Power Grid Bangladesh PLC

Ministry of Power, Energy and Mineral Resources

FINAL REPORT

Environmental and Social Impact Assessment (ESIA)

of

Madunaghat – Moheshkhali 765kV Power Transmission Lines Project

Prepared by

IIFC

Infrastructure Investment Facilitation Company

An Enterprise of ERD, Ministry of Finance

December 2025

Comments Matrix on Draft ESIA Report of Madunaghat – Moheshkhali 765kV Power Transmission Lines Project from ESU Dated: 30/09/2025

S/N	Heading (No. + Title)	Marking	Comments	Feedback
1	1 Project Background	Besides, it has been planned to construct new 700 circuit km transmission line of capacity 765 kV from power hub being developed at Moheskhali to Dhaka, which will be supposed to be completed by 2025 (Source: 8th Five Year Plan, July 2020 – June 2025).	Please recheck this line.	It has been rechecked. This line is ok. Page# 369 of 8th Five Year Plan.
2	1 Project Background	To achieve the target of 8FYP, Power Grid is going to construct new transmission lines of capacity 765kV from Moheshkhali to Madunaghat at a total distance of about 95.5-kms with 272 towers considering a total of 70-meters Right-of-Way (RoW) from center line (35m+35m).	Please check and revise the line.	Checked and revised
3	1.5.2 Environmental Baseline Survey	All the parameters selected in previous step may not be significant for the project; hence a reconnaissance survey was done to shorten this list to concentrate on significant effects.	Please mention the types and methods of the reconnaissance survey.	Mentioned with the line (The method of reconnaissance is transect walk or walkover i.e., on-foot inspection to observe terrain, features, and constraints (slopes, existing utilities, structures, road, rivers, soil) of proposed tower locations and transmission lines initially provided by Power Grid. Later, topographic surveys were carried out to know tower site topography, features, contours, and land related information, etc.
4	1.5.2.1 Physical Environment	The geological and seismic issues have been investigated using secondary information and field observation.	Please clarify how field observation is done for seismic issues?	Field observation is done to discuss with local people regarding the seismicity
5	1.5.2.1 Physical Environment	Environmental Parameters Testing	Please clarify the methods of taking sample throughout the the TL.	Clarified the basis of taking sample throughout the TL for each testing below Table# 03
6	1.5.2.1 Physical Environment	Table 3: Environmental Testing Plan	Please clarify why the sample collected in the 1st round and 2nd round are varied?	1st round has been collected as per Inception Report. 2nd round has been collected as per opinion of ESU.
7	1.5.2.1 Physical Environment	Prior to data collection, a checklist/ questionnaire was developed.	Please refer the check list.	Data collection checklist has been referred in Annex-XXVI
8	1.5.2.1 Physical Environment	The checklist included all kinds of information which should be looked into in the context of existing and potential structures	Please recheck the line.	Rechecked. It would be "The checklist included all kinds of information that should be looked

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		of the project.		into in the context of existing and potential structures of the project area.
9	1.5.2.1 Physical Environment	A combination of survey techniques was used for data collection.	Please mention the techniques.	It is mentioned as "qualitative and quantitative" survey techniques
10	1.5.2.2 Ecological Resources	Ecological Resources	Please mention is there any bird survey have been done or not?	No. Not done. Only IBAT done. We followed the ToR.
11	1.5.3 Social Baseline Survey	To prepare the baseline situation of the study area, information on some important socio-economic parameters have been collected from the reports of the Bangladesh Bureau of Statistics (BBS), 2022 and Households Income and Expenditure Survey (HIES), 2021.	Please recheck is it HIES, 21 or 22?	It is HIES 2022. During inception report, it was 2021 but now it would be 2022 (as we used data of HIES 2022 during draft report).
12	1.5.5 Bounding	However, in total 90m (35 left side + 20m middle side + 35m right side) RoW is considered for the ESIA study area for the 765kV transmission line is considered for the ESIA study area.	Please mention in what basis this area is selected?	It has been selected as per experts' opinion (Team Leader and TL Expert)
13	2.3 National Environmental and Social Laws, Regulations and Policies	Power System Master Plan, 2010	Please include Integrated Energy and Power Master Plan (IEPMP) 2023 also.	Included
14	2.3 National Environmental and Social Laws, Regulations and Policies	PGCB is verifying the number of tower footings, the extent of impact on landholders, and conducting stakeholder consultations to determine compensation amounts.	Please use Power Grid in short and Power Grid Bangladesh PLC as details instead of using PGCB and maintain it in the whole report.	It has been revised in the whole report
15	2.3 National Environmental and Social Laws, Regulations and Policies	Table 10: Key Permits Required for the Project	Please include other agencies also for example BWDB, River commission, etc.	Included Chittagong Port Authority (CPA) and BWDB for river crossing
16	3.7 Silent Features of Transmission Lines	Silent Features of Transmission Lines	Please correct the heading.	Rephrase the Heading as "Key Aspects of Proposed Transmission Lines"
17	3.7 Silent Features of Transmission Lines		In some section it has been mentioned four rivers. Please recheck it.	It has been mentioned in Section 1.4. Rechecked it and revised.
18	3.9 River Crossing Procedures of Transmission Lines		Please recheck installing suspension tower is aligned with the feasibility report or not.	No. of suspension has been reduced and angle tower has been increased due to change of route in some points. But these numbers are not significant. However, suspension tower is aligned with the feasibility report. It would be helpful if you provide Feasibility Report

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				(technical analysis part).
19	3.10 Crossing Wetland/Waterbody	There are no designated wetlands and/or beels or haors fall under the RoW of transmission lines.	Please clarify the word designated.	In the context of the statement, "designated" means that specific government declared wetlands, beels, or haors have been formally and legally identified by governmental or relevant regulatory authorities as areas requiring special environmental protection or management.
20	3.10 Crossing Wetland/Waterbody	Table 34: Proposed transmission lines crossing over the rivers	Address individual map for each river crossing indicating exact/approximate locations of crossing with tower footing distance from each side of the river bank.	Individual map for each river crossing has been provided as Figure 25, 26 and 27
21	3.11 Construction Equipment and Materials	Construction Equipment and Materials	Please provide a list and include bay extension also and there is no scope of SS, so exclude it.	List of equipment would come from Feasibility Report. We could not found full feasibility study report except summary report.
22	3.15 Temporary Facilities and Associated Facilities	Associated Facilities	Please recheck is the paragraph align with the associated facilities definition. Moreover, correct the numbering system also.	These facilities would be related with Madunaghat to Bhulta 765kV project. So, it can be considered as associated facilities. Power Grid may contribute to enrich this section as per detail FS report.
23	3.16 Development Needs and Aspirations of the Community along the RoW	Communities may seek compensation for land used for the RoW and for any disruptions to their livelihoods caused by construction or maintenance activities.	Please recheck the relevancy of the line.	Rephrase the line as “Communities, specifically, landowners of towers will get compensation as per Electricity Rules 2020 (amended 2022) as well as will get compensation against loss of crops, trees, etc. within the RoW. Vulnerable households will get allowance, if any, as well as livelihood training from the project.”
24	3.16 Development Needs and Aspirations of the Community along the RoW	Clear and open communication between the utility company and the community is vital for building trust and addressing concerns.	Please check the line.	Rephrase the line as “For that, clear and open communication, and coordination between different local government institutions (e.g., LGED, Union Parishad, power distribution entities, etc.) and the community is

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				vital for addressing the concerns."
25	3.16 Development Needs and Aspirations of the Community along the RoW	In addition, fair and equitable compensation for land use, property damage, and livelihood disruptions is crucial.	Check the line and align with safety an health.	The first sentence addresses physical and safety concerns (preventative health measures), while the second addresses economic and social impacts (reparative financial measures). Together, it defines a comprehensive framework for ethical land use by the project.
26	4.3 Alternative of Transmission Line Routes	Table 36: Routing Options for Proposed 765kV Transmission Line	No satellite image comparing the two TL.	Included satellite image as Figure 29
27	4.3 Alternative of Transmission Line Routes	SL	At least 3 options have to be considered.	Included option-3 in Table 36
28	4.3 Alternative of Transmission Line Routes	Table 37: Objects found on the proposed tower location	Some rows are missing the satellite image.	Satellite image inserted in the missing cell
29	4.4 Impact of Bangladesh Delta Plan 2100 with the Project	Impact of Bangladesh Delta Plan 2100 with the Project	Please recheck this section does the section comply with chapter or not.	Yes. I know. But I followed the ToR. It can be inserted into Chapter-2.
30	Environmental Baseline	Environmental Baseline	For this chapter trend analysis should be included using secondary data.	Year-wise trend chart of Rainfall, Temperature and RH has been provided using secondary data.
31	5.1.4 Natural Hazards	Figure 42: Seismic Zones of Bangladesh	The resolution of the maps is low. Please insert a better one.	Inserted a clear map
32	5.1.4 Natural Hazards	Table 49: Monthly total frequency and Thunderstorm days data of Chattogram	No discussion found on secondary data.	Discussion on secondary data for Chattogram and Cox's Bazar has been provided in the relevant section
33	5.1.4 Natural Hazards	The overall trend across Bangladesh, including these districts, is a rise in lightning frequency attributed to climate change.	Please use numerical data for analyzing the trend.	Trend of frequency has been presented in a chart as Figure 56.
34	5.2 Water Resources	Table 50: Proposed transmission lines crossing over the rivers	No satellite images of river crossing and canal crossing.	Inserted satellite images for river and canal crossing as Figure 57 and 58.
35	5.2.1 Flooding and Drainage Pattern	Figure 48: Overlapping TLs on the Flood Inundation Map of Bangladesh	For all map name of other countries have to be removed.	Removed from the report
36	5.3.1 Air Quality	Figure 49: Baseline air quality monitoring locations	Please remove the international boundary.	Omitted international boundary from the map
37	5.3.1 Air Quality	Table 54: Ambient air quality monitoring results (1st round)	Please mention the month of data collection in the captions the both seasonal data.	Mentioned month of data collection for both seasonal data.

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38	5.3.1 Air Quality	Interpretation of Ambient Air Quality Analysis	Seasonal data is collected with unequal samples and no discussion is found comparing the data of the two season.	1st data has been collected as per inception report, and 2nd round as per opinion of ESU. However, comparison of two seasons has been provided below Table 57.
39	NOx (Nitrogen Oxides):	Figure 51: Scenario of Ambient Air Quality	Please clarify this graph is presenting data of which season and please show a bar for the standard also. Moreover, ensure all the parameters have separate color which can easily visible and understand.	It is the graph of 2nd round data collection in monsoon season on July. Rephrase the caption of the figure.
40	5.3.2 Noise Level	Table 58: Noise Monitoring Results	No seasonal variation data. Please mention the season of the data collection in the caption.	It has been mentioned accordingly. Presently Table 59.
41	/	Figure 55: Linear relationship between the noise level (day time) and BD standard and IFC Standard	Please the seasonal variation data should be considered while generating this graph with the standard also.	Graph has been prepared considering two seasons for day and night with BD and IFC standards (Figure 68)
42	/	Figure 56: Linear relationship between the noise level (night time) and BD standard and IFC Standard	Please the seasonal variation data should be considered while generating this graph with the standard also.	Graph has been prepared considering two seasons for day and night with BD and IFC standards (Figure 69)
43	5.3.3 Groundwater Quality	Table 60: Groundwater Monitoring Results	For which season this data is denoting?	Ground water was collected only during monsoon season on July 2025.
44	Interpretation	Total Ten (10) sample was collected from the project corridor.	For which season?	Only during monsoon. It is mentioned with the line.
45	5.3.4 Surface water Quality	The surface sample was collected by maintaining standard procedures from Ten (10) location of the project corridor on 20 to 23 July, 2025.	Mention the other season also.	Mentioned 1st round pre-monsoon season
46	5.3.4 Surface water Quality	Table 62: River Water Quality Results	Please recheck it is river water or surface water quality.	Yes. It would be surface water consist of river and canal water. Revised accordingly
47	5.3.4 Surface water Quality	SW-9	Caption of the figure is missing.	Added the caption of the figure
48	5.3.4 Surface water Quality	Table 63: Pond Water Monitoring Results	Please recheck the caption of the table is there any classification for pond in ecr,23.	Not directly mentioned the 'Pond'. But it is available in the ECR (Water Quality Limits 1 (ka).
49	5.7.1 Ecological Survey using IBAT Analysis	Table 71: Status of threatened species within 2-km proximity of the proposed transmission lines	It should be analyzed at least 5-km from the project area.	There is no indication regarding proximity in the ToR. We considered 2-km left side and 2-km right side from centre line.

S/N	Heading (No. + Title)	Marking	Comments	Feedback
50	5.7.3 Ecosystem Diversity	Table 73: Ecological diversity with their area and percentage within the transmission lines	Please recheck the table earlier it is said that 90m RoW. Provide the percentage in the table also.	As per ToR, RoW is 70m. For tree counting 90m RoW was considered. It has been revised in the report.
51	5.7.4 The Asian Elephant (Elephas maximus)	Figure 74: Status of Forest and Elephant Corridors from proposed Transmission Line	Please show distance from the TL to the Wild life sanctuary.	Distance shown for Chunati WS and Elephant Corridors as Figure 88
52	6.1.20 Government Assistance	Table 88: Status of Government Assistance	VGF is mentioned twice please check it.	Checked and revised
53	6.1.21 Role of Women and Gender Issues	Table 90: Sector Wise Women Employment	Please recheck the table. It is missing the districts of the project.	Data has been provided district-wise
54	6.2.1 Public Utilities and Cultural Resources	As per tower survey conducted from February to May 2025, no public utility and cultural resources will be affected by the project intervention.	Please clarify does it consider the construction period also?	During tower location survey, we found that there are no any public utility and cultural property or resources. So, during construction of tower, no public utility will be damaged.
55	6.3.9 Awareness on HIV	Table 104: Source of Knowledge on HIV (Multiple response) (N=413)	Please recheck the table specially the percentage.	It is ok. It is multiple answer of 413 respondents which come from Table 105 ('Yes' response)
56	Power Grid Staff, PIU, ESU or its consultant	Figure 86: Picture of public consultation meeting	Please add the signature of picture of public consultation meeting at annexture.	Added in Annex-XII
57	8.4.5 Risk of Bird Collision and Electrocution	The list of the spans is presented below.	Provide a caption of the table below.	Caption added
58	10.4.2 Construction Stage Site Specific Management Plans	Construction Stage Site Specific Management Plans	Tree plantation plan has to be addressed.	Included in the section
59	10.4.3 Mitigations and Compliance Monitoring Plan	Table 117: ESMP Mitigation Plan	Define the pre-construction, construction, and O&M phases with specific timelines, and assign responsibilities to each party in a separate table. Ensure this format is consistently maintained throughout the ESMP.	Defined the pre-construction, construction, and O&M phases accordingly within the table
60	10.4.3 Mitigations and Compliance Monitoring Plan	Table 117: ESMP Mitigation Plan	Segregate the transmission line (TL) based on environmental sensitivity and other relevant criteria, and rearrange the EMP accordingly.	A separate ESMP based on environmental sensitivity (saline areas, forest areas and plain land areas) has been prepared and provided in Table 121.
61	10.4.3 Mitigations and Compliance Monitoring Plan		Include this issue in the pre-construction phase: • NOC issue from different utility agencies	Included all these issues in the pre-construction phase of ESMP

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			• CSEMP issues • Noise and Air management plan • Tree plantation plan • Include other management plans which are not included here. • Need Baseline E&S monitoring report prepared by the contractor as per ECR 23 and other associated rules and regulations.	
62	10.4.3 Mitigations and Compliance Monitoring Plan	Change of Land Use, land acquisition and requisition	Please is there any requisition is needed or not and need discussion about land compensation.	As per RP there is no requisition. Compensation would be paid as per Electricity Rules 2020 (amended 2022)
63	10.4.3 Mitigations and Compliance Monitoring Plan	Location of substations will be selected in uncultivated areas, to the extent possible.	Please clarify it in line with the scope of work.	These issues have been rectified as per scope of work i.e., construction of transmission towers as well as provide compensation instead of acquisition.
64	10.4.3 Mitigations and Compliance Monitoring Plan	Location of substations will be selected in uncultivated areas, to the extent possible.	Please justify it.	
65	10.4.3 Mitigations and Compliance Monitoring Plan	Compensation will be paid to the land owners for the land permanently acquired for the project.	Please justify the statement.	
66	10.4.3 Mitigations and Compliance Monitoring Plan	Power Grid	It should be DC office.	It would be Power Grid and DC offices. ESCMC would determine the compensation which would be approved by PIU and then send the payment to DC offices.
67	10.4.3 Mitigations and Compliance Monitoring Plan	ESCMC	Please justify why ESCMC is here?	
68	10.4.3 Mitigations and Compliance Monitoring Plan	Compensation and assistance will be paid to the PAPs.	Please mention the types of compensation and assistance.	Types of compensation are- loss of crops, trees and structures. Types of assistance are- vulnerability allowance, livelihood training, distribution of trees, etc.
69	10.4.3 Mitigations and Compliance Monitoring Plan	Contractors will lease the land for construction facilities on temporary basis.	Please clarify the leasing scenario and associated documents to be needed. Address checklist if possible.	It is actually construction of camps near the tower site and access road to reach the site. These facilities are the part of EPC and they would lease such land from land owners. EPC would make proper documents (e.g., agreement) for using the land as temporary basis.
70	10.4.3 Mitigations and Compliance Monitoring Plan	1.3 Soil, water, and noise pollution	Please consider consultant during execution as well as contractor.	Considered accordingly

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71	10.4.3 Mitigations and Compliance Monitoring Plan		Need explanation for this statement (from consultant).	
72	10.4.3 Mitigations and Compliance Monitoring Plan	Liaison with traffic police and communities will be maintained	Please recheck this statement will be aligning here or not.	Earlier point this, we written about road signage, and later, vehicle speeds. So, additionally we suggested to 'maintain liaison with traffic police and communities will be maintained'
73	10.4.3 Mitigations and Compliance Monitoring Plan	2.7.	Please recheck this section. This section can be include in the traffic management section or not.	Issue (i.e., blocked routes) is different but suggestion is same. We can keep it here.
74	10.4.3 Mitigations and Compliance Monitoring Plan		All testing of parameters must be carried out by the contractor on a quarterly basis until the end of the defect liability period. This requirement should be included in the construction phase of the ESMP.	Included in the Construction Phase of ESMP as 4
75	10.4.3 Mitigations and Compliance Monitoring Plan	3.1.	This section has to be separated.	Separated accordingly as 3
76	10.4.3 Mitigations and Compliance Monitoring Plan	ESCPs will be implemented.	The following sections have to be mentioned: • The types and sources of fuel used by the workers	Mentioned accordingly (Labor camps will use LPG bottle for cooking as their primary sources)
77	10.4.3 Mitigations and Compliance Monitoring Plan	3.2.	Please mention about the regular water sprinkling	Mentioned accordingly
78	10.4.3 Mitigations and Compliance Monitoring Plan	COVID-19 pandemic management plan will be prepared as per WHO guidelines	Mention only pandemic management plan.	Mentioned accordingly
79	10.4.3 Mitigations and Compliance Monitoring Plan	Firefighting equipment will be made available at the camps.	Include provisions for regular inspection of fire extinguishers and timely refilling/replacement before the expiry date.	Included accordingly
80	10.4.3 Mitigations and Compliance Monitoring Plan	The camp staff will be provided OHS training.	Mention the frequency of training session.	It would be twice a month. Mentioned accordingly.
81	10.4.3 Mitigations and Compliance Monitoring Plan		Please mention the following issues: • Biodiversity management plan • Wildlife Corridors • Climate & Seasonal Variability • Notifying the community before the	Mentioned all suggested issues in the relevant points

S/N	Heading (No. + Title)	Marking	Comments	Feedback
			construction work start and inform them about the GRM issue. • Community Health & Safety	
82	10.4.3 Mitigations and Compliance Monitoring Plan	Regular trainings will be provided to the workers on OHS aspects.	Please mention the frequency of the training.	Mentioned twice a month in the relevant point.
83	10.4.3 Mitigations and Compliance Monitoring Plan	Use of appropriate personal protective equipment (PPE) will be mandatory.	Regular inspection about the availability of PPE and report	Incorporated with the point
84	10.4.3 Mitigations and Compliance Monitoring Plan	Firefighting equipment will be made available as required at construction sites, camp sites, and particularly near the fuel storage.	Mention about the regular inspection of expiry date of fire extinguisher.	Mentioned accordingly
85	10.4.3 Mitigations and Compliance Monitoring Plan	Replantation will be done at 1:3 ratio;	Maintenance of the planted trees have to be done by contractor until defect liability period.	Included accordingly
86	10.4.3 Mitigations and Compliance Monitoring Plan	5.	Please mention the following issues: • Waste generated during piling and foundation. • Management of excess cement mixture during construction phase. • Management of water mixed with cement.	Incorporated the issues as 5.3, 5.4 and 5.5
87	10.4.3 Mitigations and Compliance Monitoring Plan	6.1.	Please mention: • The restoration of top soil • The restoration of land surroundings the tower area. • No khoa, cement or sand in surroundings land area.	It has been mentioned accordingly in 6.1, 6.2, and 6.3
88	10.4.3 Mitigations and Compliance Monitoring Plan	Placing of bird markers on the transmission line cables	Please specify the total number and distance of bird diverters. Indicate whether there are any special segments where additional diverters need to be installed. Ensure that the placement of bird diverters is aligned with protected areas and the bird flyway map.	Provided in 8.1 of relevant section
89	10.5.7 Budget for ESMP Implementation	Table 121: Budget for Implementation of ESMP	The contractor must provide valid supporting documents/proof for	Included in the Section 10.5.7

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			the cost of each item, which must be reviewed and approved by the relevant authority.	
90	10.5.7 Budget for ESMP Implementation	Ambient Air Quality	Samples have to be collected after 5-km. Please calculate the budget maintaining it.	Considered accordingly in same section
91	Annex-XVI: Tree Plantation Plan	In addition, laying of high-voltage power transmission lines by Power Grid Company of Bangladesh (PGCB) requires to fell a good number of trees as part of Right-of-Way (RoW) clearing and maintenance over its construction and commissioning period.	Use the full name 'Power Grid Bangladesh PLC' at first mention. In subsequent references, use only 'Power Grid.' Ensure this is applied consistently throughout the entire report."	It has been revised throughout the entire report
92	Annex-XVI: Tree Plantation Plan	PIU and Contractor shall replant trees against the felled at 1:3 basis with total of 1,18,437.	It should be calculated in category wise.	It has been calculated in Table-1 of Section 3 of Annex-XVII
93	Annex-XVI: Tree Plantation Plan	…	This should be included in the tree plantation plan: • Monitoring plan and Maintenance plan have to be mentioned • A proper timeline needed of tree plantation and maintenance	• It is included in Section-10 of Annex-XVI • Tree plantation and Maintenance Timeline has been provided in Table 20 of the Annex-XVII

Disclaimer

This report has been prepared by Infrastructure Investment Facilitation Company (hereinafter referred as IIFC) for the regulatory requirement of Department of Environment (DOE), Ministry of Environment, Forests and Climate Change (MoEFCC), The People's Republic of Bangladesh. IIFC has undertaken an environmental and social survey and has developed an Environmental and Social Impact Assessment (ESIA) report for Power Grid Bangladesh PLC hereinafter referred as Power Grid). Any third party should obtain prior consent of Power Grid (and IIFC before copying or reproducing, in whole or in part, the contents of this report. IIFC disclaims any responsibility for any loss or damage suffered by any third party by taking reliance of this report. Furthermore, IIFC will not be bound to discuss, explain or reply to queries raised by any agency other than the intended recipients of this report. All information in the report is intellectual property of the Power Grid.

