363	0.265	0.334
Benthos	0.819	0.623	0.66	-	-	-	0.346
<i>Early Summer</i>							
Phytoplankton	1.273	1.526	1.157	1.336	1.010	0.865	1.169
Zooplankton	1.502	0.831	0.864	1.103	0.641	0.000	0.802
Benthos	0.943	0.690	0.846	0.691	0.368	0.704	0.502

Source: Biomonitoring Survey, CEIA Study, 2016

4.5

SOCIAL ENVIRONMENT

The proposed Project site is located within Pirijpur Union Parishad in Sonargaon Upazilla, Narayanganj District. The socio-economic data of the Upazilla available from the secondary sources (published from reliable sources) were compiled and analysed. The socio-economic features emerging out of this broad analysis is discussed in sections below.

4.5.1

Study Area

This study area comprises of the area within the 10km radius of the proposed project site boundary. It is expected that key environmental and social impacts will be manifested within this zone of influence. The preliminary assessment shows that the potential direct socio- economic impacts may be restricted within 2 km at the maximum. The study area therefore is further divided into core zone and buffer zone. The core area (within 2 km) includes project footprint and direct social impacts caused due to the land procurement, impact on livelihoods or community health. The buffer area (between 2 -10 km) is considered as the area beyond core zone which may experience indirect impacts such as influx, increase in traffic etc. The Union Parishads within study area is presented in *Table 4.8* and a map showing the same is presented in *Figure 4.23* and *Figure 4.24*.

Table 4.8 Study Area Break-up

Sl. No.	Type of Area	Name of Administrative Unit	
		Upazilla	Union Parishad/ Paurosabha (Municipality)
1.	Core Area	Sonargaon	Pirijpur
			Shambhupura
		Gazaria	Hossaindi
2.	Buffer Area	Narayangunj	Gognagar
			Narayanganj Sadar
			Siddirganj Paurosabha
		Sonargaon	Mugrapara
			Sonargaon Sadar
			Shanmadi
			Baidyerbazar
			Bardi (south-wester part)
		Gazaria	Gazaria
			Baluakandi
			Tengerchar
			BhaberChar
		Munshigunj	Imampur (northern part)
			Munshiganj Paurosabha
		Bandar	Pandhasar (north-eastern part)
			Madanpur (Southern part)
			Dhamgar
			Musapur
			Bandar
			Kalagachia
Kadam Rashul Paurosabha			
Meghna	Chalibhanga		
	Chandanpur (south-western part)		
	Barakanda		
	Luter Char		
	Gobindapur (western part)		
Maniker Char (western part)			

The project footprint is mostly located in Pirijpur Union. As the project is located on the bank of a major river (Meghna) on which a significant number of fishermen depend for their livelihood, the neighbouring Union Parishads

(both upstream and downstream) are considered for potential livelihood impacts. Preliminary consultations with communities revealed that though small number of fishermen families is found in Pirajpur Union, however Char Balki which is under Hossaindi Union Parishad of Gazaria Upazila is a fishing hamlet. This hamlet is located on a riverine island across the project site and its habitants use adjacent areas for capture fishing as well as 'captive or cage fishing' locally referred to as 'kata fishing'. Therefore, it was decided to cover a wider area (2kms) as a core area for socio-economic impacts of the project.

4.5.2 *Administrative Structure*

The Summit M2 power plant is located within the Meghnaghat Power Hub in Sonargaon Upazila of Narayangunj District. The study area (10km radius) for the project is administratively divided into 4 districts covering 7 Upazilas – Sonargaon and Narayangunj Sadar under Narayangunj District, Gazaria and Munshigunj Sadar under Munshigunj District, Daudkandi and Homna under Comilla District and Matlab Upazila under Chandpur District.

The core study area (2 km radius around the project footprint) covers 3 Union Parishads – Pirijpur, north-eastern part of Shambhupura in Sonargaon Upazila and Hossaindi in Gazaria District. The administrative units for the core area are given in the *Table 4.9* below.

Table 4.9 *Administrative Hierarchy in Core Study Area*

District	Upazila	Union Parishad
Narayangunj	Sonargaon	Pirijpur Shambhupura
Munshigunj	Gazaria	Hossaindi

4.5.3 *Demography of Project Area*

As per the Census of Bangladesh, 2011, the total population of Narayangunj District is 29,48,217 and Munshigunj is 14,45,660 comprising 6,75,652 and 3,13,258 households respectively. The average annual increase in population since 2001 has been estimated at 3.05 percent for Narayangunj District and 1.10 percent for Munshigunj District.

The following *Table 4.10* provides an overview on the population trends of the two districts within the core study area over a decade from 2001 to 2011.

Table 4.10 *Population Trends of Narayangunj and Munshigunj Districts*

Index	Population Details of Narayangunj District		Population Details of Munshigunj District	
	2011	2001	2011	2001
Total Households	6,75,652	4,53,627	3,13,258	2,50,850
Total Population	29,48,217	21,73,948	14,45,660	12,93,972
Annual rate of Growth over period of 10 years (%)	3.05	2.16	1.10	0.85
Population Density per sq.km	4308	3161	1439	1355

Index	Population Details of Narayangunj District		Population Details of Munshigonj District	
	2011	2001	2011	2001
Average Household (HH) size	4.34	4.76	4.55	5.13

Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS)

Sonargaon Upazila is coming up as a new industrial hub in Narayanganj District. Total population of Sonargaon Upazila is 400,358 as per Census of Bangladesh, 2011 and it comprises 89,565 households. Gazaria Upazila has a population of 157,988 as per Census 2011 reports and comprises of 34,994 households.

Table.4.11 provides the population trends of the two Upazilas.

Table.4.11 *Population trends of Sonargaon & Gazaria Upazilas*

Upazila	Index	2011	2001
Sonargaon	Total Households	89,565	60,805
	Total Population	4,00,358	3,05,562
	Annual rate of Growth over period of 10 years (%)	2.70	1.55
	Population Density per sq.km	2332	1780
	Sex Ratio		
	Average Household (HH) size	4.43	4.98
Gazaria	Total Households	34,994	26,651
	Total Population	1,57,988	1,38,108
	Annual rate of Growth over period of 10 years (%)	1.33	0.73
	Population Density per sq.km	1206	1055
	Sex Ratio		
	Average Household (HH) size	4.50	5.16

Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS), 2011

Figure 4.23 Study Area Map

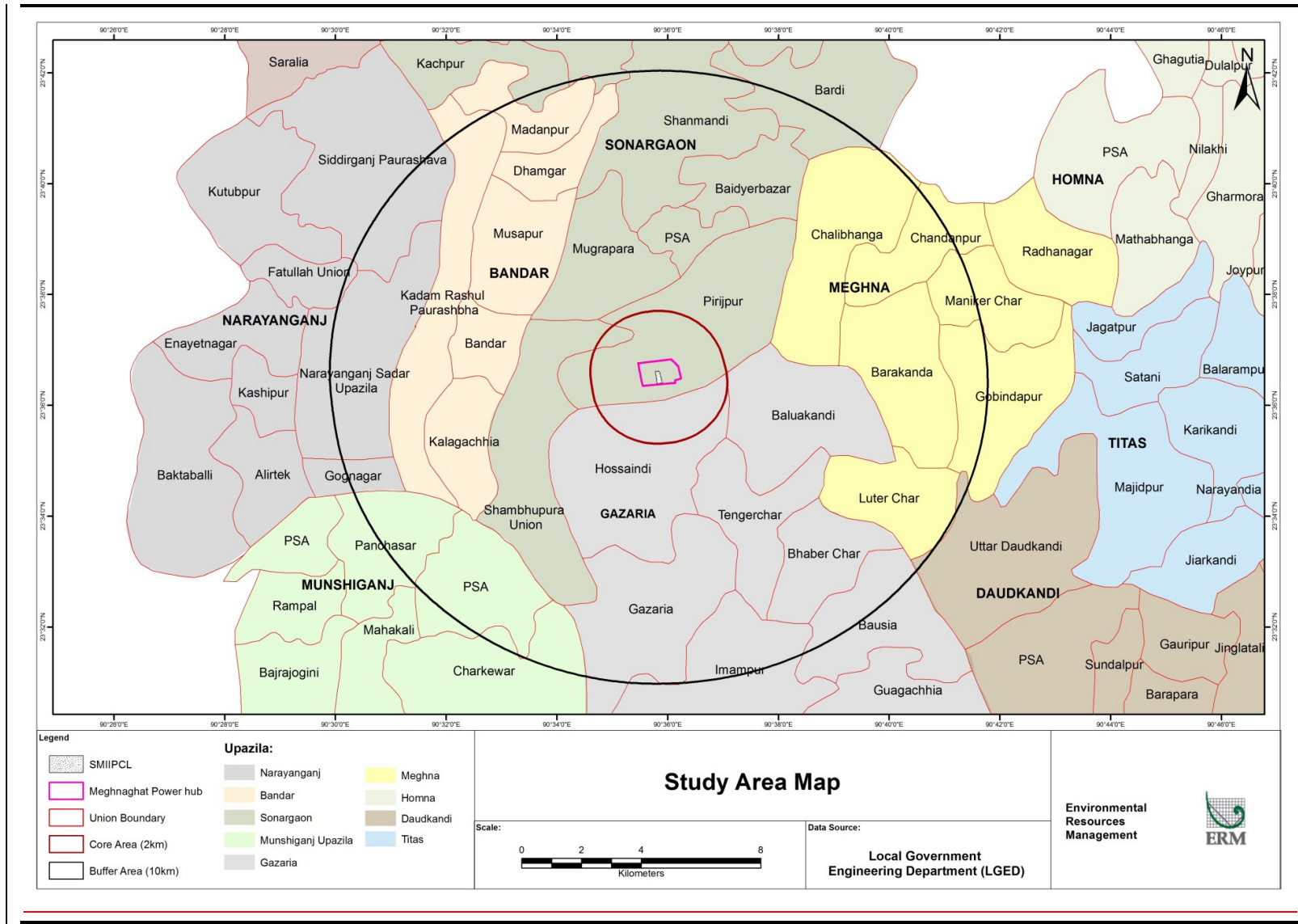
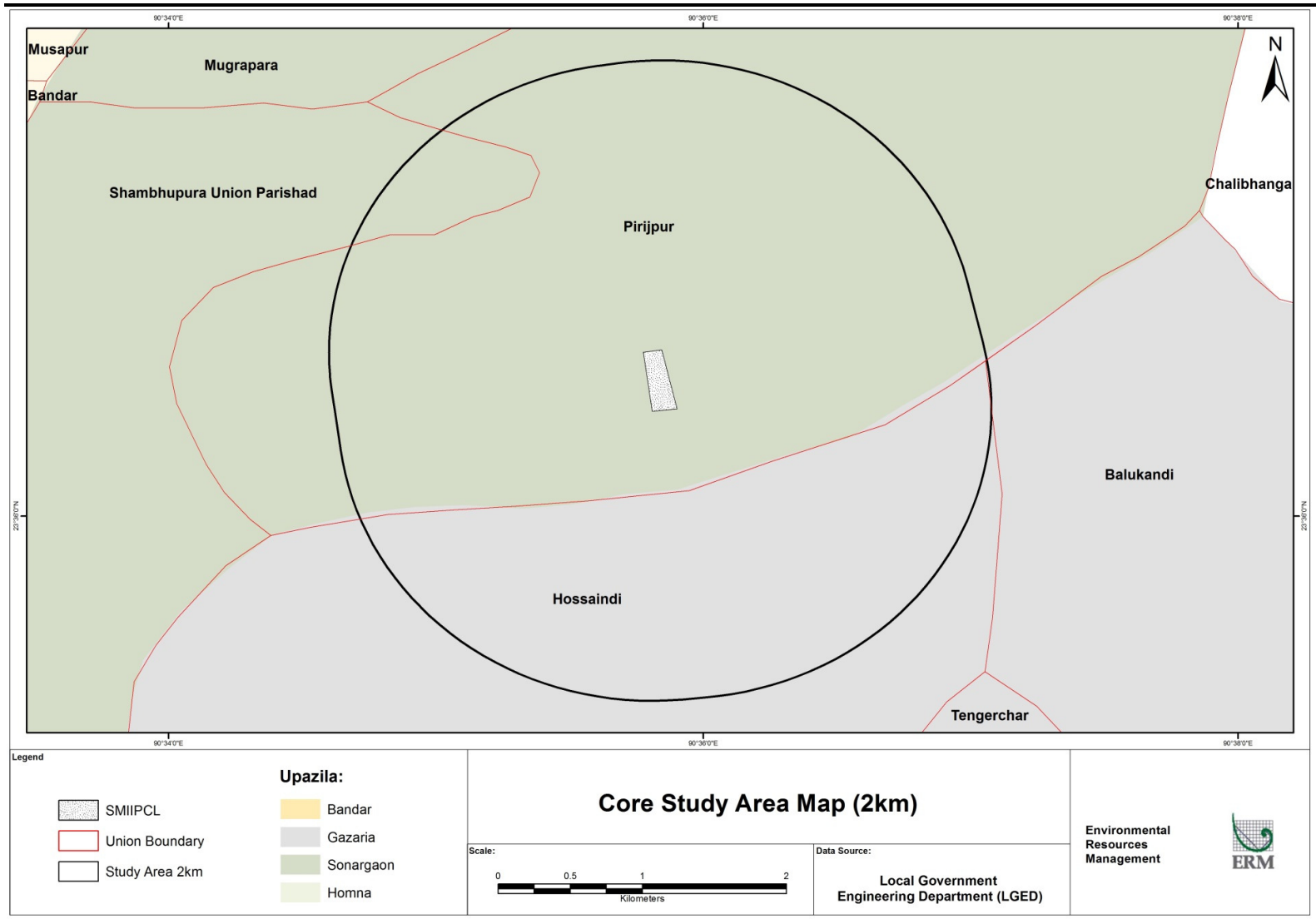


Figure 4.24 Core Study Area Map



The core study area covers Pirijpur and Shambhupura Union Parishads in Sonargaon Upazila covering a population of 45,440 and 26,646 respectively. It also covers Hossaindi Union Parishad in Gazaria Upazila comprising a population of 24,680.

Demographic profile of the Union Parishads in core area is provided in *Table 4.12*. In Pirijpur Union and Hossaindi Union, sex ratio indicates that number of males per 100 female is higher.

Table 4.12 *Demography Profile of the Core Study Area*

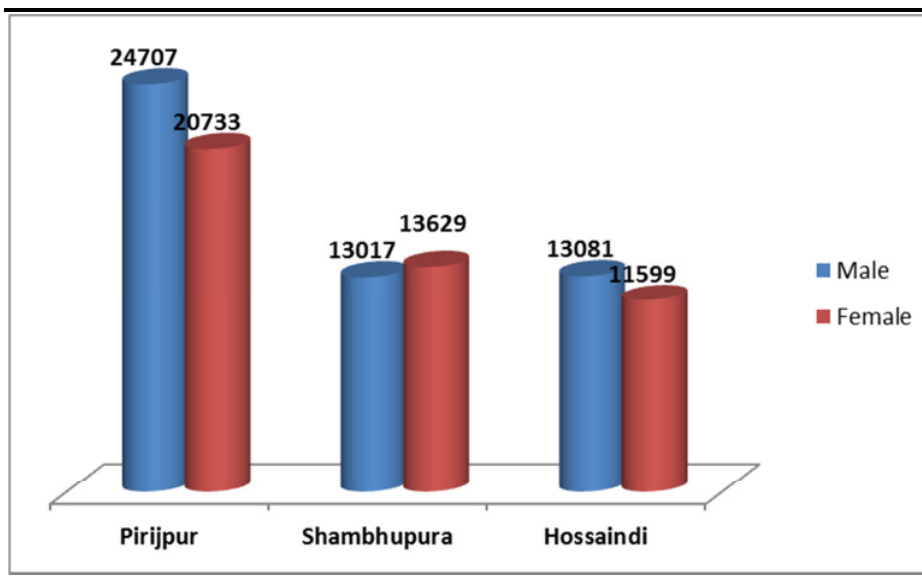
Union Parishad	Total HH	Total Population	Sex Ratio
Pirijpur Union	9917	45,440	119
Shambhupura Union	5,967	26,646	96
Hossaindi Union	5,246	24,680	113

Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS), 2011

In Narayanganj District the population increased by 35.61 percent at a decadal growth rate of 3.56 percent and in Munshiganj the population increased by 31 percent at a decadal growth rate of 1.17 percent from 2001 to 2011. Decadal growth rate in Gazaria Upazila (1.49 percent) is higher than that of Munshiganj District. In Sonargaon Upazila the decadal growth rate is less than the Narayanganj District however the population in the upazila has increased by 31 percent. The increase in population and decadal growth rate may be contributed to population influx to the districts and upazilas due to rapid pace of industrialization in the region.

Comparison of the female and male population shows that in two of the unions (Pirijpu and Hossaindi) male population is higher than the female population. *Figure 4.25* provides the sex wise population distribution in the three union parishads within the core study area. Presence of higher number of male population may be considered as an indication of presence of migrant workforce in the core area.

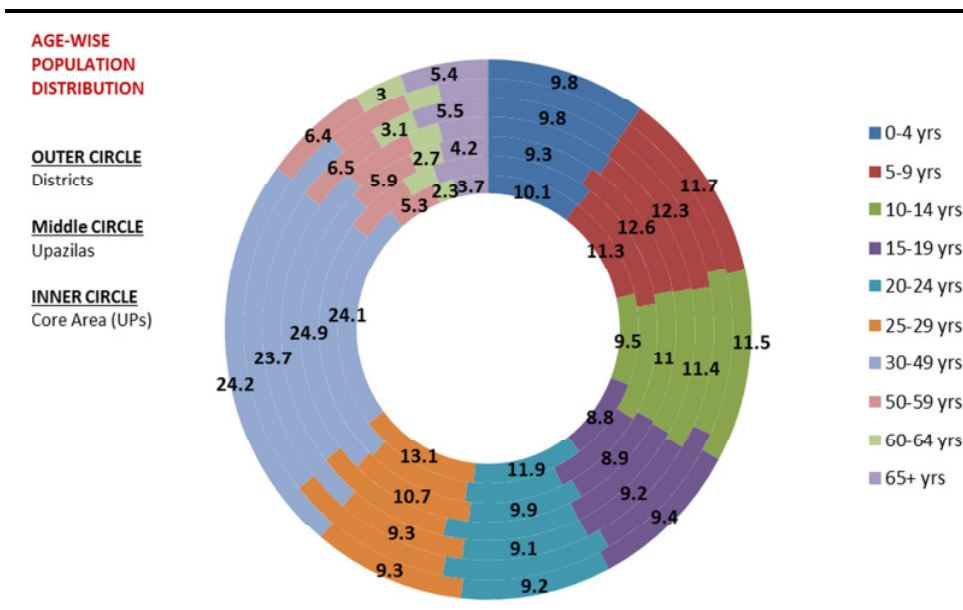
Figure 4.25 Sex wise Population Distribution within Core Study Area



Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS), 2011

The census of Bangladesh divides the population age groups into ten (10) categories. These being, those below the age of 4, between 5 and 9, 10 to 14, 15 to 19, 20 to 24, 25 to 29, 30 to 49, 50 to 59, 60 to 64 and those above the age of 64 respectively. Figure highlights the comparative trend in the age-wise population distribution in core study area with that of the overall upazila and district.

Figure 4.26 Comparison of Age-wise Population Distribution within Core Area, Upazila and District



Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS), 2011

It can be observed from the above figure that the larger proportion of the population in both core and buffer area falls within the age group of 30 to 49

years followed by population within the age group of 05 to 09 years, though the age group are not in equal interval. The trend is similar at both Upazila and District level.

Thus, 50 percent of the population in the core and buffer area is in the economically active age group (15 -19 adolescent worker and 20-59 years as adult worker), while rest the remaining 50 percent of the population is understood to be dependent. There are about 25-30 percent of the population which falls within the age bracket of 15 to 30 years, which can be considered as the potential population which looks for livelihood diversification.

4.5.4 *Vulnerability*

In addition to the infant and elderly age group, widows/separated population and disabled/differently abled population are considered as vulnerable population. The disabled or differently abled population constitutes 1.2 percent of the total population with in the study area. The widowed population in the two districts is 0.65 percent and divorced/separated population is 0.1 percent. Widowed population in the core area is 2.3 percent and separated/divorced is 0.4 percent.

As per the international social safeguard requirements the ethnic minorities population is considered as the vulnerable population. The districts of Narayanganj and Munshiganj have ethnic minority population of 899 and 103 respectively as per Census, 2011 Bangladesh Bureau of Statistics. Also, as per Census 2011, only one ethnic household is present within the core study area.

4.5.5 *Literacy Profile*

The literacy rate of Narayanganj District and Sonargaon Upazila is 57.1 and 54.6 percent respectively, which is lower than Pirijpur Union – that records for highest literacy rate within the core study area . The literacy rate of Munshiganj Within the core study area literacy rate in Pirijpur Union (59.8 percent) is higher than the national average literacy rate of 56.75 percent, while the overall literacy rate in other two unions – Shambhupura and Hossaindi is lower than the national rate. The higher literacy rate in Pirijpur and Shambhupura Unions, than the literacy rate of Sonargaon Upazila can be contribute d to the presence of more educated industrial and factory workers in the area.

Table 4.13 *Literacy Profile in Study Area*

	Male Literacy Rate	Female Literacy Rate	Overall Literacy Rate
<i>Union Parishads (Core Study Area)</i>			
Pirijpur	63.8	55	59.8
Shambhupura	57.3	53.5	55.3
Hossaindi	55.2	51.9	53.6
<i>Upazilas</i>			
Sonargaon	56.7	52.5	54.6
Gazaria	59.6	54.8	57.2
<i>Districts</i>			

	Male Literacy Rate	Female Literacy Rate	Overall Literacy Rate
<i>Union Parishads (Core Study Area)</i>			
Narayanganj	59.5	54.6	57.1
Munshiganj	56.4	55.7	56.1

Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS), 2011

With respect to individual literacy trends amongst males and females, it can be observed that literacy amongst male population is higher than their female counterparts in the core study area.

4.5.6 *Public Infrastructure and Access to Amenities*

Education Facility

As per district statistics, (2011) for Sonargaon Upazila there are 82 government primary school, 29 registered primary schools, there are no Government secondary school, however, there are 28 non- government secondary schools, no Government Colleges, 4 non-government college are present. Other than that 64 madrasah, 89 kawmi madrasah and 64 ebteedayee madrasah and 5 technical and vocational institutions are also present in this Upazila (*Table 4.14*).

In Gazaria Upazila there are 63 government primary school, 16 registered primary schools, there are no Government secondary schools, however, there are 16 non- government secondary schools, one Government Colleges, one non-government college are present. Other than that 5 madrasah, no kawmi madrasah and 8 ebteedayee madrasah and one technical and vocational institution are also present in this Upazila.

Note: Union Parishad level data was not available in the District Statistics (2011).

Table 4.14 Education Infrastructure in Upazilas and Districts

Upazila / District	Govt. Primary School	Registered Primary School	Govt. Secondary School	Non-Govt. Secondary School	Govt. College	Non Govt. College	Madrasah	Kawmi Madrasha	Ebtedayee Madrasah	Technical & Vocational Institution
Upazilas										
Sonargaon	82	29	0	28	0	4	10	19	3	0
Gazaria	63	16	0	16	1	1	5	0	8	1
Districts										
Narayanganj	425	79	2	163	4	21	64	89	64	5
Munshiganj	510	69	3	120	4	14	68	77	31	7

Source: District Statistics -2011 – Narayanganj and Munshiganj

Housing and Sanitation

According to population and housing census, there are 20,891 households with in the core study area (Pirijpur, Shambhupura and Hossaindi Unions). Distribution of households by structures shows that kutcha residential structures (65.4 percent) are highest within the core study area followed by semi-pucca structures (22 percent) and pucca structures (*Table 4.15*). Analysis of the census 2011 data shows that percentage of kutcha structures are highest in Hossaindi Union in Gazaria Upazila and pucca residential structure is highest in Pirijpur Union in Sonargaon Upazila.

Table 4.15 *Distribution of Type of Residential Structures in Core Study Areas*

Unions	No. of Households	Residential Structures				
		Pucca	Semi-pucca	Kutcha	Jhupri	
Pirijpur	9757	21.5	31.5	46.8	0.2	
Shambhupura	5961	9.4	21.9	67.8	0.9	
Hossaindi	5173	5.5	12.6	81.6	0.3	

Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS), 2011

The census 2011 information indicates that the sanitation facilities within the core study area comprises mostly of sanitary hardware with dry disposal mechanism (72.5 percent). A smaller percentage of the households (21.6 percent) were observed to be using sanitation facilities with water sealed sanitary latrines. Practice of open defecation or absence of any form of sanitation facilities was observed within the unions, although the percentage is low (*Table 4.16*).

Table 4.16 *Distribution of Sanitation Units in Core Study area*

Union	No. of Households	Sanitation Units				
		Water sealed	Non-water sealed	Non-sanitary	None	
Pirijpur	9757	21.6	69	8.7	0.6	
Shambhupura	5961	2.6	94	2.9	0.5	
Hossaindi	5173	14.2	54.5	26.2	5.2	

Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS), 2011

Health Facility

The primary centres for immediate medical assistance at the Upazila are the private or government clinics and the health complexes located at in the upazilla and the union levels respectively. However, these clinics and health complexes are mostly for diagnosis of minor medical conditions and are not equipped to handle any serious medical conditions or surgical procedures. Assistance in those regards is provided at either district level hospital or private hospitals.

The *Table 4.17* provides an overview of the medical and healthcare infrastructure within the two Upazilas and Districts.

Table 4.17 Healthcare Infrastructure Statistics for Upazilas & Districts in Study Area

Upazila / District	Medical College Hospital	District Hospital	General Hospital	Upazila Health Complexes	Union Sub Centres	Private Clinics
Upazila						
Sonargaon	0	0	0	1	3	11
Gazaria	0	0	0	1	4	2
District						
Narayanganj	0	1	1	4	12	65
Munshiganj	1	1	0	5	26	53

Source: Health Bulletin 2016, for Sonargaon & Gazaria Upazilas, Narayanganj & Munshiganj Districts

Financial Institutions

Details of the Financial Institutions in the two Upazilas – Sonargaon and Gazaria and two Districts – Narayanganj and Munshiganj are provided in **Table 4.18**.