ABBREVIATIONS

AAQ	:	Ambient Air Quality
ACSR	:	Aluminum Conductor Steel Reinforced
AEZ	:	Agro- Ecological Zone
ARIPA	:	Acquisition and Requisition of Immoveable Property Act
ASZ	:	Arakan Subduction Zone
BBS	:	Bangladesh Bureau of Statistics
BERC	:	Bangladesh Energy Regulatory Commission
BEZ	:	Bio-Ecological Zone
BFD	:	Bangladesh Forest Department
BFSC	:	Bangladesh Fire Service and Civil Defense
BIWTA	:	Bangladesh Inland Water Transport Authority
BMD	:	Bangladesh Meteorological Department
BMP	:	Biodiversity Management Plan
BNH	:	Bangladesh National Herbarium
BPDB	:	Bangladesh Power Development Board
BRTA	:	Bangladesh Road Transport Authority
BR	:	Ministry of Railways
BUET	:	Bangladesh University of Engineering and Technology
BWDB	:	Bangladesh Water Development Board
CAAB	:	Civil Aviation Authority, Bangladesh
CCA	:	Climate Change Assessment
CCF	:	Chattogram-Cox's Bazar Fault
CESMP	:	Construction Environmental and Social Management Plan
CHS	:	Community Health and Safety Plan
CIGRE	:	Council on Large High Voltage Electric Systems
CLRTAP	:	Convention on Long-Range Transboundary Air Pollution
CMP	:	Current Market Price
CWS	:	Chunati Wildlife Sanctuary
DAE	:	Department of Agriculture Extension
DPHE	:	Department of Public Health Engineering
DoE	:	Department of Environment
DOF	:	Department of Fisheries
ECA		Environmentally Critical Area
ECA	:	Environment Conservation Act
ECA	:	Ecological Critical Area
ECC	:	Environmental Clearance Certificate
ECR	:	Environment Conservation Rules
ECNWRC	:	Executive Committee of the National Water Resources Council
EDCF	:	Economic Development Cooperation Fund
EHS	:	Environmental, Health and Safety
EIA	:	Environmental Impact Assessment
EMF	:	Electric and Magnetic Fields
EMP	:	Environmental Monitoring Plan
EMMP	:	Environmental Management and Monitoring Plan
EPC	:	Engineering, Procurement, and Construction
ESCPs	:	Environmental Code of Practice
ESCMC	:	Environment Social and Construction Monitoring Consultants
ESIA	:	Environmental and Social Impact Assessment
ESMP	:	Environmental and Social Management Plan
ESMS	:	Environmental and Social Management System
ESR	:	Environmental Conservation Rules
ESU	:	Environment and Social Unit

ESU	:	Environment and Social Unit
ESZ	:	Eco-Sensitive Zone
FD	:	Forest Department
FGD	:	Focus Group Discussions
GAP	:	Gender Action Plan
GBV	:	Gender Based Violence
GHG	:	Greenhouse Gas
GoB	:	Government of Bangladesh
GIA	:	General Impact Area
GRM	:	Grievance Redress Mechanism
GRC	:	Grievances Redress Committees
GWQ	:	Ground Water Quality
HIES	:	Households Income and Expenditure Survey
IA	:	Implementing Agency
IBA	:	Important Bird Area
IBAT	:	Integrated Biodiversity Assessment Tool
ICNIRP	:	Non-Ionizing Radiation Protection
IEE	:	Initial Environmental Examination
IESC	:	Important Environmental and Social Components
IFC	:	International Finance Corporation
IIFC	:	Investment Facilitation Company
ILO	:	International Labor Organization
INGO	:	International None-Governmental Organization
IP	:	Indigenous People
IEPMP	:	Integrated Energy and Power Master Plan
IUCN	:	International Union for Conservation of Nature
LA	:	Land Acquisition
LMP	:	Labor Management Plan
LTWs	:	Line Transect Walks
KIIs	:	Key Informant Interviews
km	:	Kilometre
kV	:	kilovolt
MEAs	:	Multilateral Environmental Agreements
MCHs		Medical College Hospitals
MHA	:	Ministry of Home Affairs,
MOH&FW		Ministry of Health and Family Welfare
MoIB	:	Ministry of Information, Bangladesh
MLGRDC	:	Ministry of Local Government, Rural Development & Co-operatives
MoCA	:	Ministry of Cultural Affairs
MoDMR	:	Ministry of Disaster Management and Relief
MoE	:	Ministry of Education
MoFL	:	Ministry of Fisheries and Livestock
MoEFCC	:	Ministry of Environment, Forest, and Climate Change
MOLE	:	Ministry of Labour and Employment
MOFL	:	Ministry of Fisheries and Livestock
MoLJPA	:	Ministry of Law, Justice and Parliamentary Affairs
MoP		Ministry of Planning
MORA	:	Ministry of Religious Affairs
MoHPW	:	Ministry of Housing and Public Works
MoWR	:	Ministry of Water Resources
MoWCA	:	Ministry of Women and Children Affairs
MoYS	:	Ministry of Youth and Sports
MPEMR	:	Ministry of Power, Energy and Mineral Resources
MSW	:	Ministry of Social Welfare

NCA	:	Net Cultivable Area
NOC	:	No Objection Certificates
NEMAP	:	National Environmental Management Action Plan
NEP	:	The National Energy Policy
NIR	:	Non-ionizing radiation
NGO	:	None-Governmental Organization
NLG	:	Liquefied Natural Gas
NQ	:	Noise Quality
NWMP	:	National Water Management Plan
NWRD	:	National Water Resources Database
OHS	:	Occupational Health and Safety
O&M	:	Operation and Maintenance
OHTL	:	Overhead Transmission Line
PAHs	:	Project Affected Households
PAPs	:	Project Affected Persons
PD	:	Project Director
PCB	:	Polychlorinated Biphenyl
PCMs	:	Public Consultation Meetings
PIU	:	Project Implementation Unit
Power Grid	:	Power Grid Bangladesh PLC
PPE	:	Personal Protective Equipment
RP	:	Resettlement Plan
RoW	:	Right of Way
RHD	:	Roads and Highway Department
RTHD	:	Road Transport and Highways Division
PRA	:	Participatory Rural Appraisal
PSMP	:	Power System Master Plan
R&R	:	Resettlement and Rehabilitation
RRA	:	Rapid Rural Appraisal
SEP	:	Stakeholder Engagement Plan
SCC	:	Site Clearance Certificate
SEP	:	Stakeholder Engagement Plan
SOPs	:	Standard Operating Procedures
SPS	:	Social Protection Strategy
SPM	:	Suspended Particulate Matter
SRDI	:	Soil Resource and Development Institute
SRDI	:	Soil Resource and Development Institute
SSQ	:	Surface Soil Quality
SWQ	:	Surface Water Quality
TPP	:	Tree Plantation Plan
ToR	:	Terms of Reference
UNEP	:	United Nations Environment Programme
UNCED	:	United Nations Conference on Environment and Development
UNFCCC	:	United Nations Framework Convention on Climate Change
UP	:	Union Parishad
WARPO	:	Water Resource Planning Organization
WB	:	World Bank
WCMC	:	Environment World Conservation Monitoring Centre
WHO	:	World Health Organization
WS	:	Wildlife Sanctuary

CURRENCY EQUIVALENTS

Currency unit	–	Bangladesh Taka (BDT)
BDT 1.00	=	$ 0.012
1 US Dollar (USD)*	=	BDT. 84.80

WEIGHTS AND MEASURES

cm	–	centimetre
ha	–	hectare
1 ha	–	2.47 acre/10,000 sqm
1 acre	–	100 decimals
km	–	kilometre (1,000 meters)
kV	–	kilovolt (1,000 volts)
kW	–	kilowatt (1,000 watts)
m	–	meter
mm	–	millimetre
MVA	–	mega-volt ampere
MW	–	megawatt

NOTE

In this report, "$" refers to US dollar

*1 US Dollar (USD) = 121.50 BDT as the exchange rate of Bangladesh Bank on 12 August 2025

GLOSSARY

Adverse Impact	:	An impact that is considered undesirable
Ambient Air	:	Surrounding air
Aquatic	:	Growing or living in or near water
Accident	:	It is an unplanned event, which has a probability of causing personal injury or property damage or both
Bangla	:	Bengali language
Baseline (or existing) Conditions	:	The 'baseline' essentially comprises the factual understanding and interpretation of existing environmental, social and health conditions of where the business activity is proposed. Understanding the baseline shall also include those trends present within it, and especially how changes could occur regardless of the presence of the Project, i.e. the 'No-development Option'.
Bazar	:	Market
Beel	:	A 'back swamp' or depression can be either perennial or seasonal
Beneficial Impacts	:	Impacts, which are considered to be desirable and useful.
Biological Diversity	:	The variety of life forms, the different plants, animals and microorganisms, genes they contain and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecological diversity
Char	:	Newly accreted land: Land, sometimes islands, within main river channels and nearby mainland or in the estuary, subject to erosion and accretion
Disaster	:	It is defined as a catastrophic situation that causes damage, economic disruptions, loss of human life, deterioration of health and health service on a scale sufficient to warrant an extraordinary response from outside the affected area or community. Disasters occasioned by man are factory fire explosions and release of toxic gases or chemical substances, etc.
Electric Field Strength	:	The force (E) on a stationary unit positive charge at a positive charge at a point in an electric field; measured in volt per meter (V m-1)
Environmental Assessment	:	The systematic, reproducible, and interdisciplinary identification, prediction and evaluation, mitigation, and management of impacts from a proposed development and its reasonable alternatives.
Ecosystem	:	A dynamic complex of plant, animal, fungal and microorganism communities and associated non-living environment interacting as an ecological unit
Emission	:	The total amount of solid, liquid, or gaseous pollutant emitted into the atmosphere from a given source within a given time, as indicated, for e.g., in grams per cubic meter of gas or by a relative measure, upon discharge from the source
Endangered Species	:	Species in danger of extinction and whose survival is unlikely if the existing conditions continue to operate. Included among those are species whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to suffer from immediate danger of extinction
Environmental Effects	:	The measurable changes, in the natural system of productivity and environmental quality, resulting from a development activity
Environmental Impact	:	An estimate or judgment of the significance and value of environmental effects for natural, socio-economic, and human receptors

Environment Management Plan	:	A plan to undertake an array of follow-up activities which provide for the sound environmental management of a Project/ intervention so that adverse environmental impacts are minimized and mitigated; beneficial environmental effects are maximized; and sustainable development is ensured
Environmental Management	:	Managing the productive use of natural resources without reducing their productivity and quality
Emergency	:	It is defined as a situation where the resources out pass the demand. This highlights the typical nature of emergency. Situations of this kind are avoidable but it is not possible to avoid them always.
Emergency preparedness	:	It is one of the key activities in the overall management. Preparedness, though largely dependent upon the response capability of the persons engaged in direct action, will require support from others in the organization before, during and after an emergency.
Erosion	:	Process in which wind and water remove materials from their original place; for instance, soil washed away from an agricultural field
Evaluation	:	The process of looking back at what has been really done or accomplished
Fauna	:	A collective term denoting the animals occurring in a particular region or period
Field Reconnaissance	:	A field activity that confirms the information gathered through secondary sources. This field study is essentially a rapid appraisal
Flora	:	All of the plants found in a given area
Habitat	:	The natural home or environment for a plant or animal
Hazard	:	It is defined as a physical situation, which may cause human injury, damage to property or the environment or some combination of these criteria.
Household	:	A household is identified as a dwelling unit where one or more persons live and eat together with common cooking arrangement. Persons living in the same dwelling unit having separate cooking arrangements constitute separate households
Important Environmental Component	:	These are environmental components of biophysical or socioeconomic importance to one or more interested parties. The use of important environmental components helps to focus the environmental assessment
Khal	:	Small channel, canal
Land use	:	Types include agriculture, horticulture, settlement, pisciculture and industries
Magnetic Field Strength	:	An axial vector quantity, H, which, together with magnetic flux density, specifies a magnetic field at any point in space, and is expressed in ampere per meter (Am-1).
Mauza	:	A Bangla word for the smallest government administrative area corresponding to village revenue unit
Khatian	:	Land record that is prepared during the survey with the details of the land ownership of one or more land owners based on the mouza
Mitigation	:	An action, which may prevent or minimize adverse impacts and enhance beneficial impacts
Negative Impact	:	Negative change from the existing situation due to the Project
Non-ionizing radiation (NIR)	:	Includes all radiations and fields of the electromagnetic spectrum that do not normally have sufficient energy to produce ionization in matter;

		characterized by energy per photon less than about 12eV, wavelengths greater than 100nm, and frequencies lower than 3x1015 Hz.
Occupational Exposure	:	All exposure to EMF experienced by individuals in the course of performing their work.
Public Consultation	:	A range of techniques that can be used to inform, consult, or interact with stakeholders affected / to be affected by a proposal
Public Exposure	:	All exposure to EMF experienced by members of the general public, excluding occupational exposure and exposure during medical procedures.
Reversible Impact	:	An environmental impact that recovers either through natural process or with human assistance (e.g., cutting off fish migration by an embankment might be reversible at a later stage if a proper regulator is built)
Risk	:	It is defined as a likelihood of an undesired event (accident, injury, or death) occurring within a specified period or under specified circumstances. This may be either a frequency or a probability depending on the circumstances.
Stakeholders	:	Those who may be potentially affected by a proposal, e.g., local people, the proponent, government agencies, NGOs, donors and others, all parties who may be affected by the Project or to take an interest in it
Taka	:	Unit of Bangladeshi currency
Terrestrial	:	Living on land
Thana	:	Sub-district level of government administration, comprising several unions under district
Union	:	Smallest unit of local self-government comprising several villages
Upazila	:	Sub-district name. Upazila introduced in 1982
Zila	:	Bengali word for district

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Executive Summary

Introduction

1. The present Environmental and Social Impact Assessment (ESIA) has been carried out for the proposed 'Madunaghat—Moheshkhali 765kV Transmission Lines Project' located in Chattogram and Cox's Bazar districts of Chattogram Division in order to meet the fast-growing future demand of electricity in these areas.

2. This ESIA has been prepared based on the Feasibility Study and finalization of route comprises 95.5km with 272 towers. This ESIA serves to guide development, implementation, and operation of the project in compliance with the requirements of applicable GoB laws and regulations under Ministry of Environment, Forest and Climate Change (MoEFCC). This ESIA also address the hitherto unknown impacts due to the project that might result due to some changes in technical design at detailed design stages. The ESIA presents social and environmental safeguards screening procedures, specific arrangements for management of environmental and social impacts, (both negative and positive,) including monitoring and reporting for the project. The ESIA Report along with application for ECC shall be submitted to the DoE Head Office.

Background

3. Bangladesh, being a developing country, electricity demand is growing very rapidly. For meeting this growing electricity demand government is giving priority to generation of electricity. But owing to inadequacy of primary fuel/energy resources in the country, government has already taken up plan to install imported LNG and coal-based power plants, especially at Barishal, Khulna and Chattogram zones as these are very effective areas for transportation of coal and LNG. As a part of an imported fuel-based generation, government has also planned to construct LNG and coal-based power plants in Matarbari, Moheshkhali and Bashkhali areas of Chattogram zone. The Moheshkhali and Matarbari areas are also known for their potential for renewable energy projects, particularly in the field of solar and wind energy. Developing a renewable energy-based power plant in this region can be an effective way to harness its natural resources and contribute to the country's sustainable energy goals. The government has planned many renewable energy-based power plants in Moheshkhali and Matarbari areas.

4. According to the recent power generation plan of BPDB, about 4,920 MW of coal and LNG-based power plant will be installed at Moheshkhali area in phases within 2031 (draft IEPMP report). To evacuate this massive power from the upcoming Power Plants to the load centers (Dhaka and Chattogram) several high-capacity transmission lines will be required from Moheshkhali towards Chattogram and Dhaka.

5. The main objective of the project is to construct transmission infrastructure for evacuation of power to be generated from proposed power plants at Moheshkhali and Matarbari and to provide reliable power all over the country. The 765kV Madunaghat - Maheshkhali Transmission Line is a project to construct a high-capacity transmission line in Bangladesh, specifically to connect the power generated at Maheshkhali (Cox's Bazar) to the national grid. It's a key component of the country's efforts to upgrade and strengthen its transmission network and improve reliable electricity access. The line will initially operate at 400kV and is planned to be completed by 2030. The project aims to establish a high-capacity transmission corridor between Chattogram (Madunaghat) and Dhaka, evacuating power from the Maheshkhali region to the national grid. The project includes the construction of a 765kV double-circuit line and related substation extensions. The line will be initially charged at 400 kV. This line is Bangladesh's first

765kV transmission system project and is intended to save land, minimize social impacts, and improve reliability by transmitting high volumes of electricity.

6. Two studies have been conducted for power evacuation of Moheshkhali Power Hub planned generation: 1) Power System Master Plan 2016 by JICA study team and 2) a Study on an upcoming Power plant in Moheshkhali area by STEAG Energy Services Ltd. It can be envisaged that in addition to 400 kV network, 765 kV systems will also be inevitable for bulk power evacuation from Moheshkhali to load centers. So, it is mandatory to construct a 765 kV line (initially to be charged at 400 kV) from Moheshkhali – Madunaghat - Bhulta as soon as possible since managing the ROW for new transmission line at the narrow Feni area shall be tough. Depending on the development of Moheshkhali Power Hub generation scenario the whole Moheskahli - Madunaghat - Bhulta 765kV line will operate as an expressed gateway to evacuate power to Dhaka. By that time Moheshkhali - Madunaghat 400 kV double circuit line is inevitable as one coal-based and renewable energy-based plant is expected to be put in operation before 2030. It may be noted that this 765 kV hexa bundled line will be capable of carrying around 6,000 MW of power complying with N-1 criteria from Moheshkhali. Furthermore, high-capacity lines could be constructed in future as per recommendation of the studies to evacuate power from Moheshkhali area.

7. With the foregoing in purview, Power Grid has conceived a Project titled, Moheshkhali – Modunaghat 765kV Transmission Line Project and allocated funds for the cost of "EIA/ESIA, IESE, Route Survey, Initial Environmental Examination (IEE) and Resettlement Plan (RP) for the Project.

Project Overview

8. The project aims to build ultra-high voltage (765kV) electricity transmission corridor between Chattogram and Cox's Bazar with Dhaka, which are Bangladesh's major economic centers. The use of ultra-high voltage line will (a) help avoid building more lesser voltage transmission lines, thus saving valuable land and minimizing negative social impacts in a densely populated area; (b) allow the transmission of high volumes of electricity for the needs of a rapidly developing economy; and (c) improve reliability and decrease system losses. This will be the first 765kV transmission systems project in Bangladesh making it important for development partners like EDCF who involved in the project preparation stage.

9. Proposed transmission lines shall pass a total of three (03) major rivers namely Karnaphuli, Sangu and Matamuhuri. All rivers are Classified as Class-I as per guidelines of BIWTA. The horizontal and vertical clearance of these rivers has been provided in the relevant section of the report which help to design the river crossing and anchor towers while crossing the river.

10. The key operation and maintenance (O&M) activities of the proposed substations and transmission lines would include routine inspection of transmission lines, repairing or replacing any faulty equipment at the substations, repairing or replacing any damaged transmission line tower, repairing or replacing any damaged conductor, and attending to system faults.

Major Components of the Project

11. The Madunaghat-Moheshkhali 765kV transmission line project primarily involves the construction of a 765kV transmission line, the extension of existing substations (400kV Bay Extension), and potentially new substation construction. The line itself will likely use high-capacity conductors like the Hexa Bundle ACSR Cardinal. The project also includes feasibility studies, power sector assessments, and environmental impact assessments. Major components of the project are: (a) 765kV Double Circuit Line: The core component is the high-voltage

transmission line itself comprises of 95.5-km with 272 nos. of tower, designed to carry a large volume of electricity over a significant distance; (b) Conductors: The project will likely use high-capacity conductors like the Hexa Bundle ACSR Cardinal, known for its ability to handle high voltage and current; and (c) Support Structures: These include towers, insulators, and other hardware necessary to support the conductors and maintain the necessary clearance.

Project Location and Required Land

12. Proposed high-voltage 765kV transmission line passes over 02 districts, 07 upazilas, 38 unions, 02 wards and 72 mouzas, comprises of 95.5-km with 272 nos. of tower (88 angle tower and 184 suspension tower).

13. A total of 43.47 acres of land is required for the base area of 272 transmission towers. Of this, 43.43 acres have been identified as private land, while the remaining 0.05 acres are government land currently occupied by the Shekherkhil Union Parishad under Banshkhali Upazila in Chattogram District.

Acts, Laws and Policy Considerations

14. The ESIA Report complied with various national acts, laws and policies which are but not limited to National Environmental Policy, 2018; National Environmental Management Action Plan (NEMAP), 1995; The Environment Conservation Act, 1995; Environmental Conservation Rules (ECR, 1997), amended 2017; The Electricity Act, 2018; Electricity Rules 2020 (amended February 2022) Bangladesh Environmental Court Act, 2010; Ecologically Critical Areas (ECAs) Management Rules, 2016; National 3R Strategy for Waste Management, 2010; The Forest Act (1927) (Amendment, 2000, 2018); Bangladesh Wildlife (Conservation & Security) Act, 2012; Bangladesh Biodiversity Act, 2017; National Biodiversity Strategy and Action Plan (NBSAP), 2016 – 2021; Protected Area Management Rules 2017; Noise Pollution (Control) Rules, 2006; National Energy Policy, 2005; National Water Management Plan, 2001; Bangladesh Water Act, 2013, and Bangladesh Water Rules, 2018; Bangladesh Labour Act, 2006 (as amended through July 22, 2013 and November 2018) Bangladesh Labor Rules, 2015; The Acquisition and Requisition of Immovable Property Act 2017; National River Conservation Commission Act, 2013; Embankment and Drainage Act, 1952; The Highways Act, 1925 (amended 2001); Fire Prevention and Extinction Rules, 1961; Fire Prevention and Extinction Act, 2003 and Rules, 2014; Antiquities Act, 1968 and Antiquities Preservation Rules, 1986. The project needs to take permission— from BIWTA/BWDB while crossing the river, from RHD while crossing the highway, from Forest Department (FD) while cutting the trees. The above acts shall cover those things.

15. The ESIA also comply with procedures and policies with regard to conducting environmental assessments on Operational Policy 4.01: Environmental Assessment (October, 1991) of WB Group and its updates and other pertinent Guidelines. It has also complied with EDCF Safeguard Policy 2020.

Study Objectives

16. Power Grid is going to construct new transmission lines of capacity 765kV from Moheshkhali to Madunaghat at a total distance of about 95.5-kms with 272 towers considering a total of 70-meters Right-of-Way (RoW) from center line (35m+35m). In order to implement the project, it is a pre-requisite to prepare a Resettlement Plan (RP) as per Electricity Act, 2018 and its subsequent Rules, 2020 (amended 2022); Acquisition and Requisition of Immoveable Property Act (ARIPA) 2017 as well as EDCF Safeguard Policy 2020. As per Environmental Conservation Rules (ECR), 2023 construction of power transmission lines falls into Red Category, which requires to prepare Initial Environmental Examination (IEE) along with Terms of Reference (ToR)

to get approval of ToR. Later Environmental Impact Assessment (EIA) will be prepared as per ToR to get Site Clearance Certificate (SSC) in order to commence the construction work. Preparation of ESIA report is the funding requirement of Korea-EXIM Bank followed by necessary due diligence for funding approval under this assignment which is carried out by Infrastructure Investment Facilitation Company (IIFC), an enterprise of Ministry of Finance.

Analysis of Alternatives

17. As part of the present ESIA, technical, financial, environmental, and social aspects were analyzed for the several project alternatives including 'no-project' alternative, technology, transmission line types, and transmission line routes, etc.

18. The 'no-project' alternative was rejected because without the project, the electricity network in the in Dhaka, Chattogram and Cox's Bazar regions would not be able to support the rapidly growing commercial and industrial activities as well as residential areas, nor would any growth in the region's commercial and industrial activities be possible; and as a result, the Country will also not be able to sustain economic growth.

19. Moreover, two broad alternatives were considered for the types of transmission lines: overhead and underground. The overhead transmission lines are generally used in rural/unpopulated areas, require substantial construction works for the transmission line towers, restrict the land use and reduce the land value, and pose safety risks for the people, livestock, and wildlife. The underground transmission lines are generally used in congested urban areas where installation of overhead transmission line is quite difficult, are higher in initial cost, generally use existing right of way (RoW), and pose a smaller safety risk. For the proposed project, only overhead transmission line has been selected as there is no urban setting congested area in the project. However, there is no ecologically critically areas (ECAs), reserve forest, wildlife sanctuary, protected areas and important bird areas (IBAs) fall within the RoW of transmission lines as well as substation areas.

20. Although Option-1 and 2 offers almost same route length and angle towers however, based on the route survey, it is identified that Option-2 will have the least difficulty with respect to excavation related activities due to its alignment and location of nearby structures. Impact on the settlements is high for Option-1. All other environmental and social issues are quite similar for all three options. Therefore, Option-2 has been selected for the proposed 765kV transmission line project.

Baseline Conditions of the Project Area

21. The proposed project will be located in a combination of cultivated land; rural and semi-urban areas located in Chattogram and Cox's Bazar districts of Chattogram Division.

22. Both Chattogram and Cox's Bazar have a tropical monsoon climate, characterized by hot, humid summers and a distinct dry season, though Cox's Bazar, as a coastal area, often experiences high humidity year-round and can be more affected by monsoonal rains. Temperatures in both locations generally range from 25°C to 32°C across the year, with the driest and most pleasant conditions for visiting found between November and March.

23. The surface geology of the Chattogram and Cox's Bazar coast is characterized by young, unconsolidated coastal and deltaic deposits, with the underlying strata belonging to the Surma Group, specifically the Upper Bokabil Formation. The sedimentary environment ranges from recent beach deposits to paleo-deposits, indicating a dynamic process of tidal plains, alluvial

systems, and coastal erosion. The area is part of the stable eastern coastal zone of Bangladesh and exhibits signs of recent sea level changes and potential saline water intrusion, along with valuable heavy mineral deposits and aquifer potential.

24. The study area of the proposed project forms a part of the (a) Chattogram Coastal Plain Land (b) North Eastern Hills. This physiographic unit comprises of gently sloping, mainly loamy, alluvial flats adjoining the north-eastern hills, and extensive level clay plains. Tidal clay plains occupy most of the off-shore islands in the south.

25. The Chattogram and Cox's Bazar coastal region is seismically active, situated within the Arakan Subduction Zone (ASZ), which is part of a broader complex of faults. This area experienced a large megathrust earthquake in 1762, and ongoing geodetic studies show significant plate convergence, suggesting potential for future large earthquakes, despite a recent lack of major seismic events in some catalogs. The Chattogram-Cox's Bazar Fault (CCF) is considered a high-risk feature in the region, and various studies have developed seismic risk maps for Bangladesh, categorizing areas like Chattogram and Cox's Bazar as vulnerable to seismic activity.

26. The coastal belt is frequently hit by cyclones and associated storm surges from the Bay of Bengal, causing significant inundation. While specific dates for Chattogram and Cox's Bazar are not detailed, major floods have occurred with alarming regularity, including significant events in 2004, 2007, 2009–2014, and 2020. However, the proposed transmission line falls normal flood prone area of Bangladesh. Long-term data shows a significant increase in the annual and seasonal frequency of thunderstorms. This trend is linked to climate change, with rising temperatures and increased atmospheric moisture contributing to more frequent and intense storms.

27. The transmission line will passe Karnaphuli, Sangu and Matamuhuri rivers. These rivers inside the study area carry water throughout the year. Similarly, there are a number of khals and rivers within and around the transmission lines of study area. A total of 10-15 shallow tube-wells falls under the RoW of transmission lines but no deep tube-wells exist in the project area which provide irrigation water to the crops of the area.