Table 4.18 Financial Institutions in Upazilas & Districts in Study Area

Upazila/ District	Nationalized Commercial Bank	Private Commercial Bank	Krishi Cooperative Bank	Grameen Bank
Upazila				
Sonargaon	7	7	2	3
Gazaria	7	6	2	3
District				
Narayanganj	83	50	14	15
Munshiganj	52	33	17	24

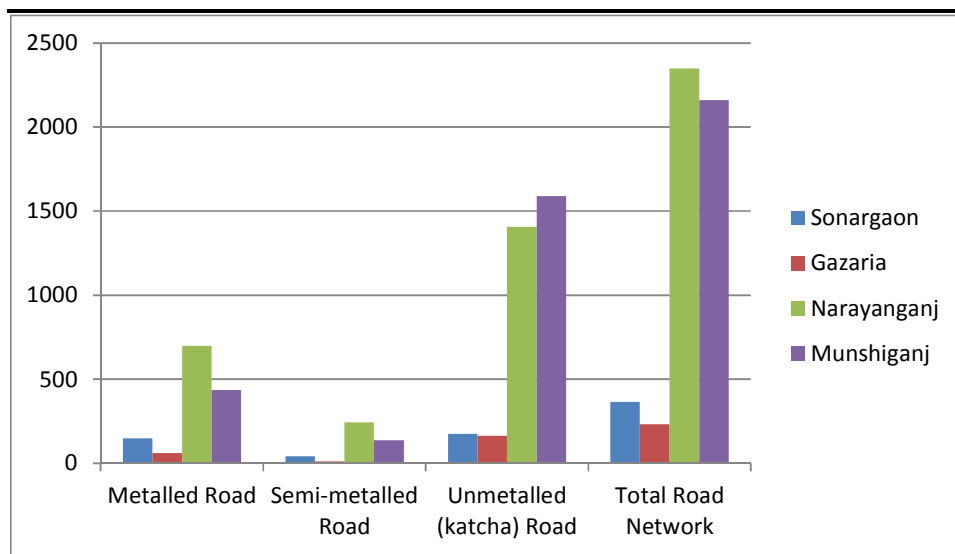
Source: District Statistics -2011 – Narayanganj and Munshiganj

Road and Transportation

The districts of Narayanganj and Munshiganj have a total road network of 2348.12 km and 2160.83 km respectively. In Sonargaon and Gazaria Upazila total road network is 364.25 km and 232 km respectively.

The following **Figure 4.27** provides the percentage of different type of road with in the study area. Percentage of un-metalled road in both the Upazilas is higher than the metalled roads. However, within the Meghnaghat Power Hub the blacktop motorable roads are available. There is existing road connection upto the Project site. This infrastructure may be required to be improved to make it capable of handling the transport load due to industrialisation.

Figure 4.27 Percentage of different type of road network with the study area



Source: District Statistics 2011, Bangladesh Bureau of Statistics (BBS)

Waterway

Sonargaon Upazila is not connected by waterways, however Gazaria Upazila is connected by 18 km waterways (river and canals) in monsoon and 28 km of waterways round the year as per information available from District Statistics, 2011.

Railway

Both Sonargaon and Gazaria Upazilas are not connected by railways.

Power Supply

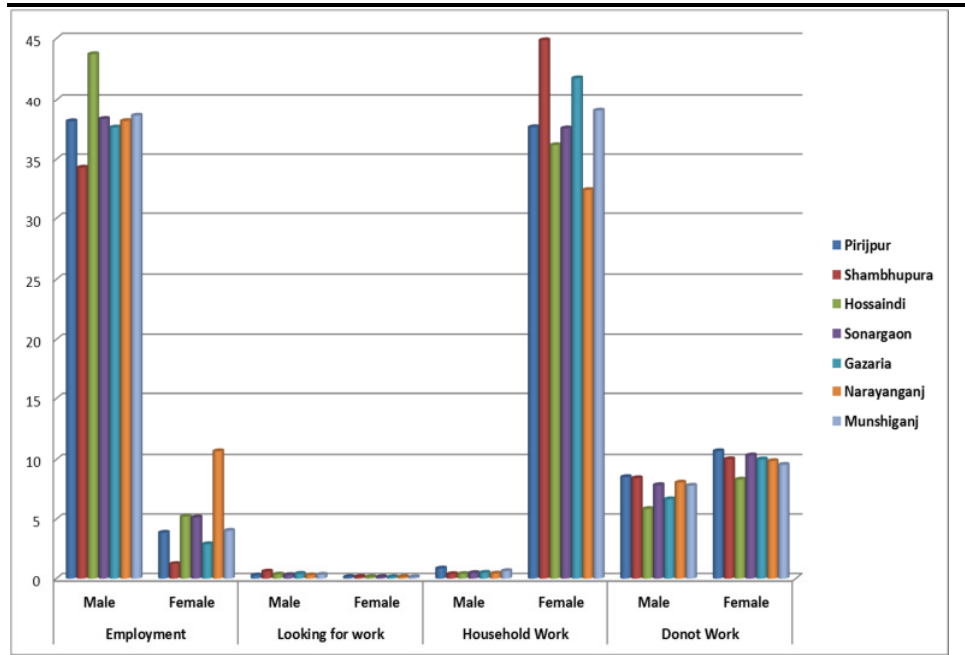
In Sonargaon Upazila 96.9 percent of the households and in Gazaria Upazila 77.6 percent households have electricity connection. Percentage of household electricity connection is higher in Pirijpur Union (98 percent) and Shambhupura Union (97.4 percent) than the Upazila. However, the rate of household electricity connection is very low (59.9 percent).

4.5.7 *Occupational Pattern*

The employed population in the districts of Narayanganj and Munshiganj are 325273 and 147819, which is 48.82 percent and 42.64 percent respectively of the total population. Within the core area the employed population is higher in Hossaindi Union which is south –west of Pirijpur Union, indicating that a large population of workers working in the Meghnaghat industrial hub potentially resides in this union. In the core study area Pirijpur, Shambhupura and Hossaindi, the rate of employment is 42.02, 35.68 and 48.94 percent respectively.

Employment status of the women shows that 32.48 percent in Narayanganj and 39 percent in Munshiganj are involved in household work. In the core study area 39.55 percent women are involved in household activities and about 10 percent of the female population do not work at all.

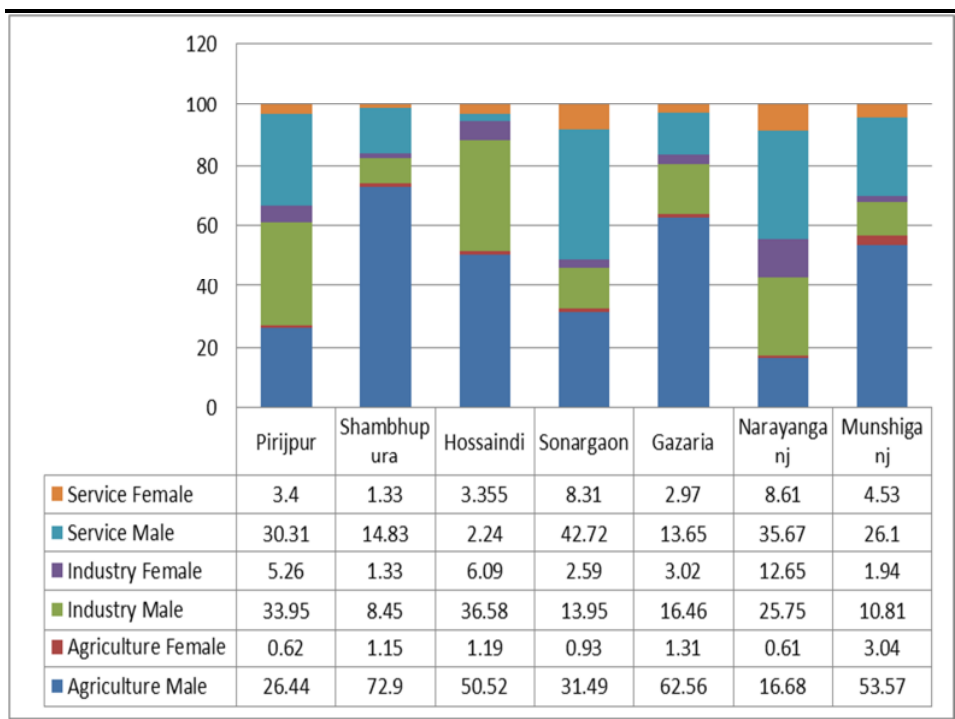
Figure 4.28 Employment Pattern



Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS), 2011

It can be observed from population census data that the main source of livelihood for a majority of the population is agriculture and related activities. Being an industrial zone number of industrial workers and service sector work provides a considerable amount of employment. Percentage of industrial workers is highest in Hossaindi Union (36.58 percentage) within the core study area, followed by Pirijpur Union (33.95 percentage). Service sector employment is higher in Narayanganj District than in Munshiganj (Figure 4.29).

Figure 4.29 Sector Wise Employment



Source: Population and Housing Census 2011, Bangladesh Bureau of Statistics (BBS), 2011

Industrialisation and the Local Economy

The local economy is driven by the presence of a large number of industries and their ancillary/associated activities. Now Narayanganj and especially Sonargaon is an industrial zone. There are already three power plants adjacent to the project. Within three kilometre radius of this project, there are shipyards, cement plants, a print and packaging industry to name a few. Many chatal (rice husking mills) are found in this bank of the Meghna River. So, many local workers are getting employment in the chatal for husking rice. And most of them are female workers. Across the river from the project site, there are many more industries, e.g. shipbuilding industry, chemical factory, refinery etc. making the area around the project industrially significant at a highest level.

Agriculture

The study area is low-lying especially Sonargaon portion. Main crops grown are Aus, Aman and Boro. The paddy is grown in the main three seasons of the year. Besides these, potatoes, sweet potatoes, oil seeds, vegetables, arum, til (sesame), wheat, sugarcane, mustard, bottle gourd etc. are cultivated in the study area. Fruits like, jackfruit, lemon, watermelon are also produced.

Fishing

Meghna River is enriched with different kinds of fishes and many people around the area depend on fishing across Meghna River for their living. The

river Meghna is flowing beside the project area. Production of cultured fish is 250kg/Acre (0.25 metric ton) and open water fish production is 500 kg/Acre (0.5 ton.). Major fish varieties are Ruhi, Katla, Taki, Kai, Magur, Singhi and Boal etc. Kai and Singhi are nearly extinct varieties. And rare fishes like River Pangas, Rani, Raia, Mahashail and Lacho fish are totally extinct varieties. Three kinds of fishermen can be found in the study area.

- Subsistence: These fishermen catch fish for just to have one or two meal. They don't depend on fishing for their living.
- Intermittent: These fishermen catch fish as a part time profession to add a little in their overall income.
- Professional: These fishermen catch fish almost every day and their livelihood depends on it. Fishing is considered to be their main source of income

At present, it is reported that there are fishing community or fishing households who reside along the banks of the Meghna River. Preliminary consultations reveal that around 40-50 fishermen families live in Char Balaki and nearly 150 fishermen fish in the core area. Their fishing practices and locations change according to the seasonal conditions. Further details are to be studied to understand their dependence on Meghna River and its aquatic life.

At present, it is reported that there are some professional fishing community or fisherman who reside across the other end of the Meghna River. There is no specific data available at this stage on their exact numbers but according to fishermen, around 40-50 fishermen families live in Charbalaki and nearly 150 fishermen fish around the area. During monsoon season, some people catch fishes in the upper reaches of the Meghna River.

Cattle Rearing

There are no cattle farms /animal husbandry farms in the area but people have been observed to keep a few cows in their home as means of supplementing their income sources. Most of the cattle owners work in various industries near the project site and keep cows as a source of additional income. These cows graze near the project site – approximately around 25-30 Nos. The owners can be expected to find other grazing grounds after the completion of the project considering that the number of cows is few and there are empty lands that are available within the industrial area adjacent to the project site.

4.5.8 Cultural Resources

No significant archaeological or historically important structure or sites are reported from the study area. But at about six to seven kilometre distance from the project site, the historical Panam City is situated. However, there will not be any impact on this historic site due to the project.

There are few other historically significant places situated in the Sonargaon Upazila namely Single domed mosque built by JalaluddinFatheh Shah, Tomb of Sultan GhiyasuddinAzam Shah, single domed mosque built by AlauddinHussain Shah, Tomb of Shah Langar, PanchPirDargah, grand trunk road, Khasnagardighi, Company Kuthi, Yusufganj mosque, Goaldi mosque and Langalband (holy bathing spot). None of these places are close enough to be adversely affected by the project.

5.1 PROJECT CATEGORISATION AS PER DOE, MINISTRY OF ENVIRONMENT AND FOREST, BANGLADESH

Depending upon location, size and severity of pollution loads, projects/ activities have been classified in the ECR, 1997 into four categories: *Green*, *Orange A*, *Orange B* and *Red*, respectively, to nil, minor, medium and severe impacts on important environmental components (IECs).

As per the *Schedule-1* of the ECR 1997, corresponding category related to power plants and associated facilities (e.g. laying of natural gas pipeline from nearest distribution point up to the power plant; water pipelines for intake and outfall; and fuel oil supply pipeline), fall under *Red Category* for the following components:

- Item 6 : power plants
- Item 64: water, power and gas distribution line laying/ relaying/ extension.

5.2 PROJECT CATEGORISATION AS PER ADB SAFEGUARD POLICY STATEMENT

Categorization for the proposed Project was undertaken by using ADB's Rapid Environmental Assessment (REA), Involuntary Resettlement (IR) and Indigenous People (IP) Assessment checklists during the screening and scoping exercise. The REA checklist of the Project for the Thermal Power Plant Sector has been presented in *Annex A*. The IR Assessment checklist and Indigenous People (IP) Assessment checklist have been presented in *Annex B* and *Annex C*, respectively. The findings of the assessment are presented in *Table 5.1*.

Table 5.1 Project Categorisation as per ADB Safeguards

S. No.	Criteria	Relevance	Remarks	Category
1	Environmental Categorization			
(a)	Irreversible	Environmental issues and impacts of the Project are anticipated during the construction and operation of the power plant and development of associated infrastructure (such as gas pipeline, construction and operation of jetty at Meghna River, etc.).	Irreversible impacts due to the Project include: <ul style="list-style-type: none"> • Increase noise and vibration during the plant construction and operation • Change in air quality due to existing and proposed projects • Affected aquatic ecology and surface water quality due to cooling water and treated effluent discharge from the power plant • Occupational health 	<i>Based on, irreversible, diverse and cumulative impacts, it should be categorized as 'A'.</i>

S. No.	Criteria	Relevance	Remarks	Category
			and safety; <ul style="list-style-type: none"> • Community health and safety; • Risks due to transport, storage and handling of highly flammable chemicals; • Associated development in the area. 	
(b)	Cumulative	Three operational power plants in the neighbourhood. Planned developments within the power hub. No. of other industrial operations within Meghnaghat north and south industrial areas	Cumulative impacts on physical, biological and socio economic environmental conditions	
(c)	Diverse	Nature of activities	The nature of activities is not diverse for the area, as there are already three operational power plants.	
(d)	Unprecedented	Change in landuse	The Project is a green-field project being proposed on developed land within a Power Hub. Summit Group is already having an operational power plant next to it. The Project and its impacts are therefore having precedence; however, this development is going to attract more industrial and infrastructure development in the neighbourhood, which is unprecedented. There will however be no change of land use due to the Plant	
2	Involuntary Resettlement Categorization			
(a)	Mode of Acquisition	By Land Lease Agreement	14.28 acres of land for the Project will be obtained through process of land lease agreement from BPDB. In addition to that about 9.4 acres of land will be required for Gas Supply Line, Laydown Area and Worker's	<i>The land will be obtained by the Project Proponent through land lease agreement from BPDB. No land acquisition will take place for the proposed</i>

S. No.	Criteria	Relevance	Remarks	Category
			Accommodation during construction period. This will be obtained through land lease agreement from BPDB and Government.	<i>project.</i>
(b)	Precedence	BPDB currently owns the land (14.28 acres) and intends to lease to the Project Proponent for a period of 25 years. In addition, land is intended to be taken from BPDB and Government through land lease agreement for Gas Supply Line, Laydown Area and Worker's Accommodation during construction period.	The proposed project area was acquired by BPDB in 1997-98. Prior to acquisition this char area was only used for cultivation in dry season. Presently there is no cultivation done. The project area is fenced and grazing is not observed. There is no settlement, trees or and crop cultivation in the project area. Therefore, R&R issue is not applicable for this project.	<i>During scoping visit no evidence of any form of land related dependence (homestead area or livelihood) was observed at the site location.</i> <i>Hence on Involuntary Resettlement, the Project shall be categorised as 'C'.</i>
(c)	Irreversible	Project affected households	Land acquisition was undertaken by BPDB in 1997-98; the affected persons have already been compensated.	
3 Indigenous People Categorization				
(a)	Presence	Existence of indigenous people	The census data (2011) of Bangladesh shows that the total population of ethnic minority in Sonargaon Upazila is 162 and in Pirijpur Union Parishad is 6. There are 42 ethnic households in Sonargaon Upazilla and 1 household in Pirijpur Union. There will be no impact on the ethnic minority household.	<i>In case of no foreseen adverse impact, project shall be categorized as 'C'.</i>
(b)	Impact	Impact on indigenous/ ethnic/ scheduled tribes	No adverse impact on the Ethnic Minority is foreseen	

5.3

PROJECT CATEGORISATION AS PER IFC PERFORMANCE STANDARDS

With reference to the IFC's environmental and social screening criteria, it is anticipated that the proposed Project will fall under *Category A* for the following reasons:

- **Irreversible:** Environmental and social impacts of the project are anticipated during the construction and operation of the power plant. The irreversible impacts will encompass increase noise and vibration during the plant construction and operation, change in air quality due to existing and proposed projects, affected aquatic ecology and surface water quality due to hot water discharge from the power plant in case of accidental discharge without cooling, occupational health and safety issues, community health and safety issues, risks due to transport, storage and handling of highly flammable chemicals as well as toxic chemicals and associated development in the area. These impacts will be irreversible in nature without any mitigation measures and hence require proper attention to mitigate and minimise the overall impact in the project influence area.
- **Cumulative:** Cumulative impacts on physical, biological and socio-economic environmental conditions are anticipated due to proposed power projects within the same airshed as well as other developmental activities including upgradation of Dhaka – Chittagong Highway and new bridge construction on the River Meghna.
- **Unprecedented:** The Project is a green-field project. The Project site is a developed land, already earmarked for the power plant. Summit Group is already having an operational power plant next to it. The Project and its impacts are therefore having precedence; however, this development is going to attract more industrial and infrastructure development in the neighbourhood, which is unprecedented. There will however be no change of land use due to the Plant.

5.4

PROJECT SCREENING USING SUMMIT CORPORATION LIMITED ESMS CHECKLIST

Summit Corporation Limited, the parent company of SMIIPCL has developed and adopted an Environmental and Social Management System (ESMS) from Year 2017. For all the new projects (greenfield/ brownfield), it requires a project screening for decision making (go/ no-go) as well as identification of further actions such as due diligence and/or environmental and social impact assessment studies or other specific studies in order to identify, assess and mitigate environmental and social impacts that could arise due to project development.

Since the Summit M2 project is a greenfield development and hence checklist for greenfield development has been prepared based on available information about the site and surroundings as well as available project information. Same is presented in *Annex D*.

6 IDENTIFICATION OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

6.1 INTRODUCTION

Potential environmental and social impacts have been identified through a systematic process whereby the activities (both planned and unplanned) associated with the construction and operation of the Project have been considered with respect to their potential to interaction with sensitive environmental and social resources or receptors. Scoping of potential impacts has been undertaken in two stages:

- Stage 1: Identification of potential interactions between project activities and environmental receptors; and
- Stage 2: Prioritization of these interactions in terms of their potential to cause significant impacts taking into consideration the current knowledge of project activities, and the existing condition/sensitivities of environmental and social baseline.

The approach taken and outcomes for each stage are discussed in the subsequent section.

6.2 SCOPING MATRIX

The Scoping Matrix enables a methodical identification of the potential interactions each Project activity may have on the range of resources/receptors within the Area of Influence for the Project.

The matrix consists of a list of resources/receptors that could be affected by the Project activities, set against a list of Project activities. Entries in the matrix cells are coloured to indicate whether:




- An interaction is not reasonably expected (white);
- An interaction is reasonably possible but none of the resulting impacts are likely to lead to significant effects (grey); or
- The interaction is reasonably possible and at least one of the resulting impacts is likely to lead to an effect that is significant (black).

All potential interactions, regardless of probability of occurrence, are considered at this stage.

Table 6.1 Scoping Matrix of Potential Interactions

Project Activity/ Hazards	Environmental Resources													Social Resources								
	Land Forms/ Profile	Soil/ Sediment Quality	Land Use	Air Quality	Climate Change	Drainage Pattern	Surface Water Quantity/Quality	Ground Water Quality	Ambient Noise Levels	Vibration	Occupational Health & Safety	Terrestrial Ecology	Aquatic Flora / Fauna (Biodiversity)	Demographics (i.e. Displacement)	Economy & Livelihoods	Social & Cultural Structures	Land Use (including Economic Displacement)	Infrastructure & Services	Cultural Resources	Community Health & Safety	Vulnerable Groups	Social/ Community Cohesion
Construction Phase																						
Land acquisition/ purchase / lease	■																					
Site clearing and levelling		■		■					■													
Site preparation					■																	
Earth moving		■		■					■													
Building of structures including temporary structures		■																■		■		
Heavy equipment operations and piling				■					■	■										■		
Storage, handling and disposal of waste		■					■													■	■	
Generation of sewage							■															
Influx of construction workers															■	■		■				
Transportation of equipment and materials over water							■								■							
Transportation of personnel and material by road				■						■								■		■	■	
Storage and handling of chemicals (unplanned release)												■								■		
Washing of vehicles and equipment							■															
Concreting works		■				■																

Project Activity/ Hazards																						
	Environmental Resources												Social Resources									
	Land Forms/ Profile	Soil/ Sediment Quality	Land Use	Air Quality	Climate Change	Drainage Pattern	Surface Water Quantity/Quality	Ground Water Quality	Ambient Noise Levels	Vibration	Occupational Health & Safety	Terrestrial Ecology	Aquatic Flora / Fauna (Biodiversity)	Demographics (i.e. Displacement)	Economy & Livelihoods	Social & Cultural Structures	Land Use (including Economic Displacement)	Infrastructure & Services	Cultural Resources	Community Health & Safety	Vulnerable Groups	Social/ Community Cohesion
Operation Phase																						
Air emissions from stacks of the plant				■							■										■	
GHG emissions					■										■						■	
Noise generation due to operation of plant and auxiliaries								■	■	■											■	
Water demand for plant operations							■								■						■	
Wastewater discharge/ disposal		■					■	■					■								■	■
Wastes – domestic waste and other non-hazardous wastes handling, storage															■						■	
Hazardous material and waste storages		■					■	■			■										■	
Natural gas transportation by pipeline																					■	
HSD transportation by barges				■			■		■				■								■	
HSD transportation by pipeline											■										■	
Transportation of personnel, raw material/s and disposal of wastes																					■	
Employment															■							

-  = Represents “no” interactions is reasonably expected
-  = Represents interactions reasonably possible but none of the outcome will lead to significant impact impacts
-  = Represents interactions reasonably possible with one of the outcomes may lead to potential significant impact

6.3 ENVIRONMENTAL AND SOCIAL IMPACTS

6.3.1 Key environmental impacts

Cumulative Impacts

There are three operating power plants in Meghnaghat Power hub; these are 337 MW Dual Fuel CCPP, 450 MW Meghna CCPP and 100 MW Engine based Power Plant. A 750 MW CCPP power plant within Meghnaghat Power Hub and a 650 MW coal based power project at Char Balaki are also proposed within or near to the Meghnaghat Power hub. Thus the project impacts cannot be assessed in isolation and the cumulative impacts are anticipated and also need to be assessed. The information about the existing power plants will be taken into consideration from the primary and secondary baseline data, whereas impact due to proposed power plants will be assessed using mathematic models, wherever practical to assess the cumulative impact on the receptors within the study area.

Land Contamination

The entire project site is developed land, which has been filled with the sand to raise the site level above the highest flood level. Source of the filling material is not known and hence the quality of the filled material needs to be ascertained during the soil sampling at site. Also, construction solid wastes will adversely impact upon soil quality and land aesthetics.

Construction Period

As Bangladesh has a long monsoon period from mid-May to early-October months, the scheduling of the construction period will be an important issue in terms of construction management and safety of the workers from construction schedule as well as safety and health related concerns.

Population Influx

The proposed project will result in influx of workers to the area because of construction activities, and hence potential employment and contract opportunities. This may result in stress on the local resources in absence of proper planning for the drinking water and sanitation facilities of the workers.

Impact on Meghna River

Treated effluent including cooling water blow down¹ from the Plant will be discharged into River Meghna by a pipeline/ open channel of about 0.5 km.

¹ Cooling tower bleed-off/blowdown is the flushing of a portion of high mineral concentration cooling tower system water down the drain, while simultaneously replacing it with fresh water. This process dilutes the system water mineral concentrations that steadily increase due to water evaporation. Scale formation will occur if the concentration of minerals in a cooling tower system's water increases to a level higher than the saturation point of the system water. The mineral content above the saturation point will fall out of the solution of the water and form hard mineral scale throughout the system.

The project will be providing induced draft cooling towers to reduce the water requirement for the Plant and the discharge capacity will be of the order of 250 m³/hr. It is to be noted that the discharge will not be continuous. It is reported that the blow down will be retained at central monitoring basin along with other treated effluent from the plant and will be tested for water quality including temperature before discharge into the Meghna River. Any likelihood of impact due to hot water discharge and/or treated effluent discharge on aquatic fauna and downstream users' needs to be studied.

There is no specific standard with respect to hot water discharge from thermal power plants in Bangladesh; however, as per Schedule 10 (Standards for Waste from Industrial Units or Projects Waste) of the ECR 1997, discharge water temperature shall not exceed 40°C during summer season and 45°C during winter season. Therefore, there is a need to design the cooling water system for the Project, based on the River water temperature during summer and winter seasons. However, during the consultation with the Fisheries Department (done earlier for similar type of Project), the department has suggested that the temperature rise be maintained within 3°C from ambient river water temperature.

Also, as per the IFC EHS Guidelines for Thermal Power Plants, thermal discharge should be designed to ensure that discharge water temperature does not result in exceeding relevant ambient water quality temperature standards outside a scientifically established mixing zone. The mixing zone is typically defined as the zone where initial dilution of a discharge takes place within which relevant water quality temperature standards are allowed to exceed and takes into account cumulative impact of seasonal variations, ambient water quality, receiving water use, potential receptors and assimilative capacity among other considerations. It also states that establishment of such a mixing zone is project specific and may be established by local regulatory agencies and confirmed or updated through the project's environmental assessment process. Also, there is no specific limit for temperature increase by thermal discharge from cooling system has been given in Performance Indicators presented in Table 5 of EHS Guidelines. It only states that Elevated temperature areas due to discharge of once-through cooling water (e.g., 1 °Celsius above, 2 °Celsius above, 3 °Celsius above ambient water temperature) should be minimized by adjusting intake and outfall design through the project specific EA depending on the sensitive aquatic ecosystems around the discharge point.

Noise and Vibrations

There will be impact of noise and vibration from the plant (during construction as well as operation) on the settlements in the close vicinity. These impacts will be from proposed power plant as well as from other power plants (existing and proposed) in the form of cumulative impacts. Though the nearest settlement is about 500 m away from the project boundary and site is already fenced, the noise and vibration impacts are required to be studied by

baseline ambient noise monitoring and prediction of impacts due to proposed power plants.

Air Emissions

The existing power plants and the proposed Project are based on dual fuel (natural gas and HSD). Primary fuel for both the plants is natural gas, which is considered as a cleaner fuel, however these plants also pollute the area with NO_x and CO emissions and can impact air quality of the area in absence of proper pollution control measures. In addition, use of HSD as an alternate fuel will increase the SO₂, NO_x and PM concentrations in the ambient air. Further to this, conceptualised future power hub developments will also have cumulative impact on the ambient air quality of the area. In order to assess the impacts arising due to the Summit M2 project and cumulative impacts of existing and planned developments within the Meghnaghat power hub, a preliminary air quality impact assessment study was carried out as part of the scoping study and the details of the same are presented in *Section 6.3.2*.

Health and Safety issues

Probability of occurrence of worker accidents is anticipated to be high in all construction works. Concentration of labour force in the work area is anticipated to create unhygienic conditions. Safety can be a major concern related to HSD supply pipeline and huge quantity of tank storage at site. Also there are risks related to the operation of the thermal power plant.

6.3.2 Social Impacts

Land Acquisition

As discussed earlier, the project does not involve acquisition of private land, though historically (1997-98) land acquisition had been undertaken and after which the land was handed over to BPDB. The land acquisition was done for establishing the power-hub. A part of land area, particularly char land (land on the banks of river which is prone to river erosion) was reportedly used for agriculture during the dry season. Most of them did not have a legal title to cultivate land. The details of the extent of the private land acquired for the power hub by BPDB is not available, though it was learnt some private land belonging to the Union Parishad Pirijpur was involved. As the project does not propose to acquire any private land, there will be no physical or economic displacement. However, the timeline and the process of the past land acquisition will be assessed and significance of any unmitigated impact from the past land acquisition process will be determined to the extent possible.

Impact on Livelihood

The project is expected to provide opportunity to unskilled wage labours in the locality. The wage earning will supplement their earnings from agriculture, fishing and household industries. Hot water from the Plant will

be discharged into River Meghna by a pipeline of about 0.5 km. The project will be providing cooling towers to reduce the water requirement for the Plant and the discharge capacity will be about 250 m³/hr and same will not be continuous. Any likelihood of impact due to hot water discharge on the fish population or on their food chain/habitat will be part of the detailed assessment.

However, it needs mentioning that a section of local population is engaged in fishing activity in the Meghna River. In the post monsoon season the fishermen practise kata fishing ¹in that area. Movement of the barges during the construction phase may put the kata fishing activities of the local fishermen at risk. To assess the impact on fishermen, The ESIA study will map the fishing villages, fishing locations and fish landing centres for nearby fishermen with respect to the project related impacts. Impact on fishing activities needs to be studied during the detail ESIA.

Population Influx

The proposed project will result in influx of workers to the area because of construction activities, and hence potential employment and contract opportunities will be created. The project will also facilitate in-migration of labour, skilled workers and staffs (national and expatriates) who would live or stay in the locality for varied length of time. This may result in stress on the local resources in absence of proper planning for the drinking water and sanitation facilities of the workers.

Labour Issues

The project in construction and operation phase will employ labour that would give rise to a range of labour issues including protecting their rights, providing them requisite facilities, protecting their health, and providing a safe working condition to them. Hence, a detailed examination is required to assess the risks to the labours engaged during the project work.

Community health and safety

The population influx is expected to expose the local population to an increased risk of communicable and vector borne diseases in the locality. Hence, a close assessment of the health care facilities available in the project area and community health and safety is necessary.

¹ Kata fishing is done by piling of tree branches, bushes or water hyacinth set on the river or *beel* (big pond) bottom. Fish are usually attracted into the kata by the shelter provided and by the increased food supply. During the dry season, fish can become densely amassed in a kata and thus becomes easier to catch once they have taken refuge there. To harvest a kata zone, blocking nets is set around the kata, the branches are removed and blocking net is closed up. Final harvest may be with a beach seine or castnet inside the blocking net.

Occupational Health and Safety

In addition to the labour employed for the construction, there will be a sizable number of skilled and supervisory staff engaged during the project construction and operation. The assessment of risk to their health and safety of their workplace will also be undertaken during impact assessment.

Impact on indigenous or ethnic communities/groups, if any

The preliminary social screening of the area based on Census 2011 data of Bangladesh within the core study area shows that there is only one household of ethnic community¹ with a total population of 6 in Pirijpur Union. There are no major residential settlements adjacent to the project site. Hence, impacts on indigenous communities are not significant.

Impact on Cultural Resources

The project site does not have any structure with cultural and heritage significance. There are no mosques and other religious places around the project site. Hence, impacts on cultural resources are not anticipated.

6.3.3 Preliminary Air Quality Impact Assessment

Criteria pollutants that will be generated by the operation of the Summit M2 project while running with RLNG as fuel will be primarily oxides of nitrogen (NO_x) and limited quantity of particulate matter (PM). In case of plant operation with liquid fuel (HSD), criteria pollutants emission will also include sulphur dioxide (SO₂). Based on the inputs received from SMIPCL, it is understood that the plant emissions will follow the emission standards, as specified in the IFC/WB EHS guidelines for gaseous/liquid fuel fired thermal power plants in a non-degraded airshed as well as applicable Bangladeshi standards. A summary of emission standards being adopted by the project are presented in *Table 6.2*.

Table 6.2 *Flue Gas Emission Standards from the Proposed Plant*

Fuel	Criteria Pollutant	Unit	Applicable Emission Standard in Bangladesh	IFC/WB EHS Guidelines (Thermal Power Plant, 2008) ^[2]	Proposed Emission Standard for the Plant
Gas (RLNG)	NO _x	mg/Nm ³	75 ^[1]	51	51
	PM	mg/Nm ³	NA	NA	20
Liquid Fuel (HSD)	SO ₂	mg/Nm ³	- ^[3]	Use of 1% or less S fuel	Use of 0.25% S fuel
	NO _x	mg/Nm ³	NA	152	152
	PM	mg/Nm ³	150 ^[1]	50	50

Note:

¹Ethnic groups in the project context as defined by the Census 2011 of Bangladesh, includes communities like Orao . Coach, Sawntal and others.

[1] Schedule-11 (Standards for Gaseous Emissions from Industries or Projects), Environmental Conservation Rules, 1997.

[2] Emission guidelines for combustion turbine using gaseous fuels with plant size more than 50 MWth in non-degraded/ degraded airshed.

[3] In Bangladesh, SO₂ concentration in gas emissions is not regulated by law, except regulations concerning stack heights. As per Schedule-11 (Standards for Gaseous Emissions from Industries or Projects), Environmental Conservation Rules, 1997, stack height need to be calculated based on SO₂ emission rates (in kg/hr).

[3] Schedule-12(E) (Standards for Sector-wise Industrial Effluent or Emission – Boiler of Industrial Unit).

Since the Summit M2 project is located within the Meghnaghat power hub, which is currently housing three operational thermal power plants (Meghnaghat Power, Summit M1 and Orion 100 MW projects) and one proposed thermal power plant (Reliance Power). In addition to that a coal based power project of 650 MW is also approved by the BPDB at Char Balaki of Orion Group. Within the Meghnaghat Power Hub, there a vacant plot of about 11 acres, however, at present BPDB has not allotted this land for any new power project development and it is currently understood that this land will be used as laydown area by the Reliance Power project. In order to assess the cumulative impact on air quality due to upcoming power projects within the study area, ground level concentrations were predicted for Summit M2 project as well as for all the three projects proposed with total generation capacity of about 2,000 MW.

Scenarios for Preliminary Air Quality Modelling

In order to assess the impact of flue gas emission from the Summit M2 project and to understand the cumulative impact of Meghnaghat power hub, the assessment is carried out. Following scenarios are therefore considered for preliminary air quality modelling study.

- Scenario 1: Operation of Summit M2 project with RLNG as fuel
- Scenario 2: Operation of Summit M2 project with HSD as fuel
- Scenario 3: Cumulative impact of three proposed power projects with Summit M2 project running with RLNG as fuel
- Scenario 4: Cumulative impact of three proposed power projects with Summit M2 project running with HSD as fuel

Background Ambient Air Quality

At present no primary monitoring has been done in the immediate project area for the Summit M2 project. However, ambient air quality monitoring data available from previous studies: (i) ESIA study of Reliance Power Project (2016); (ii) CEIA study of Meghnaghat Industrial Area (2016); (iii) Environmental monitoring data of Summit M1 project (2016-17): and (iv) ESIA study of Summit M1 project (2012) have been used to assess the background ambient air quality concentrations within the study area. Background concentrations calculated based on available secondary data of ambient air quality from different studies considered during the modelling study are presented Table 6.3:

Table 6.3 Background Ambient Air Quality Data used for Modelling

Criteria Pollutant	Averaging Period	Concentration (µg/m ³)
NO _x	1-hourly	24.5
	Annual	15.7
PM ₁₀	24-hourly	90.3
	Annual	47.7
SO ₂	24-hourly	8.0
	Annual	4.2

The background air quality (based on review of previous air quality monitoring data) indicates that the air quality in the study area represents a non-degraded airshed because the pollutants concentrations in the study area were observed well within the applicable national ambient air quality standards.

Summary of Emission Sources and Emission Rates

The key emission sources during the operation of Summit M2 as well as other plants will be power plant stacks. In each of the scenarios, the flue gas generated from gas/ liquid fuel combustion process in the turbine/boiler will be directed to the stacks.

Stack physical characteristics, flue gas characteristics and emission rates for the criteria pollutants selected for existing and proposed power plants in Meghnaghat power hub are presented in **Table 6.4**. Emission data of Meghnaghat power hub for criteria pollutants with liquid fuel based operation of Summit M1 and M2 projects is **Table 6.5**.

Table 6.4 Emission Source Characteristics and Emission Rates of Proposed Power Projects in Meghnaghat Area (Summit M2 project running with gaseous fuel)

Source	Fuel Used	Stack Identification No.	Stack Height	Stack Diameter on Top	Exit Temperature (K)	Exit Velocity	PM10	SO2	NOx
600 MW									
Summit M2 CCPP	NG	Stck1	82.5 ^[1]	5.5	383	20.0	7.39	-	18.8
750 MW Reliance CCPP	NG	Stck2	70	6.3	363	25.0	12.79	-	32.6
650 MW Orion Coal Project	Coal	Stck4	275	7.5	348	20	37.81	642.8	385.7

Source: EIA study reports of respective projects, data gathered by ERM during CEIA study of Siddhirganj and Meghnaghat power hub and guaranteed emissions for Summit M2 project

^[1] Stack height calculated based on maximum HSD consumption having S content of 0.25%

Table 6.5 Emission Source Characteristics and Emission Rates of Proposed Power Projects in Meghnaghat Area (Summit M2 project running with liquid fuel)

Source	Fuel Used	Stack Identification No.	Stack Height	Stack Diameter on Top	Exit Temperature (K)	Exit Velocity	PM10	SO2	NOx
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Source	Fuel Used	Stack Identification No.	Stack Height	Stack Diameter on Top	Exit Temperature (K)	Exit Velocity	PM10	SO2	NOx
600 MW Summit M2 CCPP	HSD	Stk1	82.5 ^[1]	5.5	383	20.0	18.97	102.78	57.7
750 MW Reliance CCPP	NG	Stk2	70	6.3	363	25.0	12.79	0	32.6
650 MW Orion Coal Project	Coal	Stck4	275	7.5	348	20	37.81	642.8	385.7

Source: EIA study reports of respective projects, data gathered by ERM during CEIA study of Siddhirganj and Meghnaghat power hub and guaranteed emissions for Summit M2 project.

^[1] Stack height calculated based on maximum HSD consumption having S content of 0.25%

Criteria

The ambient air quality threshold values have also been identified for the proposed project after comparing the national ambient air quality standard of Bangladesh with the WHO guideline values for ambient air quality. Suggested criteria of ambient air quality for the project are presented in **Table 6.6**.

Table 6.6 *Ambient Air Quality Standards/ Guidelines*

Parameter	Bangladesh*		WHO **			Suggested Criteria for the Project	
	24 hourly (µg/m³)	Annual (µg/m³)	1 hourly (µg/m³)	24 hourly (µg/m³)#	Annual (µg/m³)#	24 hourly (µg/m³)#	Annual (µg/m³)#
PM ₁₀	150	50	-	150 (interim target – 1) 100 (interim target – 2) 75 (interim target – 3) 50 (guideline)	70 (interim target – 1) 50 (interim target – 2) 30 (interim target – 3) 20 (guideline)	150	50
SO ₂	365	80	-	125 (Interim Target – 1) 50 (Interim Target – 2) 20 (guideline)	-	365	80
NO _x	-	100	200 (guideline)	-	40 (guideline)	-	100

Note:

* The Bangladesh National Ambient Air Quality Standards have been taken from the Environmental Conservation Rules, 1997 which was amended on 19th July 2005 vide S.R.O. No. 220-Law/2005.

*** WHO Ambient Air Quality Guideline Values (2005 and 2000), which are also being referred in the World Bank and IFC’s General EHS Guidelines (2007)

Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

■ Represents the standard values that should be applicable to the Project. Since Bangladesh is having its own national ambient air quality standards, therefore, as per IFC EHS guidelines, same have been considered as applicable to the project.

Prediction of Impacts

Impacts due to the operation of the plant were assessed by modelling projected emission rates (*Table 6.4* and *Table 6.5*) for the four modelling scenario using the AMS/EPA Regulatory Model (AERMOD). AERMOD is a modelling system consisting of three separate modules: AERMET, AERMAP and AERMOD. AERMET is a meteorological pre-processor and uses hourly surface observations, cloud cover, and upper air parameters from twice-daily vertical sampling of the atmosphere to create two output files consisting of surface and vertical profile data, respectively. The terrain pre-processor AERMAP uses DEM maps as well as user generated receptor grids. AERMAP's output file consists of the x, y locations of each receptor, mean sea level (MSL) elevation and hill profile parameters. The hill profile parameter is used in determining plume flow around elevated terrain.

Model Options

The AERMOD 9.5.0 model was run with the following regulatory default options in this assessment:

- Stack-tip downwash;
- Elevated terrain effects;
- Use of calms processing routine;
- Use of missing data processing routine;
- No exponential decay; and
- Dry and wet deposition

The study area surrounding the Project site has scattered rural settlements with no major industrial and/or urban infrastructure. Based on this, the Project site and its surroundings have been considered as rural area, and therefore, the rural dispersion coefficients were used in the Model.

Meteorological Data

The input meteorological data for the AERMOD was generated using the MM5 model, which was downscaled to fine grid data suitable for modelling. The data used in the study was site specific and was collected over one year period (2016). In all there were 8760 hours of meteorological data used in the model. This quantity of data allows an adequate assessment of hourly, 8-hourly, daily and annual average pollutant concentrations around the Project site. The annual wind rose diagram and wind class frequency distribution are presented in *Figure 6.1* and *Figure 6.2*, respectively.

Figure 6.1 Annual Windrose of the Project Site

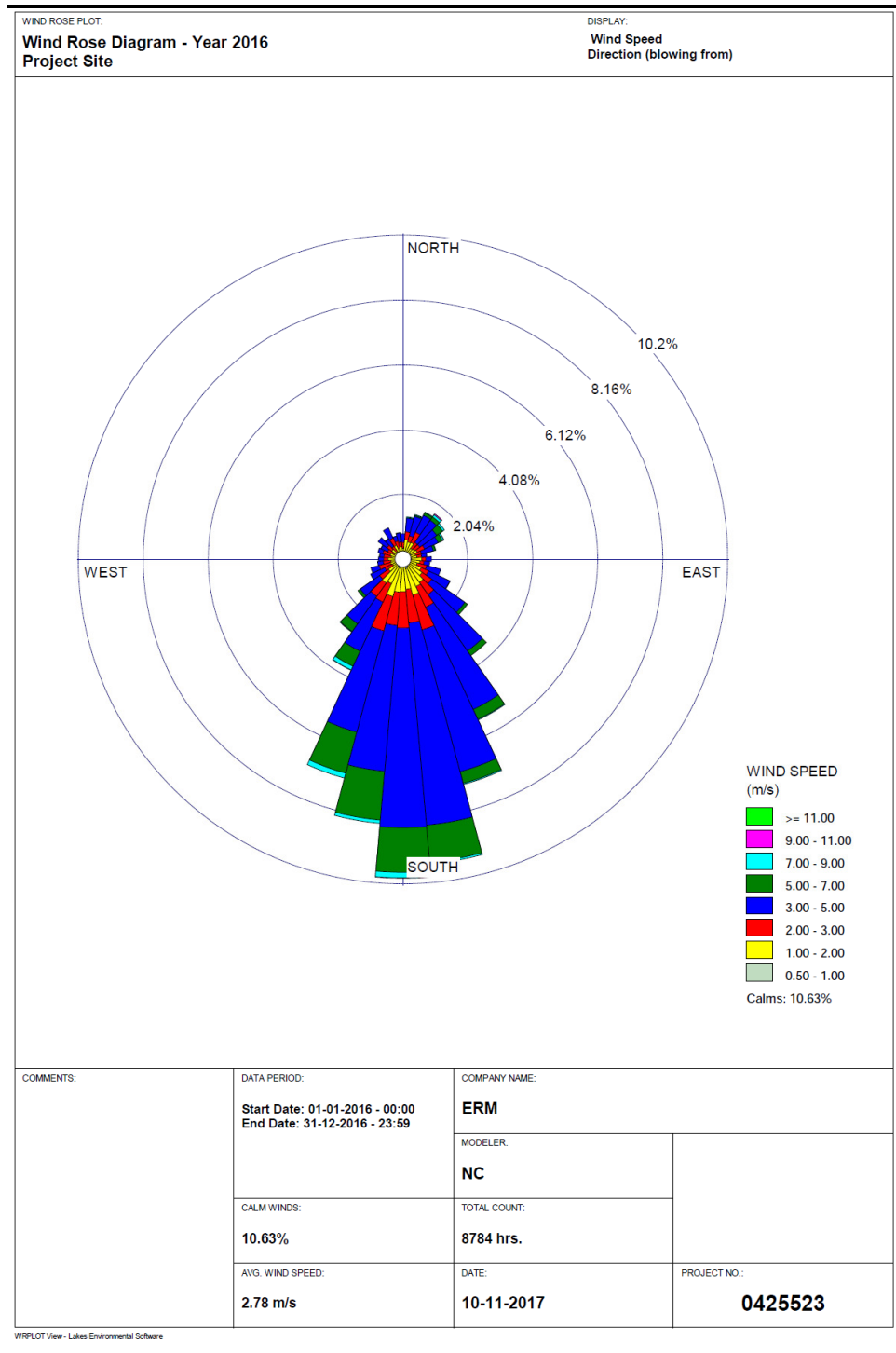
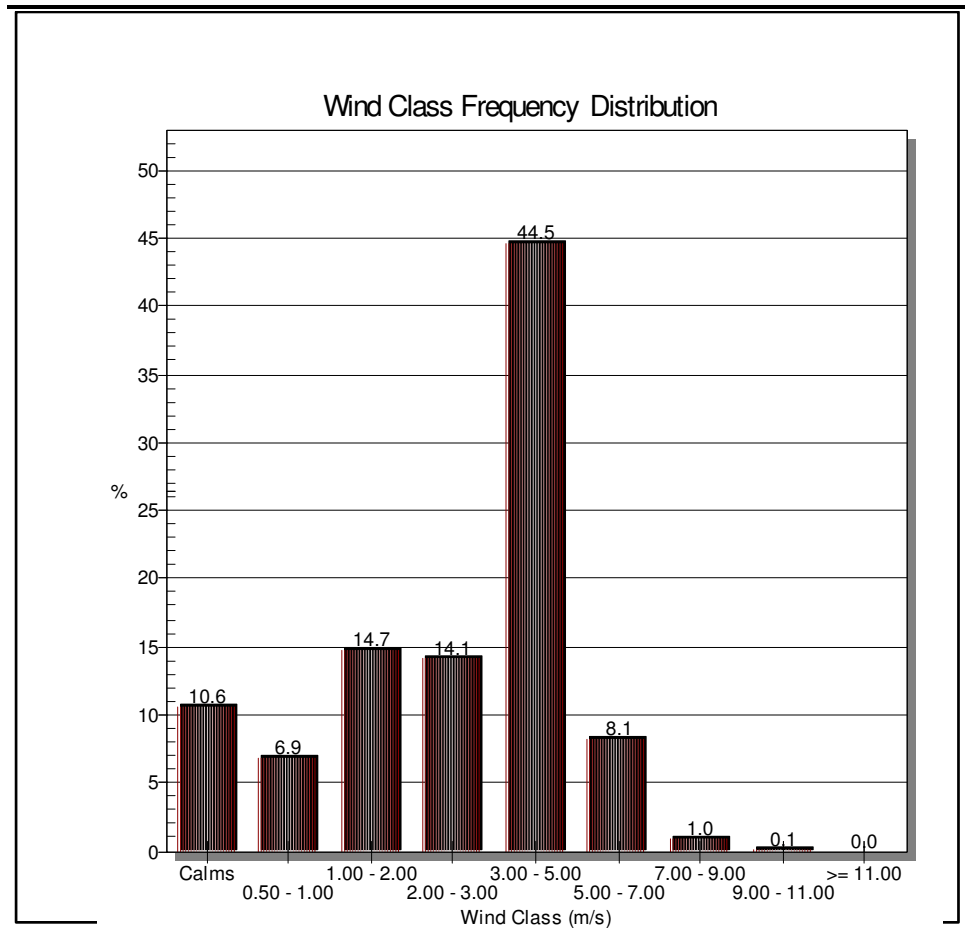


Figure 6.2 Wind Class Frequency Distribution



Terrain Data

Terrain data for the AERMAP model were taken from the 30 m SRTM database, while land cover data was sourced from satellite imagery of the Project site and its surroundings. The topographic map of the study area is presented in *Figure 6.3*.

Receptors

The receptor grid or network, defined the locations of predicted ground level concentrations (GLCs) used to assess compliance with the relevant standards or guidelines. In order to assess the GLCs of each criteria pollutant for the identified scenarios, a 10 km radial zone around the emission source/s was taken into consideration and nested grid receptors were considered in the modelling study with a total of 7,775 receptors in total. This network used Cartesian (X, Y) receptors with UTM coordinates. Base elevation of all the receptors were found using terrain elevations interpolated from SRTM (~30 m) Digital Elevation Model (DEM) data. The emission sources are shown in *Figure 6.4*.