28. Testing environmental parameters have been considered for two seasons i.e., during pre-monsoon (1st Round) and monsoon (2nd round). Sample points have been selected based on nearby tower area with residential and commercial objects, availability of power connections and ease access to reach the sample locations. Value of all parameters i.e., air quality, noise, water and soil found in the limit of ECR 2023.

29. For construction of new 95.5 km of transmission line, a total of 272 towers will have to construct for the project and 43.47 acres of land will be required for the construction of towers. Out of total affected land a total 31.27 acres of agriculture land will be used for transmission towers. As per ToR, considering 70-meter RoW of the transmission line for 765kV, the estimated crop land due to the impact of the project is 1651.84 acres.

30. Bio-ecologically major portion of the transmission line fall over the zone namely (a) Coastal Plains (b) Offshore Islands (c) Chattogram Hills and The CHTs. Considering 2-km proximity using IBAT analysis, 16 plant species have been reported. In plant species, all species belong to phylum TRACHEOPHYTA. Mostly belobde to class MAGNOLIOPSIDA also known as dicots. Few monocots were also observed. All species are either endangered critical or vulnerable. Such a situation is alarming and needs conservation plan to be enforced without delay. Plants are mostly terrestrial.

31. 174 animal species have been reported mostly aquatic species reported. Many aves and mammals also contribute to the composition. All species fall into the concerned group. This also points immediate conservation strategy for animals.

32. However, there are no important bird area (IBA) and ecologically critically areas (ECA) at or near the project RoW. In addition, there is no protected area (PA), game reserve (GR), national park (NP) and wildlife sanctuary (WS) falls under the RoW of proposed transmission lines. Chunati WS is about 2-3 km distance from the TLs. Asian Elephant Corridors are about 10-12-km away from the lines.

33. Due to the construction of 95.5 km of transmission line and considering a 90-meter Right of Way (RoW) for counting trees, various types of trees will be affected. These include 8,144 fruit-bearing trees, 21,178 timber trees, 86 medicinal plants, and 10,071 bamboo clumps. However, the survey identified that a total of 39,479 trees will be directly affected by the transmission line alignment.

34. The proposed project doesn't fall in migratory bird areas as per the information of "The Asia-Pacific Migratory Waterbird Conservation Strategy" 2001-2005; and it can also be concluded that the proposed transmission lines shall not make the risk for international bird flyways in East Asian Flyway (Bangladesh). However, a biodiversity management plan (BMP) has been prepared for this project in order to minimize the impact over the local biodiversity due to project activity.

Potential Impacts

35. The potential impacts of the project's construction phase on physical and biological environment could include soil erosion particularly close to rivers and khals; dust emissions caused by operation of machinery and running vehicles on earthen tracks within the RoW and along the access routes; gaseous emissions from construction vehicles, machinery, and generators; release of waste effluents and solid wastes from construction areas and camps causing soil and water contamination; loss of homestead, village and roadside vegetation and trees in the RoW; hunting, trapping, and or catching of wild species by the project personnel at the site; and finally, occupational health and safety (OHS) hazards for the construction staff and other project site personnel. A total of 39479 trees would need to be felled for clearing the RoW of transmission lines. The key potential impacts of the transmission lines and substations during the operation and maintenance stage include occupational health and safety risks for the maintenance workers, electrocution and collision of birds, electromagnetic radiation, radio interference, and solid waste generation.

36. The 'effects of the corona' are as follows: (i) The glow appear across the conductor which shows the power loss occur on it; (ii) The audio noise occurs because of the corona effect which causes the power loss on the conductor; (iii) The vibration of conductor occurs because of corona effect; (iv) The corona effect generates the ozone because of which the conductor becomes corrosive; (v) The corona effect produces the non-sinusoidal signal thus the non-sinusoidal voltage drops occur in the line; (vi) The corona power loss reduces the efficiency of the line; and (vii) The radio and TV interference occurs on the line because of corona effect.

37. The most significant social impacts of the project pertain to the resettlement issues including land acquisition, devaluation land, damage to crops, trees, and structures that exist in the RoW. Other potential impacts of the project's construction phase on the local communities include temporary blockage of local routes, loss of livelihood, project-related traffic on local roads, noise generation causing nuisance and disturbance to local population, safety hazards caused by construction activities and project-related vehicular traffic, social conflict or cultural issues

caused by labor influx – some of them may be from other parts of the country, additional pressure on local resources such as water and fuel, damage to sites of cultural and or religious significance such as graveyards and shrines, and disturbance to women activities. The potential impacts of the project's operation and maintenance activities on the local communities could include risk of electrocution and occasional crop damage. Moreover, no wetland will be harmed or filled due to the project activity.

38. Community health and safety impacts during the construction and decommissioning of transmission and distribution power lines are common to those of most large industrial facilities. These impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labor.

Mitigations

39. To address the potentially negative environmental impacts of the project, appropriate mitigation measures have been included in this ESIA. These include water sprinkling to suppress dust emissions particularly near the settlements, using properly tuned vehicles and machinery to minimize exhaust emissions; ensuring that no untreated waste effluents are released to the environment and using appropriate treatment mechanism for this purpose; preparing and implementing waste management and pollution control plans; enforcing 'no hunting, no trapping, no catching' policy for the wildlife; and preparing and implementing an Occupational Health and Safety (OHS) plan. To address the risk of bird collision and electrocution, Power Grid will consider attaching visible spheres to the upper wire of the overhead transmission line section that crosses the rivers, contingent to technical viability. In the vicinity of river crossings, the sags to be considered to ensure sufficient vertical clearance. Furthermore, the spacing between transmission line conductors will be kept in a manner to avoid electrocution of birds found in the area (including migratory birds) owing to the size of their wing span. The contractor will install diverters during laying the transmission lines. A compensatory replantation ratio of 1:3 will be carried out to mitigate the ecological loss of felling trees.

40. As part of the mitigation measures, Power Grid has prepared Resettlement Plan (RP), Labor Management Procedures (LMP), Stakeholders Engagement Plan (SEP), GBV prevention plan along with this ESIA. And that, during preparation of these plans, Power Grid has conducted several consultation meetings with relevant primary and secondary stakeholders. These documents will be updated (if required) during the detailed design stage.

41. To address the resettlement impacts described earlier, compensation and assistance will be paid to the project-affected persons (PAPs). For the remaining potential impacts of the project on the people and communities, appropriate mitigation measures have been included in the present ESIA and will be included in the contractual obligations of the contractor. These mitigation measures include maintaining liaison with the local community during the construction phase to ensure that local routes are not blocked in the first place, however if it is unavoidable, then alternate routes are identified in consultation with the affected community. For mitigating the impacts of noise generation, the contractor will use machinery and vehicles equipped with standard noise reduction arrangements (such as silencer and canopy), will avoid nighttime work to the extent possible, and will maintain liaison with the communities. For increased traffic on local roads, the contractor will prepare and implement a traffic management plan. The contractor will also prepare and implement a safety management plan to ensure that safety hazards for the communities are minimized. To address the Environmental, Social, Health and Safety (ESHS) issues, a code of conduct and Construction Environmental and Social Management Plan (CESMP) will be prepared and all site personnel will be required to follow that. WHO guidelines will be followed by the contractor for COVID 19 pandemic. The contractor will be

required to obtain supplies such as water, fuel and other commodities in a manner that the local communities are not negatively affected; liaison with the local community will also be maintained for this purpose in addition to establishing a grievance redress mechanism. The contractor will also be required to avoid any damage to places such as graveyards and shrines. The civil works for pilling, footing, etc., and erection need to be carried out in such a way that will not be affected by elephant. Finally, to protect safety of women, the code of conduct described above will be enforced at the site.

Community Health and Safety

42. The contractor will (a) follow the Environmental Health and Safety Guidelines of Electric Power Transmission and Distribution of IFC as mentioned in Section 2.5.3; (b) follow the pandemic guidelines of WHO during the construction of the project; (c) construction camps will be located at least 500 m away from the communities (d) entry of the site personnel in the local communities will be minimized to the extent possible/appropriate; (e) prepare and implement an Occupational Health and Safety (OHS) Plan that will also cover communities' health and safety aspects; (f) prepare and implement a Traffic Management Plan that will also address traffic safety for communities; (g) inform about the nature of construction activities and the associated health and safety risks; awareness raising of the communities will be carried out for this purpose with the help of training sessions, posters, signage, and other similar means; (h) perform awareness raising of communities will be carried out, in a culturally-sensitive manner, about the communicable diseases including sexually transmitted infections; (i) fence as appropriate to minimize entry of the local communities particularly children in the work areas; (j) establish GRM to address community grievances related to health and safety aspects.

Environmental and Social Management Plan

43. An Environmental and Social Management Plan (ESMP) has been prepared as part of the present ESIA in order to define the implementation mechanism for the above-described mitigation measures. The ESMP includes description of institutional arrangements, a mitigation plan, a monitoring plan, a training and capacity building plan, documentation protocols, and a grievance redress mechanism (GRM).

44. The overall responsibility of environmental and social performance of the project and effective ESMP implementation will rest with Power Grid. Power Grid will establish the Project Implementation Unit (PIU) to lead the Project implementation. The PIU will be headed by the Project Director (PD). An Environment and Social Unit (ESU), comprising qualified environmental and social development staff, will be established under the PIU. The PIU will engage environment social and construction monitoring consultants (ESCMC) to supervise the construction contractors in order to ensure design compliance and quality assurance of the construction activities. The ESCMC will also supervise the contractors for ESMP implementation. For this purpose, ESCMC will engage environmental and social development specialists.

45. The environmental and social management of the project will be achieved through implementation of a number of plans: a) Environmental Codes of Practices (ESCPs); b) mitigation plan; and c) Construction Environmental and Social Management Plan (CESMP). The ESCPs provide generic guidelines and control measures to address negative impacts encountered during construction phase. The mitigation plan, prepared on the basis of impact assessment carried out during the present ESIA, provides project-specific mitigation measures and assigns implementation and supervision responsibilities for these measures. The CESMP will be prepared by the construction contractor based upon the ESMP included in the present ESIA and will comprise a number of sub-plans including pollution prevention plan, waste management plan, traffic management plan, camp management plan, OHS plan, and others.

46. As one of the key elements of the ESMP, a two-tier monitoring program has been proposed comprising compliance monitoring and effects monitoring. The main purpose of this monitoring program is to ensure that the various tasks detailed in the ESMP particularly the mitigation measures are implemented in an effective manner, and also to evaluate project's impacts on the key environment and social parameters.

47. Capacity building for effective implementation of the environmental and social requirements is a key element of the ESMP. This capacity building will need to be carried out at all tiers of the project, including Power Grid, PIU, ESCMC, and contractors. At the construction site, ESCMC will take the lead in implementing the capacity building plan, though the contractors will also be responsible to conduct training for their own staff and workers.

48. Power Grid will ensure the proposed ESMP and associated ESCPs as part of the tender documents, and in the contract agreements of the selected bidders. Power Grid shall also supervise and monitor the ESMPs during construction phase through INGO, ESCMC and external monitoring consultants.

49. For implementing the present ESMP, a total of Tk. 93,95,89,640 has been estimated where (a) about Tk. 37,00,000 for the implementation of environmental management and monitoring, (B) Tk. 81,02,97,400 for the implementation of social management and monitoring plan and (c) Tk. 12,55,92,240 for the expense of carry out institutional arrangement.

Grievance Redress Mechanism

50. Power Grid will establish a grievance redress mechanism (GRM) to ensure social accountability and to answer queries and address complaints and grievances about any irregularities during the project implementation for ensuing environmental responsibilities and workers right. The GRM will help resolve issues/conflicts amicably and quickly, saving the aggrieved persons from having to resort to expensive, time-consuming legal actions. The procedure will, however, not pre-empt or deny a person's right to go to the courts of law.

51. Survey revealed that a total of 2461 nos. APs shall be affected by the project. Under the GRM, grievance redress committees (GRCs) will be established locally at Project sites and centrally at the Project level to receive as well as settle grievances from the affected persons and other local stakeholders. GRM will also handle any issues raise in the case of gender-based violence (GBV). The two-tier GRM will be composed of local GRCs (LGRC) at the union/municipal level as the first tier, and Project GRC (PGRC)at the central level as the second-tier. Most of the grievances will be resolved at the local-level GRC, but those cases that cannot be resolved at the local level will be forwarded to PGRC. The LGRC will be constituted with representation of the local Union Parishad Chairman and affected people ensuring women's representation. The PGRC will be constituted with representation from the PIU, Implementing NGO/Agency (INGO/IA) and one independent person from the civil society having knowledge about land acquisition/ requisition law of Bangladesh and involuntary resettlement. Details of the GRM are provided in the SEP.

Stakeholder Consultations

52. An extensive consultation process was undertaken during the present EIA, in accordance with the national regulatory requirements. The key objectives of these consultations included informing the stakeholders particularly the local communities about the proposed interventions and soliciting their views, concerns, and recommendation concerning project and its impacts.

53. A participatory approach was adopted to conduct consultations particularly with the communities. A checklist was used to maintain uniformity and relevancy in discussion and in properly recording the opinions and views of the participants. During the consultations, the socio-economic, labor and gender issues, agricultural, hydrological, fisheries, and ecological issues were discussed in detail, including potential impacts of the interventions on the environmental and social parameters. Institutional issues were also discussed regarding which the participants provided their opinions and suggestions freely. During the present EIA study, nine consultations and focus group discussions were held with the stakeholders. A total of 13 public consultations has been carried out at each substation's location. A total of 106 persons participated in these sessions, of which 97 was male and remaining 9 was female.

54. The key concerns shared by the stakeholders during these consultations included payment of compensation for all losses caused by the project, managing traffic congestion caused by the construction activities, maintaining liaison and coordination with other departments and entities, minimizing blockage of access particularly for essential facilities such as hospitals, removal of excavated soil and other debris from the construction sites, and provision of employment opportunities to the local population. Detailed procedures of stakeholder's engagement at different stages of the project are proposed with SEP.

Disclosure

55. The draft and final ESIA report will need to be disclosed in an accessible place (e.g., local government offices, libraries, community centers, etc.), and a summary translated into local language (Bengali) for the project-affected people and other stakeholders. The translated summary of ESIA report will be disclosed in DC offices, Upazila and Union Parishad of respective project areas. The Power Grid will also post the final ESIA document (at least 60 days prior to Board consideration (regular procedure), Closing Date (Streamlined Procedure), or management approval date (delegated authority) as part of their disclosure policy (e.g., on its website), and the same will be submitted to the Department of Environment (DoE) for approval and disclosure at local (DC offices, Upazila Parishad) and national level, so affected people, contractors, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation. The effectiveness of the ESIA is directly linked to the degree of continuing involvement of those affected people directly or indirectly by the project. During the preparatory stage, consultations were held at local, sub district and district level. Several additional rounds of consultations with stakeholders will be planned in ESIA finalization, and during construction as well as operation phases of the Project. Disclosure methods are also discussed in the SEP.

Recommendations

a) PIU and Contractor should comply with the Terms and Conditions given by Department of Environment (DoE) in the Environmental Clearance Certificate (ECC);
b) Power Grid and Contractor should strictly maintain environmental and social monitoring compliance mentioned in Chapter 10;
c) Resettlement Plan (RP) should implement properly, and updating the RP before paying the compensation after the appoint of ESCMC;
d) Contractor should carry out the construction work to follow the ESCPs; and prepare site-specific CESMP;
e) Proper training regarding EHS/OHS should be provided to Project Management Unit (PMU) as well as work forces during construction phase;
f) Detailed hydro-morphology study should be carried out for crossing Karnaphuli, Sangu and Matamuhuri Rivers. Location of anchor should be selected based on the recommendation

of hydro-morphology study. However, Contractor will assess or distance of anchor tower from shoreline or river bank before footing;

g) Contractor should implement Tree Plantation Programme in consultation with PIU, ESU and ESCMC with similar felled species at or near the suitable places of T/L during monsoon season;

h) Diverters (i.e., colored balls) should be installed for 39 towers beside the Chunati WS to avoid bird collision and electrocution on the power lines. Towers on both sides of the river should have light beams focused on the balls on the power lines, at night, during 'mid-February to end March' and again from 'mid-September to mid-November'. Each tower on the flyway will have blinking light on its top.

i) Eligible local people should be considered at least during construction phase as skill or non-skilled labor on priority basis that will be helpful for minimizing the socio-economic disruption;

j) Eventually, Power Grid can introduce the concept of 'Corporate Environmental and Social Responsibility (CESR)' for the management of local environmental, their employees, adjacent communities, stakeholders, etc.

Chapter 1
Introduction

1.1 Project Background

Bangladesh has now embarked on achieving a visionary goal of becoming a developed economy by 2041 and for which it has adopted the Perspective Plan (PP) 2041. Energy has always played pivotal role in emerging economies in accelerating growth, particularly during the rapid industrialization phase leading to quality job growth, as they move from middle-income to upper-middle income and developed stage of development. During the 6th FYP and 7th FYP period's priority was given to increase generation capacity to meet demand; and at this point of time Bangladesh has surplus installed capacity. The Government will continue on this path, leading into the 8th FYP, but with increased focus on energy efficiency gain, renewable energy and financial sustainability. This will enable Bangladesh to move to a competitive and environmentally sustainable least-cost power generation, transmission, and distribution system along with greater private sector participation and own resource mobilization so as to reduce the burden on limited fiscal resources. The 8th FYP will also focus on timely implementation of all power and energy projects so as to optimize achieving the goals of Government's energy sector strategy, whose key elements related with transmissions are— (1) Development of transmission and distribution system in line with generation; (2) Improving power sector efficiency and reducing transmission and distribution losses (Source: 8th Five Year Plan, July 2020 – June 2025).

Table 1: Transmission System and Substation Infrastructure during 7th FYP

Fiscal Year	Transmission System (ckt km)			400 kV VDC Substation		400/230/132 kV station		230/132 kV Substation		132/33 kV Substation	
	400 kV	230 kV	132 kV	No	MW	No	MVA	No	MVA	No	MVA
2009-10	-	2647.30	5670.30	-	-	-	-	13	6300.00	75	7844.00
2010-11	-	2647.30	6018.00	-	-	-	-	13	6675.00	81	8437.00
2011-12	-	2647.30	6080.00	-	-	-	-	13	6675.00	83	8737.00
2012-13	-	3020.77	6080.00	-	-	-	-	15	6975.00	84	9705.00
2013-14	164.70	3044.70	6120.00	01	500	-	-	18	8775.00	86	10714.00
2014-15	164.70	3171.45	6358.83	01	500	01	520	19	9075.00	89	11964.00
2015-16	220.70	3171.45	6396.83	01	500	01	520	19	9375.00	90	12420.00
2016-17	559.75	3312.99	6503.95	01	500	02	1690	19	9675.00	91	13364.50
2017-18	559.75	3324.99	6795.89	01	500	03	2210	19	9675.00	91	15045.50
2018-19	698.00	3407	7545.00	02	1000	05	4220	26	13135.00	135	23640.00
2019-20	861.00	3658	7764.00	02	1000	06	5070	28	13985.00	145	26222.00

Electricity demand of Bangladesh is growing very rapidly. For meeting growing demand, the Government is giving priority for transmission network development as well, and in this regard plans to construct 3358 ct.km. This will include enhancing the transmission capacity from 132/230 kV to 400 kV, and about 1120 circuit km transmission line to be constructed for it during FY 2021- 25, for or maximum power transfer. Besides, it has been planned to construct new 700 circuit km transmission line of capacity 765 kV from power hub being developed at Moheskhali to Dhaka, which will be supposed to be completed by 2025 (Source: 8th Five Year Plan, July 2020 – June 2025).

The main operating function of Power Grid is wheeling of energy from Bangladesh Power Development Board (BPDB) power stations and Generation Companies to Distribution entities utilizing transmission network. Power Grid gets its energy wheeling charge from its clients (distribution entities) at the rate fixed by Bangladesh Energy Regulatory Commission (BERC).

The Power Grid took over about 1,144 circuit km of 230kV lines, 5255 circuit km of 132kV lines, 6 nos. of 230/132kV Substation and 63 nos. of 132/33 kV substations from BPDB and Dhaka Electricity Supply Company (DESCO) in different phases. Transmission lines of the company up to June, 2024 are stood at 2469 circuit km of 400kV lines, 4236 circuit km of 230 kV lines, 8,555 circuit km of 132 kV lines and 1 no. of 400 kV station, 7 nos. of 400/230kV substation, 4 nos. of 400/132kV substation, 29 nos. of 230/132 kV substation, 1 no. of 230/33 kV substation and 129 nos. of 132/33 kV substations (Source: Power Grid, June 2024).

However, Power Grid is going to construct new transmission lines of capacity 765kV from Moheshkhali to Madunaghat at a total distance of about 95.5-kms with 272 towers considering a total of 70-meters (as per ToR) Right-of-Way (RoW) from center line (35m+35m). In order to implement the project, it is a pre-requisite to prepare a Resettlement Plan (RP) as per Electricity Act, 2018 and its subsequent Rules, 2020 (amended 2022); Acquisition and Requisition of Immoveable Property Act (ARIPA) 2017 as well as EDCF Safeguard Policy 2020. As per Environmental Conservation Rules (ECR), 2023 construction of power transmission lines falls into Red Category, which requires to prepare Initial Environmental Examination (IEE) along with Terms of Reference (ToR) to get approval of ToR. Later Environmental Impact Assessment (EIA) will be prepared as per ToR to get Site Clearance Certificate (SSC) in order to commence the construction work. Preparation of ESIA report is the funding requirement of Korea-EXIM Bank followed by necessary due diligence for funding approval under this assignment which is carried out by Infrastructure Investment Facilitation Company (IIFC), an enterprise of Ministry of Finance.

1.2 Information of the Project Proponent

The main operating function of Power Grid is wheeling of energy from BPDB power stations and Generation Companies to Distribution entities utilizing transmission network. Power Grid gets its energy wheeling charge from its clients (distribution entities) at the rate fixed by Bangladesh Electricity Regulatory Commission (BERC). The company has taken infrastructure development projects for further development of its operation.

The main purpose of the company is to construct adept and effective management of national power grid. Power Grid has been devising required plan, conducting primary feasibility study, exploration, research, preparation of architectural design and constructing transmission lines and Grid Sub-station. In addition, operation and maintenance of transmission line, grid sub-station, load dispatch center and communication facilities are also aim of Power Grid. To achieve desired goal, Power Grid is rigid. Power Grid is an enterprise holding certificate of latest version ISO 9001:2015 of International Standard of Quality Management. Moreover, Power Grid has achieved internationally recognized standard BS OHSAS 18001:2007 related to professional security management in workplace. However, the contact address of the company is:
Power Grid Bangladesh PLC
Office of the Chief Engineer (Project Monitoring)
Power Grid Bhaban, 11th Floor, Aftabnagar, Dhaka-1212
Contact# 01777-760418
Email: ce.pm@Power Grid.gov.bd; pmoffice.Power Grid@gmail.com
Website: https://Power Grid.gov.bd/

1.3 ESIA Study Team and Timeline

This ESIA has been prepared on behalf of Power Grid by a consultant's team of IIFC appointed by Power Grid and Environment and Social Unit (ESU) of Power Grid to conduct the national EIA study.

Table 2: ESIA Study Team

Name of Expert	Education Qualification	Experience	Area of Study	Signature
Md. Rafiqul Alam (Team Leader)	BSC in Electrical Engineering, BUET	More than 30 years of experience on development & extension of grid network, technical matters of Power Grid in the field of Operation, Maintenance, and improvement of whole Grid network of Bangladesh which includes system operation, system protection, and central load dispatch centre. Controlling the power generation of all power stations of BPDB, IPP, O&M of the Transmission System of Greater Dhaka area including 230 kV/132kV sub-station & Transmission Line, O&M of the Transmission System of Greater Dhaka area including 230 kV/132kV sub-station & Transmission Line, Operation and Maintenance of 230 kV/132 kV /33kV sub-station, 230 kV 132 kV transmission line	Overall management, communication, co-ordination, monitoring of project activities, Formulate and prepare design method and design analysis of various components of the Consultancy Service	
Muhammad Abul Foysal (Environmental Expert)	B.Sc. and MS in Forestry, University of Chattogram	15 years of working experience in development sector of Bangladesh. He has specific work Experience as a Team Leader/ Environmental Expert for about 30 projects.	Prepare IEE/IESE and EIA/ESIA and will take responsibility for reporting to Power Grid with relevant environment safeguard deliverables	
Mohammad Badrul Alam (Transmission Line Engineer)	BSC in Engineering (Electrical and Electronic), BUET	More than 20 years of experience in designing and commissioning high-voltage power transmission lines	Design transmission lines tower, finalize route considering technical issues	
Mr. M. A. Hayat (Route Survey Expert/GIS Expert)	BSc in Civil Engineering, RUET	20 years experiences in conducting route survey, land survey and GIS mapping as well. Conducting/Supervision Route Survey for 25 nos. projects including 8 nos. in high voltage transmission system 230 KV and above in Power Sector.	Preparation of route survey tools and methodology; Conduct route survey and collect baseline and primary data as per ToR requirement	
Mr. Mohammad Mofazzal Hoque (Water Resource	BSc in Civil Engineering BUET	45 years of working experience in water resource sector	Carry out studies whether the development of the Project affects the riverine ecosystem and cause significant	

Name of Expert	Education Qualification	Experience	Area of Study	Signature
Expert)			adverse impacts on river resource users, primarily by altering river water, sediment, and biodiversity flows (daily and seasonal) and also recommend new or revised policies, procedures, or regulations to support water resource or conservation goals.	
Jahanara Khatun (Socio-economic Development Specialist)	BSS & MSS in Social Science, Dhaka University	21 years working experience in planning, designing, developing, monitoring, and evaluating different agriculture, transportation, road Railway, power and water management and socio-economic survey/study, resettlement projects	Plan, organize, and supported census, socio-economic surveys, community meetings, public announcements, and consultations; Responsible for consultation with women group and address gender sensitive issues during preparation and implementation of the Resettlement Action Plan	
Prof. Dr. Md. Tajul Islam (Biodiversity Expert)	PhD in Environmental Engineering, Tohoku University, Japan MSc in Environmental Engineering, Royal Institute of Technology, KTH, Sweden.	26 years of professional experience in teaching, research, EIA, feasibility study including as a Professor, Researcher, Biodiversity Expert, Environmental Expert and Principal Investigator and so on.	Prepare Integrated Biodiversity Assessment Tools (IBAT), and collect the data; Prepare an outline for the preparation of Biodiversity Management Plan (BMP), and provide key inputs for the preparation of Environmental Codes of Practice (ECoP)	
Dr. Santosh Kumer Sarker (Agriculturist)	MSc. Ag. in Entomology Bangladesh Agricultural University, Mymensingh	More than 30 years of work experience in conducting training, social studies especially in agricultural sectors. As Agriculturist he has conducted Seven (05) projects in Power Sector.	Recommendations on tree plantation, soil management, crop rotation, irrigation and drainage, environmental stability, how to manage and maintain agricultural land etc. within the project impact area.	
Md. Rubel Hassan (OHS Expert/CHS	BSc and MSc in Environmental Science, Noakhali	About 5 years' experience as Junior Environmental and Social Expert and he worked in different sector including	Responsible for supervision and monitoring of the ESIA and EMP	

Name of Expert	Education Qualification	Experience	Area of Study	Signature
Expert)	Science and Technology University	feasibility study, developing and monitoring of donor funded programs/projects, implementing policies and procedures to ensure continuous environmental safety compliance both governmental and non-governmental organizations.		
Mr. Aminur Rahman (Resettlement Expert)	MSS in Sociology, University of Dhaka	More than 30 years' experience in development sector as an international and national level expert. His expertise areas include capacity building, training, strategic plan development, socio-economic survey, social assessment, study tools development resource mobilization as well as research and evaluation etc.	Preparation and implementation of RAP. Prepare Resettlement Report. Planning, implementing, monitoring, evaluation and reporting and overall responsibility to lead and supervise the team in implementing LA & RP activities of the project.	

1.4 Statement of Need

Within the Project, it is proposed to conduct comprehensive detailed project studies and perform Environmental and Social Impact Assessment (ESIA) along with Resettlement Plan (RP).

According to the line route map submitted by JK-KEPCO Consortium (appointed as consultants by Korea EXIM Bank-EDCF), the proposed 765kV transmission line will cross over the upazillas namely Moheshkhali, Pekua, Banshkhali, Anowara, Patiya, Boalkhali, and Raozan. The line route map and associated materials further denote that the line is 95.5 kilometers in length and consist of 272 towers. The proposed line route will cross three major rivers such as Sangu, Matamuhuri, and Karnaphuli.

As construction of 765kV transmission line and associated work falls within ultra-high voltage class which is completely new in Bangladesh, a comprehensive study in light of Environmental and Socio-economic impacts and associated study by a competent and experienced international/national Consultant is required.

1.4.1 Project Overview

Bangladesh is currently undertaking significant projects to upgrade and expand its electricity transmission network, including the development of 765 kV transmission lines, primarily through the Madunaghat-Bhulta 765kV Transmission Line Project and the Madunaghat-Maheshkhali 765 kV Transmission line. These projects aim to enhance the capacity and reliability of power transmission, especially between major economic centers like Chattogram and Dhaka, and to ensure reliable electricity access across the country.

Proposed Madunaghat-Moheskhali 765kV Transmission line aims to evacuate power generated from proposed power plants in Maheshkhali to the national grid, supporting reliable power supply to the country. The introduction of 765kV transmission lines will enable the transmission of high volumes

of electricity necessary for Bangladesh's rapidly developing economy and significantly improve reliability by reducing system losses.

The project aims to build ultra-high voltage (765kV) electricity transmission corridor between Chattogram and Cox's Bazar with Dhaka, which are Bangladesh's major economic centers. The use of ultra-high voltage line will (a) help avoid building more lesser voltage transmission lines, thus saving valuable land and minimizing negative social impacts in a densely populated area; (b) allow the transmission of high volumes of electricity for the needs of a rapidly developing economy; and (c) improve reliability and decrease system losses. This will be the first 765kV transmission systems project in Bangladesh making it important for development partners like EDCF who involved in the project preparation stage.

1.4.2 Objectives and Scope of the Study

Major objectives of the project are to establish transmission infrastructure for evacuation of power to be generated from proposed power plants at Moheshkhali; and to provide reliable power to all over the country. The project has two main scopes:

(a) Construction of 765kV Overhead Power Transmission Lines;
(b) Construction of 400kV Bay Extension.

The scope of ESIA study will cover only the construction of transmission lines. This study provides the information on impact of different environmental and social issues due to construction of transmission lines which includes the environmental impact mainly during construction phase of the project. With this information mitigation measures are suggested to abate the impacts on the existing environment of the project area. The main objectives of this report are:

- Establishment of the environmental and social baseline condition in respect of water resources, air quality, noise level, land resources including land use/land cover, agriculture, fisheries, ecosystems and socio-economic conditions;
- Specific statutory requirements applicable in Bangladesh;
- Study legal perspective and also safeguard policies of donor agencies specially EDCF and applicable other donor agencies policy to prepare associated assigned reports.
- Carry out public consultation and disclosure with adjacent buffer zone communities;
- Identification of Important Environmental and Social Components (IESC);
- Assessment of impacts of the proposed transmission lines on the environmental and social components;
- Analyze the economic effects/impacts of environmental, disaster and climate change effects/ impacts and possible compensation for ecological damages.
- Site specific detail Environmental and Social Management Plan (ESMP);
- Suggestion recommended abatement/mitigation/management measures to ensure environmental, biological, health and social compatibilities and also to comply with the national environmental legal requirements and national environmental quality standards.

1.5 Approach and Methodology

ESIA study for the Project has been carried out as per the requirements of the Environment Conservation Rules, 2023, EDCF Safeguard Policy 2020, applicable EHS guidelines of IFC/WB related to environment and social. Reconnaissance surveys were conducted to identify environmental and social issues in the project area. A detailed desk-based literature survey was also undertaken and relevant information was collected for environmental and social baseline assessment. The process of the preparation of ESIA report is presented in Figure 1.

Social surveys and consultations were also conducted by IIFC and the Project Affected Households (PAHs) was visited to collect information on the socio-economic and cultural aspects of the local community. Various government departments and other agencies were contacted to gather information relevant to the Project or the Project area. Based on the baseline and proposed activities, an impact analysis was carried out where potential direct and indirect impacts of the Project activities have been considered. A detailed Environmental Management and Monitoring Plan (EMMP) has been formulated for the Project where measures are proposed to mitigate adverse impacts along with recommended good practices. Following plans have been developed and/or followed for the Project:

- Resettlement Plan (RP)
- Tree Plantation Plan (TPP)
- Stakeholder Engagement Plan (SEP);
- Gender Action Plan (GAP);
- Labour Management Plan (LMP);
- Occupational Health and Safety Plan (OHS);
- Community Health and Safety Plan (CHS);
- Biodiversity Management Plan (BMP);
- Climate Change Assessment (CCA), etc.

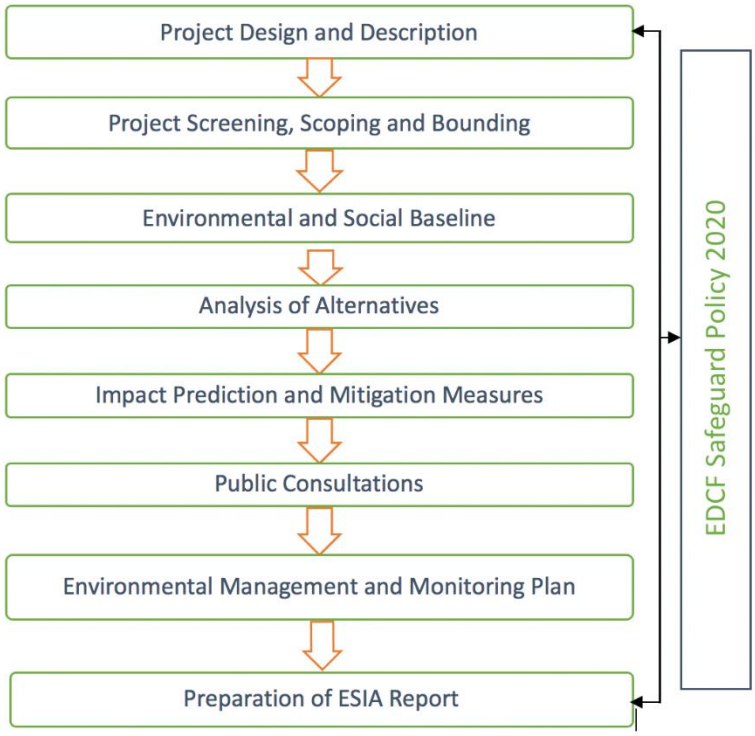

Figure 1: Process of the preparation of ESIA report

1.5.1 Project Design and Description

Environmental and social impacts are triggered by physical interventions in the natural system for which it is essential to understand the proposed interventions while conducting ESIA study. Detailed information about project was collected from Power Grid by the multi-disciplinary ESIA team members for gaining a thorough understanding of the proposed interventions and their possible environmental and social consequences. This information helped in designing data collection programs. The following issues have been included in the brief description of the project:

- Location of the project and its accessibility;
- Use of natural resources i.e., water and its sources;

- Use of power and its sources;
- Use of raw materials, fuels and chemicals, their quantities, characteristics, arrangements for transport to site, and storage facilities;
- Products and by-products, their storage and transport;
- List of main equipment and machinery, built-in pollution control equipment, description of detailed manufacturing process (temperature and pressure conditions of each unit operation);
- Quantities of solid, liquid and gaseous waste generated, and their points of generation;
- Noise level produced by equipment and machinery at source and capital and operating costs of pollution control;
- Social considerations of the project due to land acquisition, loss of crops, etc.
- Layout map (1:1000 scale) showing different units, roads, storage, water supply lines, sewerage, storm drainage, water pools housing, green belt, etc.

1.5.2 Environmental Baseline Survey

IIFC conducted the baseline survey with the help of iPAD. The KMZ (keyhole marked up zipped) file of the proposed approved route was opened in iPAD through Google Earth and followed the route exactly. It is convenient to locate the current position of the iPAD holder quickly that help to adjust the position with the route of T/L and cross-check the location with map through ground truthing. All the parameters selected in previous step may not be significant for the project; hence a reconnaissance survey was done to shorten this list to concentrate on significant effects. The method of reconnaissance is transect walk or walkover i.e., on-foot inspection to observe terrain, features, and constraints (slopes, existing utilities, structures, road, rivers, soil) of proposed tower locations and transmission lines initially provided by Power Grid. Later, topographic surveys were carried out to know tower site topography, features, contours and land related information, etc. Also, data has been collected from all possible secondary sources, whichever are available. Environmental and socio-economic data from different sources (BBS, DoE, BMD, BWDB, Agro-climatic survey of Bangladesh and other reports) of the proposed project area were collected to prepare the baseline environmental and socio- economic profile of the study area. Consultant's multi-disciplinary team of experts made reconnaissance visits to observe the condition of the project site and its surroundings and to identify various sites for investigation.

The environmental and social baseline condition of the proposed project area has been developed by collecting relevant data from primary and secondary sources. Under the ESIA study, available data on climate, geology, seismicity, water resources, land resources, soil properties, agriculture, fisheries, ecology and socio-economic components have been collected from secondary sources followed by primary. The study team made a number of field visits to the proposed interventions and collected primary data on environmental and social components using RRA techniques. During the field visits, the multidisciplinary ESIA team members made professional observations pertaining to their individual areas of expertise. Local knowledgeable persons and community representatives were also interviewed.

Secondary sources and used appropriately in preparing the environmental and socio-economic baseline of the project. All primary data and information here should be considered as the expert estimation and opinion of local people and project stakeholders.

Data from secondary as well as primary sources on physical environment, water resources, land resources, agriculture, fisheries, eco-systems and socio-economic condition have been collected for establishing the baseline condition for the project. Census has been carried out using semi-structured questionnaire for the collection of socio-demographic data on Project Affected

Households (PAHs) in terms of RoW of transmission lines. Resource based parameters or criteria on which data have been collected including the data sources methodology of collection are presented in the following sections.

1.5.2.1 Physical Environment

The professional observation of the multi-disciplinary team members backed by feedback from the local people during field visits was the main tool of physical environmental observation. The examination of physical environmental was backed by secondary data, high resolution recent satellite images and field observation. In general, the physical environmental data collection and survey have been carried out by a composite method of investigation including remote sensing image analysis, observation, and public consultation Analysis has been carried out with world standardized tools and the result presented with GIS interface.

The geological and seismic issues have been investigated using secondary information and field observation. The general geological features and the seismicity of the project and its surrounding areas have been collected from available secondary literature and the Geological Survey of Bangladesh. The lithology of the project area has been collected from the National Water Resources Database (NWRD) of WARPO.

Meteorological data such as rainfall, evapo-transpiration, temperature, sunshine hours, humidity, and wind speed and wind direction have been collected and analyzed for assessing local climate that are directly related to water resources of the study area. Meteorological data for selected stations has been collected from BMD stations available at project study area which contains long series of temporal data showing daily values for meteorological stations maintained by the Bangladesh Meteorological Department (BMD).

Water Resources

Information on water resources have been collected from secondary sources. Data on specific fields of interest on special hydrological events such as drainage congestion, water logging, erosion – sedimentation etc. have been collected. Water resources data under four broad headings namely river hydrology, groundwater hydrology, ground and surface water quality and use have been collected from secondary sources.

Land Resources

The baseline for land resources has been developed by considering the criteria of Agro-ecological Zone (AEZ), land type with net cultivable area (NCA), land use and soil texture. The identification and development of baseline condition have been carried out through the following process:

The AEZ of the proposed project area has been identified using information from secondary sources (BARC, 2012). Information on land type, soil texture, and soil nutrient status has also been collected from different publications of Soil Resource and Development Institute (SRDI).

The secondary data on these parameters have been verified at field level through physical observations as well as during consultation with the local people and officials of the Department of Agriculture Extension (DAE) during field visits.

Field surveys have been conducted to collect ground-truth data on current land use/ land cover, soil texture etc. Finally, maps of the land use/land cover, soil texture etc. have been produced through digital classification with the help of ground-truth data.

Environmental Parameters Testing

Testing environmental parameters have been considered for two seasons i.e., during pre-monsoon (1st Round) and monsoon (2nd round). Sample points have been selected based on nearby tower area with residential and commercial objects, availability of power connections and ease access to reach the sample locations.

Table 3: Environmental Testing Plan

SL	Name of Testing	No. of Sample		Applicable Rules
		1st Round	2nd Round	
1.	Ambient Air Quality (AAQ)	4	12	Air Pollution Control Rules 2022
2.	Noise Quality (NQ)	2	12	Noise Pollution (Control) Rules 2006
3.	Ground Water Quality (GWQ)	-	10	ECR 2023
4.	Surface Water Quality (SWQ)	4	10	ECR 2023
5.	Surface Soil Quality (SSQ)	-	10	Dutch Standard 2009

Parameters for AAQ: CO, Pb, NO_2, PM_{10}, $PM_{2.5}$, O_3, SO_2, NH_3
Methods of Taking Sample throughout the TL: (a) Nearby tower area with residential and commercial objects (b) Availability of Power Connections (c) Ease access to reach the sample locations
Parameters for NQ: Considering classifications for 24-hrs
Methods of Taking Sample throughout the TL: (a) Nearby tower area with residential and commercial objects (b) Ease access to reach the sample locations
Parameters for GWQ: pH, SS, TDS, Chloride, Turbidity, As, Cu, CN, Pb, Mn, Cd, Cr, NO_3, NO_2, Fe, Total Coliform, Fecal Coliform
Methods of Taking Sample throughout the TL: (a) Nearby tower area with availability of ground water sources (b) Ease access to reach the sample locations
Parameters for SWQ:

(a) Pond Water: pH, DO, BOD, NO_3-N, NH_4-N, PO_4-P, Total Cr, Pb, Hg, Total Coliform, TDS, COD
(b) River/Canal Water: pH, SS, DO, COD, Total Coliform, Fecal Coliform, NO_3^--N, PO_4^{-3}, Oil & Grease, Phenols, As, Cd, CN^-, Hexavalent Cr, Pb, Hg

Methods of Taking Sample throughout the TL: Rivers, Canals and Ponds under or near the RoW of TL
Parameters for SSQ: Arsenic (As), Copper (Cu), Iron (Fe), Mercury (Hg), Nickle (Ni), Lead (Pb), Zinc (Zn)
Methods of Taking Sample throughout the TL: As much as near the tower area under RoW

Agricultural Resources

Data collected on agricultural resources include existing cropping patterns, crop variety, crop calendar, crop yield, crop damage and agricultural input used. Agriculture data have been collected from primary sources through extensive field survey by developing questionnaires and in consultation with local people and relevant agricultural officials. Data on agricultural resources have also been collected from secondary sources (Upazila Agriculture Extension office of the DAE).

Fishery Resources

Fisheries data have been collected for this study by considering the seasonal variance of dry and wet seasons. Prior to data collection, a checklist/ questionnaire was developed. The checklist included all kinds of information that should be looked into in the context of existing and potential structures of the project area. A combination of survey techniques (e.g., qualitative and quantitative) was used for data collection. The survey techniques included sampling site selection, data collection, data analysis and reporting.

1.5.2.2 Ecological Resources

Ecological data have been collected from primary and secondary sources. The primary sources are mainly Line Transect Walks (LTWs) and Key Informant Interviews (KIIs); the secondary sources were from Forest Department, International Union for Conservation of Nature (IUCN), Bangladesh Asiatic Society's Encyclopedia of Flora and Fauna of Bangladesh, Bangladesh National Herbarium (BNH) and other relevant sources through literature review. In addition, the Bio-Ecological Zone (BEZ) classification of Bangladesh by IUCN Bangladesh (2002) has been used for the bio-ecological zoning of the study area. Based on information from the project site map, a field survey has been conducted to list the available flora and fauna as well as habitats in the study area. The surveys included LTWs (70-meters RoW from center line (35m+35m) within the study area covering all major habitats. Only tree counting survey was carried out considering 90-m RoW as per discussion in the kick-off meeting. However, the tree inventory survey for, transmission lines, evaluating the ecological loss shall be conducted with height information. The status of the threatened species has been mentioned in this report in reference to IUCN- Bangladesh Red List 2015. In addition, the team has used the technique of Integrated Biodiversity Assessment (IBAT) Tools for ecological surveys and preparation of Biodiversity Management Plan (BMP).

1.5.3 Social Baseline Survey

To establish a baseline for this ESIA study, data have been collected from different sources which can be grouped into two categories:

Primary sources

Primary data are collected through census (for RoW of transmission lines), inventory of losses and socio-economic survey (for RoW of transmission lines) in order to comply with Electricity Rules 2020 and amended 2022. Moreover, primary data also be collected through FGD, consultations and KII with different stakeholders and agencies. During the detailed design stage, this ESIA will be updated based on resurvey to all affected households and consultations with them. During implementation stage, EPC and ESCMC jointly shall carry out this.

Secondary sources

To prepare the baseline situation of the study area, information on some important socio-economic parameters have been collected from the reports of the Bangladesh Bureau of Statistics (BBS), 2022 and Households Income and Expenditure Survey (HIES), 2022. Secondary environmental data are collected from different government agencies and IUCN. Secondary data is also collected from the website-disclosed available authentic documents.

Technique of data collection

Different techniques have been used to gather relevant information on the existing socio-economic condition of the study area. Quantitative and qualitative data have been collected from secondary and primary sources. Quantitative data have been collected through literature review, FGDs and KIIs, informal interviews and PCMs (Table 4).

Table 4: Variables and associated data collection techniques

Variables	Techniques
Demographic and household information	Literature review
Quality of life	RRA
Safety net & poverty reduction measures	RRA, informal interview
People's perception	PCM, RRA

The data collected from PCMs, RRAs and informal interviews have been analyzed using appropriate statistical tools and instruments. The sum and percentage of total values have been used to specify the percentage of households containing different values on different variables.

Data Analysis

Data analysis has been carried out using MS Excel, GIS Software for Mapping, etc.

1.5.4 Scoping

A scoping process was followed for identifying Important Environmental and Social resources, which are likely to be impacted by the 765kV high-voltage transmission lines areas. This was done in two stages. Individual professional ESIA team members made a preliminary list of the components pertaining to their disciplines, which could be impacted by the project. The second stage included village-scoping sessions where stakeholder perceptions were obtained about the environmental and social components, which could be impacted by the project interventions. Professional judgment of the ESIA team members as well as the stakeholder opinions obtained in the village scoping sessions were considered in selecting the valuable environmental and social resources. IIFC would provide census data of T/L, digital survey of tower with mauza maps, mauza rates, route survey as per ToR, etc.

1.5.5 Bounding

The geographical boundary of the "General Impact Area - GIA" and the potential “Direct Impact Area - DIA” were delineated as a requirement of the environment assessment study. The GIA is the physical location of the proposed power transmission lines of the project impacts resulting from implementation of the proposed power transmission lines including pre-construction, construction, and post-construction conditions. It is recognized that the benefits of the proposed 765kV transmission will extend to the regional as well as national scale. For the ESIA, the focus of the study was limited to areas where the impacts of the activity will be directly felt. However, as per ToR, total 70m (i.e., 25 left side + 20m middle + 25m right side) RoW is considered for the ESIA study area for the 765kV transmission line is considered for the ESIA study area. A general socio-economic profile was prepared for the administrative units over which the power transmission lines shall traverse.

1.5.6 Major Field Investigation

Data on the IESCs were collected through RRA, PRA, and FGD using checklists for water resource, agriculture, ecosystem and socio-economic components. Intensive consultation with the local people was carried out in each case for securing people’s participation. The multidisciplinary ESIA team members also made professional observations during the field visits. The concentration was on the historical status of the IESCs and the possible condition of the same against the proposed interventions.

Information on individual households whose land and livelihood could be permanently or temporarily impacted was collected through a questionnaire which was developed and field-tested before conducting the actual census. However, a total of 461 households for transmission lines were interviewed during the census.

1.5.7 Prediction of Probable Impacts

The project implementing periods i.e., pre, during and post project situations were considered for the impact assessment. At this stage, local people’s opinions obtained at the major field investigation stage were duly considered. Environmental impacts of the proposed interventions on the key environmental and social resources have been assessed through several sets of activities. The statuses of the environmental and socio-economic resources under baseline conditions have been predicted considering the possible changes under pre, during and post project situations conditions.

The differences found between the two conditions have been considered as the impacts of the proposed interventions on the environment and people. Changes expected to be brought about due to the implementation of the project has been assessed using professional judgment of the multidisciplinary ESIA team members based on information collected during the major field investigation stage and feedback received through intensive stakeholder consultation to generate the future condition.

1.5.8 Assessment of Potential Impact

Once the potential impacts are identified, each potential impact is described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent). The potential impacts are qualitatively assessed based on the above characteristics to determine whether it is potentially significant or not. The significance of potential impacts was assessed using the risk assessment methodology that considers impact magnitude and sensitivity of receptors, described below.

1.5.9 Impact Magnitude

The potential implications of the project have been categorized as major, moderate, minor or nominal based on consideration of the parameters such as i) duration of the effect; ii) spatial extent of the impact; iii) reversibility; iv) likelihood; and v) legal standards and established professional criteria. The magnitude of each potential impact of the Project has been identified according to the categories outlined in Table 5.

Table 5: Parameters for Determining Magnitude

Parameter	Major	Moderate	Minor	Minimal
Duration of potential impact	Long term (beyond the project life)	Medium Term Lifespan of the project (within the project life span)	Limited to construction period	Temporary with no detectable potential impact
Spatial extent of the potential impact	Widespread far beyond project boundaries	Beyond next project components, site boundaries or local area	Within project boundary	Specific location within project component or site boundaries with no detectable potential impact
Reversibility of potential impacts	Potential impact is effectively permanent, requiring considerable intervention to return to baseline	Environmental or social parameter needs a year or so with some responses to come back to baseline	Baseline returns naturally or with limited response within a few months	Baseline remains constant
Legal standards and established professional criteria	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but violates international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential impacts occurring	Occurs under typical operating or construction conditions (Certain)	Happens under worst case (negative consequences) or best case (positive	Occurs under abnormal, exceptional or emergency	Unlikely to happen

		impact) working conditions (Likely)	conditions (occasional)	

1.5.10 Sensitivity of Receptor

The sensitivity of a receptor has been determined based on a review of the population (including proximity/numbers/vulnerability) and the presence of features on the site or the surrounding area. For each potential impact of the project, sensitivity of the related receptor was determined using the criteria outlined in table below.

Table 6: Criteria for Determining Sensitivity

Sensitivity Determination	Definition
Very severe	Vulnerable receptor with little or no ability to absorb proposed changes or minimal opportunities for mitigation.
Severe	Vulnerable receptor with little or no ability to absorb proposed changes or limited opportunities for mitigation.
Mild	Vulnerable receptor with some ability to absorb proposed changes or moderate opportunities for mitigation
Low	Vulnerable receptor with good ability to absorb proposed changes or/and excellent opportunities for mitigation

1.5.11 Assigning Significance

Following the assessment of impact magnitude and determining the quality and sensitivity of the receiving environment or potential receptor, the significance of each potential impact was established using the impact significance matrix shown in Table 7.

Table 7: Criteria for Determining Impact Significance

Magnitude of Impact	Sensitivity of Receptors			
	Very severe	Severe	Mild	Low
Major	Critical	High	Medium	Negligible
Moderate	High	High	Medium	Negligible
Minor	Medium	Medium	Minor	Negligible
Minimal	Negligible	Negligible	Negligible	Negligible

1.5.12 Identification of Mitigation and Enhancement Measures

Once the significance of potential impact has been characterized, the mitigations and enhancement measures were suggested. For this purpose, mitigation strategies adopted during earlier projects of similar nature were reviewed in addition to relying upon experts' judgment. Subsequently, residual impacts – impacts that are likely to take place even after the implementation of mitigation measures – and their significance was assessed.