Figure 6.3 Topography Map of the Study Area

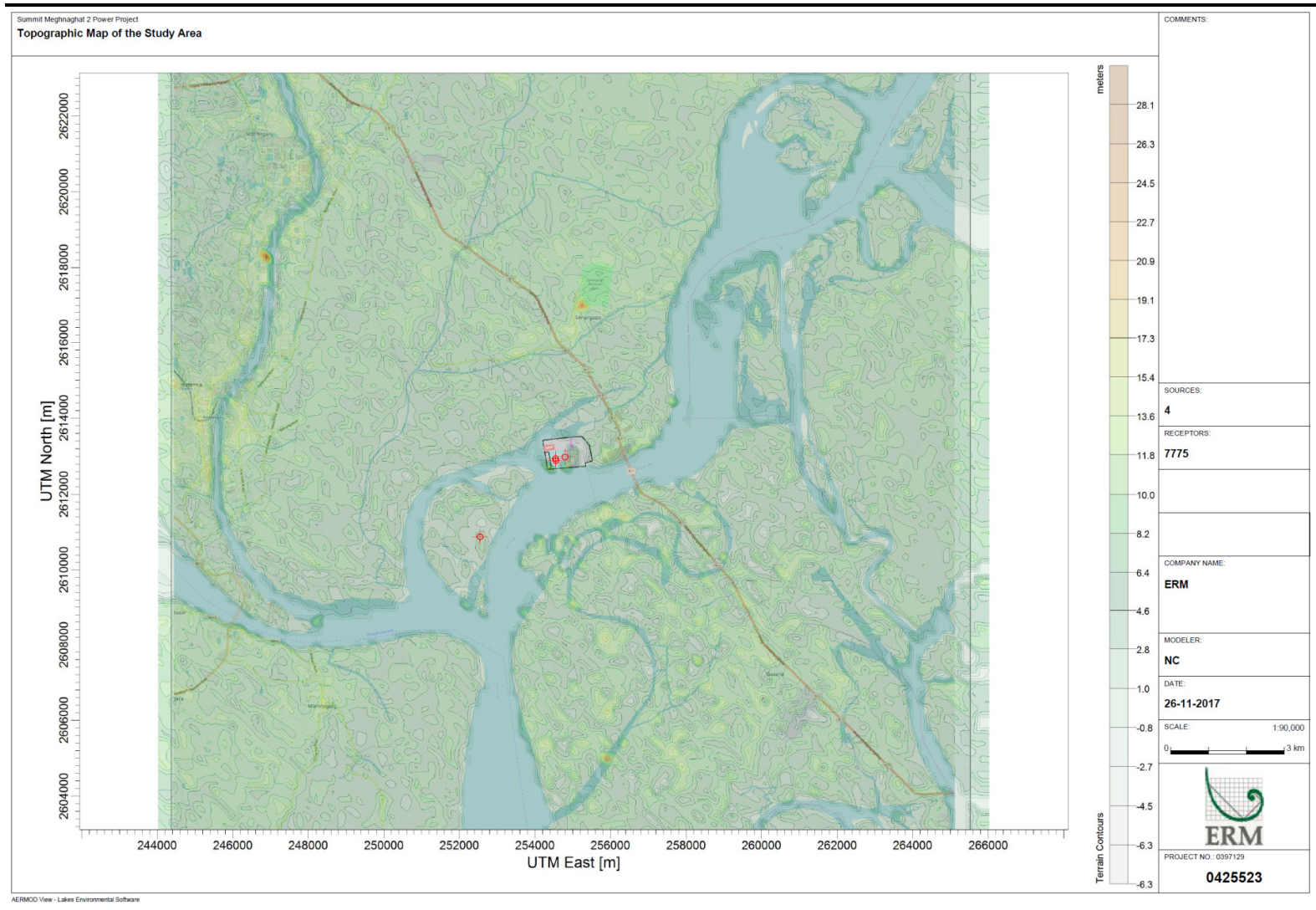
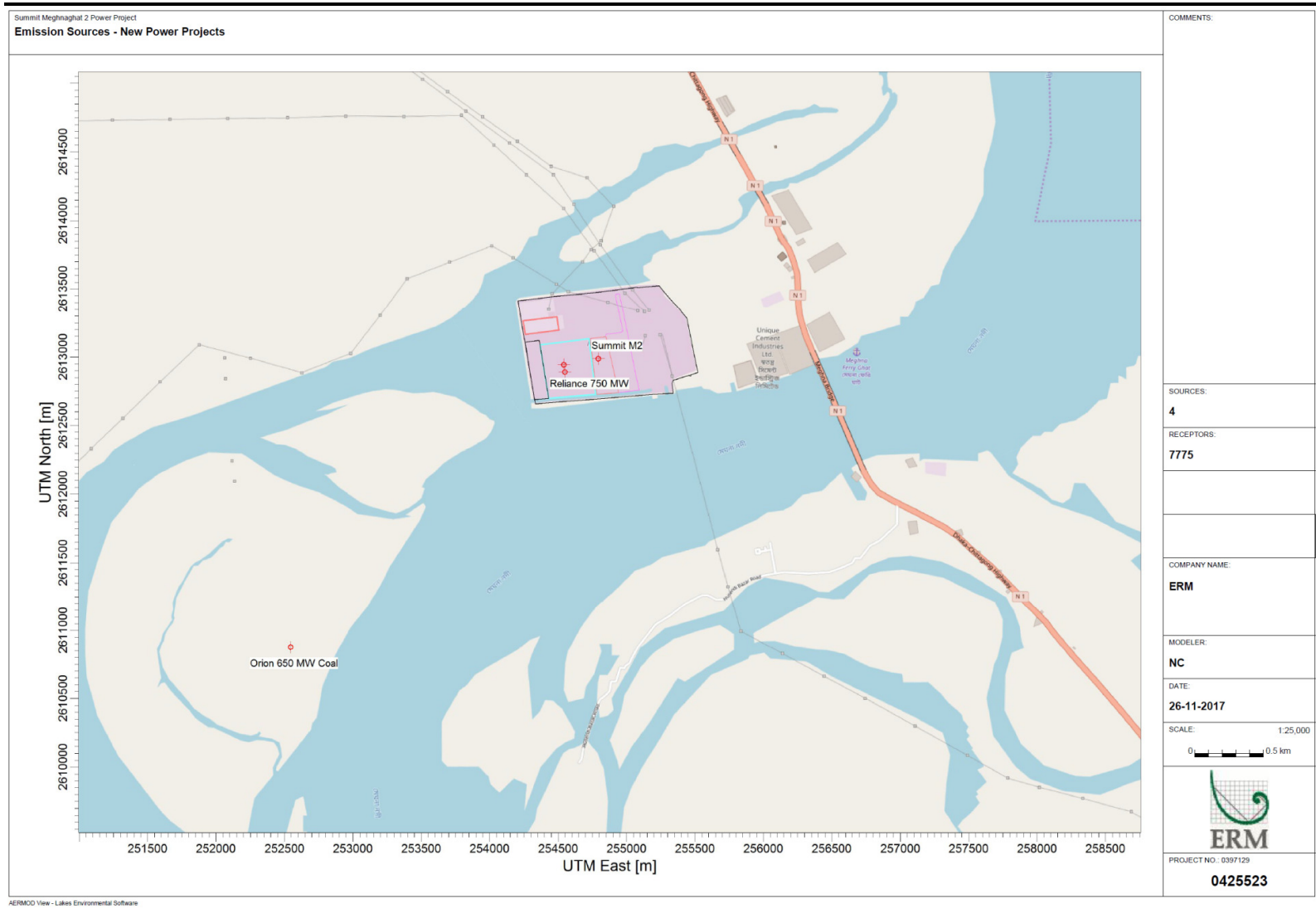


Figure 6.4 Emission Sources considered in the Study



Summary of Prediction Results

Ground level concentration within the Project study area for all the four scenarios have been predicted for 24 hourly average (for SO₂ and PM₁₀), 1 hourly average (for NO_x) and annual average (for all the three pollutants). The summary of maximum ground level concentrations for different averaging periods and annual average are presented in **Table 6.7**.¹ Isoleths of project specific ground level concentrations as well as cumulative ground level concentrations with background concentrations for NO_x, PM₁₀ and SO₂ are presented in **Figure 6.5** to **Figure 6.11**.

The predicted results were compared with the defined ambient air quality criteria for the project and it indicates the following:

1. **NO_x**: No exceedance in case of NO_x with use of both gaseous and liquid fuels.
2. **PM₁₀**: No exceedance in case of PM₁₀ with use of both gaseous and liquid fuels.
3. **SO₂**: No exceedance in case of SO₂ with use of both gaseous and liquid fuels.

Based on the above, it is evident that the project emissions are well within the ambient air quality standards of Bangladesh (refer to **Table 6.6**) and overall contribution of the Summit M2 project from different criteria pollutants and averaging periods are well within 25% of the applicable ambient air quality standards for the project. Therefore, overall impact on air quality due to the project is considered to be low in magnitude. Cumulative impacts of the proposed three power plants with overall generation capacity of about 2,000 MW also indicate that the maximum ground level concentrations along with background concentrations will be well within the ambient air quality criteria applicable for the project.

The modelling results with background concentrations clearly indicate that the airshed within the study area will remain non-degraded with addition of three new power plants with total generation capacity of about 2000 MW.

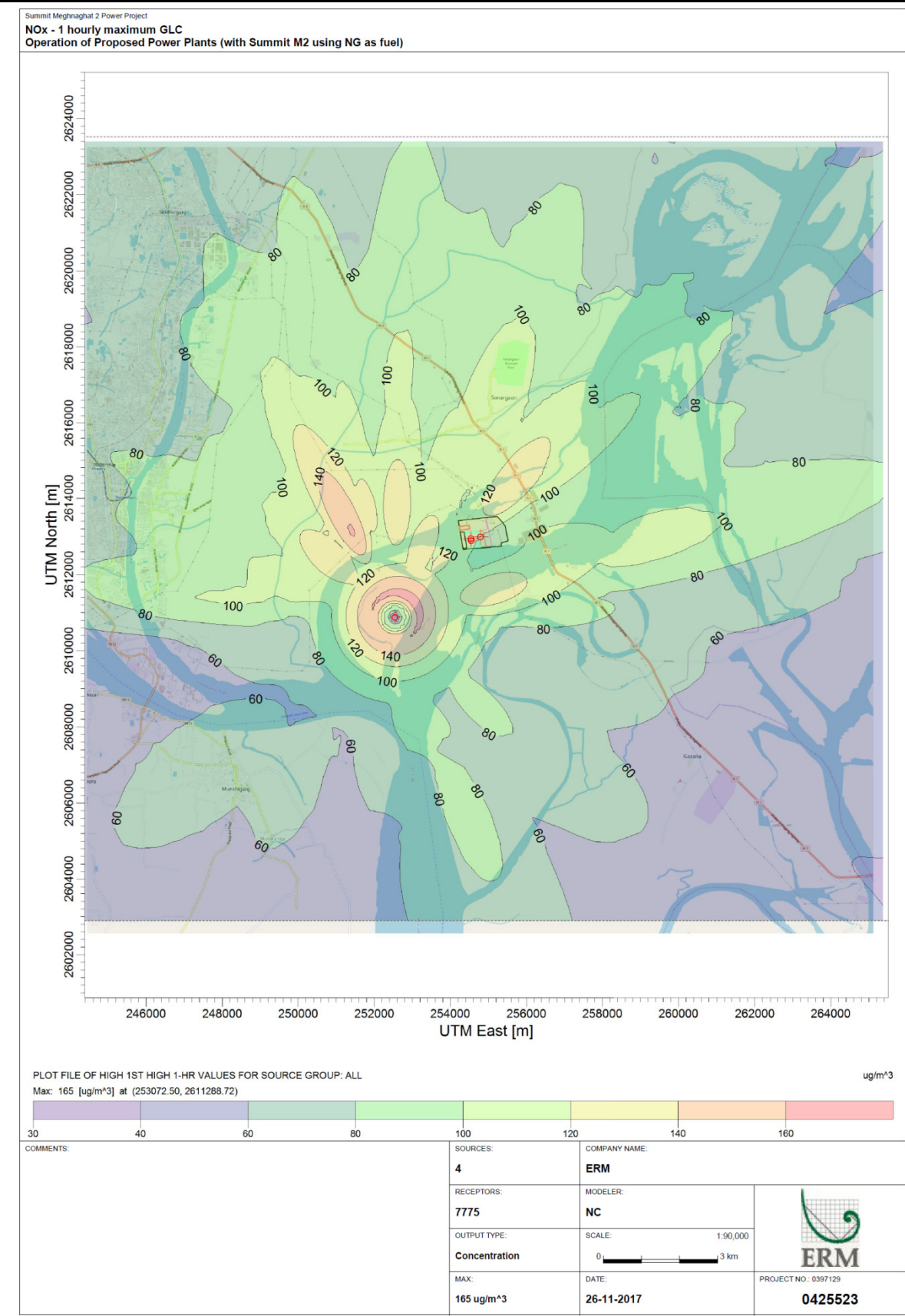
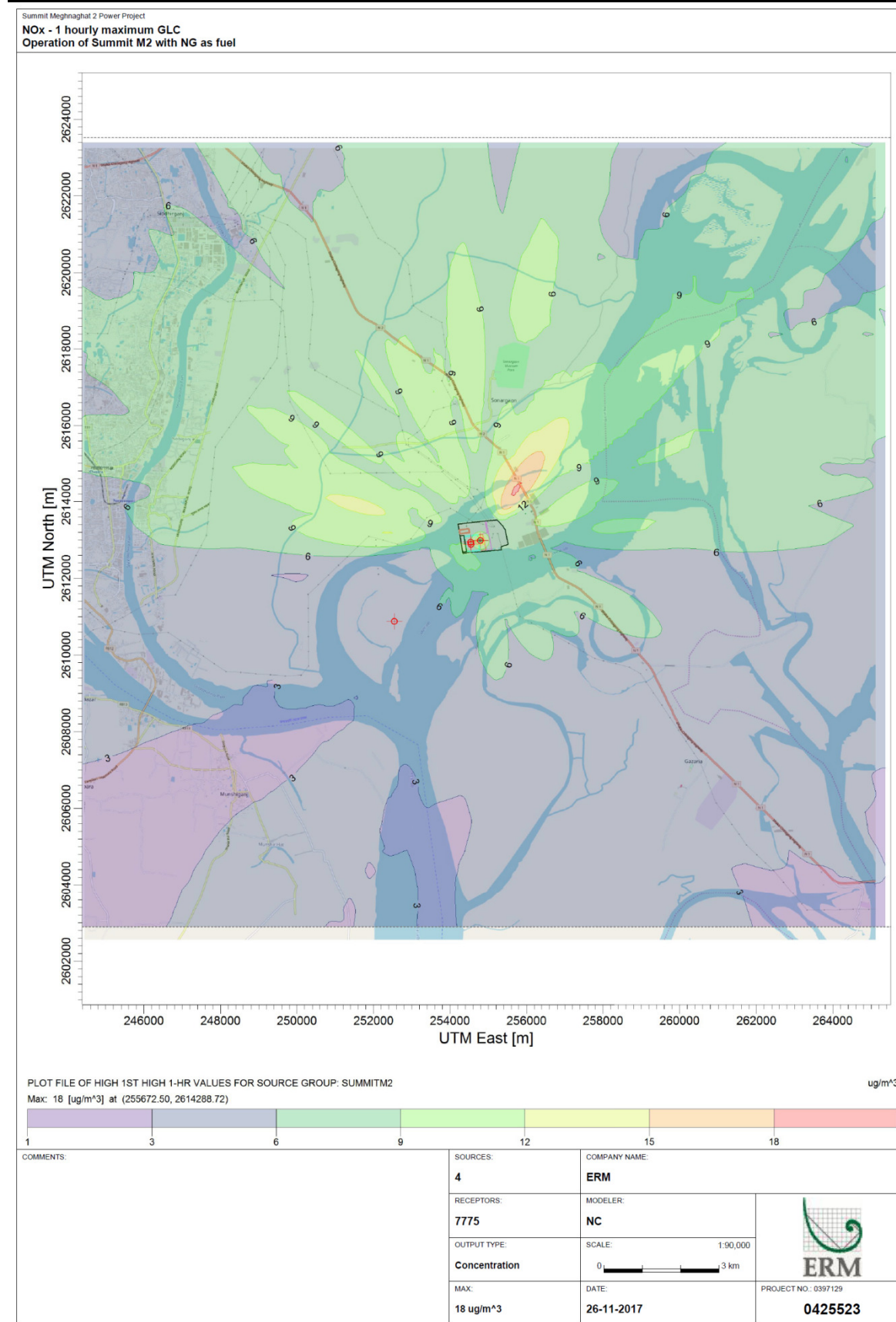
¹ Predictions have been made for 1st highest ground level concentrations in the absence of any specific criteria in Bangladesh.

Table 6.7 Prediction Results Summary with maximum values

S. No.	Scenario	NO _x		PM ₁₀		SO ₂	
		1 Hourly Maximum GLC (µg/m ³)	Annual Average GLC (µg/m ³)	24 Hourly Maximum GLC (µg/m ³)	Annual Average GLC (µg/m ³)	24 Hourly Maximum GLC (µg/m ³)	Annual Average GLC (µg/m ³)
1	Operation of Summit M2 Plant with Gaseous Fuel						
		18.27	0.77 {0.77%}	1.56 {1.04%}	0.30 {0.6%}	-	-
2	Operation of Summit M2 Plant with Liquid Fuel						
		55.93	2.36 {2.36%}	4.01 {2.67%}	0.78 {1.56%}	21.72 {5.95%}	4.21 {5.26%}
3	Operation of All Proposed Plants (with Summit M2 using gaseous fuel) + Background Concentration						
		164.79	21.47	95.46	48.82	46.89	12.72
4	Operation of All Proposed Plants (with Summit M2 using liquid fuel) + Background Concentration						
		171.39	22.76	97.26	49.25	49.95	13.51

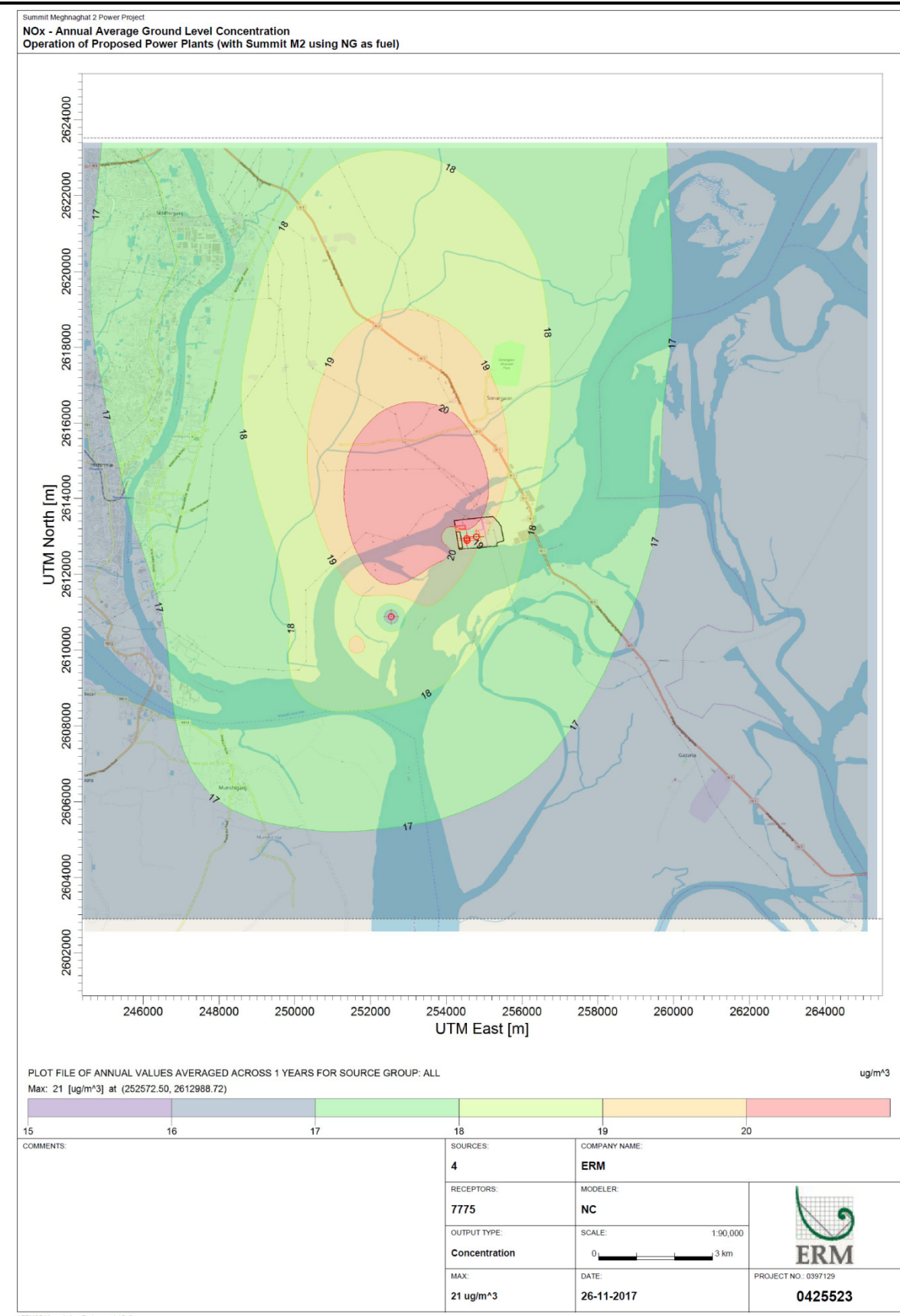
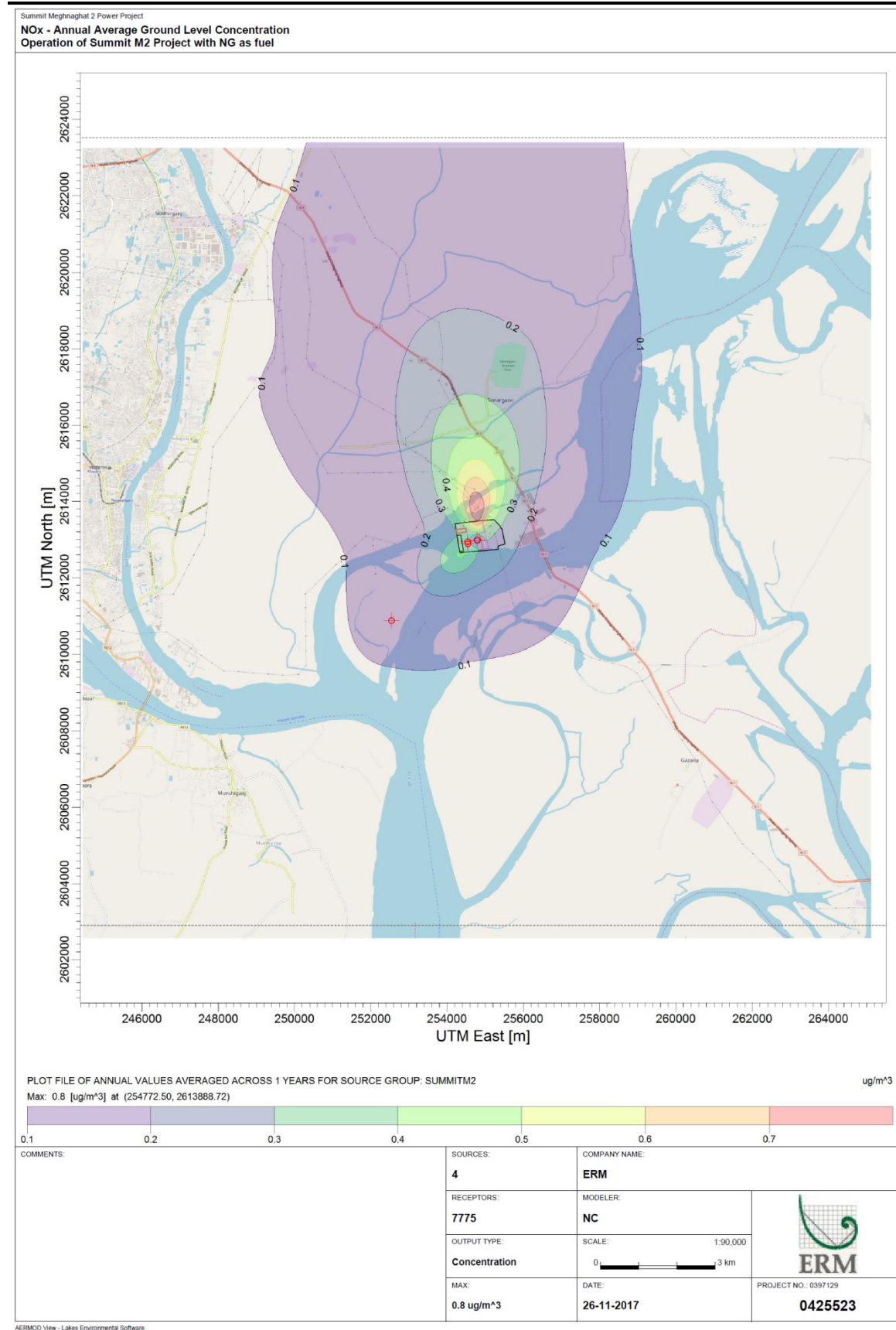
Note: Numbers in parenthesis indicate % contribution of Summit M2 project with respect to applicable national ambient air quality standards in Bangladesh.

Figure 6.5 Isopleths – NOx (1-hourly Maximum Ground Level Concentration) – Gaseous Fuel



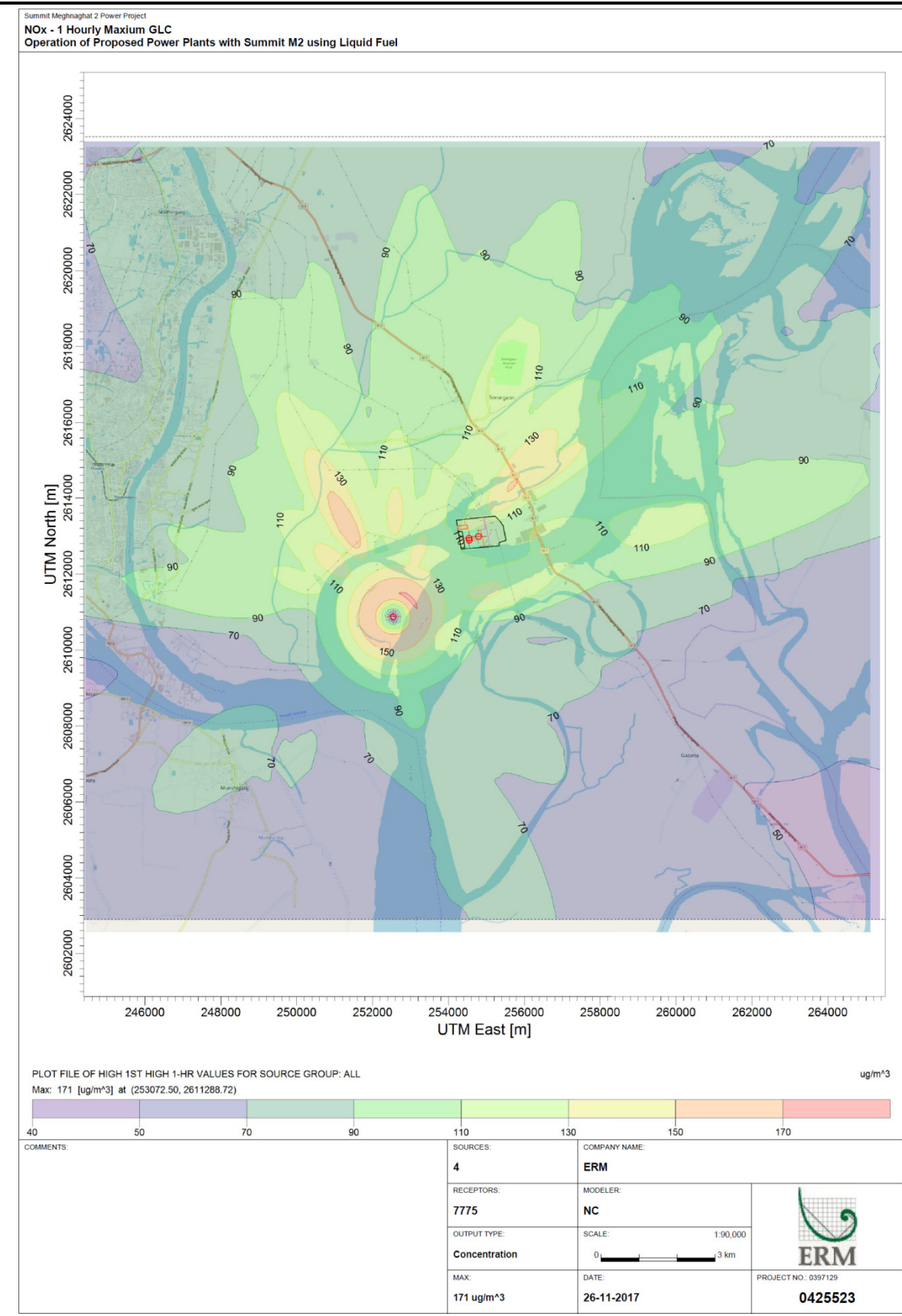
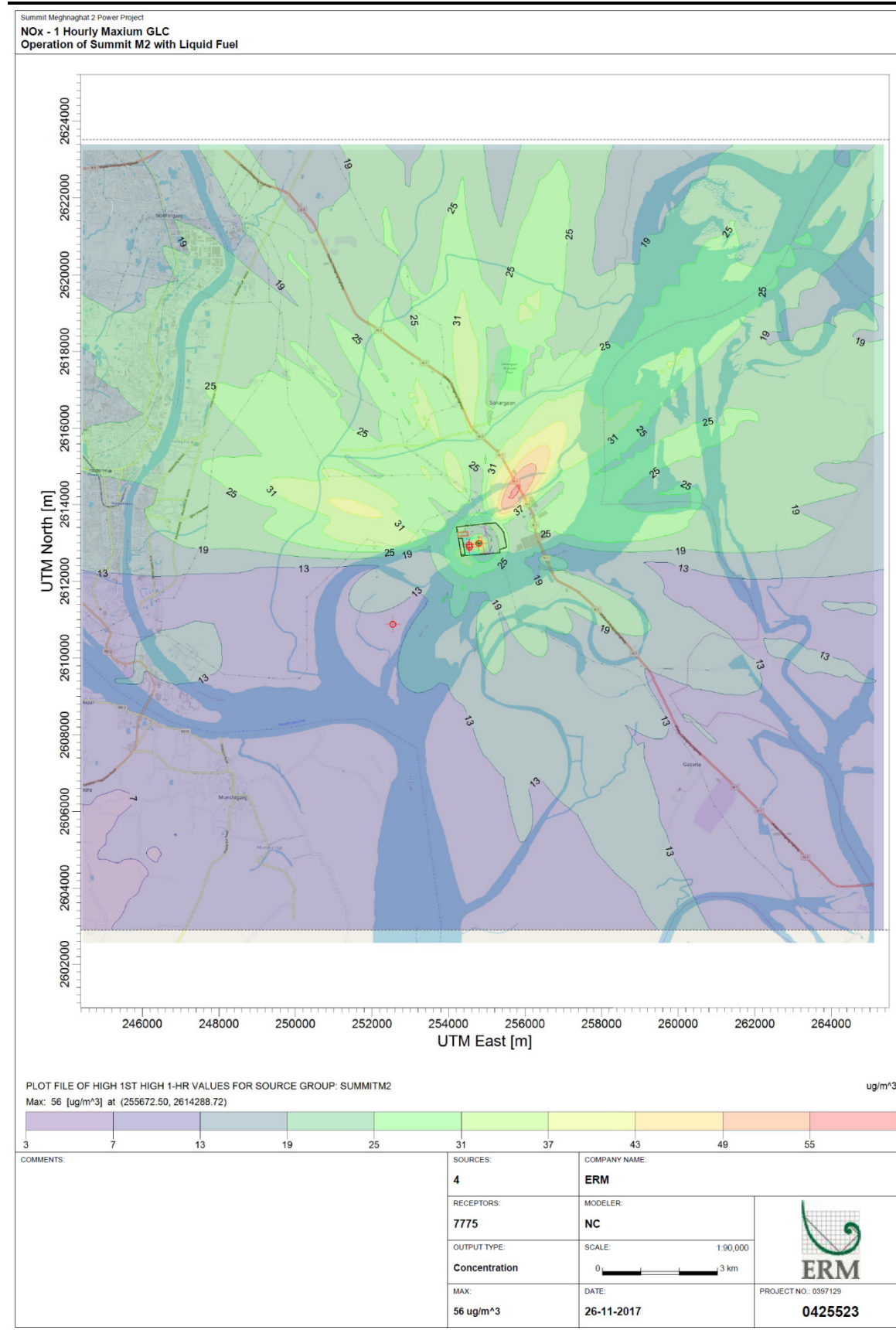
Note: Cumulative ground level concentrations include background ambient air quality of the averaging period as well.

Figure 6.6 Isopleths – NOx (Annual Average Ground Level Concentration) – Gaseous Fuel



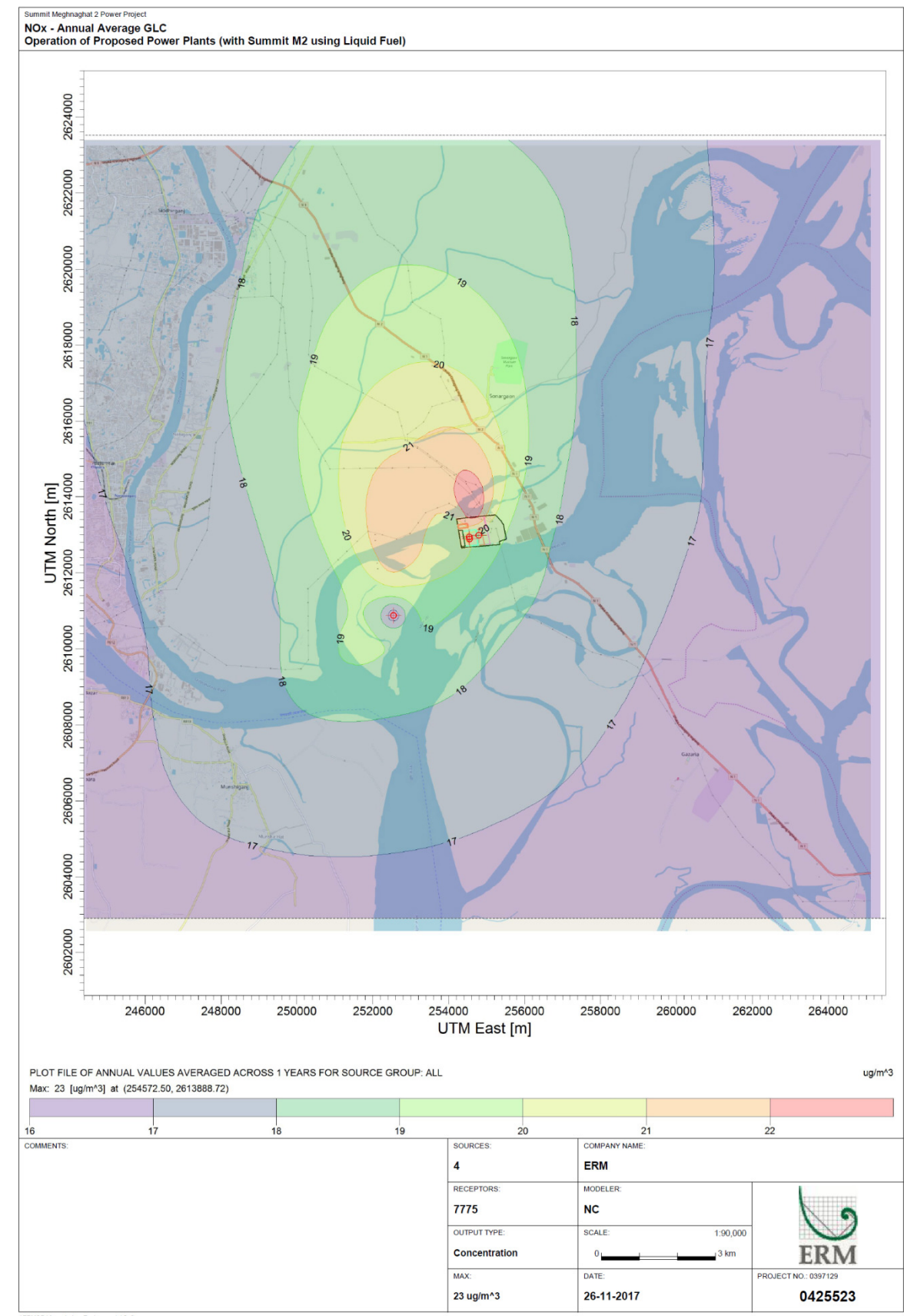
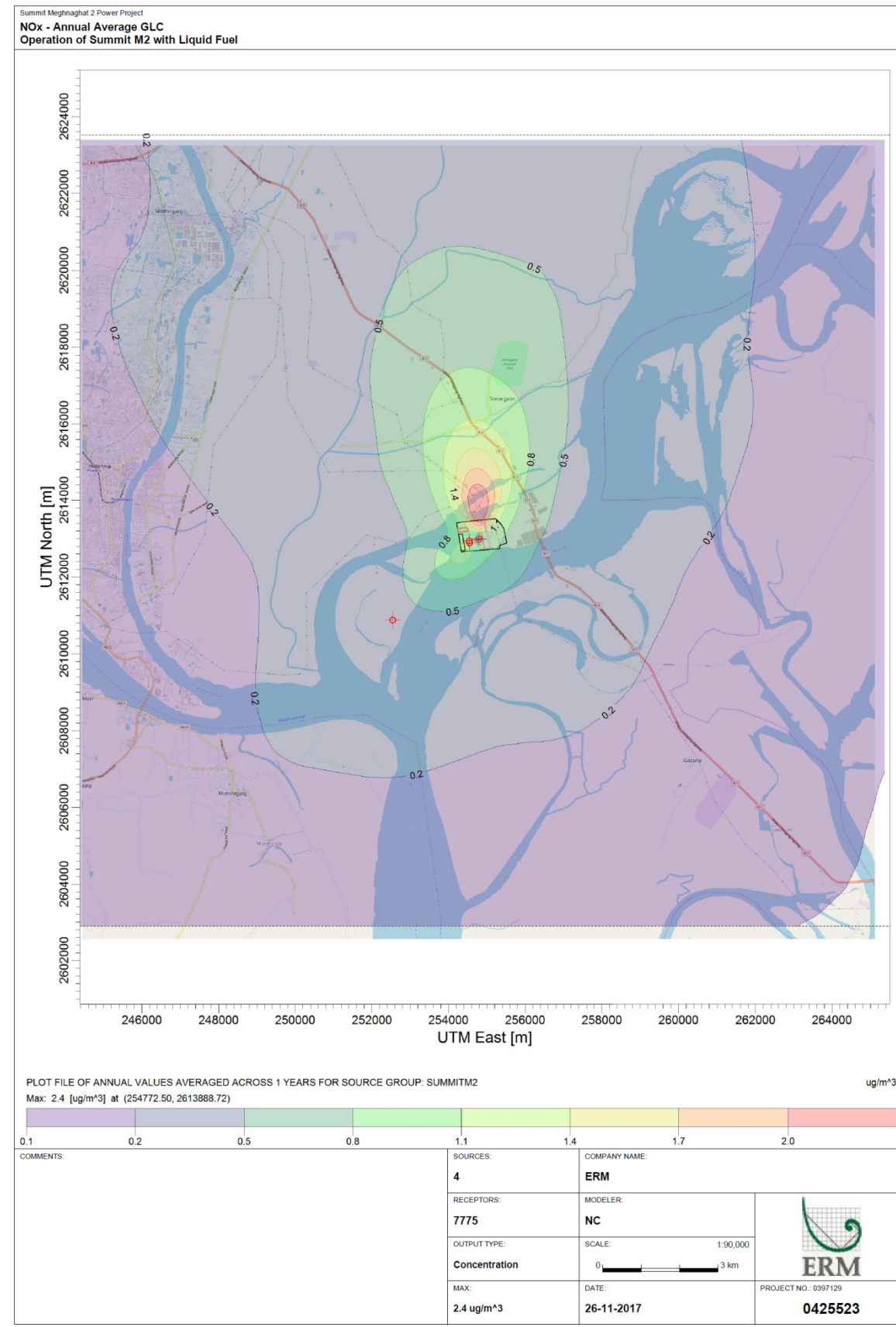
Note: Cumulative ground level concentrations include background ambient air quality of the averaging period as well

Figure 6.7 Isopleths – NOx (1-hourly Maximum Ground Level Concentration) – Liquid Fuel



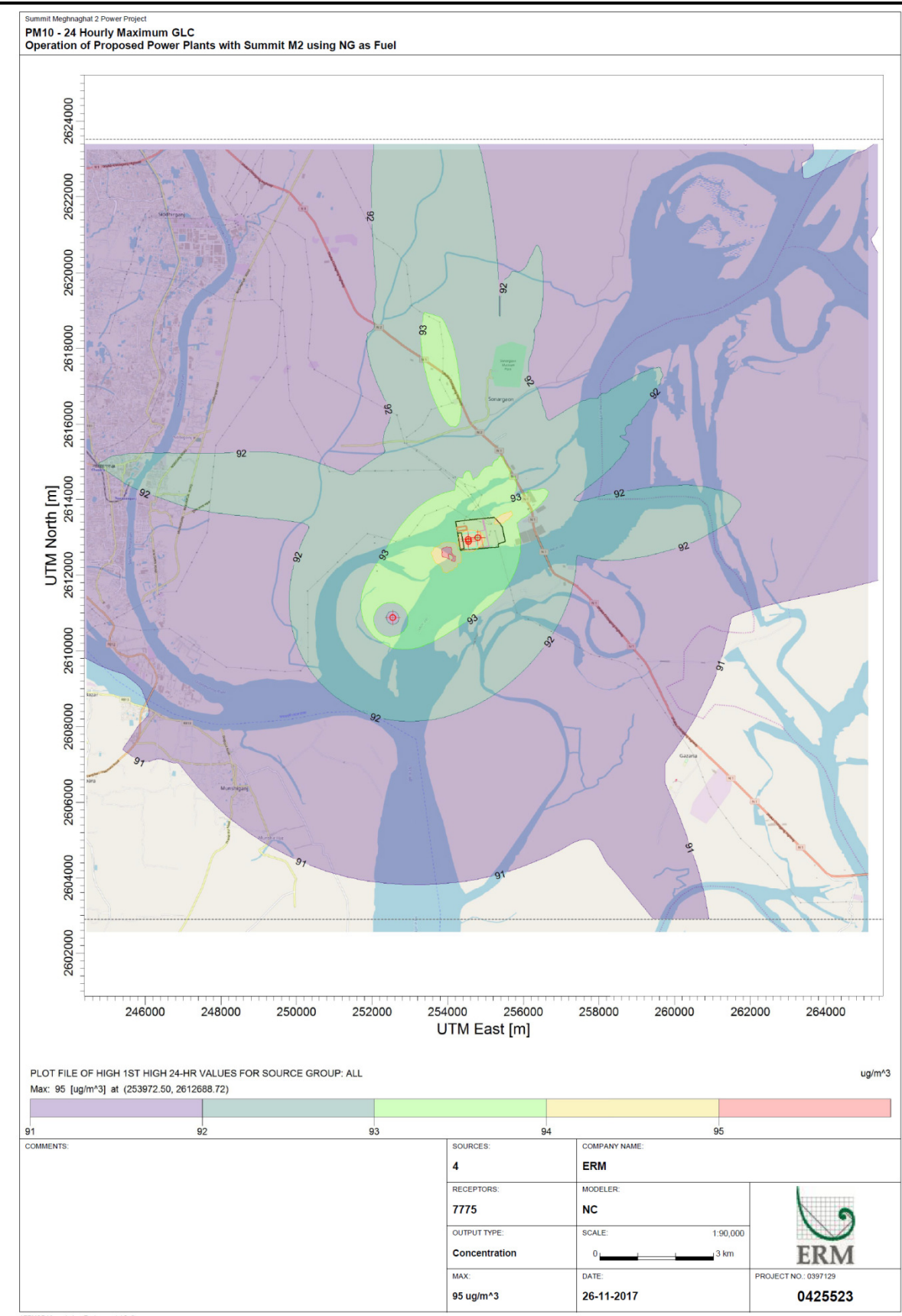
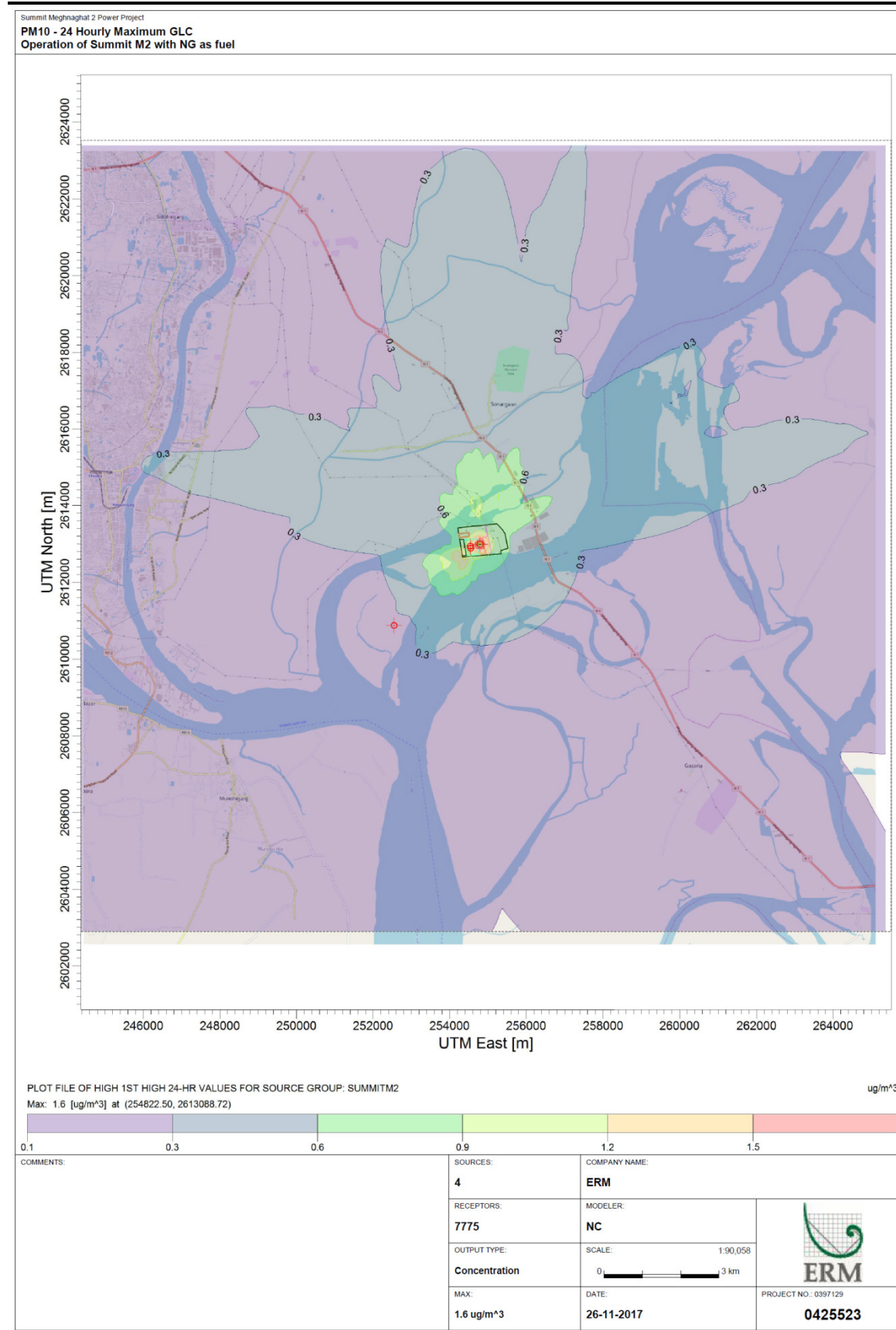
Note: Cumulative ground level concentrations include background ambient air quality of the averaging period as well.

Figure 6.8 Isopleths – NOx (Annual Average Ground Level Concentration) – Liquid Fuel



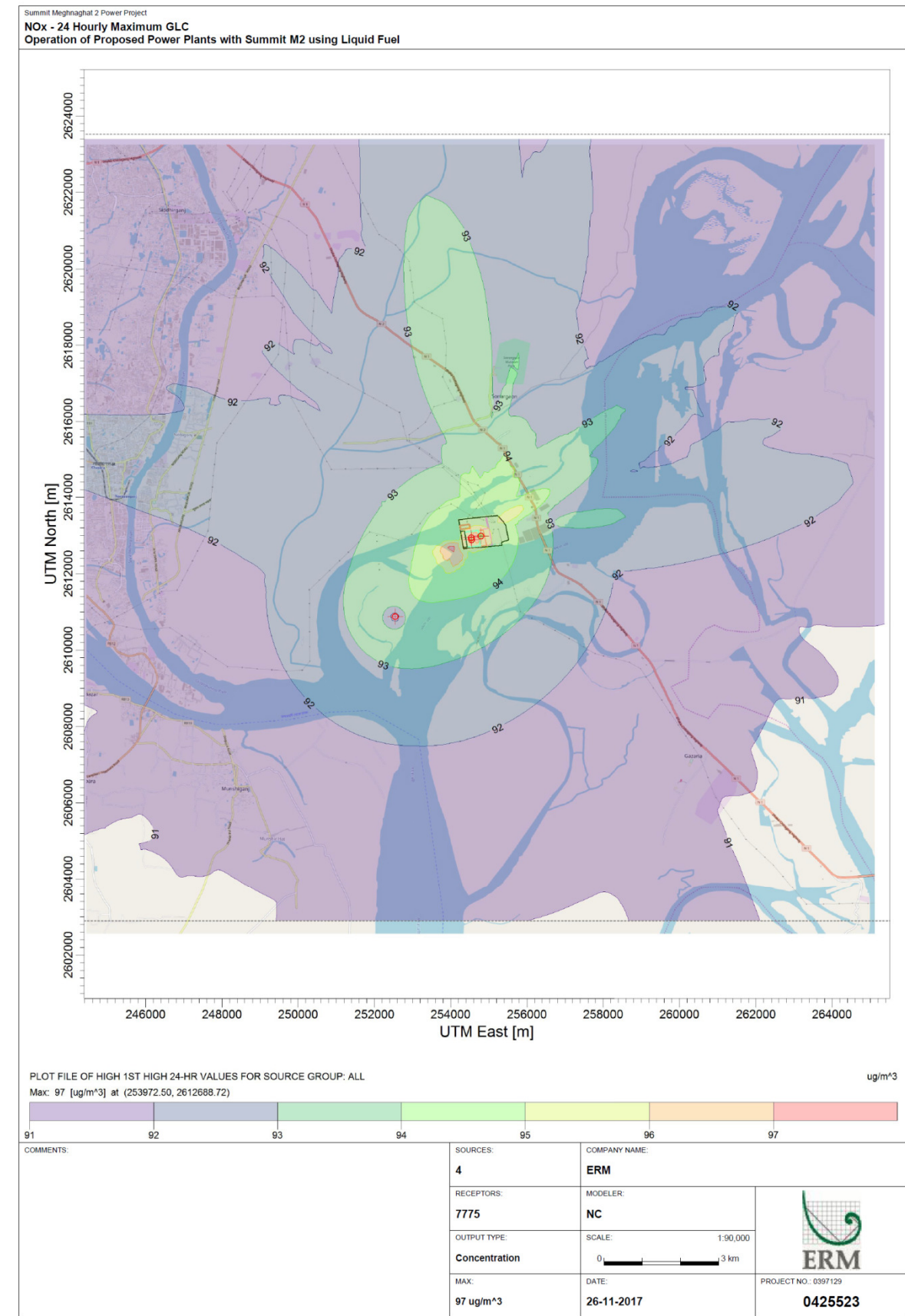
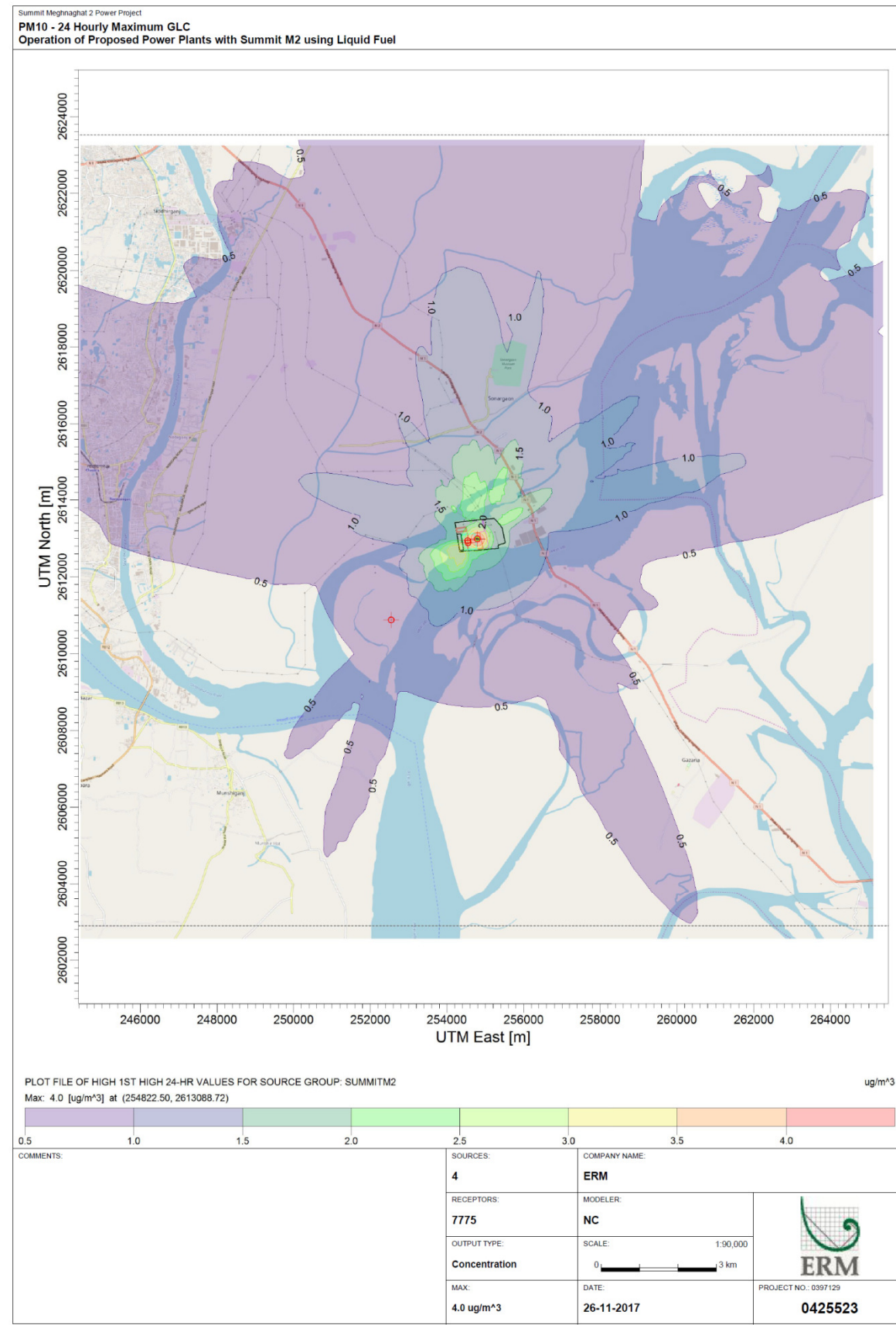
Note: Cumulative ground level concentrations include background ambient air quality of the averaging period as well.