1.5.13 Environmental and Social Management Plan

The environmental and social management plan (ESMP) was compiled once the impact assessment was completed and mitigation measures were identified. During the ESMP compilation, institutional arrangements for environmental and social management of the project were recommended, mitigation and monitoring plans were formulated, documentation and reporting protocols were defined, training needs were assessed, and cost of ESMP implementation estimated. It is to be noted

that, following the proposed ESMP, site specific ESMP will be prepared during the implementation stages and before the construction starts.

1.5.14 Environmental and Social Monitoring Plan

Finally, an environmental monitoring plan was prepared for detecting changes taking place in the environmental and social components due to project implementation. This monitoring plan will be followed through the project period. It may be updated if any new impacts and risks are identified.

1.5.15 Budget for Environmental Management Plan

A tentative budget has been prepared for implementing environmental management plan for the proposed project. In this budget, mitigation cost, enhancement cost, contingency costs are included. The monitoring costs during implementation period is also included within this budget. This budget will be updated during the detailed design stage.

1.5.16 Public Consultation

Public consultation is necessary for identifying the problem and solution across the intervention by following participatory approach. This starts from environmental and social baseline stage when data and information on baseline conditions is collected from the directly and indirectly project impacted people. Their perceptions were considered in the selection of important environmental and social components through the scoping process. Some formal consultation was carried out during ESIA study and some consultation meetings were conducted after completing the census for project affected person. The ESIA team arranged a formal consultation meeting with project affected people. Along with this, the study team also communicated with local government authority to inform them and to pick their perception regarding this project. A participatory approach was followed during consultation meetings. During the study, a total 13 consultations were carried out, and a total of 106 persons participated in these sessions. Detailed consultation procedures through the project cycle are described with SEP.

1.6 The Study Area

The project is located in Chattogram and Cox's Bazar districts of Chattogram Division in order to meet the fast-growing future demand of electricity in these areas.

Division	District	Upazila	Union	Mauza	Length	Tower
Chattogram	1. Chattogram 2. Cox's Bazar	1. Moheshkhali 2. Pekua 3. Banshkhali 4. Anowara 5. Patiya 6. Boalkhali 7. Raozan	38 nos.	75 nos.	95.5 km	272 nos.

Proposed power facility, after its completion, will be gradually integrated with the existing and upcoming infrastructures being installed under different on-going projects and contribute to a strong and reliable national transmission grid, besides addressing all the identified problems of the projected areas. 500m range has been considered as directly influenced area for air, noise, water, solid waste, etc. and 2-km range has been considered for indirectly influenced area, especially for ecological impacts of ESZ/NP/IBA/WLS. The ESIA study team made visits along the route of 95.5km overhead transmission line. There are no underground transmission lines of this project. The following map shows the locations of the proposed transmission line.

Figure 2: Location of the proposed 765kV transmission line

1.7 Limitations

The impact assessment study for the proposed Project is largely based on the Project information from client, discussion with local community and other stakeholders and observations from various surveys and investigations undertaken in the Project area. Professional judgement and subjective interpretation of facts have been applied for this study. Any change in Project location, orientation, proposed Project activities is likely to result in variation of the impacts. It is to be noted that any technological advances during the course of construction and execution of the Project will alter the extent and severity of impacts on the surroundings.

The statements, conclusions, and opinions contained in this report are only intended to give approximations of the environmental and social condition of the site. Moreover, there are several major limitations that are inherent in the conduct of this, or any other, environmental, and social assessment.

- First, it is difficult to predict which, if any of the potential environmental and social issues identified will become actual problems in the future, environmental regulations continually change, as do the enforcement priorities of the applicable governmental agencies involved.
- Second, even for problems currently identified, it is often difficult and sometimes impossible to accurately estimate the liabilities that may be involved in mitigating the problem(s), for the legal and technological standards for evaluating, mitigating, and allocating liability for environmental issues are in a constant state of change. Moreover, the liability for mitigating environmental problems tends to be highly dependent upon agency negotiations and the sometimes arbitrary and unpredictable nature of agency officials charged with such negotiations.
- The data collection has been carried out during pre-monsoon and monsoon seasons. Team mobilization, field visit, tower survey, tree counting survey, socio-economic survey (SES), environmental testing, consultations and group discussion were very difficult to arrange.

1.8 Structure of the Report

The report has been structured in compliance with the requirements of Environmental Conservation Rules (ECR) 2023 of DoE and the EDCF Safeguard Policy 2020. The layout of the report is as provided below:

Chapter 1: Introduction

Chapter 2: Describes Policy, Legal and Administrative Framework

Chapter 3: Description of the Project

Chapter 4: Provides an Analysis of Alternative

Chapter 5: Description of Existing Environmental Conditions

Chapter 6: Social Baseline

Chapter 7: Provides details on the Stakeholder Analysis and Consultation

Chapter 8: Potential Environmental Impact Assessment

Chapter 9: Potential Social Impact Assessment

Chapter 10: Provides Environmental and Social Management Plan (ESMP)

Chapter 11: Grievance Redressal Mechanism

Chapter 12: Conclusion and Recommendations

Chapter 2
Policy and Regulatory Frameworks

2.1 Policy, Legal and Administrative Framework

This chapter provides a description of the regulatory framework applicable to the proposed power transmission lines project. It highlights environmental, health and safety (EHS) and social regulations with applicable permits and standards in association with the project. It broadly focuses on the:

- Legal Enforcement Agencies at National Level;
- Applicable national and local Environmental and Social Laws, Regulations and Policies;
- International & National Environment Standards/Guidelines; and
- Applicable International Conventions/Protocols.

2.2 Legal Enforcement Agencies

The responsibility of formulation, implementation and modification of national level environmental laws in Bangladesh lies with the Ministry of Environment, Forests and Climate Change (MoEFCC). The Department of Environment (DOE) established under the Environmental Pollution Control Ordinance, 1977 which functions under the MoEFCC. It is responsible for carrying out the purposes and provisions of the Environment Conservation Act, 1995 as amended till 2010 (hereinafter referred as ECA) and Environmental Conservation Rules, 2023 (hereinafter referred as ECR) which are the umbrella legislations regulating environmental issues in the country. A brief description of the relevant legal enforcement agencies has been described in Table 8.

Table 8: Relevant Legal Enforcement Agencies and their Functions

SN	Agency	Functions
1.	**Ministry of Environment, Forest and Climate Change (MoEFCC)**	The MoEFCC is the nodal agency in the administrative structure of the Central Government, for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. It oversees all environmental matters in the country and is a permanent member of the Executive Committee of the National Economic Council. It plays a pivotal role as a participant of the United Nations Environment Programme (UNEP). Its principal activities include: • Conservation & survey of flora, fauna, forests and wildlife; • Prevention and control of pollution; and • Forestation & regeneration of degraded areas and protection of environment in the frame work of legislations.
2.	**Department of Environment (DOE)**	An Environment Pollution Control Board was setup under the Environment Pollution Control Ordinance, 1977. It underwent a series of subsequent restructuring and was finally renamed as Department of Environment in 1989. It is headed by a Director General appointed by the Government. The DOE through its head, divisional and District level offices conduct the following principal activities: • Advising the Government to avoid such manufacturing processes, commodities and substances which are likely to cause environmental pollution; • Advisory and issuing directions to the concerned person regarding the environmentally sound use, storage,

SN	Agency	Functions
		transportation, import and export of a hazardous substance or its components; • Conducting inquiries and research activities on conservation, improvement and pollution of the environment and rendering assistance to any other authority/organization regarding the same; • Collection and publication of information about environmental pollution; • Conducting programs for observation of drinking water quality and issuing directives, if necessary, for adherence to drinking water quality standards; • Formulation of environmental guidelines; • Prescribing and modifying environmental quality standards pertaining to air, water, noise, vehicular emissions etc.; • Issuing Location Clearance and Environmental Clearance Certificates to Projects; and • Implementation of provisions of ECA and rules made there under.
3.	**Bangladesh Forest Department (BFD)**	It was established under the MoEFCC and is responsible for identifying and declaring of certain areas as reserved or protected or private forest lands. It implements the provisions of Forest Act, 1927 and National Forestry Policy, 1994. It is also responsible for wildlife preservation and protection through implementation of Wildlife (Preservation & Security) Act, 2012.
4.	**Water Resources Planning Organization (WARPO)**	It was established under the Water Resources Planning Act, 1992. Its core functions include: • Monitoring the implementation of National Water Management Plan (NWMP); • Upkeep of water resource assessments; • Maintenance, updating and dissemination of the National Water Resources Database (NWRD) and MIS; • Secretariat to the National Water Resources Council (NWRC) and the Executive Committee of the National Water Resources Council (ECNWRC); • Responding to the NWRC/ECNWRC requests for information and advice; • Periodic update of the NWMP; • Assisting other agencies in planning, monitoring, studies and investigations; • Ad hoc advice on policy, strategy, institutional and legal issues; • Laying down effluent discharge standards into river in consultation with DOE; and • Special studies and research as required.
5.	**Ministry of Fisheries and Livestock (MOFL)**	The main functions of the MOFL include: • Preservation of fisheries resources; • Fulfilling the requirement of animal protein through proper management and planned development; • Increasing socio-economic conditions of fishermen; • Creating employment opportunities for rural unemployed and landless people; • Expanding foreign exchange earnings by exporting fish and fishery products; • Developing innovative technologies through research for fisheries development and preservation; and

SN	Agency	Functions
		• Protection of fishes through implementation of Protection and Conservation of Fish Act, 1950 as amended till date.
6.	**Bangladesh Power Development Board (BPDB)**	It is a statutory body created in May 1, 1972 and is responsible for major portion of generation and distribution of electricity mainly in urban areas except Dhaka and West Zone of the country. It has undertaken a massive capacity expansion plan to add about 10500 MW generation capacities in next 5 years to achieve 24000 MW Capacity according to Power System Master Plan (PSMP) 2021.
7.	**Bangladesh Energy Regulatory Commission (BERC)**	It was established under the Bangladesh Energy Regulatory Commission Act, 2003. Some of its key functions include: • Issue, cancel, amend and determine conditions of licenses, exemption of licenses and determine the conditions to be followed by such exempted persons; • Regulation of generation, storage, supply, and transmission of energy; • Determine tariff for electricity distribution etc.; • Ensure control of environmental standard of energy under existing laws; • Extend co-operation and advice to the Government, if necessary, regarding electricity generation, transmission, marketing, supply, distribution and storage of energy.
8.	**Ministry of Labour and Employment (MOLE)**	It was established with following objectives: • Creation of employment opportunity; • Creation of semi-skilled and skilled manpower; • Enhancement of productivity of factories by creating friendly working environment between workers & employers; • Ensuring welfare of workers in different industrial areas; • Implementation of labor laws; • Fixing up minimum wages of labor; and • Ensuring justice through Labor Court. It has been divided into four departments, viz: • Directorate of Labor • Chief Inspector of Factory and Establishment • Minimum Wages Board • Labor Appeal Tribunal
9.	**Ministry of Law and Parliamentary Affairs**	This ministry is divided in to the Law and Justice Division and the Parliamentary Affairs Division for functional purposes. The Law and Justice Division of the Ministry of Law, Justice and Parliamentary Affairs have the responsibility of providing legal advisory services to other ministries, divisions, departments, and organizations of the Government. The parliamentary affairs division is assisted by the law commission and the human rights commission and its main function lies in formulating, scrutinizing and preparing legislations. When needed, it provides legal opinions and translations for other ministries.
10.	**Ministry of Land**	The ministry of land is in charge of land administration, management and development for the overall growth of the nation. The Ministry manages Government owned lands, vested properties and abandoned properties. It is responsible for the collection of land development tax, land surveying and record keeping and updating. Land Acquisition and requisition fall under the responsibilities of this ministry.

SN	Agency	Functions
11.	**Civil Aviation Authority, Bangladesh (CAAB)**	The Government of the People's Republic of Bangladesh formed Civil Aviation Authority, Bangladesh in the year of 1985. The main functions of CAAB are: • It is responsible for registration of aircrafts and issues license to each personnel responsible for flight operations; • To regulate air traffic and provides facilities and services for aeronautical telecommunications and air navigation; The authority is responsible for construction, maintenance and development of airports and aerodromes.
12.	**Road Transport and Highways Division (RTHD)**	The Roads and Highways Department (RHD) was created in 1962 when the old 'Construction & Building (C&B) organization was split into 2 separate bodies (the other being Public Works Department). RHD is responsible for the construction and the maintenance of the major road and bridge network of Bangladesh. The major functions of RTHD are: • Repair, rehabilitate and maintain the highway network; • Improve and expand the national, regional highways and zilla roads; • Adopt and accomplish economically important highway projects; • Introduce and operate digital motor vehicle management system • Ensure road safety; • Introduce and operate integrated mass rapid transit system; • Provide passenger and cargo services on domestic and international routes; • Encourage Public Private Partnership (PPP) in road transport sector.
13.	**Ministry of Railways**	Among the public transport modes of the country, the railway is the largest state transport sector of the government of Bangladesh. The first railway in this country was started on 15 November 1862 with the construction of Darshana-Jagati railway line. the Ministry of Railways was constituted as per SRO No. 361 Act / 2011 dated 04-12-2011 of the Cabinet Division. The functions of ministry of railways are: • Formulation of policies and strategies for railways and rail transport and safety; • Development, expansion and maintenance of railways; • Coordination of railway system at national and international level; • Survey and monitoring of rail transport; • Formulation and implementation of safety policies for rail transport; • Establishment of international railway system and execution of transport agreements; • Determination and rescheduling of fares and tolls of Bangladesh Railway; • Conduct development and investment programs and budgetary activities of Bangladesh Railway; • Conduct and control the administrative activities of all offices and agencies under the Ministry.
14.	**Union Parishad**	Union Parishad (UP) currently is the only elected statutory local government body for the rural Bangladesh. A UP consists of a chairman and twelve members. They are elected on the basis of adult franchise. Each UP has a full-time Secretary, appointed by the Deputy Commissioner (DC). The functions of UP are: • Maintenance of law and order and conduction of censuses of all kinds;

SN	Agency	Functions
		• Registration of births, deaths, blind people, beggars and destitute; • Planning and implementation of development schemes in the field of agriculture, forestry, fisheries, livestock, education, health, small and micro enterprises, communications, irrigation and flood control; • Protection and maintenance of public property such as roads, bridges, canals, embankments, markets, telephones and electricity lines.

2.3 National Environmental and Social Laws, Regulations and Policies

The relevant acts and rules pertaining to the Project have been summarized in Table 9. Both Contractor and Power Grid would responsible to comply with applicable national and international laws, regulations and policies.

Table 9: National Environmental and Social Laws, Regulations and Policies

Summary of Applicable legislation/ Policy	Responsible Agency	Applicable Permit and Requirements
A. ENVIRONMENTAL RELATED		
National Environment Policy, 1992 and Action Plan It sets out the framework for establishment of legislations related to 15 sectors including environment, water, agriculture, water resources development, forest & wildlife, fisheries etc. The key provisions of the policy are: • Initial Environmental Examination (IEE) of all new public and private sector industrial Projects is mandatory; • Adoption of corrective measures by polluting industries in phases; • Prevention of land erosion, and environmentally sound management of newly accreted land; • Conservation of wildlife, bio-diversity, forest, fisheries and livestock.	Ministry of Environment, Forest and Climate Change (MoEFCC), Bangladesh Department of Environment (DOE), Bangladesh	Power Grid should ensure that Project activities comply with the provisions made under the policy and the legislations made there under for implementing the same.
National Environmental Policy, 2018 This policy has been formulated based on the National Environmental Policy 1992 aimed to achieve Sustainable Development Goals (SDGs). The main consideration of this policy is to ensure sustainable development reducing the dependency of human on nature resources. A total of 19 sectors has been considered in this policy including environment, water, agriculture, water resources development, forest & wildlife, fisheries etc.	Ministry of Environment, Forest and Climate Change (MoEFCC), Bangladesh Department of Environment (DOE), Bangladesh	Power Grid should ensure that Project activities comply with the provisions made under the policy and the legislations made there under for implementing the same.
National Environmental Management Action Plan (NEMAP), 1995 The NEMAP is a wide-ranging and multi-faceted plan which builds on and extends the	Ministry of Environment, Forest and Climate Change	Power Grid should ensure that Project activities comply with the provisions made under the policy and

Summary of Applicable legislation/ Policy	Responsible Agency	Applicable Permit and Requirements
statements set out in the National Environmental Policy. NEMAP was developed to address issues and management requirements during the period from 1995 to 2005, and set out of the framework within which the recommendations of the National Environmental Policy were to be implemented. It identified four broad objectives and remains highly relevant today. The four key environmental management directions specified were: • identification of key environmental issues affecting Bangladesh • identification of actions necessary to halt or reduce the rate of environmental degradation of the natural environment sustainable resource use and the conservation of habitats and biodiversity • improvement of the quality of life of the people.	(MoEFCC), Bangladesh Department of Environment (DOE), Bangladesh	the legislations made there under for implementing the same.
The Environment Conservation Act, 1995 *as amended till October 5, 2010* (hereinafter referred as ECA) **The Environment Conservation Rules, 2023** (hereinafter referred as ECR) The salient features of the Act are as follows: • A Department of Environment (DoE) to be established subsidiary to the MoEFCC to exercise the provisions of the Act; • The Government of Bangladesh (GoB) will declare Ecologically Critical Areas (ECA) and specify the activities or processes that cannot be initiated or continued in an ECA; • An industrial unit/project cannot be established without obtaining an Environmental Clearance Certificate (ECC) from the Director General of DoE; • Publication of environmental guidelines related to environmental pollution control and mitigation, conservation, and improvement of the environment; • Prescription of rules for implementing the provisions of the Act. The provisions under the ECR are summarized as follows: ○ The industries for the purpose of obtaining ECC have been classified into the following	Ministry of Environment, Forest, and Climate Change (MoEFCC) Department of Environment (DoE)	The proposed project being a power transmission line falls under the Red Category as classified under Schedule-I of the ECR 2023. Power Grid shall ensure compliance with the applicable provisions of the Act and the Rules made there under. Reportedly Power Grid has collected No Objection Certificate (NOC) from Union Parishads for the Project site. Furthermore, Power Grid already applied for approval of Terms of Reference (ToR) for EIA/ESIA report preparation and submission followed by receiving Site Clearance Certificate and later Environmental Clearance Certificate (ECC) in the requisite manner along with prescribed documents at DoE Head Office. Power Grid shall ensure that pollutant emissions/discharges from various sources, etc. during Project activities are well within the standards prescribed in the Schedules 2-5 of the ECR 2023. Some of the standards have been revised by the DOE viz. Ambient Air Quality standard Vehicular Emission standards Ambient Noise Standards

Summary of Applicable legislation/ Policy	Responsible Agency	Applicable Permit and Requirements
4 categories based on their site and impact on the environment: i. Green ii. Yellow iii. Orange iv. Red *The list of industries falling under each category has been annexed in the Schedule – I to the ECR.* • For proposed industries falling under the yellow, orange, and red categories, a Site Clearance Certificate (SCC) needs to be obtained from DoE prior to the issuance of ECC; • The Project entrepreneur shall apply for ECC in Form 3 (for industrial park) along with prescribed documents and application fees; • ECC (for red category) will be valid for 1 year from the issuance date and shall be renewed at least 30 days prior to expiry; • Various environmental quality standards pertaining to air, water, sound, odor etc. have been laid down in the schedules attached to the Act. • Emissions and waste discharge standards have been laid down in Schedules 2-5. • The person in charge of facility/unit shall notify the Director General, DoE in case of pollutant emission/ discharge in excess of prescribed standards or where there is a possibility of the same.		The various applicable standards have been provided in subsequent sections. Compliance to such standards shall be ensured by Power Grid.
Environmental Court Act, 2010 Bangladesh Environment Court Act, 2010 has been enacted to resolve the disputes and establishing justice over environmental and social damage raised due to any development activities. This act allows government to take necessary legal action against any parties who creates environmental hazards/ damage to environmentally sensitive areas as well as human society. According to this act, government can take legal actions if any environmental problem occurs due to project interventions.	Ministry of Environment, Forest and Climate Change (MoEFCC), Bangladesh	Power Grid shall ensure compliance with legal requirements under such provisions.
Bangladesh Water Act, 2013, and Bangladesh Water Rules, 2018 Bangladesh Water Rules, 2018 have been formulated under the Bangladesh Water Act, 2013. The key features of the Act and Rules are:	Water Resource Planning Organization (WARPO)	This Act and Rules was implemented in 2013 and 2018 respectively, and the NWRC and Executive Committee are yet to be formulated. Upon formation of the aforementioned bodies, water

Summary of Applicable legislation/ Policy	Responsible Agency	Applicable Permit and Requirements
• A National Water Resources Council (NWRC) to be established for implementing the provisions of the Act • A National Water Policy shall be adopted by the Council addressing the following issues: i. Purpose and sectors of water use ii. Affordability of water users iii. Actual cost of water abstraction and distribution iv. Financial ability and backwardness of water users of any group thereof v. Water demand and supply vi. Any other issues considered relevant by GoB • An Executive Committee of the Council shall be established or ensuring efficient performance of the Council. • The GoB can declare certain areas as Water Stress Areas for the protection of water sources or aquifers. • Water zone demarcation (industrial, agricultural, brackish water aquaculture and hatchery water zones) through gazette notification and issuance of protection order for efficient water management in such zones • Declaration of flood control zone and its management. • Restriction on abstraction of total water from any water source.		stress areas and related provisions may be prescribed. Power Grid shall ensure compliance with legal requirements under such provisions.
Ground Water Management Ordinance, 1985 As per the provisions as per schedule 5 of this act, no tube well shall be installed in any place without a license granted by the Union Parishad. Also, no application shall be entertained by the Union Parishad unless it is accompanied by such fee as may be prescribed under the requirements of this ordinance.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh	Power Grid should ensure that no tube-well shall be installed in any place without a license granted by the Union Parishad. Power Grid should furnish the following information: • the aquifer condition of the soil where the tube-well is to be installed; • The distance of the nearest existing tube-well; • The area likely to be benefited by the tube-well; • The likely effect on the existing tube-wells including tube wells used for domestic purpose; • The suitability of the site for installation of the tube-well; and • The conditions on which a license, if any, may be granted.

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Bangladesh Wildlife (Conservation and Security) Act, 2012 (previously known as Bangladesh Wildlife (Preservation) Order, 1973; amended as Bangladesh Wildlife (Preservation) Act 1974) This Order aims to protect and conserve wildlife in Bangladesh. Wildlife preservation, conservation and management fall within the jurisdiction of the Forestry Department. The previous Wildlife (Preservation) Order, 1973 & Wildlife (Preservation) (Amendment) Act, 1974 have been revamped to Wildlife (Conservation & Security) Act of 2012. The Act has adopted new types of protected areas for conservation and protection of wildlife resources, created avenue for community conserved areas and also community-based management of protected areas. This Act protects 1,307 species of plants and animals under four schedules that mandates imprisonment and fines for wildlife poaching, capturing, trapping, and trading. Bangladesh Wildlife (Preservation) Order (1973) and Act (1974) regulate the hunting, killing, capture, trade and export of wildlife and wildlife products. It designates a list of protected species and game animals. Protection of wildlife is provided with lists of species within four schedules of the Order: • First Schedule - The Schedule -1 (823) represents Protected Animal (Amphibians-14, reptiles-96, birds-578, mammals-110, fishes-25) of Bangladesh which are open to shooting and may be hunted on a special hunting permit (though since 1988 no hunting permits have been issued by the Government). • Second Schedule – Schedule-2 (424) also represents Protected Animal (Amphibians-18, reptiles-58, birds-44, mammals-3, fishes-27, phylum cnidaria – class anthozoa (coral)-32, molluscs – shells and snails-137, arthropods – crustacea (crabs and lobster)-22, insect (butterflies and moths)-59, Insect – beetles-24 those species that are not to be hunted, killed or captured and CITES Specification; • Third Schedule – Schedule -3 (6) represents Vermin-6Protected animals; and	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Bangladesh Forest Department	During construction and operation phase Power Grid shall comply with this act

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• Fourth Schedule - Schedule -4 (54) represents Protected Plants-41 and Orchid-13. In addition to these, the Government of Bangladesh has declared 14 protected areas and is considering declaring more. Further, the Government of Bangladesh has recently declared seven areas as Ecologically Critical Areas under the Environmental Conservation Act (1995). These are Hakaluki Haor, Sonadia Island, St. Martin's Island, and Teknaf Peninsula (including the Cox's Bazar Sea Beach but not the buffer zones), Tanguar haor, Marjat baor and outside of Sundarbans Reserved Forest for a distance of 10 km.		
Noise Pollution (Control) Rules, 2006 According to Environmental Protection Act, 1995, the government formulated the noise pollution Rules & Regulation in 2006. This regulation recommends to keep the sound level 50dB at the quieter area from 6am until 9pm and at night 40dB, similarly, at residential area on the day of 55dB and at night 45dB, a mixed area, 60dB at day time and at night 50dB, a commercial area on the day of 70dB and at night 60dB and the industrial areas of the day 75dB and at night 70dB.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh	Power Grid is required to undertake action for noise generation from the operation of construction machinery in order to keep the sound in standard level.
Bangladesh Delta Plan 2100 (BDP 2100) It is a long-term, integrated plan for sustainable development of the Ganges-Brahmaputra-Meghna delta, aiming to address climate change and other delta-related challenges. BDP2100 envisions a prosperous, climate-resilient delta, ensuring water and food security, economic growth, and environmental sustainability. It outlines national and delta-specific goals, including poverty elimination, achieving upper-middle-income status, and building a prosperous nation beyond 2041. The plan incorporates adaptive delta management strategies, focusing on water resources, land use, ecosystems, and climate change, to mitigate risks and enhance resilience. The plan identifies "hotspots" – areas facing similar vulnerabilities to natural hazards and climate change – to prioritize interventions.	Bangladesh Planning Commission, Ministry of Planning	By enhancing the capacity to transmit electricity, the project contributes to the energy security aspect of BDP2100, particularly in the context of a growing demand for power in the delta. he project's implementation, along with other infrastructure investments, needs to be considered within the framework of adaptive delta management, accounting for potential future scenarios and climate change impacts.
Disaster Management Act 2012 The Act was approved by the Parliament on September 2012 after a long collective effort by the government and development and civil society actors to create a legislative tool under which disaster and emergency management will be undertaken. It has placed mandatory	Ministry of Disaster Management and Relief	Power Grid should comply with this Act during construction and operation phases of the project

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obligations and responsibilities on ministries and committees, and ensures transparency and accountability in the overall disaster management system. The objectives of the Act are substantial reduction of the overall risks of disasters to an acceptable level with appropriate risk reduction interventions; effective implementation of post disaster emergency response; rehabilitation and recovery measures; provision of emergency humanitarian assistance to the most vulnerable community people; strengthening of institutional capacity for effective coordination of disaster management involving government and non-government organizations, and establishing a disaster management system capable of dealing with all hazards for the country.		
Protection and Conservation of Fish Act, 1950 as amended through February 16, 1995 This Act was promulgated for conservation of fish in Bangladesh and their protection against indiscriminate fishing, poisoning due to industrial effluent disposal into the water, oil spills, etc.	Ministry of Environment, Forest and Climate Change (MoEFCC), Bangladesh Department of Fisheries (DoF)	Power Grid shall ensure compliance with provisions mandated under this Act.
Protection and Conservation of Fish Rules, 1985 The Rules were prescribed under the provisions of Protection and Conservation of Fish Act. It provides the regulations for prohibition of fishing during certain periods, licenses for catching fishes, prevention of fish destruction due to explosives and industrial effluent disposal etc.	Ministry of Environment, Forest and Climate Change (MoEFCC), Bangladesh Department of Fisheries (DoF)	Power Grid shall ensure that untreated effluent is not disposed into the river. The treated effluent shall comply with the discharge standards stipulated under the ECR.
The National Fisheries Policy, 1999 The objectives of the fisheries policy are: • Enhancement of the fisheries production; • Poverty alleviation through creation of self-employment and improvement of socio-economic conditions of the fishermen; • Fulfilling the demand for animal protein; • Achieve economic growth through earning foreign currency by exporting fish and fisheries products; and • Maintain ecological balance, conserve biodiversity, ensure public health and provide recreational facilities. The policy broadly aims at fisheries development, regulation of aquaculture, biodiversity conservation and formulation of	Ministry of Fisheries and Livestock (MoFL) Department of Fisheries (DoF)	Power Grid shall ensure that during construction work no fish habitats will be affected.