Figure 6.9 Isopleths – PM10 (24-hourly Maximum Ground Level Concentration) – Gaseous Fuel



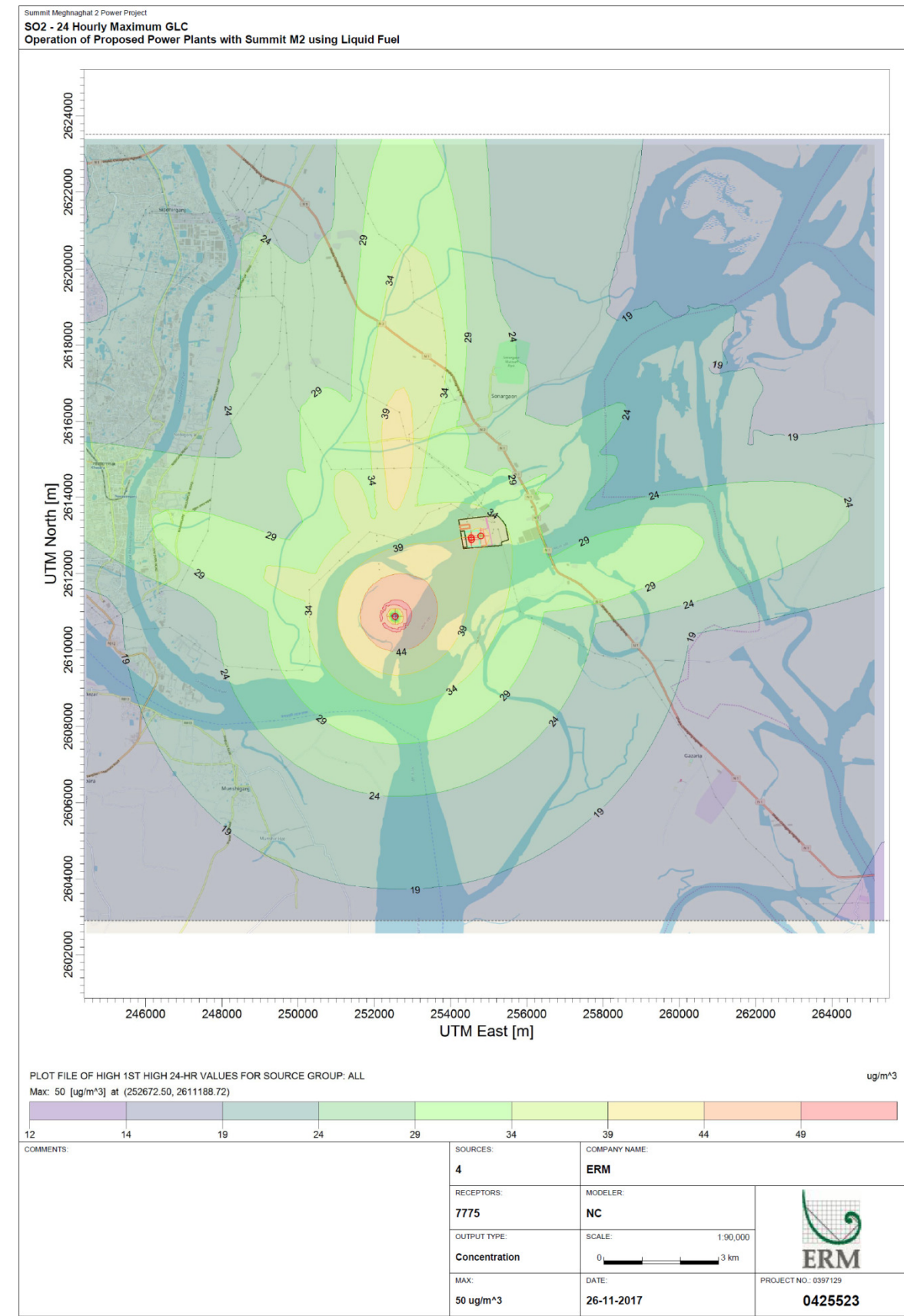
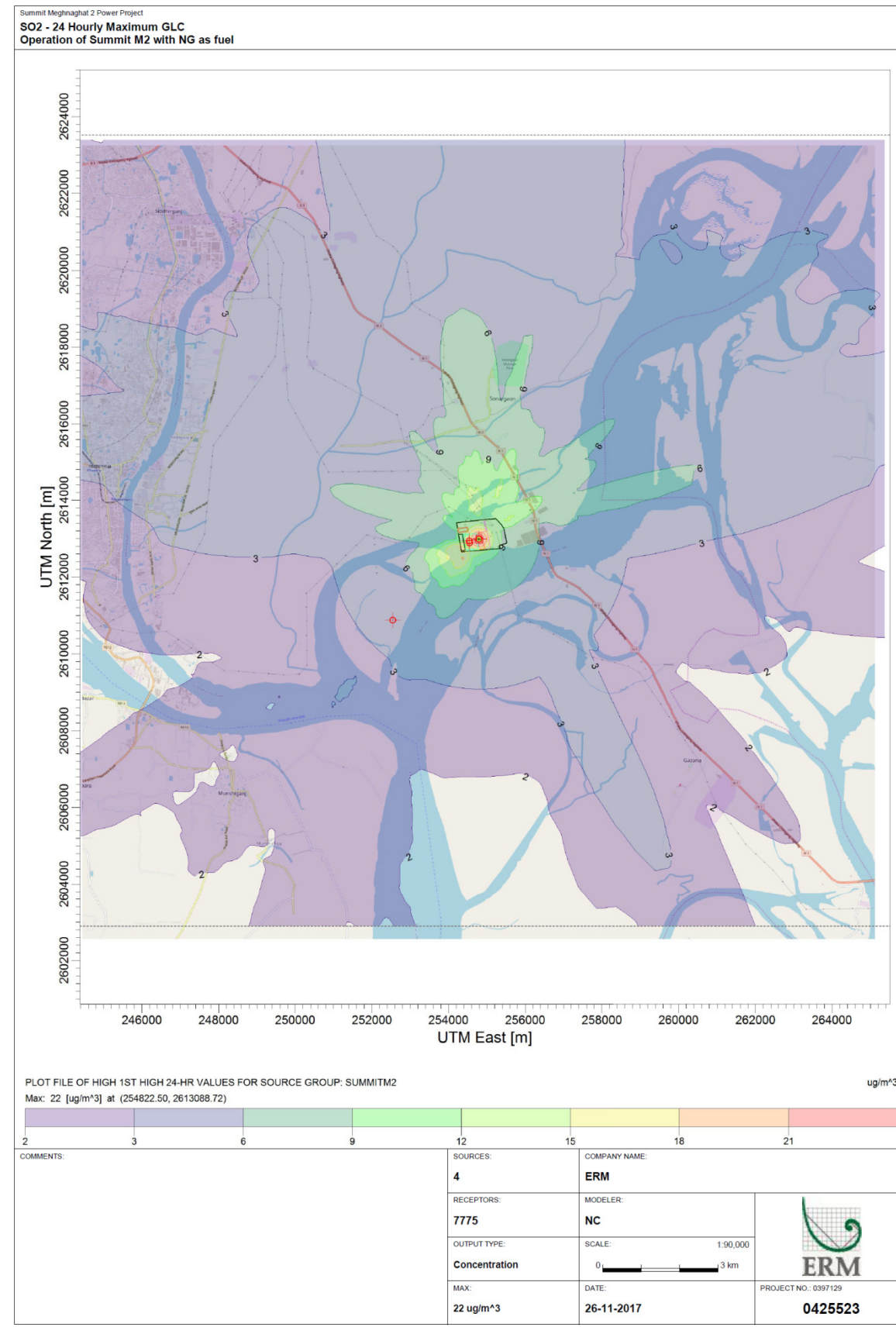
Note: Cumulative ground level concentrations include background ambient air quality of the averaging period as well.

Figure 6.10 Isopleths – PM10 (24-hourly Maximum Ground Level Concentration) – Liquid Fuel



Note: Cumulative ground level concentrations include background ambient air quality of the averaging period as well.

Figure 6.11 Isopleths – SO₂ (24-hourly Maximum Ground Level Concentration) – Liquid Fuel



Note: Cumulative ground level concentrations include background ambient air quality of the averaging period as well.

A stakeholder is defined as “an individual, group, or organization, who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project”. “Stakeholder Analysis” is the process of sorting identified stakeholder groups according to their impact on the project and the impact the project will have on them. This information is then used to assess the manner in which the interests of the stakeholders or projects impact on them should be addressed in the project development plan or its operation.

The importance of stakeholder analysis lies in the assessment and understanding of the socio-political environment surrounding the project. It allows for:

- Identification of the interests, concerns and societal risks surrounding the stakeholders, as well as conflicts of interests (if any);
- Identification of relations between stakeholders that may enable “coalitions” of project sponsorship, ownership and co-operation as well as the mechanisms which may influence other stakeholders;
- Key groups/ individuals to be identified who need to be informed about the project during the execution phase;
- Identifying stakeholders (those who might have an adverse impact on the project) and taking appropriate measures to mitigate their influence; and;
- Development of a framework for participatory planning and implementation of various project activities including interventions for community development.

This Section of the report describes the stakeholder engagement process undertaken during the ESIA scoping phase to gather baseline information and assess the potential impacts and risks due to the project. The process initiated with the Kick-off Meeting held on 4th October 2017 between Summit Meghnaghat II Power Company Limited, a wholly owned subsidiary of Summit Corporation Limited and ERM to understand the environmental and social scope.

7.1 PURPOSE & OBJECTIVE OF STAKEHOLDER ENGAGEMENT

7.1.1 Purpose

This Stakeholder Engagement and Consultation Plan covers stakeholder engagement requirements as part of the Environmental and Social Impact Assessment (ESIA) study for the Project in next phase.

7.1.2 *Scope and Specific Objectives*

The broad objective of the stakeholder engagement and involvement process is to provide authorities, as well as interested and affected stakeholders with the opportunity to identify issues, concerns, and opportunities regarding the proposed Project and to address key stakeholder concerns during the preparation of the various safeguard policy documents (ESMF) for the Project. Specific objectives for stakeholder consultations are as follows:

- To address relevant issues including those perceived as being important by other sectoral agencies, public bodies, local communities, affected groups and others,
- To improve information flows between proponents and different stakeholders, improving understanding of a project,
- To identify important environmental characteristics or mitigation opportunities,
- To ensure that the magnitude and significance of impacts has been assessed properly,
- Improves the acceptability and quality of mitigation and monitoring process

7.2 IDENTIFICATION OF STAKEHOLDERS

The stakeholder identification was carried out by ERM in discussion with Summit Corporation Limited. The key stakeholders who were consulted to collect relevant information for the scoping purpose are provided in *Table 7.1*.

Table 7.1 List of Stakeholders Identified

Stakeholder Category/Group	Key Stakeholders
Local Community	<ul style="list-style-type: none"> • Residents of Pirajpur Union Parishad • Fishermen in Pirajpur and its neighbouring Union Parishads • Fishermen in Char Balki Island
Institutional Stakeholder	<ul style="list-style-type: none"> • Residents and Commercial entities along the access road. • BPDB • Department of Fisheries • Department of Inland Waterways • Office of Land Acquisition, District Commissioner • Department of Land Revenue • Department of Agriculture • District Administration • Department of Public Health and Engineering • Bangladesh Inland Waterways Authority • Bangladesh Water Development Board • Public Works Department • Local Government Engineering Department • Public Health Department including hospitals and primary health centres

Stakeholder Category/Group	Key Stakeholders
Others	<ul style="list-style-type: none"> • School teachers • Local workforce in Meghnaghat power hub • NGOs working in the study area

7.3 *STAKEHOLDER CONSULTATION*

As part of the screening and scoping exercise, ERM held preliminary consultations with a few stakeholders available during the site reconnaissance visit. A brief overview of these stakeholder consultations is provided below.

Table 7.2 *Summary of Stakeholder Consultations during Site Reconnaissance*

Stakeholder Name	Key Points from Discussion
Community Members in Char Balki	<ul style="list-style-type: none"> • Char Balki is the largest fishing hamlet in the neighbourhood of the project site. • There are 50-60 active fishing households in this island. • Some of them own agriculture land cultivate paddy along with practicing fishing in Meghna River. • The land acquisition for thermal power plan in their island has reduced availability of agriculture land. • Therefore, their reliance on fishing and other industrial employment opportunities has increased. • Most of the fishing households own boats. They mostly use the traditional boats which are fixed by 2 to 4hp diesel motors. A few of them still use non-motorised boats. • The fishing is done through drag-nets of varying sizes depending on the fish species targeted. • A few of them also use lines for fishing occasionally. • In post monsoon period, some of the wealthy fishermen go for 'cage or captive fishing' which is locally known as 'kata fishing'. An enclosure is created in Meghna River using nets and bamboo poles where fish fingerlings are released. They depend on hyacinth and fish feeds and grow within this enclosure. • The fishing grounds are mostly located down stream, though areas close to the existing water intake and jetty are also used. • Practicing fishermen reported reduction of fish catch in recent years due to rapid industrialisation. • They also complained about the pollution of the water in Meghna River which sometimes causes itching and skin irritations. • Some of the community members reported that prior to development of the power hub, some of them used the vacant char land to cultivate seasonal vegetables. This practice has been abandoned for several years now. • A number of young people now migrate to work as wage labourers due to lack of suitable employment opportunities locally. • The community expressed their concern over the impacts of industries on the Meghna River water and its eco-system which they perceive to be the cause for reduction in their fish catch volume over the decade.
Fisherman Practicing Kata Fishing	<ul style="list-style-type: none"> • The kata fishing requires a sizable financial investment. Hence, only wealthy households are able to practice it.

Stakeholder Name	Key Points from Discussion
People pursuing recreational fishing at Meghna River	<ul style="list-style-type: none"> • In general, they invest around 15-20 Lakhs taka per season. • They hire local fishermen on wages to prepare the bamboo framework and net lines. It also requires regular maintenance and supervision. • The Kata fishing is mostly done around the Char Balki island and the tributaries of the Meghna river. • They reported instances of damages to their kata fishing area by movement of large barges which causes immense loss to them. • They perceive any increase in the movement of barges and large ships will pose threat to their fishing practice and would increase instances of conflict with local industries.
Surveyor from Land and Revenue Office- Pirajpur	<ul style="list-style-type: none"> • People as far as Dhaka come to this area with their fishing rods to fish; • There are multiple locations along the banks of Meghna where recreational fishing is done; • In general they spend 2 to 6 hours at these sites and their daily catch varies. • They spread across the area as crowding at one location does not help them catching fish. In a rough estimate, around 20-30 persons in the day come to this area for fishing. • The economic profile of these recreational fishermen varies, though none of them depend on this for livelihood or for food supply. <ul style="list-style-type: none"> • The entire area demarcated for the power hub is in possession of BPDB and no char land is allotted to anyone for cultivation. • Prior to the development of the Power hub, most part of the land was government land though a small portion was privately owned. • The land acquisition process to their knowledge has been completed and there are no pending cases. However, the detail of the land acquisition is not available with them. • The land acquisition division in District Commissioner's office was reported to have the details about the land acquisition process.

Stakeholder Consultation Documentation Protocol

A	Project Title		
B	Name of Stakeholder		
	<p><u>Important Notice:</u> This document provides a working summary of the main facts captured during the consultation/key-informant interview held, and should not be treated as a formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to capture significant information/feedbacks and not intended for official review or approval.</p>	(Insert Photo)	
C	Basic details		
	Location		
	Date:		
D	Attended By (Name)	Designation	Contact Number
E	Purpose of Consultation	Information Disclosure	
		Medium	
		Disclosure Protocols Used	
F	Key Questions	Responses	
G	Supplementary Questions/Issues Raised by Stakeholder	Responses	
H	Information/Documents Collected	Information Sources Recommended	
	Photos		

The proposed Terms of Reference for the Environmental and Social Impact Assessment Study (ESIA) Study for the of 589.750 (net) MW on Gas/ 541.220 (net) MW on Liquid Fuel based Combined Cycle Power Station at the Meghnaghat Power Hub is presented in **Table 8.1**.

Table 8.1 Proposed Terms of Reference for ESIA Study

S. No	Section	Particulars	Description
I	Executive Summary		This section will concisely provide a brief description of the Project, baseline conditions, the critical facts, significant findings, and recommended actions. The summary will also be translated in local language (Bengali) for disclosure.
II	Introduction	<ol style="list-style-type: none"> 1. Background 2. Purpose of the Study 3. Need of the Project 4. Importance of the Project 5. Scope of EIA Study 6. EIA Team 7. Report Layout 8. Limitations 	This section will also include a reference to the agreed and approved Terms of Reference and its compliance in a tabular format.
III	Project Description	<ol style="list-style-type: none"> 1. Project Proponent 2. Project location and area 3. Nature and Size of the Project 4. Project Concept 5. Project Components 6. Project Activities 7. Project schedule 8. Resources and utilities demand 9. Sources of Primary Fuels (Quality and Country of Origin) 10. Transportation of primary Fuel 11. Project Site 12. Project Layout 13. Land Requirement 14. Fuel Requirement 15. Water Requirement 16. Technology Selection and Process Description 17. Description of Major Systems 18. Material Balance 19. Pollution Mitigation Measures (Units 	<p>Project data sheet shall be prepared taking into consideration Project Feasibility Study Report along with additional studies carried out as part of project feasibility. Project components should also include associated facilities and/or activities that are required by or for the project.</p> <p>This section will provide condensed description of those aspects of the project (based on project feasibility study), likely to cause environmental effects.</p> <p>Details should be provided to give clear picture of the following:</p> <ul style="list-style-type: none"> • Location (maps showing general location, specific location, project boundary & project site layout) • Size or magnitude of operation (incl. Associated activities required by or for the project) • Technology and process description • Project description. Including drawings showing project layout, components of project etc. Schematic representations of the feasibility drawings which give information important for ESIA purpose • Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other ESIA requirements (as required by the scope)

S. No	Section	Particulars	Description										
		& Devices)	Assessment of New & untested technology for the risk of technological failure										
IV	Legal and Legislative Framework, Regulations and Policy Considerations	Legislative, regulation and policy consideration (covering the potential legal, administrative, planning and policy framework within which the EIA will be prepared)	This section will discuss the national and local legal and institutional framework within which the environmental and social assessment is carried out. It will also identify project-relevant international environmental agreements to which the country is a party. This will also take into consideration internal guidelines and standards voluntarily committed to by the Project Owner/s. Furthermore, as the project is looking for international financing and hence, the international guidelines of the World Bank Group, the Asian Development Bank, The Asia Infrastructure Investment Bank and Equator Principles Financials Institutions etc. also need to be included.										
V	Analysis of Suitability for Different Alternatives	(this analysis shall be performed, among other approaches, in a GIS based Spatial Decision Support System (SDSS) presenting the suitability of different options for both the interventions)	This section should take into consideration various alternatives with respect to the Project and associated components studied as part of the project feasibility study in order to avoid and/or mitigate environmental and social impacts. This should clearly provide: <ul style="list-style-type: none"> • Description of each alternative • Summary of adverse impacts of each alternative • Mitigation measures proposed for each alternative and • Selection of alternative 										
VI	Description of Environment	<ol style="list-style-type: none"> 1. Study Area (10 Km. radius), Period, Component and methodology (Seasonal Variation should be covered) 2. Land use and land cover 3. Water availability 4. Hydrogeology 5. Meteorology 6. Ambient Air Quality 7. Ambient Noise Quality 8. Surface & Ground Water Quality 9. Soil Quality 10. Ecology <ol style="list-style-type: none"> a. Habitat b. Flora c. Fauna 11. Demography Profile and Occupational Pattern 	<p>This section shall clearly define:</p> <ul style="list-style-type: none"> • study area, period, components & methodology • establishment of baseline for valued environmental components, as identified in the scope • Base maps of all environmental components <p>Land use and land cover analysis shall be carried out by using recent satellite imageries of the study area and shall be done for both pre-monsoon season and post-monsoon seasons. A statistical analysis of the land use/ land cover shall also be provided in this section. (with all the existing resource classes along with area coverage shall be shown in the respective maps derived from updated image of proper spatial and spectral resolution. Basic information (name of satellite, date and time of acquisition with atmospheric condition, spatial resolution, color composite etc.) of the image data)</p> <p>Environmental baseline monitoring and surveys shall cover the following:</p> <table border="1"> <thead> <tr> <th>S. No.</th> <th>Environmental Attributes</th> <th>Location</th> <th>Frequency</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	S. No.	Environmental Attributes	Location	Frequency	Remarks					
S. No.	Environmental Attributes	Location	Frequency	Remarks									

S. No	Section	Particulars	Description				
		12. Land use and Cropping Pattern 13. Socio-economic Scenario 14. Distance to urban and rural communities (proximity to sensitive receptors)	1	Hydrogeology and Drainage	Plant site and within study area/AOI	-	Establishment of surface and ground water hydrology (availability of water, depth, rate of exploitation, quality).
		15. Transmission capacity/options for linking to grid 16. Distance to existing infrastructure such as roads, ports, rail, etc. 17. Current and surrounding land use and associated communities	2	Water Quality - Surface and - Ground <u>In-situ measurements</u> pH, Dissolved oxygen (DO), Salinity, Temperature, Turbidity, Observation: Odour and Colour. <u>Laboratory Measurements:</u> Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Nutrients: Total Nitrogen, Total Phosphorus, Metals: Aluminium (Al), Barium (Ba), Arsenic (As), Cadmium (Cd), Lead (Pb), Mercury (Hg), Copper (Cu), Nickel (Ni), Zinc (Zn), Iron (Fe), Total Chromium, Copper (Cu), Zinc (Zn), Manganese	10 (incl. both surface and ground water)	Once during the study period	Establishment of physico-chemical characteristics, pollution levels and bacteriological contamination of surface and ground water in the study area. Assessment of the measured ambient water quality conditions will be conducted with reference to local criteria (Environmental Conservation Rules, 1997) as well as based on comparison with international standards (eg USEPA Criteria), as applicable.

S. No	Section	Particulars	Description			
			(Mg), Iron (Fe), Mercury (Hg), Vanadium (V) Total Petroleum Hydrocarbon (TPH) Oil and Grease Coliform			
3	Soil Quality	Particle size distribution, texture, % moisture, alkalinity, acidity, specific gravity, bulk density, porosity, infiltration capacity, pH, electrical conductivity, nitrogen, phosphorus, potassium (NPK), calcium, magnesium, chloride, sulphate, carbonate, iron, copper, zinc, boron, sodium, cation exchange capacity, alkali metals, Sodium Absorption Ratio (SAR), permeability, water holding capacity	02 within study area	Once during the study period	Establishment of physico-chemical characteristics and nutrient levels of soil in study area. Establishment of infiltration characteristics of soil in and around the ash disposal area.	
4	Micro meteorology	Ambient temperature, barometric pressures, wind direction, wind speed, relative humidity, cloud cover and rainfall	1 location near the project site: hourly for 8 weeks	Continuous	An automatic micro-meteorological station with data logging facility will be installed at the onshore site for continuous monitoring for 3 months.	