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laws to ban the disposal of any untreated industrial effluents into the water bodies.		
Bangladesh National Building Code, 2006 (amended 2020) The provisions of this Code are applicable to the design, construction, use or occupancy, alternation, moving, demolition and repair of any building or structure and to any appurtenances installed therein or connected or attached with the building/structure. The Code also sets out the constructional responsibilities according to which the relevant authority of a particular construction site shall adopt some precautionary measures to ensure the safety of the workmen during construction. With relation to this, the Code set out the details about the different safety tools of specified standard. The general duties of the employer to the public as well as workers are also stipulated in the BNBC.	Ministry of Housing and Public Works	The implication of this legal binding in this proposed Project arises from the safety of public and workers in relation to the construction of 765kV power transmission lines aim to evacuate the power from generation through substation.
The Building and Construction Act and Rules 1996 • As per Section 3A of this act, no owner or occupier of a building shall, without obtaining previous permission from the Authorized Officer or the Committee use the building for the purpose other than that mentioned in the sanction. • All the construction, re-construction works to be undertaken as per terms or conditions prescribed.	Authorized Officer or Committee	Power Grid shall ensure that no building or tank shall be constructed without prior permission from the Authorized Officer or Committee of the area.
Ecologically Critical Areas (ECAs) Management Rules, 2016 The Rules provide different committee systems for the management of ECAs from the national to village level. The Rules at first provide for the establishment of a National Committee consisting of a Chairperson5 and 19 other members including academics and 2 NGO activists. The Department of Environment (DoE) provides the secretarial assistance to the National Committee. The Rules then describe responsibilities and functions of the National Committee. The National Committee plays a pivotal role in the management of ECAs. In recommending a site, the National Committee will consider existing natural conditions and biodiversity, forests, wildlife, protected areas, wetlands etc. and causes for ecological degradation, possible threats, and preventive measures for this. The Committee will also take into account livelihoods, religious and social culture of local inhabitants, and the presence of archaeological sites. The National	Ministry of Environment, Forest and Climate Change (MoEFCC), Bangladesh Department of Environment (DoE)	Power Grid shall ensure compliance with legal requirements under such provisions.

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Committee will also make recommendations regarding the generation of alternative livelihoods for the people dependent on an ECA.		
National 3R Strategy for Waste Management, 2010 The 3R strategy sets the goal of waste reduction, reuse and recycling and minimizing waste disposal in open dumps, rivers, flood plains and landfills by 2015 and promotes recycling of waste through mandatory segregation of waste at source as well as creates a market for recycled products and provides incentives for recycling of wastes. It recognizes waste as a resource and advocates for segregation of waste at source, encourages emission reducing technology through private sector investment and tapping the potential of CDM provisions, promotes "polluters pay" principle as well as cleaner production and Environmental Management System (EMS), and supports the participation of the informal sectors who are engaged in the recycling of various materials.	Department of Environment (DoE)	During construction and operation phase Power Grid shall comply with this 3R strategy
The Forest Act (1927) (Amendment, 2000, 2018) This Act was enacted to control trespass, illegal resources extraction from forests and to provide a framework for the forestry revenue collection system. It is the main legislative context for forestry protection and management in Bangladesh. The Act allows for the notification of forest reserves in which the government, through the Forest Department, regulates the felling, extraction and transport of forestry produce in Bangladesh.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Bangladesh Forest Department	During construction and operation phase Power Grid shall comply with this act
National Forest Policy, 1994 The National Forest Policy of 1994 is the amended and revised version of the National Forest Policy of 1977. The policy is designed to conserve the existing forest areas, bring about 20 % of the country's land area under the Forestation Programme, and increase reserve forests by 10 percent per year to 2015 through coordinated efforts of GoB-NGOs and through active participation of the people. Amendments of the existing laws (acts, rules and regulations) relating to the forestry sector and creation of new laws for sectorial activities have been recognized as important conditions for achieving the policy goals and objectives. The Forestry Policy also recognizes the importance of fulfilling the responsibilities and	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Bangladesh Forest Department	During construction and operation phase Power Grid shall comply with this policy

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commitments under International Conventions, Treaties and Protocols (ICTPs).		
Bangladesh Biodiversity Act, 2017 The Act is to ensure conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of benefits arising out of the utilization of genetic resources. This Act regulates the biodiversity conservation and sustainable use of its resources; biota and the fair and equitable share of the benefits derived from their use of and other matters. The Act focuses biodiversity and related activities undertaken and transfer restrictions, approved and rejected applications; functions of the National and Technical Committees on Biological Diversity; Biodiversity management teams, associations and sustainable uses.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Bangladesh Forest Department	Power Grid shall ensure the compliance of this Act if laying the transmission lines over/within the forests area.
National Biodiversity Strategy and Action Plan (NBSAP), 2016 – 2021 National Biodiversity Strategy and Action Plan is the basic instrument for implementing the Convention on Biological Diversity (CBD) at the national level. The plan has been prepared in order to fulfill the commitment of Bangladesh towards implementing the three objectives of Convention on Biological Diversity: conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of benefits arising out of the utilization of genetic resources. The first generation NBSAP developed in 2004 took into consideration of the issues of implementation of 2010 biodiversity targets. The updated NBSAP has been prepared in line with CBD strategic planning 2011-2020 (Aichi Biodiversity Targets), and implementation of 20 national targets, etc.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Department of Environment (DoE)	Power Grid shall ensure the compliance of this Act if laying the transmission lines over/within the forests area.
Protected Area Management Rules 2017 The rules aided by the Wildlife (Conservation and Security) Act, 2012 further stabilized the co-management approaches in the country whereby peoples' engagement and benefits are ensured. This rule guides how to manage PA and institutionalize all of the structure by involving the local government and local community. Guideline clearly delineate the roles and responsibilities, including managing ecosystem services, biodiversity conservation, project planning and budget, awareness raising activities of different committee and forum to manage and maintain the protected areas.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Bangladesh Forest Department	Power Grid shall ensure the compliance of these rules if laying the transmission lines within/over the protected area

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Intended Nationally Determined Contributions, 2015 UNFCCC INDC sets out a number of mitigation actions that will help limit the country's GHG emissions. The INDC of Bangladesh consists of the following elements: *Mitigation contribution:* • An unconditional contribution to reduce GHG emissions by 5% from Business as Usual (BAU) levels by 2030 in the power, transport and industry sectors, based on existing resources. • A conditional 15% reduction in GHG emissions from BAU levels by 2030 in the power, transport, and industry sectors, subject to appropriate international support in the form of finance, investment, technology development and transfer, and capacity building. • A number of further mitigation actions in other sectors which it intends to achieve subject to the provision of additional international resources. *Adaptation component:* • An outline of what Bangladesh has already done on adaptation and what the next steps are, including the long-term vision for adaptation in Bangladesh and synergies with mitigation measures. *INDC implementation:* • Proposals for governance and coordination of INDC implementation and an outline of key next steps. Support for INDC implementation: • A qualitative description of Bangladesh's support needs and an outline of plans to further quantify this, along with some examples of indicative costs of taking action on mitigation and adaptation.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh	Power Grid shall ensure the compliance of this Plan if laying the transmission lines.
Antiquities Act, 1968 and Antiquities Preservation Rules, 1986 These legislations govern 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	Ministry of Cultural Affairs	Not applicable as the study area does not have any likely cultural heritage or ancient monuments of national or international significance. However, in case, any such evidence of archaeological findings arises, the Project will act in consonance to the Act
National River Conservation Commission Act, 2013 An Act to establish a Commission for preventing illegal occupation of rivers, pollution of water and environment, pollution	Ministry of Shipping	Power Grid ensures the compliance of this act during crossing the transmission lines over the river and footing the towers on river bank.

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of rivers caused by industrial factories, illegal constructions and various irregularities and ensuring multidimensional use of rivers for socio-economic development including restoration of the normal flow of rivers, proper maintenance thereof and making them navigable.		
Embankment and Drainage Act, 1952 The Act consolidates the laws relating to embankments and drainage providing 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 or other damage by water. The specific Sections and Articles relevant to the RMIP are mentioned below. • Section 4 (1) of the Act states that the embankment, water-course, and tow-path, earth, pathways, gates, berms and hedges of the embankments shall vest in the Government of the Authority (BWDB). • Section 56 (1) states that, person will be subject to penalty (500 taka or imprisonment… if he erects, or causes of willfully permits to be erected, any new embankment, or any existing embankment, or obstructs of diverts, or causes or willfully permits to be obstructed or diverted, any water course. • Section 15 allows for the engineer (engineer in charge of Divisional level BWDB) for constructing new embankment or enlarging, lengthening, or repairing existing embankments. • The other sections of the Act give powers and access to the Government or Authority or Engineers to commence necessary Project activities, for land acquisition (through the Deputy Commissioner), and site clearing activities including removal of trees or houses (if necessary).	Ministry of Water Resources	Applicable due to site location. Power Grid ensures the compliance of this act during crossing the transmission lines over the river and footing the towers on river bank.
Municipal Ordinance 1979 and Act 1982 The "Municipal Ordinance 1979" in Bangladesh refers to the Conciliation of Disputes (Municipal Areas) Ordinance, 1979 (Ordinance No. V of 1979). This ordinance was enacted to establish a system for resolving disputes within municipal areas. It was later repealed by the Conciliation of Disputes (Municipal Areas) Act, 2004 (Act No. XII of 2004) Purpose: To provide a mechanism for settling disputes arising within municipal areas.	Ministry of Local Government, Rural Development & Co-operatives	Power Grid shall ensure the compliance with this ordinance if applicable.

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Establishment: It created a framework for dispute resolution within the context of municipal governance. Municipal Act 1982 outlines the corporation's legal status, powers, and responsibilities in governing the city. The ordinance was later repealed by the Local Government (City Corporation) Act, 2009.		
B. ENERGY RELATED		
National Power Policy, 1996 This policy aimed to ensure the sustainable development of the energy sector by focusing on exploration, production, distribution, and rational use of energy resources. It also sought to encourage both public and private sector participation in energy development and management. The 1996 National Energy Policy laid the foundation for the development of Bangladesh's energy sector. The policy was updated in 2004 to address the evolving global and domestic situation. In particular it sets out the following objectives: (i) To provide energy for sustainable economic growth so that the economic development activities of different sectors are not constrained due to shortage of energy. (ii) To ensure optimum development of all the indigenous energy sources. (iii) To meet the energy needs of different zones of the country and socio-economic groups. (iv) To ensure sustainable operation of the energy utilities (v) To ensure rational use of total energy sources. (vi) To ensure environmentally sound sustainable energy development program, with due importance to renewable energy, causing minimum damage to environment. (vii) To encourage public and private sector participation in the development and management of the energy sector. (viii) To integrate energy with rural development to boost rural economy. (ix) To bring entire country under electrification by the year 2020. (x) To ensure reliable supply of energy to the people at reasonable and affordable price. (xi) To develop a regional energy market for rational exchange of commercial energy to ensure energy security.	Ministry of Power, Energy and Mineral Resources	Power Grid shall ensure the compliance with this policy.
National Energy Policy, 2005 The National Energy Policy (NEP) of Bangladesh was formulated in 1996 to ensure proper exploration, production, distribution and	Ministry of Power, Energy and Mineral Resources	Power Grid shall ensure following issues under this policy: To provide energy for sustainable economic growth so that the

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rational use of energy resources to meet the growing energy demands of different zones, consuming sectors and consumers groups on a sustainable basis. With rapid change of global as well as domestic situation, the policy was updated in 2005.		economic development activities of different sectors are not constrained due to shortage of energy; To ensure sustainable operation of the energy utilities; To ensure rational use of total energy sources; To ensure environmentally sound sustainable energy development programmes, with due importance to renewable energy, causing minimum damage to environment, etc.
Bangladesh Energy Regulatory Commission (Electricity Grid Code) Regulations, 2019 It is a set of regulations governing the electricity transmission system in Bangladesh, aiming to ensure efficient and reliable power transmission. These regulations, made under the Bangladesh Energy Regulatory Commission Act 2003, outline the rules and procedures for various aspects of grid management, including grid code management, planning, connection, outages, and scheduling and dispatch.	Ministry of Power, Energy and Mineral Resources Bangladesh Energy Regulatory Commission (BERC)	Power Grid shall ensure the compliance of these regulations if laying the transmission lines.
The Electricity Act, 2018 An Act to repeal and re-enact the Electricity Act, 1910 with modification for developing and reforming the sectors of power generation, transmission, supply and distribution and for better service delivery to consumers and meeting the increasing demand for electricity. Subsection 12 of section 3, (1) If any damage, harm or inconvenience is caused while doing civil works under this Act, the licensee shall, in such manner as may be prescribed by rules, pay compensation to the person affected or the owner of the land affected for acquiring land for construction of electricity towers. (2) If any dispute arises from the amount payable as compensation under sub-section (1), the provisions of the Commission Act shall apply to settle such dispute. Subsection 27 of section 5, No licensee shall harm or obstruct or interfere with railways, highways, airports, waterways, canals, docks, wharves and jetties and pipes, during power generation, transmission, supply or distribution; and shall, in co-ordination with the concerned authority, take measures for protection and safety of the same. Subsection 28 of section 5, The licensee shall take all logical precautions during construction of power supply lines and doing civil works so as not to have any harmful effect on the communication system of telegraph,	Ministry of Power, Energy and Mineral Resources	Power Grid shall ensure to take necessary and relevant permission before the commencement of construction work from applicable authorities according this act.

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telephone or electromagnetic signal emitting lines by way of induction or any other means.		
Power System Master Plan, 2010 Power System Master Plan is formulated for the attainment of stable power supply by achieving the 3Es—Economic Growth, Energy Security and Environmental Protection simultaneously. The Government of Bangladesh set the target of reducing poverty in a shortest period of time for achieving high economic growth. Planning electrification via the stabilization and efficiency of the electric power supply system can be expected to reduce poverty. This Master Plan aims to promote development that will provide a self-reinforcing cycle of poverty reduction and 3E simultaneous achievement. In addition, this Master Plan proposed the vision in line with Government energy policy, and stipulates 6 value-up plans to achieve the vision.	Ministry of Power, Energy and Mineral Resources	Power Grid shall ensure following issues under this policy: To realize a low carbon society by introducing a highly efficient power supply and low CO_2 emission technology.
Integrated Energy and Power Master Plan (IEPMP) 2023 The IEPMP focuses on a "3E plus S" concept: Energy Security, Economic Efficiency, and Environment, plus Safety. • Clean Energy Transition: It aims for a "clean energy" target of 40% of total installed capacity by 2041. • Decarbonization Pathways: The plan outlines three main scenarios for the power mix: - Reference Scenario (REF): Continues reliance on coal, oil, and gas. - Advanced Technology Scenario (ATS): Introduces advanced technologies like hydrogen and ammonia co-firing. - Net-Zero Scenario (NZS): Targets a carbon-neutral energy system by 2050 using hydrogen, nuclear, and carbon capture and storage (CCS). Key Components of the Energy Mix: • Renewable Energy: The plan projects that solar and wind will contribute significantly in advanced scenarios, with potential for 9,500 MW of solar and 7,575 MW of wind by 2041. • Advanced Technologies: It emphasizes ammonia co-firing in coal plants (starting as early as 2035) and hydrogen co-firing in gas plants (starting in 2037). • Nuclear Power: Expansion of nuclear capacity is a central pillar for stable, low-carbon baseload power.	Ministry of Power, Energy and Mineral Resources	Power Grid shall ensure following issues under this policy: Proposed 765kV project is crucial infrastructure supporting the Integrated Energy and Power Master Plan (IEPMP) 2023's goal of a low-carbon energy future, enabling large-scale renewable integration (solar/wind) and efficient transmission of bulk power, especially from large plants and import points, by modernizing the grid, reducing congestion, and ensuring energy security towards achieving decarbonization targets by 2050, aligning grid capacity with future demand and clean energy sources.

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• Fossil Fuel Role: Natural gas (and LNG) remains a preferred "transition fuel," with gas-fired power plants expected to integrate CCS technology after 2037.		
C. HEALTH AND SAFETY RELATED		
Fire Prevention and Extinction Rules, 1961; Fire Prevention and Extinction Act, 2003 and Rules, 2014 The Fire Prevention and Extinction Act 2003 is supplemented by the Fire Prevention and Extinction Rules 2014 which enumerates that owner of the building shall have to apply for occupancy certificate of the building at the end of the construction (Rule 22). These enable the authority to inspect the building, to examine whether the owner met all the requirements of the building code for the public safety or not.	Bangladesh Fire Service and Civil Defense	Power Grid should ensure the compliance with the rules for the construction of transmission lines.
Fatal Accidents Act, 1855 This Act was promulgated to provide compensation to families for loss occasioned by the death of a person caused by actionable wrong. The company will be liable to pay compensation in case of death of any worker/employee or damages in case death has not ensued but such circumstances could have resulted in death.	Ministry of Labor and Employment	Power Grid shall ensure compliance to the Rules.
Bangladesh Labour Act, 2006 (*as amended through July 22, 2013 and November 2018*) **Bangladesh Labor Rules, 2015** The provisions prescribed under chapters pertaining to occupational health and safety, and compensations due to accidents are entailed below. *Chapter V: Health and Hygiene* The chapter deals with provisions regarding cleanliness of the any facility, drinking water supply, ventilation, lighting, dust bean and spittoons, etc. *Chapter VI: Safety* This chapter addresses the issues regarding safety of building and machinery, precautions in case of fire, fencing of machinery, works on or near machinery in motion, hoists and lifts protection of eyes, explosive or inflammable dust/gas, etc. *Chapter VII: Special Provisions related to Health, Hygiene and Safety* This chapter deals with provisions to be taken in case of hazardous operations, notice to be given in accidents, notice of certain dangerous occurrences and diseases etc. *Chapter VIII: Welfare* This chapter prescribes the provisions to be facilitated in the facility regarding first-aid	Ministry of Labor and Employment	Power Grid shall ensure compliance to the Bangladesh Labour Act, 2006 (as amended through July 22, 2013 and November 2018) Bangladesh Labor Rules, 2015 Power Grid shall also ensure that all conditions provided in chapters V, VI, VII and VIII of the Act, pertaining to Health, hygiene safety and welfare are met in accordance with the amended act. During the construction and operation phases of the proposed Project, Power Grid shall ensure the facilitation of the following provisions: • Management of workers under service rules as approved by the Chief Inspector. • Provision of Letter of Appointment and ID card (with photograph) for each and every worker. • Maintenance of Service Book with the requisite details. • Retrenchment Policy and conditions of re-employment of

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appliances, safety record books, washing facilities, canteens, shelters, rooms for children, etc. This Act consolidates and amends the laws relating to employment of labor, relations between workers and employers, determination of minimum wages, payment of wages and compensation for injuries to workers, formation of trade unions, raising and settlement of industrial disputes, health, safety, welfare and working conditions of workers, apprenticeship and matters connected therewith. The provisions prescribed under chapters pertaining to labour benefits and entitlements are as follows: • Conditions of Service and Employment • Employment of Adolescent • Maternity Benefit • Working Hours and Leave • Wages and Payment • Workmen's Compensation for Injury by Accidents • Trade Unions and Industrial Relations		retrenched workers, termination of employment etc. • Provisions regarding gratuity, provident fund and other payments at the time of retirement of workers. • Any adolescent employed in any dangerous operation shall be in possession of Certificate of Fitness issued by a registered medical practitioner. • Maternity benefits shall be paid as stipulated in the Act. • Cleanliness of the facility through washing, painting and varnishing etc. for ensuring hygiene. • Ventilation and removal dusts and fumes through adequate number of exhaust systems. • Adequate number of drinking water facilities equipped with cooling systems at convenient places in the unit. Al such places shall be legibly marked 'Drinking water' in Bangla. • Separate and adequate number of latrines and urinals for men and women. They shall be maintained in a clean and sanitary condition at all times with suitable detergents and disinfectants. • Leave Policy stating the working hours and the number of leaves the workers are entitled to under the provisions of the Act. • Compensation/wages shall be stated in the Letter of Appointment given to the workers/employees. • Power Grid shall ensure that there is no policy restricting the association of workers'/trade unions. • Workmen's Compensation Policy stating the compensation to be meted out in case of injury due to accidents. • Safety of workers engaged in loading and unloading of industries as per prescribed provisions.

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Labor Relations under Labor Laws, 1996 General concerns during the project implementation state that the project manager must recognize labor unions.	Ministry of Labor and Employment	Power Grid shall comply with these laws during construction and operation phases of the project
Public Health (Emergency Provisions) Ordinance, 1994 Calls for special provisions regarding public health. In case of emergency, it is necessary to make special provisions for preventing the spread of disease, safeguarding the public health, and providing adequate medical service, and other services essential to the health of respective communities and workers during construction-related work.	Department of Public Health Engineering	Power Grid shall comply with these laws during construction and operation phases of the project
The Vehicle Act, 1927 • As per section 4 of this act, no owner or person in charge of a vehicle shall allow any person under the age of eighteen years to drive the same in any public place. • As per section 7, no person shall drive a vehicle in a public place unless he is licensed in the prescribed manner. • Every vehicle must possess a valid registration certificate as per section 11 of this act.	Bangladesh Road Transport Authority (BRTA)	Power Grid shall ensure that every vehicle possess a certification of registration as required under this act.
The Motor Vehicle Ordinance Act, 1983 (*as modified on November, 1990*) • As per section 3 of the ordinance, no person shall drive a motor vehicle in any public place unless he holds an effective driving license. • No person under the age of eighteen years shall drive a motor vehicle in any public place.	Bangladesh Road Transport Authority (BRTA)	Power Grid shall ensure that no person shall drive a motor vehicle in any public place unless he holds an effective driving license issued to himself authorizing him to drive the vehicle.
D. SOCIAL RELATED		
Electricity Rules, 2020 and amended 2022 Electricity Rules has been published by ministry on November 2020 based on Clause 59 of Electricity Act 2018 (SRO 297 of Act/2020). The main observation is to provide compensation for the installation of transmission line towers to the land owners as per the applicable laws and policy. Key explanation of the rules is: **(a) Previous Rules:** Prior to the 2020/2022 amendments, there were no specific provisions for compensating individuals for land occupied by transmission line towers or their footings, according to a document from Power Grid. **(b) New Provisions:** The Electricity Rules 2020 (amended in 2022) specifically address this issue. Rule 10, By-law	Ministry of Power, Energy and Mineral Resources	Power Grid shall ensure to provide the compensation to project affected persons (PAPs) according the rules.