S. No	Section	Particulars	Description		
5	Ambient Air Quality	<ul style="list-style-type: none"> - Particulate Matter (SPM, PM₁₀ and PM_{2.5}) - Sulphur Dioxide (SO₂) - Oxides of Nitrogen (NO_x) - Ozone (O₃) - Carbon monoxide (CO) 	06 locations within study area / AOI	8 weeks with a frequency of 1 sample per location per week	Establishment of ambient air quality in the area during winter and pre-monsoon season (preferably) in order to capture season variability. The monitoring will be carried out as per the prevailing meteorology of the area during monitoring period. The locations will comprise of control and sensitive receptors. Monitoring locations will be selected in down-wind, up-wind and cross-wind directions including the maximum ground level concentration zone.
6	Noise	Equivalent noise levels (L _{eq day} , L _{eq night} , L _{eq hourly} , L ₉₀ , L ₅₀ and L ₁₀)	12 locations within study area/AOI	Once during the study period	Establishment of ambient noise levels in the study area. Monitoring will be carried out for 24 hours at each location and hourly equivalent noise levels (Leq) will be calculated.
7	Traffic Status	(Road and Waterway traffic)	02 locations within study area/AOI	Once during the study period	Establishment of existing traffic density on the important roads/ waterways of the study area and the one leading to the proposed site.
8	Terrestrial Ecology Status	<ul style="list-style-type: none"> - <i>Flora and fauna</i> - <i>Habitat/Forests</i> - <i>Ecologically sensitive areas</i> 	Plant site, associated facilities footprint and within study area/AOI	Once during the study period	Identification & enumeration of flora and fauna along with rare and endangered species present in the area. Species at risk and their habitats (flora and fauna), migratory patterns of species, ecologically sensitive or significant areas, and protected areas and critical habitat features (if applicable).

S. No	Section	Particulars	Description	
				<p>Preferred season for the terrestrial ecology will be winter and pre-monsoon season.</p> <p>IFC's Performance Standard (PS) 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC, 2012) and the associated guidance note (IFC, 2012) will be used as a basis for determining habitat values across the project footprint and for identification of critical habitats within the AoI (if applicable) and impacts to species and habitats. The assessment will include:</p> <ul style="list-style-type: none"> • Delineate natural and modified habitats within the AOI. • Understand presence of critical habitat candidate species (CR,EN, endemic, migratory etc) by using Criteria 1 to 5 in PS6. • Assess these against Criteria 1 to 5 to determine whether critical habitats exist in the project AoI. • Assess impacts to critical habitats and provide mitigation actions based on the mitigation hierarchy • If residual impacts to natural habitats or critical habitats are still significant, then offsets will need to be

S. No	Section	Particulars	Description		
					designed with No Net Loss for natural habitats and Net Positive Gain for Critical Habitats. This scope of work does not include the development of such offsets designs.
9	Aquatic Ecology Status	- Phyto and zooplanktons - Benthos - Fishes - Turtles - Others	Within study area/AOI	Once during the study period Bio monitoring in 4 location	Identification and enumeration of aquatic flora and fauna, habitats, spawning and breeding grounds of fishes. <ul style="list-style-type: none"> Opportunistic records of aquatic fauna (reptiles, birds and mammals) during baseline water quality as well as sediment quality and macro benthos surveys; and See notes above regarding classification of habitat under IFC PS.
10	Fisheries Survey		Within study area/AOI	Once during the study period	<ul style="list-style-type: none"> Identification of various fish species found in the Project AOI based on market survey; Identification of fishermen villages in the Project AOI; Consultation in local fish markets; Focus Group Discussions with Fishermen community in the Project AOI; Identification of threatened/ endemic and protected fish species in the Project AOI; Assessment of migratory movement of fish species in the rivers based on previous

S. No	Section	Particulars	Description
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			studies conducted in that area, if any.
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The scope for the socio-economic baseline study should focus on a 10 km radius from the project site in order to cover fence line communities and other settlements near the proposed power plant and associated facilities. The focus of the socio-economic baseline survey should be as follows:

- Establishment of demographic characteristics and occupational structure of population within the study area;
- Identification of the ethnic characteristics of the affected population and any social and political sensitivities;
- Identification of the land tenure arrangements and predominant livelihood patterns;
- Socio-economic environmental components including local economy, local services, road network, traffic volumes and types of vehicles on the roads of access to the plant;
- Land use and zoning restrictions;
- Overview of fishing areas (near shore, estuarine and deep sea) and profile of fishing villages;
- Assessment of tangible and intangible archaeological and heritage resources;
- Transportation infrastructure and associated infrastructure;
- Current concerns about the health and safety of the public, etc.

A socio-economic census of the directly affected households (physically or economically displaced) shall be conducted. Additional socio-economic parameters for these households shall be covered to capture the pre-resettlement baseline and gain sufficient insight to design an effective livelihood restoration and rehabilitation plan.

The key data collection methods (qualitative and quantitative) for the socio-economic impact assessment and resettlement and livelihood restoration framework shall be as follows:

Data Collection Technique	Unit of Data Collection	Type of Data Collected
Village Surveys and Resource Mapping	A settlement or group of settlements	Quantitative based on a questionnaire
Sample Household Survey	Collecting household level information from a sample of HH	Household Questionnaire

S. No	Section	Particulars	Description
			representing potentially affected communities
		Focus Group Discussions	Collection of information from specific groups (women, youth, elderly, livelihood groups, ethnic groups etc.)
		Key-Informant Interviews	Collection of Information from specific individuals
		Discussions with local authorities	Line departments within government offices in Upazilla and district
			Qualitative information on a range of topics including livelihoods, land tenure etc.
			collection of qualitative information around a specific topic
			Qualitative information

The socio-economic survey should also ascertain the type of near shore fishery livelihoods from the context of the dredging activities, reclamation and construction of embankment for coal conveying, inlet and outfall for water during the operations phase of the project.

VII	Environmental and Social Impacts	<ol style="list-style-type: none"> 1. Identification of Impact 2. Pre-Construction and Development Stage Impact <ol style="list-style-type: none"> a. Impact on the sites from where material would be collected b. Impact on Landform c. Impact on Natural Resources d. Impact on Eco-systems e. Impact on Ambient Air f. Impact on Ambient Noise g. Impact on Water Bodies h. Impact on Soil i. Impact on Workers Health, Sanitation and Safety j. Impact on Key Point Installations & Others k. Solid Waste Disposal l. Impact due to transportation of raw materials 3. Construction Stage Impact <ol style="list-style-type: none"> a. Impact on Landform 	<p>The anticipated changes in the baseline environmental condition shall be quantified where possible by predicting the likely impacts of the proposed activities on the different environmental components using the relevant prediction tools. All the impacts listed in the left column as well as identified during the scoping study shall be captured in the impact assessment. The impact assessment shall take into consideration embedded/ in-built control measures of the project while carrying out the impact analysis.</p> <p>Cumulative impact arising due to other developments within the study area shall also be studied.</p>
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S. No	Section	Particulars	Description
		b.	Impact on Natural Resources
		c.	Impact on Eco-systems
		d.	Impact on Ambient Air
		e.	Impact on Ambient Noise
		f.	Impact on Water Bodies
		g.	Impact on Soil
		h.	Impact on Workers Health, Sanitation and Safety
		i.	Impact on Key Point Installations & Others
		j.	Solid Waste Disposal
		k.	Social Impact due to industrial set up and harnessing of coal and other resources locally (if any)
		l.	Impact due to transportation of raw materials
	4.	Operation Stage Impact	
		a.	Impact on Natural Resource
		b.	Impact on Eco-systems
		c.	Impact on endangered Species
		d.	Impact due to collection of Resources from Local Sources within the Country (if any)
		e.	Impact on Ambient Air
		f.	Impact on Ambient Noise
		g.	Impact on Water Bodies (both surface & ground)
		h.	Solid Waste Disposal
		i.	Soil and Agriculture
		j.	Impact on Ground Water
		k.	Impact due to Ash Disposal
		l.	Impact on Occupational Health
		m.	Impact on Public Health and Safety
		n.	Impact on Traffic Movement and avigation

S. No	Section	Particulars	Description
		<ul style="list-style-type: none"> o. Social Impact p. Impact on Tourism q. Impact due to transportation of primary fuels 	
VII I	Evaluation of Impacts and Mitigation Measures	The impacts should be evaluated in terms of their local, regional and national importance. The impact should be assessed in terms of the magnitude, significance, frequency of the occurrence, duration and probability. The confidence level in the prediction must be stated.	<p>Assessment of significance of impacts (Criteria for determining significance, Assigning significance) shall be well defined and consistent for each impact identified as part of scoping study and approved ToR.</p> <p>The judgment of significance of impacts will be based on one or more of the following, depending on the environmental factor being evaluated. These are:</p> <ul style="list-style-type: none"> a. comparison with laws, regulation or accepted national or international standards b. reference to pre-set criteria such as conservation or protected status of a site, feature or species c. consistency with pre-set policy objectives d. consultation and acceptability with the relevant decision makers, civil society, local community or the general public. <p>Mitigation measures which may be of the following categories and coverages:</p> <ul style="list-style-type: none"> a. changing project layout, transport routes, disposal routes or locations, timing or engineering design b. introducing pollution controls, waste treatment, phased implementation and construction, engineering measures, monitoring, landscaping, social services or public education; c. rehabilitation, compensation to restore, relocate or provision of concession for damage
IX	Risk Assessment	<ul style="list-style-type: none"> 1. Consequence Analysis 2. Emergency Response Plan 3. Risk Mitigation Measures 	<p>From the design documents, potential plant specific hazards shall be identified. Reviews of literature and accident databases shall also be undertaken. The frequencies, or the likelihood, of the various possible outcomes resulting from fire hazards, explosion hazards, toxic gas release and corrosion hazards etc. shall be derived from historical accident databases and, where necessary, shall be modified to take into account local factors.</p> <p>For all identified hazards assessed the consequences of each release shall be modelled using ALOHA/PHAST consequence modelling software and evaluated against acceptable hazard end-points.</p>

S. No	Section	Particulars	Description
			<p>The risk analysis shall also take into consideration natural hazards and associated impacts and provide:</p> <ul style="list-style-type: none"> • Management and Mitigation Measures • Institutional Capacity Building and Budget Allocation <p>On-site and off-site emergency response plan shall be prepared based on the outcome of risk analysis.</p>
X	Environmental and Social Management Plan	<ol style="list-style-type: none"> 1. EMP during Preparation Phase <ol style="list-style-type: none"> a. Land Development b. Location and Sources of Soil and Other Material for Development c. Transport of Soil and Other Material d. Method and Equipment for Collection of Soil and Other Material e. Closing of Sites of Sources of Soil and Other Material 2. EMP during Construction Phase <ol style="list-style-type: none"> a. Site Preparation b. Infrastructure Services c. Construction Equipment d. Safety Measures 3. EMP during Operation Phase <ol style="list-style-type: none"> a. Air Pollution Management <ol style="list-style-type: none"> i. transportation and handling of raw materials ii. Operation Stage b. Waste Water Management c. Noise Management d. Solid Waste Management e. House Keeping f. Safety and Occupational 	<p>This section shall provide description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the ESIA.</p> <p><u>Stakeholder Engagement plan</u></p> <p>Stakeholder Engagement Plan will be prepared based on the social survey and assessment of Impacts. The purpose of the plan will be to suggest appropriate, time bound engagement measures for the project proponent to involve and include various stakeholders in the project development and operation. This plan will also include a grievance redress mechanism for the community.</p> <p><u>Disaster Management Plan and Occupational Safety</u></p> <p>Disaster Management Plan (DMP) will be prepared for handling emergency situation arising due to fire, explosion, leakages of hazardous substances, etc. in the plant shall be prepared. The plan will also include storage, handling, transportation etc. for the hazardous and toxic materials to be used in the power station. Occupational risk involved during construction and operation of the plant will be assessed and necessary safety and protective measures would be spelt out. The DMP will include both onsite and off-site plans.</p> <p>In addition to that other specific plans will include:</p> <ul style="list-style-type: none"> • Occupational Health and Safety Plan • Traffic Management Plan • Waste management Plan • Pollution Prevention Plan • Construction Labour Management Plan • Emergency Preparedness and Response Plan for both onsite and offsite emergencies; • Grievance Resdressal Plan

S. No	Section	Particulars	Description
		Health	
		4. Greenbelt Development	
		5. Rain Water Harvesting Plan	
		6. Thermal pollution management	
		7. Budget for EMP	
		8. Contingency Plans	
XI	Environment Monitoring Plan	<ol style="list-style-type: none"> 1. Monitoring Plan <ol style="list-style-type: none"> a. Stack Emission Monitoring b. Ambient Air Monitoring c. Meteorological Monitoring d. Equipment and Ambient Noise e. Surface Water & Waste Water Monitoring f. Ground Water Monitoring g. Solid & Hazardous Waste Monitoring h. Flora and Fauna Monitoring i. Workers Health and Safety Monitoring j. Community Health Monitoring k. Monitoring of DMP l. Monitoring and CSR Activities 2. Action During Abnormal Operating conditions 3. Budgets for Monitoring 4. Reporting 	The environmental and social monitoring plan shall include technical aspects of monitoring the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget)
XII	Project Benefits with Benefit-Cost analysis that covers among others, Environmental and Social Cost		<p>The analysis will cover the following:</p> <ul style="list-style-type: none"> • Improvements in the physical infrastructure • Improvements in the social infrastructure • Employment potential –skilled; semi-skilled and unskilled • Other tangible benefits
XII	Stakeholder	Public Consultation ensures that	As required under the applicable international standards, stakeholder engagement is an

S. No.	Section	Particulars	Description
I	Consultation	<p>consultation with interested parties and the general public will take place and their views taken into account in the planning and execution of the project.</p> <p>Some of the authorities. to be engaged include: Department of Environment, Forest Department, Water Development Board, BIWTA, RHD, PWD, DPHE, Bangladesh Parjatan Corporation, Department of Fisheries, LGED, other national/local departments where deemed necessary, Local Administrations (DC, UNO, UP Chairman & Members), Local Communities, Non-Governmental Organizations, etc.</p>	<p>ongoing process that commences at the onset of the project planning. Following are some of the significant public consultation events to be carried out as part of this ESIA study:</p> <ul style="list-style-type: none"> • Consultations during baseline data collection and to understand community perceptions and concerns; • Community Meeting at Meghnaghat for sharing key project impacts and proposed mitigation measures after Draft ESIA is ready; • Technical Presentation to key institutional stakeholders and relevant independent expert community on ESIA findings and proposed mitigation measures for securing larger public acceptance of the ESIA at national level. <p>The comments received from these public consultation meetings shall be incorporated in the Final ESIA report, which will be submitted to the DoE for regulatory approval.</p>
XI	Conclusion and Recommendation		<p>This section should provide:</p> <ul style="list-style-type: none"> • Overall justification for implementation of the project • Explanation of how, adverse effects have been mitigated.

Figure 8.1 Monitoring Location Map for Air, Noise, Traffic and Met Station

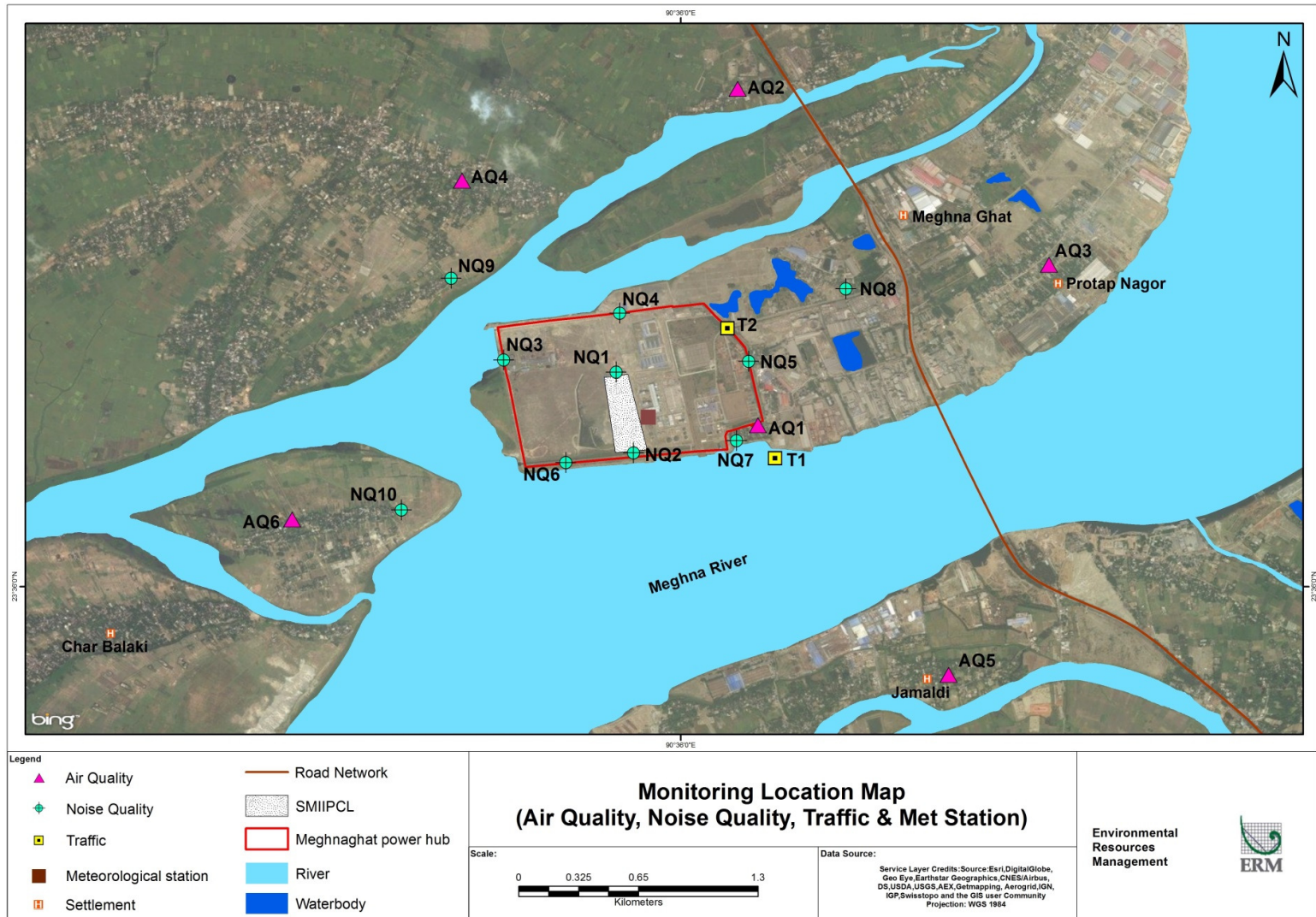
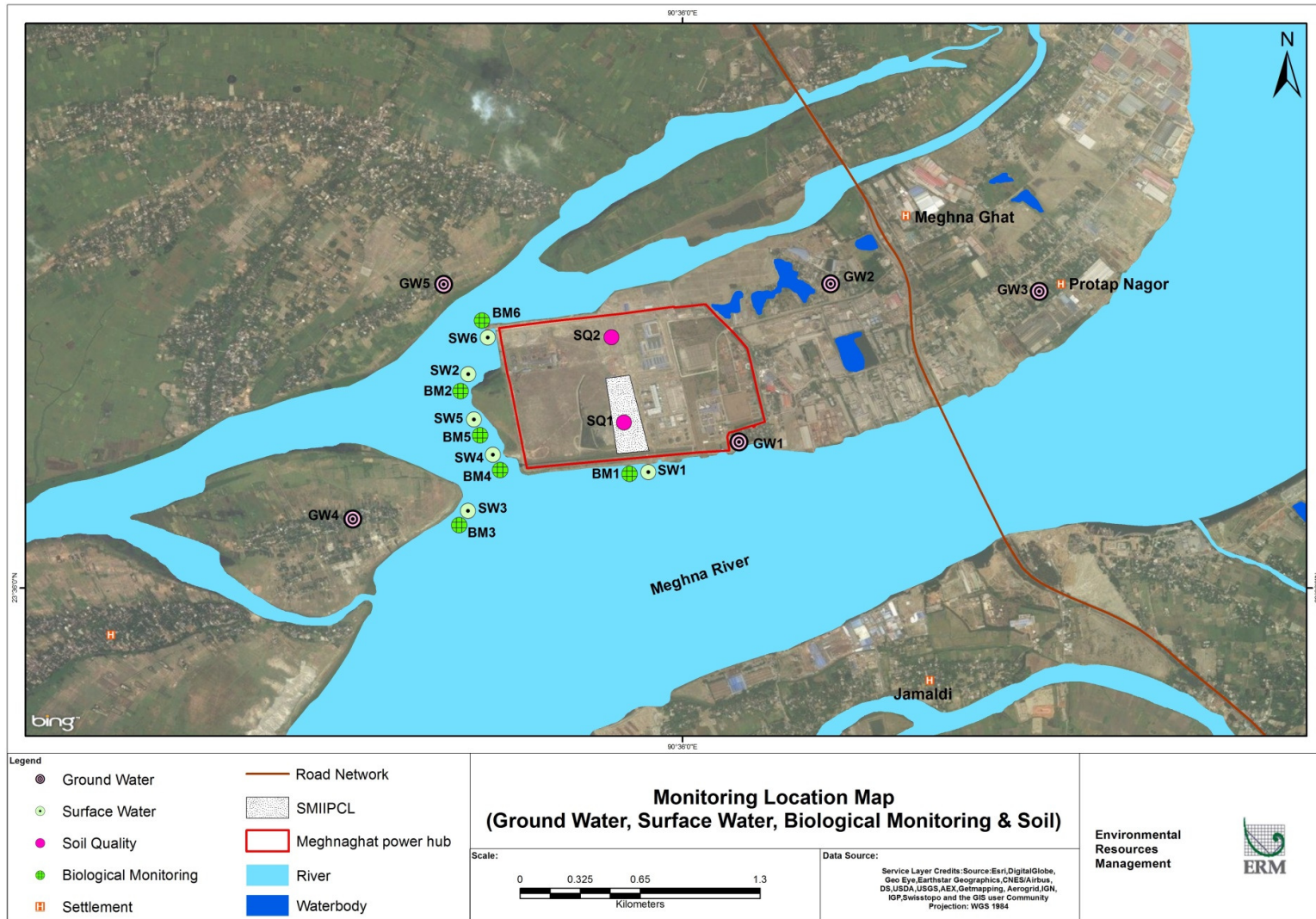


Figure 8.2 Monitoring Location Map for Surface & Ground Water and Soil Quality



Annex A

Rapid Environment Assessment Checklist

Country /Project Title: Bangladesh/ Summit Meghnaghat-2 Power Project

589.750 (Net) MW on Gas/ 541.220 (Net) MW on Liquid Fuel of
Combined Cycle Power Station, Meghnaghat Power Hub, Bangladesh

Sector: Thermal Power Plant

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the project area adjacent to or within any of the following environmentally sensitive areas?			
<ul style="list-style-type: none"> ▪ Cultural Heritage Site 		<input checked="" type="checkbox"/>	<p>As per the information available from Department of Archaeology, Bangladesh (www.archaeology.gov.bd), there are reportedly no cultural heritage sites and archeological monuments close to the project site. The nearest archaeologically important sites are Tomb of Sultan Ghiasuddin, the shrines of Panjpirs and Shah Abdul Alla and a beautiful mosque at Goaldi village, which are about 5 km north of the project site. Other important site is Idrakpur Fort, which is about 9.5 km south-west in Munshiganj.</p> <p>There are religious structures such as local mosques in the unions as well as in nearby areas including in the Meghnaghat industrial area. The key ones are Meghnaghat Jama Mosque, BPML-1 Jama Mosque, Protap Nagar Jama Mosque within Meghnaghat Industrial Area; and Dudghata Mosque, Mongalargoan Maszid, Chowdhurygoan Mosque in the Pirijpur Union. These are located between 1 and 2 km from the project site.</p>
<ul style="list-style-type: none"> ▪ Protected Area 		<input checked="" type="checkbox"/>	<p>There is reportedly no protected area, such as National Park, Wildlife Sanctuary, Game Reserve, Safari Parks, Eco-Parks, Reserve and Protected Forests within the 10 km study area.</p> <p>The nearest Ecological Critical Area is Sitalakhya River, which is approximately 9.2 km west from project site. The ecosystem of Sitalakhya River is considered to be threatened to reach a critical state. Sitalakhya River and its foreshore areas were declared as “ecologically critical area” (ECA), according to provisions of the Environmental Conservation Act 1995 and the Environmental Conservation Rules 1997.</p>
<ul style="list-style-type: none"> ▪ Wetland 	<input checked="" type="checkbox"/>		In Bangladesh wetlands area classified into river, streams, Baors, Haors and Beels. All of these are considered as wetlands and regarded as valuable fish and wildlife

SCREENING QUESTIONS	Yes	No	REMARKS
			habitat. The Meghnaghat Industrial area has been developed on the riverine island of Meghna River. The Meghna River is located on the east and minor channel of Meghna River is on west. In the 10 km study area, there are other channels and numbers of beels and canals. However none of the important wetlands are located in the 10 km study radius.
▪ Mangrove		<input checked="" type="checkbox"/>	No mangrove vegetation was observed in and around the study area during the reconnaissance and baseline survey visit. Also no reference was available about mangrove vegetation in the Narayanganj District.
▪ Estuarine		<input checked="" type="checkbox"/>	The Project site and district is not part of any estuary.
▪ Buffer Zone of Protected Area		<input checked="" type="checkbox"/>	There is no Protected areas on land in 10 km radius study area around the proposed project site The Sitalakhya River has been declared as an Ecologically Critical Area and is located 9.2 Km west of the Project Site.
▪ Special Area for Protecting Biodiversity		<input checked="" type="checkbox"/>	None
B. Potential Environmental Impacts			
Will the Project Cause...			
▪ Impairment of historical/cultural monuments and other areas, and loss/damage to these sites?		<input checked="" type="checkbox"/>	No impairment of historical/ cultural monuments and loss/ damage to these sites envisaged due to the proposed project.
▪ Encroachment into precious ecosystem (e.g. sensitive habitats like protected forest areas or terrestrial wildlife habitats?		<input checked="" type="checkbox"/>	No encroachment into precious ecosystem is envisaged due to the proposed Project, as there is reportedly no protected area, such as National Park, Wildlife Sanctuary, Game Reserve, Safari Parks, Reserve, and Protected Forests protected by law, within the study area.
▪ Dislocation or involuntary resettlement of people?		<input checked="" type="checkbox"/>	None
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		<input checked="" type="checkbox"/>	None
▪ Aesthetic degradation and property value loss due to establishment of plant and ancillary facilities?		<input checked="" type="checkbox"/>	The Project is being developed next to an existing Power plant so aesthetically it has precedents. The area was identified and developed for power plants so property value loss due to establishment of plant is not expected.
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical,	<input checked="" type="checkbox"/>		The occupational health and safety impacts during the construction and operation