Summary of Applicable legislation/ Policy	Responsible Agency	Applicable Permit and Requirements
4, now requires compensation for land occupied by tower footings. **(c) Implementation:** Power Grid is working on compensating landowners for tower footing land based on these new rules. **(d) Assessment and Consultation:** Power Grid is verifying the number of tower footings, the extent of impact on landholders, and conducting stakeholder consultations to determine compensation amounts. **(e) Compensation Basis:** The compensation is based on the project design, the Resettlement Action Plan (RAP) census, and assessment of crop damage. **(f) Independent Mechanism:** In some cases, such as for electricity and gas transmission, an independent mechanism may be established to determine compensation claims. This mechanism ensures fairness and accessibility in determining compensation amounts.		
The Acquisition and Requisition of Immovable Property Act 2017 The ordinance consolidates and amends the laws relating to acquisition and requisition of immovable property by the government. It lays down the procedures and conditions for acquisition of land and other immovable properties such as common property resources (wells, places of worship, burial grounds, etc.).	Ministry of Land, Bangladesh	The land for the construction of towers need land as per Electricity Rules 2022 and hence a resettlement action plan (RAP) has been prepared. There is no structure on the land proposed towers.
The State Acquisition and Tenancy Act, 1950 The East Bengal State Acquisition and Tenancy Act of 1950 was a landmark law in Bangladesh (formerly East Bengal) that aimed to abolish the zamindari system and redistribute land ownership. It allowed the state to acquire the interests of rent-receivers and establish a new system of land tenancy under state ownership.	Ministry of Land, Bangladesh	Power Grid shall ensure the compliance with provisions of this ordinance relating to compensation if applicable.
Grievance Redress System Guidelines 2015 (revised 2018) The Grievance Redress System (GRS) Guidelines 2015, published by the Cabinet Division of the Government of Bangladesh, outlines procedures for addressing public grievances against government services. These guidelines were revised in 2018. They emphasize both online and manual systems to ensure accessibility for all citizens. Key Features of the Guidelines are: (a) Accessibility:	Cabinet Division, Government of Bangladesh	**Purpose and Goals:** (1) Reduce Corruption: *Digitization of the GRS is intended to reduce opportunities for corruption by making the process more transparent and accountable.* (2) Improve Service Delivery: *By addressing public grievances, the GRS aims to improve the quality and responsiveness of government services.* (3) Promote Citizen Participation:

Summary of Applicable legislation/ Policy	Responsible Agency	Applicable Permit and Requirements
The guidelines stress the need for both digital and manual systems to cater to citizens with varying levels of access to technology and digital literacy. (b) Institutionalization: The GRS aims to be integrated into government structures, with focal point officers nominated in various ministries and divisions. (c) Online Platform: The Cabinet Division has established an online GRS platform (www.grs.gov.bd) to handle complaints efficiently. (d) Coordination: The guidelines emphasize synchronizing grievance redress systems across different NGOs and government bodies to ensure uniformity. (e) Review and Improvement: The guidelines include provisions for reviewing existing GRS systems and making improvements, including merging online platforms. In essence, the Grievance Redress System Guidelines 2015 provide a framework for the Government of Bangladesh to address public grievances, promote transparency, and improve service delivery through a combination of digital and manual systems.		*The system encourages citizens to voice their concerns and participate in improving public services.* (4) Awareness and Capacity: *A lack of public awareness and capacity among service providers can hinder the effectiveness of the GRS.* (5) Institutional Capacity: *The guidelines highlight the need for capacity development of service providers and establishing a dedicated GRS authority within the Cabinet Division.* However, Power Grid would comply with this guideline if suitable and satisfactory to the affected landowners.
Chattogram Hill Tracts (Land Acquisition) Regulation (Amendment) Act, 2019 The below sub-section will be applicable in place of sub-section (2) of section-4 under Chattogram Hill Tracts (Land Acquisition) Regulation, 1958 (Regulation No.1 of 1958). (2) In addition to the market value of the land, as provided above, the Deputy Commissioner shall, in every case, award a sum of 200 (two hundred) per centum for public purpose and 300 (three hundred) per centum for private purpose on such market value, in consideration of the compulsory nature of the acquisition. In addition, Chattogram Hill Tracts (Land Acquisition) Regulation (Amendment) Ordinance, 2018 has been ban according to this amendment.	Ministry of Land, Bangladesh	There is no indigenous or ethnic community at or near the study area. However, Power Grid should ensure the compliance with provisions of the act if applicable.
National Women Development Policy (NWDP) 2011 It aims to create a society where men and women have equal opportunities and rights across all aspects of life. It seeks to eliminate discrimination and violence against women and promote their full participation in the	Ministry of Women and Children Affairs (MoWCA)	It provides distinct guidelines on prevention of child marriage, removal of discrimination against disabled girls and their protection, secured and standard recreational, cultural and sports facility for the female child, and removal of mental and physical abuse

Summary of Applicable legislation/ Policy	Responsible Agency	Applicable Permit and Requirements
social, economic, political, and cultural spheres.		of women, rape, dowry, family abuse and acid throwing. However, Power Grid shall ensure to comply with this policy
The Highways Act, 1925 (amended 2001) As per section 8 of the act, no person, without written permission form the Department, shall- (a) take possession or use any part of the slope, Berm, borrow pit of any highway. (b) construct or change any structure, dig of fill earth or cultivate or plant or undertake any works on or under any part of a highway or within ten meters of the highway. (c) deposit of place goods or materials on a highway.	Roads and Highway Department (RHD)	Power Grid shall ensure to take permission for crossing transmission lines over the highways.
The Civil Aviation Authority Ordinance, 1985 As per section 11 of the ordinance, only Civil Aviation Authority have control over: • All the civil airports and aerodromes in Bangladesh including their planning, construction, operation and maintenance; • All air routes in Bangladesh; Air space management of civil airports and aerodromes.	Civil Aviation Authority, Bangladesh (CAAB)	The height of the tower may require clearance from CAAB. Power Grid shall ensure compliance with rules made under this ordinance if necessary.
National Land-Use Policy, 2001 The Government of Bangladesh has adopted National Land Use Policy, 2001. The silent features of the policy objectives relevant to the proposed are as follows: • To prevent the current tendency of gradual and consistent decrease of cultivable land for the production of food to meet the demand of expanding population; • To ensure that land use is in harmony with natural environment; • To use land resources in the vest possible way and to play supplementary role in controlling the consistent increase in the number of landless people toward the elimination of poverty and the increase of employment; • To protect natural forest areas, prevent river erosion and destruction of hills; • To prevent land pollution; and • To ensure the minimal use of land for construction of both government and non-government buildings.	Ministry of Land, Bangladesh	The proposed transmission lines would be constructed mostly on the agricultural land; and then salt cultivation land, hill, forests, etc. However, the land will be used in manner that the existing national land use policy is adhered.

Summary of Applicable legislation/ Policy	Responsible Agency	Applicable Permit and Requirements
National Child Labor Elimination Policy, 2010 The National Child Labor Elimination Policy 2010 has been adopted to provide a framework towards eradicating all forms of child labor by 2015. The policy defines and lays guidelines for underage workers, regulation of their working hours, wages, nutrition needs, mental health, education and overall work environment. As per the policy, a child is a person under the age of 14. A person between the ages of 14 and 18 is an adolescent, and should be granted special amendments, if compelled to work due to poor economic status. The policy also entails that a child may not be employed as a regular employee, not be made to work in hazardous settings, provided breaks more frequent than those for regular employees and have enough time left for study.	Ministry of Labor and Employment Ministry of Women and Child Welfare	During all stages concerning employment of labor, Power Grid should take the policy as a guidance document for following ethical practices at workplace, in dealing with adolescent workers, if at all.
Children's Act, 2013 (Act No. 24 of 2013) The Act implements the Nation's ratification to the UN Convention on the Rights of the Child (CRC), and replaces The Children's Act of 1974. The main components of the act are as follows: • The Act changes the legal definition of a child from being a person under the age of 14 to one under the age of 18. • It enforces the national authorities to establish Child Welfare Boards in each District, besides one at the national level. • It criminalizes any kind of cruelty inflicted on children while they are working in both the formal and informal sectors. • The Act further prescribes stricter punishments for using or exploiting children in begging, in brothels, and in carrying drugs, arms, or other illegal commodities.	Ministry of Law, Justice and Parliamentary Affairs. District Commissioner's Office.	Power Grid will ensure that at through all stages of construction and operation, no juvenile (children between ages 14 and 18) is engaged on site.

The key permits required to be obtained by Power Grid for the construction and operations of the proposed project are set out in Table 10.

Table 10: Key Permits Required for the Project

SN	Type of Permits	Permitting Authority	Relevant Legislation	Role of Permit	Permission Schedule
1.	**Environmental Clearance Certificate (ECC)**	Director General, DOE	Environment Conservation Rules, 2023	Authorization to operate the project facilities with limited environmental effects of development and operation of the proposed project.	Prior to Operation Work
2.	**No Objection Certificates (NOC) from Union Parishad**	Union Parishad/Upazila/ DC office	Environment Conservation Rules, 2023	A consent in form of NOC from respective Union Parishad/s	Prior to Construction Work
3.	**No Objection Certificate (NOC) from Railway**	Ministry of Railways	The Electricity Act 2018 Electricity Rules, 2022	Apply for NOC for crossing the transmission lines over the railway	Prior to Construction Work
4.	**No Objection Certificate (NOC) from Forest Department**	Bangladesh Forest Department	The Forest Act (1927) (Amendment, 2000)	Apply for NOC for felling the trees due to crossing the transmission lines within the forest	Prior to Construction Work
5.	**No Objection Certificate (NOC) from CPA**	Chittagong Port Authority (CPA)	Chittagong Port Authority Act, 2022. (Previously, Chittagong Port Authority Ordinance, 1976)	Apply for NOC for crossing Karnaphuli River	Prior to Construction Work
6.	**No Objection Certificate (NOC) from BWDB**	Bangladesh Water Development Board (BWDB)	Bangladesh Water Act, 2013. National River Conservation Commission Act, 2013 (as amended)	Apply for NOC for crossing Sangu and Matamuhuri River	Prior to Construction Work

2.4 Administrative Procedures for Obtaining Location/Environmental Clearance

The Bangladesh Environment Conservation Act was passed in 1995 to reduce environmental pollution in Bangladesh in order to promote environmental protection, raise environmental standards, and exercise control. This Act has undergone numerous amendments. To determine the requirements for air, water, sound, soil, and other environmental components, the government has passed the Environment Conservation Rules, 1997, in accordance with section 20 of the BECA, 1995. The Regulations have widely defined criteria for disposing of waste from different categories of industry regarding the management of toxic and hazardous substances.

In accordance with section 20 of The Bangladesh Environment Conservation of Act No. 1 of 1995, the Government in March, 2023 passed the Bangladesh Environment Conservation Rules, 2023. This Article discussed various important provision of the Regulation.

Rule -3 Application and Remedies for Environmental Pollution or Degradation Damages Remedies
Sub-section (1) of Section 8 of the Act requires the Director-General to dispose of an application within 30 working days by means of public hearing. The Director General may extend the application period by 15 working days, if necessary, by stating the reason.

Rule-4 Notice for Collection of Samples
According to the provisions of Section 11 of the Act, if an officer authorized by the Director General wants to take samples of air, water, soil or other substances for the purpose of analysis, the owner, occupier or agent of the factory, premises or place concerned shall give a notice in accordance with Form-2.

Rule 5 Classification of Industrial Institutions and Projects for the purpose of issuing Environmental and Location Clearance Certificate

Industrial projects and units must be classified based on their activities, pollution, and potential harm to the environment and health. The categories are described below.

Table 11: Categorization of the project as per ECR 2023

Sl	Category	Justification
1.	Green	The industry and projects that low impact on the environment and human health and have opportunities to adopt pollution mitigation measures.
2.	Yellow	The industry and projects that moderate impact on the environment and human health, which need to take all the adoption and mitigation measures.
3.	Orange	The industry and projects that have significant impacts on the environment and human health, which need to be avoided for environmental protection and reduced by mitigation measures.
4.	Red	Red category refers to those industries and projects that have severe impact on the environment and human health, which need to be avoided and mitigated to an appropriate extent to protect the environment.

6. Obligation to obtain Location Clearance and Environmental Clearance Certificate

Before instituting new yellow, orange and red industries mentioned in Rule 5 and taking up the project, first the location clearance and then the Environmental Clearance Certificate should be obtained from the Director.

(a) For green categories industrial unit Environmental Clearance Certificate must be obtained from the director.

(b) In the case of all categories of industrial unit or projects set up in government or private export processing zones, economic zones or industrial cities of Bangladesh Small and Cottage Industries Corporation, it is not necessary to take location clearance certificate, only Environmental Clearance Certificate should be taken from the Director.
(c) Without taking Location Clearance Certificate no development of land or construction of any infrastructure for this purpose shall be allowed for the establishment of an industrial unit of the yellow, orange and red categories.
(d) Gas, electricity, water, or other essential services cannot be provided to new industries, institutions or projects of yellow, orange and red categories without obtaining Location Clearance Certificate.
(e) New industrial Units of green, yellow and red categories will not be allowed to conduct trial production or launch projects without obtaining Environmental Clearance Certificate.

7. Application procedure for Location clearance and Environmental Clearance Certificate

Application should be submitted to the district office, if there is no district office the application should be submitted to the office or departmental office without jurisdiction. In metropolitan area an application should be submitted to metropolitan office. Application must be submitted to district office if there is no separate office for metropolitan area. Application should be submitted to regional office or divisional office if multiple districts under the same division. If the same category is widespread, the application should be submitted to the head office of the department.

Procedure for issuance of Environmental Clearance and Location Clearance Certificate

9. Procedure for issuance of environmental clearance certificate to green class industrial units and projects- green categories industrial units or project entrepreneurs should fill in the applicable sections as per Form 3 schedule 7 for obtaining environmental clearance certificate. Rule 10 and 11 Procedure to provide projects and industrial units in the yellow category with location clearance certificates as per Form 3 schedule 6. After obtaining the location clearance certificate, yellow class related industrial units or project entrepreneurs should apply for environmental clearance certificate. Rule 12 and 13 for granting Location Clearance Certificate to orange category industrial units and projects- The project entrepreneurs and industrial unit should fill in the applicable sections as per Form 3 schedule 6 and guideline of schedule-9 shall be followed. Within 21 (twenty-one) working days of the application submission, the applicant should receive the Location Clearance Certificate. Provided that if the application is rejected, the concerned applicant shall be notified in writing and the reasons for it within 5 (five) working days of the decision. For granting Environmental clearance certificate to orange category industrial units and projects. The project entrepreneurs and industrial units according to Rule-7 should apply to the concerned office of the director.

Within 20 (twenty-one) working days of the application's submission, the applicant should receive the Environmental Clearance Certificate. Provided that if the application is rejected, the concerned applicant shall be notified in writing and the reasons for it within 5 (five) working days of the decision. Rule14 Procedure for granting location clearance certificate to red category industrial units and projects should fill the Form 3 schedule 6 and guideline of schedule-9 shall be followed. Provided, however, that any additional information or documents required may be provided to the applicant for submission within a maximum of 7 (seven) working days. Also provided that, if the application is rejected, the concerned applicant shall be notified in writing and the reasons for it within maximum 7 (seven) working days of the decision.

20. Validity period of Location Clearance and Environmental Clearance Certificate- The period of Environmental Clearance Certificate for green category industrial units or projects shall be 5 (five) years from the date of issue which shall be renewable at 5 (five) year intervals. Yellow Category industrial unit or project Location Clearance Certificate or Environmental Clearance Certificate shall be valid for 2 (two) years from the date of issue which shall be renewable at 2 (two) year intervals.

Orange and red Category Industrial units or Project Location Clearance or Environmental Clearance Certificate shall be valid for 1 (one) year from the date of issue which shall be renewable at 1 (one) year intervals. According to Rule-21 and 22 all categories of industrial unit or projects will expire after 30 (thirty) days. For renewal, the concerned industrial unit or project entrepreneurs should apply to the relevant office according to rule 7 by filling Form-4 and paying the fee mentioned in Schedule-7 for renewal of the location clearance certificate and form-5 schedule-7 for renewal of Environmental Clearance Certificate to the concerned industrial unit or project entrepreneur.

Appeal, Appellate Authority and Procedure

27. Appeal: Within 30 days of the day the notice, order, or direction was given, anyone who is dissatisfied they have been aggrieved by one of these issues has the right to file an appeal with the government-established Appellate Authority. Provided that no such appeal can be filed by any industrial unit or project entrepreneur who has not applied for Environmental Clearance Certificate.

28. Appellate Authority: For the purposes of the Act and Rules, an Appellate Authority shall be comprised of the following members:

(a) He will serve as Chairman and Secretary for the Ministry of Environment and Forests, and Environmental Issues.
(b) Additional Secretary (Environmental Pollution Control), Ministry of Environment Forest and Climate Change
(c) The Joint Secretary (Environment-II), Ministry of Forests and Climate Change, who will also be the Member Secretary.

29. Procedure to be followed by the Appellate authority

(a) The Appellate Authority shall fix the date for hearing the appeal and give notice to all parties concerned.
(b) The Appellate Authority shall order both the parties to file reports on the relevant issues for the benefit of the appeal hearing.
(c) The Appellate Authority may decide on an appeal application after acquiring all relevant information, including a written description of any essential documents provided with the application and, if required, oral testimony.
(d) The relevant notification may cancel, modify, or amend the decision made by the order or instruction within 90 (ninety) working days of filing an appeal in the hearing process and may provide an appropriate decision in the review.

30. Procedure for hearing the appeal

(a) If the appellant does not appear on the fixed hearing day, the Appellate Authority may dismiss the appeal. With the proviso that the Appellate Authority may extend the hearing date in view of the appellant's request.
(b) If an appeal application is rejected, an application for execution may be submitted to the appellate authority within 21 (twenty-one) working days after the day of the aforementioned order of rejection was issued.
(c) The Appellate Authority shall issue an order in writing signed by the majority of the members and shall send it to the Director General of the concerned office.
(d) The Location Clearance or Environmental Clearance Certificate approved in favor of the concerned industrial unit or project shall be granted and renewed until the appeal is settled.

Services, fees, and mode of payment

34. Various services and their fees Upon application of any person, industrial unit or project entrepreneurs or organization, the department shall supply analysis report of the samples of water, liquid waste, air and sound and also the information or data derived from such analysis. For services-appropriate fees are payable as described in Schedule -8.

35. Procedure for payment of fees: The fees prescribed under these rules shall be deposited in the government treasury by treasury challan, bank draft, pay order, or other electronic means and proof of payment of the fee shall be preserved by the depositor.

36. Environmental damage remedy and compensation - Under clause-7 of the Act, activities of responsible persons, industrial unit or projects may be suspended till the pollution is not controlled. In case of failure to pay compensation, the Location Clearance Certificate issued in favor of the concerned individual industrial unit or project shall not be suspended or renewed.

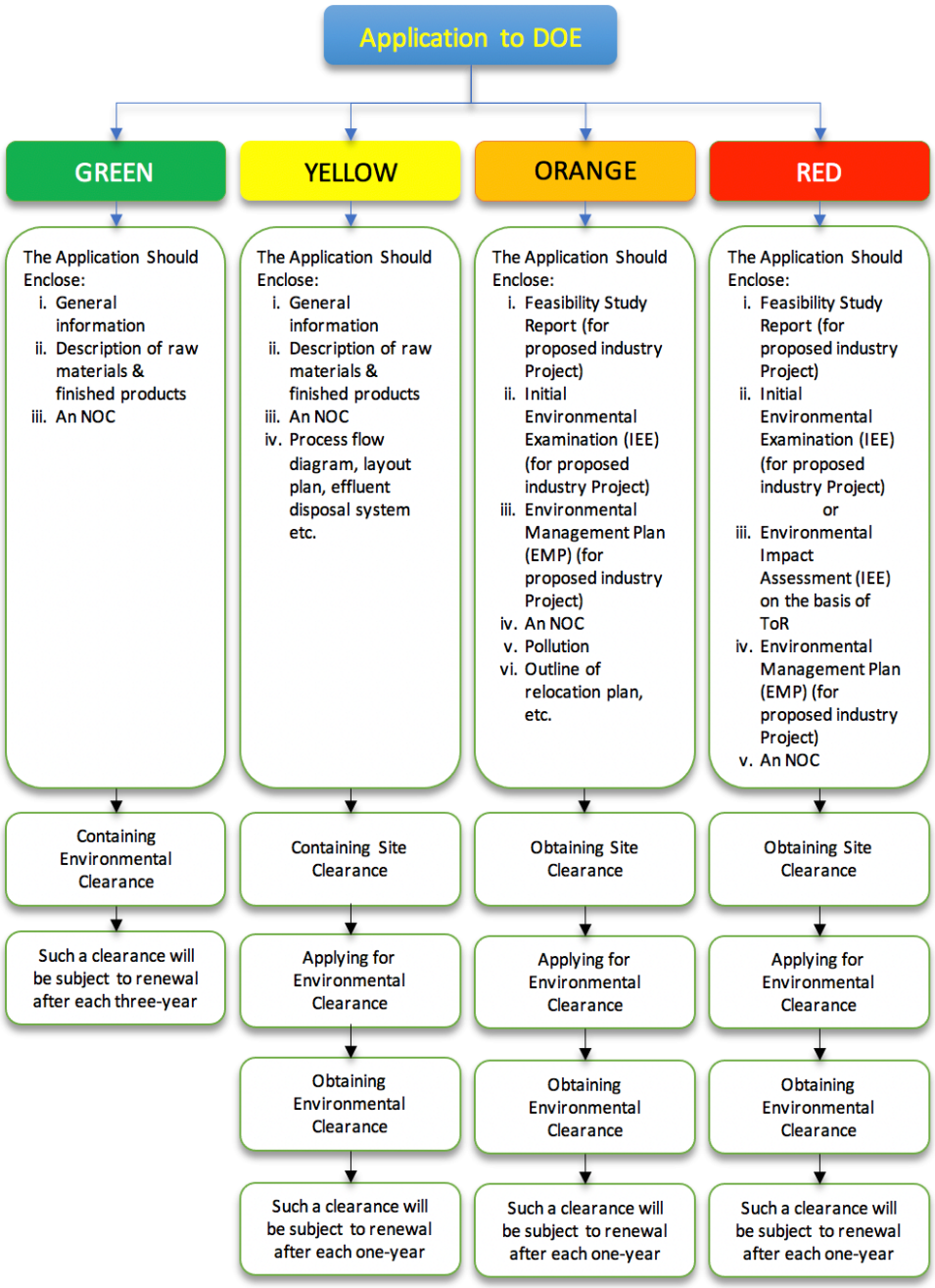


Figure 3: DoE Environmental Clearance Applicability and Procedure

2.5 EDCF Safeguard Policy

Korea Eximbank acting as the Economic Development Cooperation Fund (EDCF) operation agency, has prepared a Safeguard Policy in 2016, corresponding to the environmental and social sustainability. As of July 1, 2020, Korea Eximbank updated the current EDCF Safeguard Policy for addressing environmental and social issues in project design, implementation and operation. Korea Eximbank's approach to sustainability in two ways. First, Korea Eximbank helps borrowers manage environmental and social risks and we deliver solutions to that enable them to adopt and implement international best practices.

Korea Exim Bank is committed to ensuring the environmental and social sustainability of Economic Development Cooperation Fund (EDCF) funded projects. The objectives of the EDCF Safeguard Policy 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
- help the borrowers to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

2.5.1 EDCF Environmental Impact Analysis Categorization

Korea Exim Bank conducts its project screening to determine the type and scope of ESIA and IESE based on the information provided by the borrower at the initial stage of the project preparation. Korea Exim Bank classifies projects into one of four categories in accordance with the type, location, sensitivity, scale and potential project impacts, as well as the size and nature of the risks of the project. However, this project is assessed as "Category B+" according to the classification of EDCF environmental and social impact analysis risk.

Table 12: Environmental Impact Analysis Categorization

Category	Justification
Category A (High Risk)	• A proposed project is classified as category A if it is likely to have significant adverse environmental and social impacts and high risks that are irreversible, diverse, or unprecedented. • These impacts may affect an area larger than the sites or facilities. Category A, in principle, includes projects in sensitive sectors or located in or near sensitive areas such as those composed of large-scale dam construction which involves a large number of involuntary resettlement, biodegradable risks, and/or negative impacts and risks to indigenous peoples. • PEA will be required to conduct full-scale ESIA (draft or final) and KEXIM ensures ESIA execution by the PEA.
Category B+ (Substantial Risk)	• A proposed project is classified as category B+ if it is likely to have substantial adverse environmental and social impacts and risks that are less adverse than those of category A projects. • These impacts and risks can be managed and predicted in a manner consistent with the EDCF Safeguard Policy. • ESIA (draft, final, framework, strategy, plan, and/or environmental impact assessment) is required.
Category B (Moderate Risk)	• A proposed project is classified as category B if its potential adverse environmental and social impacts are less adverse than those of category B+ projects. • These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be

Category	Justification
	designed more readily than for category B+ projects. KEXIM ensures execution of IESE by the PEA. • IESE (draft, final, framework, strategy, plan, and/or environmental impact assessment) is required.
Category C (Low Risk)	• A project which it is likely to have minimal or no adverse environmental and social impacts. • ESIA and IESE are not required

2.5.2 EDCF Safeguard Policy Requirements

EDCF Safeguard Policy requires the Borrower make and execute the management plan and the monitoring plan for the environmental social impact of each stage about the below 3 stages;

- Pre-construction Stage

(a) Ambient air quality impact: The impact caused by vehicles which visit the construction site to investigate the substation and TL corridor
(b) Noise impact: The noise caused by vehicle moving
(c) Soil impact: The impact caused by the preparation work for access road paving
(d) Water quality impact: The water quality impact caused by the erosion in substation proposed site and TL corridor during pre-construction stage
(e) Ecology impact: The impact to forest in substation proposed site and TL corridor during pre-construction stage

- Construction Stage

(a) Ambient air quality impact: The impact caused by the exhaust emission from vehicles which move the equipment and the materials during the construction of the substation and TL
(b) Noise impact: The impact caused by the noise of vehicles which move the equipment and the materials during the construction of the substation and TL
(c) Soil impact: The soil contamination caused by soil compression and the oil leakage by vehicle moving
(d) Water quality impact: The impact caused by the drain and soil erosion for TL foundation work
(e) Ecology impact: The impact to ecology caused by the noise, dust, light, etc. during construction

- Post Construction Stage

(a) Electromagnetic impact: The impact caused by the electromagnetic field which generate in low frequency band of substation and TL
(b) Noise impact: The impact caused by the corona noise which generate in substation and TL

2.5.3 Applicability for Environmental and Social Impacts Evaluation

The below evaluation table is the result of evaluation about the environmental and social impacts by F/S team.