SCREENING QUESTIONS	Yes	No	REMARKS
biological, and radiological hazards during project construction and operation?			phase of the Project would be (i) heat, (ii) noise, (iii) confined spaces, (iv) electrical hazards, (v) fire and explosion hazards, (vi) chemical hazards and (vii) dust
<ul style="list-style-type: none"> ▪ Noise and dust from construction activities? 	<input checked="" type="checkbox"/>		Noise and dust will be temporally generated due to civil works, movement of heavy machinery, transportation of man & material, excavation of earth and other construction activities.
<ul style="list-style-type: none"> ▪ Short-term soil erosion and silt runoff due to construction? 	<input checked="" type="checkbox"/>		As per the Bangladesh Meteorological Department (BMD), district Narayanganj receives heavy rainfall. Based on the rainfall record of 24 years (1991 – 2015), annual average rainfall varied from 1787 - 2900 mm. The proposed project site is already developed and raised above HFL. During construction of plant, some earth work is expected due to piling and foundations. During monsoon season, erosion of exposed soil (due to earth work) some erosion may occurred. This eroded matter may discharged into the nearest Meghna River is surface water drainage system with sedimentation tank not properly planned and maintained.
<ul style="list-style-type: none"> ▪ Fugitive dust during transportation, unloading, storage, and processing of coal, and polluted runoff from coal storage? 	<input checked="" type="checkbox"/>		The proposed power plant is based on natural gas as primary fuel and HSD will be used only in case of non-availability of natural gas supply as secondary fuel. No use of coal is envisaged in the project.
<ul style="list-style-type: none"> ▪ Risk of oil spills, which could pollute surface and groundwater and soil? 	<input checked="" type="checkbox"/>		Such risks exist during the construction as well as operation phase of the Project. HSD will be transported and stored at near to site in existing tank farm of Summit M1 project. No new tank farm for the project to store HSD is planned.
<ul style="list-style-type: none"> ▪ Hazards in gas pipeline operation and gas storage at power plant sites? 	<input checked="" type="checkbox"/>		The gas pipeline operation would have fire and explosion hazard, as the natural gas will be present in pipeline at high pressure (about 600 psig). However, no gas storage is required at site. The gas pipeline will be constructed in accordance with GSA specification and will be transferred to gas supplier after testing & commissioning. It will be gas supplier's property as part of the gas supply network during the plant operation. The pipeline will have a minimum cover of 1.0 m on top of it. Cathodic protection will be in place for the buried section of the pipeline and the design will be based on soil resistivity.
<ul style="list-style-type: none"> ▪ Changes in flow regimes downstream of the water intake due to abstraction for cooling purposes? 		<input checked="" type="checkbox"/>	The cooling system using induced draft cooling towers is basically a closed system which reduces the fresh water requirement for cooling purpose significantly in

SCREENING QUESTIONS	Yes	No	REMARKS
			<p>comparison of once through cooling system. The fresh water requirement for cooling water make-up and other plant water requirements will therefore be limited to 1000 m³/day, which will be abstracted for the Meghna River.</p> <p>The Meghna River is wide river near Meghnaghat Industrial area. The surface water is available through-out the year. The withdrawal of 1000 m³/day, from Meghna River may not cause any significant impact to other down-stream users.</p>
<ul style="list-style-type: none"> ▪ Pollution of water bodies and aquatic ecosystem from wastewater treatment plant for boiler feed, bleed-off from cooling towers, boiler blowdown and wash-water, and effluent from ash pond? 		<input checked="" type="checkbox"/>	<p>Project will be having induced draft cooling towers for cooling purpose, which will reduce the water requirement as well as discharges. About ¼ of the total intake water (including cooling tower blowdown, treated domestic and industrial effluent) will be discharged into the Meghna river through a channel of about 700 m length.</p>
<ul style="list-style-type: none"> ▪ Air pollution from fuel gas discharged into the atmosphere? 	<input checked="" type="checkbox"/>		<p>NOx and CO will be primarily emitted from gas based power generation, whereas SO₂, NOx, CO, and PM will be emitted from HSD based power generation during non-availability of gas.</p>
<ul style="list-style-type: none"> ▪ Public health and safety hazards due to solid waste disposal in sanitary landfills (see Matrix of Impacts and Measures for Solid Waste Disposal)? 	<input checked="" type="checkbox"/>		<p>Solid waste generation from the project would be limited and only from the canteen and office complex. In addition to that construction waste (inert) will be generated during the construction stage.</p> <p>The solid and non-hazardous wastes generated from the various areas during operations will be collected and segregated at the point of generation and stored in proper designated areas and disposed of through waste disposal contractors or authorized recyclers.</p> <p>It is planned that hazardous wastes (such as Chemical Cleaning waste from the CT compressor, Waste/used oil from the power house and workshop, Oil/dust contaminated cloths and rags from the lube oil system and spill kit waste) generated from the proposed Project will be collected and stored in designated roofed-areas and/or barrels with concrete flooring and secondary containment and disposed of/ sold through contractors or treated prior to discharge.</p>
<ul style="list-style-type: none"> ▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		<input checked="" type="checkbox"/>	<p>During the peak construction phase, the project will require about 800 personnel. A site camp will be provided for EPC contractor/ subcontractor personnel. It is reported that majority of unskilled and semi-skilled workforce will be engaged</p>

SCREENING QUESTIONS	Yes	No	REMARKS
			<p>from neighboring areas and this will reduce the requirement of housing arrangement for these workers. Also as the project area is already been developed as an industrial hub with existing worker population, hence, no large population influx is anticipated.</p> <p>During the operation phase, manpower requirement will be between 60 to 75 personnel. A dormitory will be provided for O&M team within the project site.</p>
<ul style="list-style-type: none"> ▪ Social conflicts if workers from other regions or countries are hired? 		<input checked="" type="checkbox"/>	There will be no social conflicts as the place has local workers available in the region.
<ul style="list-style-type: none"> ▪ Risks community safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 	<input checked="" type="checkbox"/>		Natural gas will be supplied to the project through underground pipeline, whereas a new natural gas pipeline will be constructed for that of about < 0.5 km length. Fuel oil (HSD) required for gas turbines will be delivered by Bangladesh Petroleum Corporation. The oil will be delivered by barges to the existing jetty on the Meghna River of Summit M1 project and will be stored in existing tank farm of Summit M1 project. No new jetty/ tank farm is proposed for Summit M2 project.
<ul style="list-style-type: none"> ▪ Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g. ash pond) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 	<input checked="" type="checkbox"/>		The plant operation will require chemicals for water treatment and process requirements. A list of the hazardous chemicals which will be used in the Plant, such as hydrochloric acid, caustic lye, sulphuric acid, chlorine etc.

A Checklist for Preliminary Climate Risk Screening

Country /Project Title: Bangladesh/ Summit Meghnaghat-2 Power Project

*589.750 (Net) MW on Gas/ 541.220 (Net) MW on Liquid Fuel of
Combined Cycle Power Station, Meghnaghat Power Hub, Bangladesh*

Sector: Thermal Power Plant

Screening Questions		Score	Remarks ¹⁷
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	The proposed project site not located in active flood risk zone, cyclone/ storm surge prone area. The proposed project site is already raised above HFL
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	0	Dependency of the project on river water is limited for meeting the raw water requirement, which is limited due to the use of cooling towers in the project. As, the Meghna River is large and surface water resource is available throughout the year. The proposed withdrawal will not cause any measurable change of river hydrology.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	Weather and current and future climate conditions are unlikely to impact the selection of project inputs (primarily natural gas).
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	1	It is possible that changes in weather and likely future climate conditions could affect the maintenance of project outputs.

(1) ¹⁷ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Screening Questions		Score	Remarks ¹⁷
Performance of project outputs	Would weather /climate conditions and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?		

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): Medium

Annex B

Involuntary Resettlement Impact Categorization Checklist

Probable Involuntary Resettlement Effects	Yes	No	Not Known	Remarks
Involuntary Acquisition of Land				
1. Will there be land acquisition?		<input checked="" type="checkbox"/>		<p>Land acquisition for Meghnaghat Power Hub (which includes the proposed project) was done in 1997-98 and handed over to BPDB. No new land acquisition for the project is anticipated.</p> <p>14.28 acres of land for the Project will be obtained through process of land lease agreement from BPDB. In addition to that about 9.4 acres of land will be required for Laydown Area and Worker's Accommodation during construction period. Area identified for the same are also available within the Meghnaghat power hub and will be obtained through land lease agreement from BPDB.</p>
2. Is the site for land acquisition known?		<input checked="" type="checkbox"/>		No land acquisition will be undertaken for the project.
3. Is the ownership status and current usage of land to be acquired known?	<input checked="" type="checkbox"/>			Land required for the project including laydown area and workers' accommodation area are located within the Meghnaghat power hub and land ownership is presently with BPDB.
4. Will easement be utilized within an existing Right of Way (ROW)?	<input checked="" type="checkbox"/>			BPDB will grant SMIIPCL the right to the non-exclusive, free and unfettered use of the Access road throughout the term of the LLA. In addition to that RoW for the gas pipeline up to the valve station of Petrobangla appointed agency will be provided by the BPDB.
5. Will there be loss of shelter and residential land due to land acquisition?		<input checked="" type="checkbox"/>		Not applicable

Probable Involuntary Resettlement Effects	Yes	No	Not Known	Remarks
6. Will there be loss of agricultural and other productive assets due to land acquisition?		<input checked="" type="checkbox"/>		Not applicable
7. Will there be losses of crops, trees, and fixed assets due to land acquisition?		<input checked="" type="checkbox"/>		Not Applicable
8. Will there be loss of businesses or enterprises due to land acquisition?		<input checked="" type="checkbox"/>		Nat Applicable
9. Will there be loss of income sources and means of livelihoods due to land acquisition?		<input checked="" type="checkbox"/>		No loss of income sources is anticipated and no loss of livelihood due to land acquisition for the project, as no land acquisition will be undertaken.
Involuntary restrictions on land use or on access to legally designated parks and protected areas				
10. Will people lose access to natural resources, communal facilities and services?		<input checked="" type="checkbox"/>		Typically, local people can lose access to natural resources, but the exact nature and scale is not known.
11. If land use is changed, will it have an adverse impact on social and economic activities?		<input checked="" type="checkbox"/>		The area where the Project is located has already been demarcated as industrial zone (especially power hub). However, any adverse impact on social and economic activities is not known at this stage.
12. Will access to land and resources owned communally or by the state be restricted?		<input checked="" type="checkbox"/>		
Information on Displaced Persons:				
<p>the likely number of persons that will be displaced by the Project? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>If yes, approximately how many? _____</p>				
<p>poor, female-heads of households, or vulnerable to poverty risks?</p> <p style="text-align: right;"><input checked="" type="checkbox"/> Unknown <input type="checkbox"/> No <input type="checkbox"/> Yes</p>				
<p>persons from indigenous or ethnic minority groups?</p> <p style="text-align: right;"><input type="checkbox"/> Unknown <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes</p>				

Annex C

Indigenous Peoples Impact Screening Checklist

KEY CONCERNS (Please provide elaborations on the Remarks column)	YES	NO	NOT KNOWN	Remarks
A. Indigenous Peoples Identification				
1. Are there socio-cultural groups present in or use the project area who may be considered as "tribes" (hill tribes, schedules tribes, tribal peoples), "minorities" (ethnic or national minorities), or "indigenous communities" in the project area?		<input checked="" type="checkbox"/>		The census data (2011) of Bangladesh shows that the total population of ethnic minority in Sonargaon Upazila is 162 and in Pirijpur Union Parishad is 6. There are 42 ethnic households in Sonargaon Upazilla and 1 household in Pirijpur Union. There will be no impact on the ethnic minority household.
2. Are there national or local laws or policies as well as anthropological researches/studies that consider these groups present in or using the project area as belonging to "ethnic minorities", scheduled tribes, tribal peoples, national minorities, or cultural communities?		<input checked="" type="checkbox"/>		Not applicable
3. Do such groups self-identify as being part of a distinct social and cultural group?		<input checked="" type="checkbox"/>		Not applicable
4. Do such groups maintain collective attachments to distinct habitats or ancestral territories and/or to the natural resources in these habitats and territories?		<input checked="" type="checkbox"/>		Not applicable
5. Do such groups maintain cultural, economic, social, and political institutions distinct from the dominant society and culture?		<input checked="" type="checkbox"/>		Not applicable
6. Do such groups speak a distinct language or dialect?		<input checked="" type="checkbox"/>		Not applicable

KEY CONCERNS (Please provide elaborations on the Remarks column)	YES	NO	NOT KNOWN	Remarks
7. Has such groups been historically, socially and economically marginalized, disempowered, excluded, and/or discriminated against?		<input checked="" type="checkbox"/>		Not applicable
8. Are such groups represented as "Indigenous Peoples" or as "ethnic minorities" or "scheduled tribes" or "tribal populations" in any formal decision-making bodies at the national or local levels?		<input checked="" type="checkbox"/>		Not applicable
B. Identification of Potential Impacts				
9. Will the project directly or indirectly benefit or target Indigenous Peoples?		<input checked="" type="checkbox"/>		Not applicable
10. Will the project directly or indirectly affect Indigenous Peoples' traditional socio-cultural and belief practices? (e.g. child-rearing, health, education, arts, and governance)		<input checked="" type="checkbox"/>		Not applicable
11. Will the project affect the livelihood systems of Indigenous Peoples? (e.g., food production system, natural resource management, crafts and trade, employment status)		<input checked="" type="checkbox"/>		Not applicable
12. Will the project be in an area (land or territory) occupied, owned, or used by Indigenous Peoples, and/or claimed as ancestral domain?		<input checked="" type="checkbox"/>		Not applicable
C. Identification of Special Requirements <i>Will the project activities include:</i>				
13. Commercial development of the cultural resources and knowledge of Indigenous Peoples?		<input checked="" type="checkbox"/>		Not applicable

KEY CONCERNS (Please provide elaborations on the Remarks column)	YES	NO	NOT KNOWN	Remarks
14. Physical displacement from traditional or customary lands?		<input checked="" type="checkbox"/>		Not applicable
15. Commercial development of natural resources (such as minerals, hydrocarbons, forests, water, hunting or fishing grounds) within customary lands under use that would impact the livelihoods or the cultural, ceremonial, spiritual uses that define the identity and community of Indigenous Peoples?		<input checked="" type="checkbox"/>		Not applicable
16. Establishing legal recognition of rights to lands and territories that are traditionally owned or customarily used, occupied or claimed by indigenous peoples?		<input checked="" type="checkbox"/>		Not applicable
17. Acquisition of lands that are traditionally owned or customarily used, occupied or claimed by indigenous peoples?		<input checked="" type="checkbox"/>		Not applicable

D. Anticipated project impacts on Indigenous Peoples - Not Applicable

Project Component / Activity / Output	Anticipated Positive Effect	Anticipated Negative Effect
1.		
2.		
3.		
4.		
5.		

Note: The project team may attach additional information on the project, as necessary.

Annex D

Screening Checklist for Greenfield Projects – Summit Corporation Limited

SITE SELECTION/SCREENING FOR GREENFIELD PROJECT

Project Title	589.750 (net) MW on Gas/ 541.220 (net) MW on Liquid Fuel of Combined Cycle Power Station (Summit Meghnaghat 2)
Type of Project	Dual fuel fired combined cycle power project (CCPP)
Project Components (as e.g. power plant, fuel pipeline, water arrangements, transmission line, access road, arrangement for transportation of materials through jetty, worker accommodation etc)	<ul style="list-style-type: none"> • Power plant (1 dual fuel GT + 1 ST + 1 HRSG); • LNG and HSD pipelines of less than 500 m; • Water intake from Meghna River; • Induced draft cooling towers; • Temporary jetty in close vicinity for transportation of heavy lifts and major construction materials; • Use of existing pontoon of Summit Meghnaghat 1 project for HSD unloading; • Use of existing tank farm of Summit Meghnaghat 1 project for HSD storage; • Existing access road connection; • Workers accommodation and laydown areas within 500 m from the site.
Status of Land (Made available by GoB/to be transferred/to be acquired/to be purchased/existing)	Site located within Meghnaghat Power Hub of the Bangladesh Power Development Board (BPDB), Government of Bangladesh. Same will be leased to the project company (Summit Meghnaghat II Power Company Limited) after signing of the land lease agreement (LLA).
Total Land involved	<ul style="list-style-type: none"> • Available land to be leased for the power plant : 14.28 acres • Land requirement for laydown area/s (construction phase) : 6.20 acres • Land requirement for workers' accommodation (construction) : 3.20 acres
Location details	<p>Meghnaghat Power Hub</p> <p>Mouza: Char Ramjan Sonauallah</p> <p>Union: Pirijpur</p> <p>Upazilla: Sonargaon</p> <p>District: Narayanganj (Bangladesh)</p>
Coordinates	<p>The Project site co-ordinates are as follows:</p> <ul style="list-style-type: none"> • NW corner: 23°36'36.73"N, 90°35'46.53"E • NE corner: 23°36'37.31"N, 90°35'50.69"E • SE corner: 23°36'24.10"N, 90°35'54.10"E • SW corner: 23°36'23.56"N, 90°35'48.50"E

GO/NO-GO CRITERIA FOR GREENFIELD PROJECT

S. No.	Criteria / Things to Check for	(Please tick appropriate one)		Evidence Details	Remarks
		Go	No Go		
1.	Work in or near an ecological or cultural area of international or national importance (e.g., RAMSAR wetland, National Park, protected ecological preserve, world heritage site, etc.)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Protected areas as per Wildlife (Conservation and Security) Act, 2012 Reserved and protected forests Ecologically critical area None, within 10 km radial zone (No forest land within Narayanganj and Mushiganj districts) None within 10 km radial zone Shitalakshya River: 9.2 km* west	
2.	Land involving, impacting, or simply near Indigenous Peoples, Traditional Cultures or equivalent communities.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The census data (2011) of Bangladesh shows that the total population of ethnic minority in Sonargaon Upazila is 162 and in Pirijpur Union Parishad is 6. There are 42 ethnic households in Sonargaon Upazilla and 1 household in Pirijpur Union.	
3.	<ul style="list-style-type: none"> Coastal Areas - Site falling within High Tide line (HTL) Distance from flood plains or riverine systems (In context to Bangladesh, there could be many such sites which are in the HTL. Such information should trigger the mitigation requirement and the associated cost it may induce. 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Project site is not close to coastal areas, however, the site abuts Meghna River. The Meghnaghat Power Hub is not prone to flooding. The Project site is also not affected by flood waters in the past, since BPDB has raised the land above . In order to avoid any flooding event, BPDB has raised the land above HFL and embankment has been constructed around the power hub.	
4.	Are there any sites of cultural or archaeological importance at the site within 500 m?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The nearest cultural and archaeological sites of importance are located in Sonargaon, which include Tomb of Sultan Ghiasuddin, the shrines of Panjpirs and Shah Abdul Alla and a mosque at Galdi village.	
5.	Seismic Zone Note: This is to identify extra measures which may be required during construction stages.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The project site and study area is located in Seismic Zone II resulting in a basic seismic coefficient $z = 0.20$.	Refer to Section 4.3.11 of the E&S Scoping Report for

					details
6.	<ul style="list-style-type: none"> • Large scale resettlement (Example involving more than 350 HHs) • Is the land being used for economic/livelihood purposes for sizeable population and has the potential to increase livelihood and associated vulnerability 	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The proposed project area was acquired by BPDB in 1997-98. Prior to acquisition this char area was only used for cultivation in dry season. Presently there is no cultivation done. The project area is fenced and grazing is not observed. There is no settlement, trees or and crop cultivation in the project area. Therefore, R&R issue is not applicable for this project.	
7.	Is the land categorised as tribal land/ indigenous people land or any such category followed in Bangladesh	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The project site is part of Meghnaghat Power Hub, which is an industrial area for setting up of power infrastructure.	
8.	Work on a project (or in a region) that is the subject of any actions or campaigns being waged by any NGO etc.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	No such information was found during the external factors review of the project.	

Note: Only after majority of Primary Siting Criteria is met for a particular Site, it will be subjected to more rigorous Social and Environmental Screening Checklist for the selected Site at a later stage of the project either internally or through a third party ESDD to trigger the need for specialized studies.

SITE SELECTION/SCREENING FOR GREENFIELD PROJECT

No.	Screening questions	Details			Remarks if any
1.	Resource related Sourcing details:				
	Total Land (Area, type of land government/private)	14.28 acres for Project and additional 9.3 acres for laydown area and construction camp during construction stage of the project.			Entire land is owned by BPDB. No private land is required for the project.
	Water availability and connectivity	About 1000 m ³ /day, which will be sourced from Meghna River			
	Fuel availability and connectivity	Natural gas will be provided by Petro Bangla or any of its company at the Meghnaghat Power Hub.			Project will take tapping from the valve station to be located within Meghnaghat Power Hub.
	Connectivity to the site	Site is already having an access road from the Dhaka-Chittagong Highway.			
	Effluent and waste disposal arrangements	An effluent treatment plant and sewage treatment plant will be provided at site and treated water along with cooling tower blow down will be discharged through about 0.5 km long channel to the Meghna River.			
	Manpower	During the peak construction phase, the project will require about 800 personnel. During the operation phase, manpower requirement will be between 60 to 75 personnel.			A construction camp will be provided within Meghnaghat Power Hub for the migrant workers as well as expats, whereas local workers will make their own arrangements. During operation phase, a dormitory will be provided for O&M team within project site.
2.	Project Siting Is the project located within or near to any of the following environmentally sensitive areas?	Yes	No	NA	
	Protected Area-National park, wildlife sanctuary, Ramsar site, world heritage site etc (Km, Direction)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Buffer Zone of Protected Area (Km, Direction)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Area for protecting biodiversity- ecopark, migration corridor of CR/EN species etc (Km, Direction)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Wetland (Km, Direction)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

No.	Screening questions	Details			Remarks if any
	Estuarine (Km, Direction)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Mangrove (Km, Direction)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Cultural Heritage site (Km, Direction)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	More than 5 km away from site
	Indigenous people (Km, Direction)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	As per Census 2011, only 1 HH in Pirijpur Union.
	Natural hazards prone (especially floods and cyclones)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Site is already a developed land with flood embankment and elevation above the HFL.
3.	Mapping (Distance and direction) of the Project and associated components with respect to sensitive receptors	Yes	No	NA	
	Distance from nearest settlement and Houses (Nos:) in that settlement	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Settlement near approach road: 0.65 km* north-east Dudghata village: 0.95 km* north-west
	School	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	None within 500 m from site
	Other Major settlements (Km, Direction)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pirijpur, Char Balaki, Islampur (within 2 km radial zone)
	Religious or culturally important property or site	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Meghnaghat Jama Maszid (1.5 km)
	Place or property of local/national importance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	None specific
	Other common property resources as roads, water bodies, agricultural roads etc	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Meghna River (forms boundary of Meghnaghat Power Hub from three directions)
4.	Will the project result in the following?	Yes	No	NA	
	Displacement or involuntary resettlement of people	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Impairment of historical/cultural property or sites and loss/damage to these sites	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Large influx of population resulting in increased burden on infrastructure and services	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Community safety risks/biodiversity risks due to accidental or natural hazards or structural failures (ash pond, storage/transportation of flammable chemicals, fuel, hazardous chemicals etc.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.	Will project or any of its component impact the following in the project area?	Yes	No	NA	
	Land use	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

No.	Screening questions	Details			Remarks if any
	Aesthetics	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Habitats like protected forest areas or terrestrial wildlife habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Water body/Aquatic ecosystem or habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Treated water and cooling tower blow down will be discharged into Meghna River.
	Flow regime of the river (due to water intake)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Water demand for the project is limited to 1000 m3/day, which is about 0.0002% of the available water in Meghna River during the lean season
	Ground water scenario	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	No ground water abstraction for the project is planned
	Ambient air quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Use of Natural Gas and HSD for power generation will result into emission of criteria pollutants (e.g. NOx, PM, CO, SO2). Project will meet the emission guidelines of the DoE as well as World Bank guidelines.
	Ambient noise levels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	From operation of turbines, cooling towers, pumps, compressors and other equipment and machinery
	Cultural heritages	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	None within 5 km from the site
	Community health and safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Use of HSD and Chlorine can result into community risks
	Common property resources	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6.	Information/Issues in the Public domain about the Project Area				
	Any aspect of Significance (such as particular ecological species, agricultural crop or pattern, livelihood, skills etc)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Discharge of treated water and cooling tower blow down can impact surface water quality near discharge point.
	Any controversies (related to land etc)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7.	Any others				
	Litigations pending	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

SITE COMPARISON SUMMARY:

Not applicable for the Project as the project site is already identified and developed by the BPDB for Power Project.

Parameters for Selection	Site 1	Site 2	Site 3
Land Availability Status			
Water Availability			
Fuel Availability			
Connectivity			
Resettlement required			
Distance from environmentally sensitive area as Protected areas, wildlife sanctuaries, national park, Ramsar site, UNESCO heritage site etc			
Distance from nearest Settlement and no of Houses			
Indigenous People impact			
Cultural heritage site			

Summary of Key Remarks (if any) and **Project Categorization**

Refer to Scoping Report (Section 5)

Note: The summary will provide enough information to be able to clearly highlight the E&S sensitivity and the associated risk which the company will be possibly exposed to because of the Project. Preliminary project categorisation will also be undertaken at this stage and will be further confirmed based on subsequent assessments.

Details of further studies required

Refer to Scoping Report – Section 8 (ToR for ESIA Study)

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Note: This will not necessarily be a complete list of all studies to be conducted; however will inform the ToR preparation for conducting ESDD (if required) and subsequent ESIA and specific studies.

Opinion on selection of particular site:	
Date:	

Note: This will ensure that the ESMS committee and the board are in a position to take an informed decision after critically evaluating the findings on site level E&S screening.

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