Table 13: Considerations for Environmental and Social Impacts Evaluation

Sl	Questions	Yes	No	Unsure	Remarks
1.	This project is assessed as "Category B+" according to the classification of EDCF environmental and social impact analysis risk.	√			

Sl	Questions	Yes	No	Unsure	Remarks
2.	Are there any landmarks that are aesthetically valuable within or close to the project's area of influence?		√		
3.	Is the project in or within an area that is culturally and historically valuable?		√		
4.	Will the project occupy or transform important areas where environmental considerations should be taken into account?		√		
5.	Will the project require large quantities of resources such as water and energy during its construction and operation?		√		
6.	Will the project's demands exceed existing infrastructure capacities, such as the water supply and sewage system or the transportation infrastructure?		√		The drain pipes with PVC, RCC and the washroom repair tools are provided as temporary sanitation facility. The existing water resource will be used and tubular well will be used if required.
7.	Is the project likely to generate a large volume of waste, particularly hazardous or toxic materials?		√		The metal waste or plastic waste can be produced during construction
8.	Will the project generate a large volume of wastewater or air pollutants?		√		The heavy vehicle for construction materials can cause particle pollution when driving on unpaved road.
9.	Will the project have an adverse impact on bodies of water or riparian areas?		√		The ground surface can be damaged by TL tower erection and close water turbidity can be increased and this gives adverse impact to inhabited fishes.
10.	Is the project located in an area such that it will have a significant impact on surface water and groundwater (water quantity and quality)?		√		The impact will be 'insignificant' as per impact evaluation before mitigation action.
11.	Will the project need accommodation or convenience facilities during its construction or operation?		√		-
12.	Will the project need large amounts of chemical materials such as fertilizers and pesticides?		√		-
13.	Will the project introduce exotic species?		√		
14.	Will the project cause large population inflows or outflows and related economic activities?	√			The large manpower is required and the inhabitants will be allocated as per their function and the local family budget or finance will be increased.

Sl	Questions	Yes	No	Unsure	Remarks
15.	Will the project produce a habitat for vectors?	√			The local manpower will be in flowed and the AIDS or HIV can be spread. The impact will be 'insignificant' as per impact evaluation before mitigation action
16.	Will the project be located in a densely populated area and will it cause air pollution, noise, vibration, or foul odors?	√			The pollution in construction site and closed inhabitants' area and pedestrians street can be occurred by various vehicles moving and construction machine running. The impact will be 'insignificant' as per impact evaluation before mitigation action.
17.	Will the project need the involuntary resettlement or compensation?	√			The TL traverse the densely populated area, so the involuntary resettlement and compensation are required.
18.	Considering the characteristics of the project site and project operation, will there be significant soil erosion or degradation?	√			The surface soil and nourishment can be eroded by the excavation for TL tower erection. The impact will be 'insignificant' as per impact evaluation before mitigation action.

- Counselling and participation
  - The Exim bank of Korea considers the participation of stakeholder important and it is regarded as principle for the borrower to execute the project with complying to the below requirements;
    - The borrower requires to develop the communication organization with stakeholder.
    - The borrower requires to develop the decision-making organization for the project affected people to attend.
  - The notice for gathering opinions from stakeholder
    - The continuous promotion during project period after the project preparation stage
    - The delivery of useful information to affected people at appropriate timing
    - Discussion at not forceful atmosphere
    - Demand reflection without vulnerable social group and gender division
    - Reflection of opinions of stakeholder and residents in affected area through counselling on decision-making stage, project stage, mitigation action preparation, development gain distribution process

- Local grievance redress committee
  - The necessity of grievance redress committee caused by development
    - The demand of affected residents
    - Utilization of clear and understandable procedure (considering gender and culture)

2.5.4 Environmental Social Impact Level under EDCF Policy

This project is category A under EDCF safeguard policy, because it is judged that the environmental social hazard of this project is serious and this project can give an impact to wide area. The distance of this project is 765kV 100km and traverse the wide area and it gives an impact to traverse area. The traverse area includes the sensitive area like the forest preserve and the densely populated area.

According to OECD common approaches (April 2016)*, the project is classified as category A when the TL length is longer than 15km and the voltage is higher than 110kV as category A project example (appendix-1). The category A project require to submit ESIA report. MDB's environment assessment criteria including EDCF safeguard policy comply with OECD common approaches and share the spirit.

*Subtitle: RECOMMENDATION OF THE COUNCIL ON COMMON APPROACHES FOR OFFICIALLY SUPPORTED EXPORT CREDITS AND ENVIRONMENTAL AND SOCIAL DUE DILIGENCE (THE "COMMON APPROACHES")

In addition, the formal ESIA is required for 765kV, 100km TL project in Korea. After review of the above international criteria and the discussion about the environmental social hazard category of receiver based on the character and scope of this project, it is highly likely that this project can be classified as category A according to EDCF safeguard policy.

2.5.5 Requirements for Project Execution under EDCF Policy

Category A project in accordance with the environmental social impact level of EDCF safeguard policy article 22 is required to execute ESIA and EDCF safeguard policy appendix 2 and 3 suggest the guideline of ESIA configuration. So, the borrower is required to execute full ESIA in accordance with this guideline. Especially the TL traverse the densely populated area and the forest preserve, so it is required to closely analyze the environmental social impact through ESIA process and the reduction countermeasure needs to be proposed. The close administrative discussion among the related Bangladesh government departments is required for the compensation plan about the densely populated area and the reserve plan of passing area in the forest preserve which is environmentally sensitive area.

2.6 Applicability of IFC Performance Standards

The IFC Performance Standards (PS) stipulates that any proposed Project shall meet the following requirements throughout the life of an investment by IFC or other relevant financial institution:

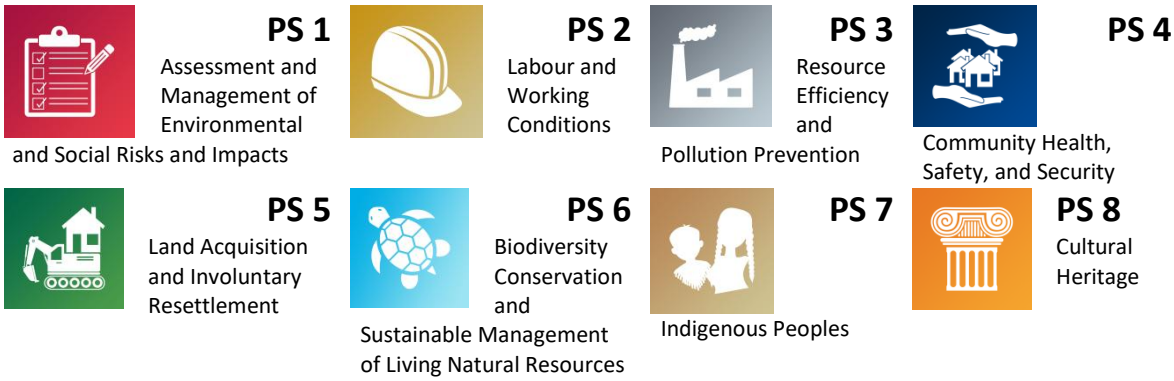


Figure 4: Performance Standards of IFC

Source: https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/Performance-Standards/

These performance standards and guidelines provide ways and means to identify impacts and affected stakeholders and lay down processes for management and mitigation of adverse impacts.

Performance Standard (PS) 1:
Assessment and Management of Environmental and Social Risks and Impacts

PS 1 establishes the importance of:

- Integrated assessment to identify the environmental and social impacts, risks, and opportunities of Projects;
- Effective community engagement through disclosure of Project-related information and consultation with local communities on matters that directly affect them; and
- The Project proponent's management of environmental and social performance throughout the life of the Project;
- PS 1 is applicable to all Projects and associated facilities having environmental and/or social risks and/or impacts. Some of the key environmental and social impacts that the proposed Project can be associated with:
  - Selection of the best power transmission and substations installation technology;
  - Designing tower heights according to Good International Industry Practice (GIIP)
  - SF6, Corona Effects and Electromagnetic field (EMF);
  - Emission of dust during construction and operation activities of the TLs;
  - Discharge of various type of domestic and effluents into river during construction;
  - Management of solid waste generating from construction activities of TLs;
  - Land acquisition and possible resettlement of local population; and
  - Loss of livelihood of local population due to Project operations etc.

Box 1: Applicability to PS1

PS 1 is applicable for the Project and an Environmental and Social Impact Assessment (ESIA) study needs to be conducted prior to the commencement of the Project. Power Grid also needs to develop and implement an Environmental and Social Management System (ESMS) to manage the identified risks associated with its operations during construction and operation phase of the Project.

Performance Standard 2:
Labour and Working Conditions

PS 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. The objectives of the PS 2 are:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers;
- To establish, maintain, and improve the worker-management relationship;
- To promote compliance with national employment and labour laws;
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain;
- To promote safe and healthy working conditions, and the health of workers; and
- To avoid the use of forced labour.

The applicability of PS 2 will be more important during the construction phase as operation phase will have lesser number of staff. This PS covers not only the main plant employees, but all employees/workers, even indirect workers working through contractors. Migrant workers will be engaged for the Project and they will be provided accommodation in labour camps. Hence, standards pertaining to campsites will be applicable.

Box 2: Applicability to PS2

PS 2 are applicable to the Project and Power Grid shall ensure provision of adequate facilities such as access to clean water, sanitary facilities and other necessary facilities at the construction sites. Power Grid shall ensure measures to prevent child labour, forced labour, and discrimination are strictly implemented.

Freedom of association and collective bargaining shall be provided. Wages, work hours and other benefits shall be regulated as per the national labour and employment laws.

Performance Standard 3:
Resource Efficiency and Pollution Prevention

The PS 3 outlines approach to pollution prevention and abatement in line with internationally disseminated technologies and practices with the following objectives:

- Avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from activities; and
- Promote the reduction of emissions that contribute to climate change.

Box 3: Applicability to PS3

The impacts and risks associated with the generation, use, storage, release, and/or disposal of pollutants has been assessed as part of the ESIA. Power Grid shall ensure implementation of the mitigation measures provided in the Environmental and Social Management Plan (ESMP) for construction phase. Power Grid shall also ensure that pollution control measures are planned and implemented right from the Project conception stage. Practices like minimal release of waste/emissions, safe disposal of waste, waste water management, etc. shall be considered prior to each Project phase. PS 3 is therefore applicable for the proposed Project.

Performance Standard 4:
Community Health, Safety and Security

PS 4 recognizes that Project activities, equipment, and infrastructure can increase community exposure to risks and impacts. Its main stress is to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner, that avoids or minimizes risks to the affected communities.

Box 4: Applicability to PS4

The Applicability of this PS has been extended to construction as well as operational phases of the Project. It will be associated with unloading and loading of activities of different industries, movement of vehicles, noise generation, etc. Community health and safety consideration related to the Project has been addressed while assessing the environmental and social risks and impacts. Security staff will be engaged form local community whereas labour engaged will be both local as well as migrant.

A stakeholder engagement process has been formulated as a part of community engagement requirements consistent with the requirements of PS 1 including the informed consultation and participation process of Affected Communities. It will also include dissemination of information pertaining to security arrangements to workers and community. Also, Power Grid will construct and operate the structural elements of the Project in accordance with GIIP taking into consideration safety risks to the affected community.

Performance Standard 5:
Land Acquisition and Involuntary Resettlement

PS 5 recognizes that Project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Its main aim is to anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by providing compensation for loss of assets at replacement cost and ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of affected persons and community.

Box 5: Applicability to PS5

For Transmission Lines, tower footings area shall be acquired to follow the Electricity Rules 2020 (amended February 2022). There is no substation under this project.

Performance Standard 6:
Biodiversity Conservation and Sustainable Management of Living Natural Resources

PS 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. This standard is aimed to promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

Box 6: Applicability to PS6

The proposed Project will involve discharge of bit domestic sewage only. Temporary pit would be used for sewage. Similarly, bit liquid waste would be generated from labour shed and substations and would be treated using Settling tank.
However, Power Grid shall ensure, in fact, that the discharge of waste water will be undertaken only after suitable management of the waste and the limit of the parameters have to be within the standards prescribed by applicable national laws and international guidelines whichever of the two is more stringent.
PS 6 will be applicable in addressing the aforementioned issues and managing the risks posed by such Project operations.
The details of this PS would be detailed out in the ESIA study, while implementation of the actions necessary to meet the requirements of this PS shall be managed through the suggested mitigation measures. The operation phase of the proposed Project shall ensure protection of fauna and flora of the site and surroundings.

Performance Standard 7: Indigenous Peoples

PS 7 recognizes Indigenous Peoples as social groups with identities that are distinct from mainstream groups in national societies, and are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development.

Box 7: Applicability to PS7

Census records and public consultations indicate that there are no Indigenous populations in the study area. Thus, PS 7 shall not be applicable to this Project.

Performance Standard 8: Cultural Heritage

PS 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their Project activities. In addition, the requirements of this Performance Standard on a Project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

Box 8: Applicability to PS8

This PS is applicable when tangible forms of cultural heritage, unique natural features or tangible objects that embody cultural values and certain instances of intangible forms of culture are impacted or are proposed to be used for commercial purposes. No such tangible forms of cultural heritage or objects were found at or near the Project area. Hence this PS is not applicable to the proposed Project.

2.7 Applicable World Bank Group EHS Guidelines

The Equator Principle III requires follow up of the environmental, health and safety requirements as per the following guidelines released by International Finance Cooperation (IFC) on 30th April, 2007. These guidelines ensure that the Projects are developed in a manner that is socially responsible and reflects sound environmental management practices. EHS considerations into the site selection and plant design processes should be considered in order to maximize the range of options available to prevent and control potential negative impacts.

(a) Environmental, Health, and Safety General Guidelines;
(b) Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution;

The key requirements stated in the EHS guidelines have been discussed in below table.

Table 14: Key Requirements as per EHS Guidelines of IFC

SN	Relevant Requirements as Stated in EHS Guidelines
	ENVIRONMENTAL
A.	**Terrestrial Habitat Alteration**
1.	**Construction of Right-of-Way (RoW)**
a)	Site transmission and distribution rights-of-way, access roads, lines, towers, and substations to avoid critical habitat through use of existing utility and transport corridors for transmission and distribution, and existing roads and tracks for access roads, whenever possible[1];
b)	Installation of transmission lines above existing vegetation to avoid land clearing;
c)	Avoidance of construction activities during the breeding season and other sensitive seasons or times of day;
d)	Revegetation of disturbed areas with native plant species;
e)	Removal of invasive plant species during routine vegetation maintenance;
2.	**Right-of-Way Maintenance**
a)	Implementation of an integrated vegetation management approach (IVM). The selective removal of tall-growing tree species and the encouragement of low-growing grasses and shrubs is the common approach to vegetation management in transmission line rights-of-way. Alternative vegetation management techniques should be selected based on environmental and site considerations including potential impacts to non-target, endangered and threatened species[2];
b)	Removal of invasive plant species, whenever possible, cultivating native plant species;
c)	Scheduling activities to avoid breeding and nesting seasons for any critically endangered or endangered wildlife species;
d)	Observing manufacturer machinery and equipment guidelines, procedures with regard to noise, and oil spill prevention and emergency response;
e)	Avoiding clearing in riparian areas;
f)	Avoiding use of machinery in the vicinity of watercourses.
3.	**Forest Fires**
a)	Monitoring right-of-way vegetation according to fire risk
b)	Removing blowdown and other high-hazard fuel accumulations
c)	Time thinning, slashing, and other maintenance activities to avoid forest fire seasons;
d)	Disposal of maintenance slash by truck or controlled burning. Controlled burning should adhere to applicable burning regulations, fire suppression equipment requirements, and typically must be monitored by a fire watcher;
e)	Planting and managing fire resistant species (e.g., hardwoods) within, and adjacent to, rights-of-way;
f)	Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow firefighting access.
4.	**Avian and Bat Collisions and Electrocutions**
a)	Aligning transmission corridors to avoid critical habitats (e.g., nesting grounds, heronries, rookeries, bat foraging corridors, and migration corridors);
b)	Maintaining 1.5 meter (60-inch) spacing between energized components and grounded hardware or, where spacing is not feasible, covering energized parts and hardware
c)	Retrofitting existing transmission or distribution systems by installing elevated perches, insulating jumper loops, placing obstructive perch deterrents (e.g., insulated" V's"), changing the location of conductors, and / or using raptor hoods;
d)	Considering the installation of underground transmission and distribution lines in sensitive areas (e.g., critical natural habitats);
e)	Installing visibility enhancement objects such as marker balls, bird deterrents, or diverters.

[1] Considering potential for electrical interference with telecommunication lines and railway lines due to mutual induction.

[2] Mowing with heavy-duty power equipment may be used to control growth of ground covers and prevent the establishment of trees and shrubs in the right-of way. Herbicides, in combination with mowing, may control fast-growing weedy species that have a potential to mature to heights over those permitted within the right-of-way. Trimming and pruning may be utilized at the boundaries of rights-of-way to maintain corridor breadth and prevent the encroachment of tree branches. Hand removal or removal of vegetation, while labor intensive, may be used in the vicinity of structures, streams, fences, and other obstructions which make the use of machinery difficult or dangerous.

SN	Relevant Requirements as Stated in EHS Guidelines
5.	**Water consumption and aquatic habitat alteration**
a)	Reduction of maximum through-screen design intake velocity to 0.5 ft/s
b)	For freshwater rivers or streams intake flow should be sufficient to maintain resource use (i.e., irrigation and fisheries) as well as biodiversity during annual mean low flow conditions.
c)	Reduction of impingement and entrainment of fish and shellfish by the installation of technologies such as barrier nets (seasonal or year-round), fish handling and return systems, fine mesh screens, wedge wire screens, and aquatic filter barrier systems.
d)	Designing the location of the intake structure in a different direction or further out into the water body may also reduce impingement and entrainment.
B.	**Aquatic Habitat Alternation**
a)	Site power transmission towers and substations to avoid critical aquatic habitat (e.g., watercourses, wetlands, and riparian areas), as well as fish spawning habitat, and critical fish over-wintering habitat;
b)	Maintaining fish access when road crossings of watercourses are unavoidable by utilizing clear span bridges, open-bottom culverts, or other approved methods
c)	Minimizing clearing and disruption to riparian vegetation
1.	**Marine Habitat Alteration**
a)	Locating and siting cable routes, and shore access, to avoid critical marine habitats (e.g., breeding grounds and eelgrass) and coral reefs;
b)	Burying submarine cables when traversing sensitive intertidal habitat;
c)	Monitoring cable laying path for presence of marine mammals;
d)	Avoiding laying submarine cable during fish and marine mammals breeding periods, calving periods, and spawning seasons.
C.	**Electric and Magnetic Fields (EMF)**
a)	Evaluating potential exposure to the public against the reference levels developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). Average and peak exposure levels should remain below the ICNIRP recommendation for General Public Exposure
b)	Considering siting new facilities so as to avoid or minimize exposure to the public. Installation of transmission lines or other high voltage equipment above or adjacent to residential properties or other locations intended for highly frequent human occupancy, (e.g., schools or offices), should be avoided
c)	If EMF levels are confirmed or expected to be above the recommended exposure limits, application of engineering techniques should be considered to reduce the EMF produced by power lines, substations, or transformers. Examples of these techniques include: ○ Shielding with specific metal alloys ○ Burying transmission lines ○ Increasing height of transmission towers ○ Modifications to size, spacing, and configuration of conductors
D.	**Hazardous Materials**
1.	**Insulating Oils and Fuels**
a)	Replacing existing transformers and other electrical equipment containing PCB, and ensuring appropriate storage, decontamination, and disposal of contaminated units;
b)	Prior to final disposal, retired transformers and equipment containing PCB should be stored on a concrete pad with curbs sufficient to contain the liquid contents of these containers should they be spilled or leaked. The storage area should also have a roof to prevent precipitation from collecting in the storage area. Disposal should involve facilities capable of safely transporting and disposing of hazardous waste containing PCB
c)	Surrounding soil exposed to PCB leakage from equipment should be assessed, and appropriate removal and / or remediation measures should be implemented.
2.	**Wood Preservatives**
a)	Consider use of alternative preservatives (e.g., copper azote)
b)	Evaluating the cost and benefit of using alternative pole materials (e.g., steel, concrete, and fiberglass)
c)	Undertake appropriate disposal of used poles. Landfill facilities should be capable of handling wastes that may have chemical leaching properties. Disposal through incineration or through recycling should consider associated air emissions and secondary product residues of preservative chemicals
3.	**Pesticides**
d)	Provide those responsible for deciding on pesticides application with training in pest identification, weed identification, and field scouting;
e)	Use mechanical weed control and / or thermal weeding
f)	Support and use beneficial organisms, such as insects, birds, mites, and microbial agents, to perform biological control of pests
g)	Protect natural enemies of pests by providing a favorable habitat, such as bushes for nesting sites and other original vegetation that can house pest predators;

SN	Relevant Requirements as Stated in EHS Guidelines
h)	Use animals to graze areas and manage plant coverage;
i)	Use mechanical controls such as traps, barriers, light, and sound to kill, relocate, or repel pests
	OCCUPATIONAL HEALTH AND SAFETY
A.	**Live Power Lines**
a)	Only allowing trained and certified workers to install, maintain, or repair electrical equipment
b)	Deactivating and properly grounding live power distribution lines before work is performed on, or in close proximity, to the lines;
c)	Ensuring that live-wire work is conducted by trained workers with strict adherence to specific safety and insulation standards. Qualified or trained employees working on transmission or distribution systems should be able to achieve the following: ○ Distinguish live parts from other parts of the electrical system ○ Determine the voltage of live parts ○ Understand the minimum approach distances outlined for specific live line voltages ○ Ensure proper use of special safety equipment and procedures when working near or on exposed energized parts of an electrical system
d)	Workers should not approach an exposed energized or conductive part even if properly trained unless: ○ The worker is properly insulated from the energized part with gloves or other approved insulation; or, ○ The energized part is properly insulated from the worker and any other conductive object; or, ○ The worker is properly isolated and insulated from any other conductive object (live-line work).
e)	Where maintenance and operation are required within minimum setback distances, specific training, safety measures, personal safety devices, and other precautions should be defined in a health and safety plan
f)	Workers not directly associated with power transmission and distribution activities who are operating around power lines or power substations should adhere to local legislation, standards, and guidelines relating to minimum approach distances for excavations, tools, vehicles, pruning, and other activities;
g)	Minimum hot stick distances may only be reduced provided that the distance remaining is greater than the distance between the energized part and a grounded surface.
B.	**Working at height on poles and structures**
a)	Testing structures for integrity prior to undertaking work;
b)	Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers, among others;
c)	Establishment of criteria for use of 100 percent fall protection (typically when working over 2 meters above the working surface, but sometimes extended to 7 meters, depending on the activity). The fall protection system should be appropriate for the tower structure and necessary movements, including ascent, descent, and moving from point to point
d)	Installation of fixtures on tower components to facilitate the use of fall protection systems;
e)	Provision of an adequate work-positioning device system for workers. Connectors on positioning systems should be compatible with the tower components to which they are attached
f)	Hoisting equipment should be properly rated and maintained and hoist operators properly trained;
g)	Safety belts should be of not less than 16 millimeters (mm) (5/8 inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident;
h)	When operating power tools at height, workers should use a second (backup) safety strap
i)	Signs and other obstructions should be removed from poles or structures prior to undertaking work
j)	An approved tool bag should be used for raising or lowering tools or materials to workers on structures
C.	**Electric and magnetic fields**
a)	Identification of potential exposure levels in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities;
b)	Training of workers in the identification of occupational EMF levels and hazards;
c)	Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers;
d)	Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE). Personal exposure monitoring equipment should be set to warn of exposure levels that are below occupational exposure reference levels (e.g., 50 percent). Action plans to address occupational exposure may include limiting exposure time through work rotation, increasing the distance between the source and the worker, when feasible, or the use of shielding materials.
D.	**Exposure to chemicals**

SN	Relevant Requirements as Stated in EHS Guidelines
a)	Train personnel to apply pesticides and ensure that personnel have received the necessary certifications, or equivalent training where such certifications are not required;
b)	Respect post-treatment intervals to avoid operator exposure during reentry to crops with residues of pesticides;
c)	Ensure hygiene practices are followed (in accordance to FAO and PMP) to avoid exposure of family members to pesticides residues
	COMMUNITY HEALTH AND SAFETY
A.	**Electrocution**
a)	Use of signs, barriers (e.g., locks on doors, use of gates, use of steel posts surrounding transmission towers, particularly in urban areas), and education / public outreach to prevent public contact with potentially dangerous equipment;
b)	Grounding conducting objects (e.g., fences or other metallic structures) installed near power lines, to prevent shock.
B.	**Electromagnetic Interference**
a)	The corona of overhead transmission line conductors and high frequency currents of overhead transmission lines may result in the creation of radio noise. Typically, transmission line rights-of-way and conductor bundles are created to ensure radio reception at the outside limits remains normal. However, periods of rain, sleet or freezing rain sharply increase the streaming corona on conductors and may affect radio reception in residential areas near transmission lines.
C.	**Visual Amenity**
a)	Extensive public consultation during the planning of power line and power line right-of-way locations;
b)	Accurate assessment of changes in property values due to power line proximity;
c)	Siting power lines, and designing substations, with due consideration to landscape views and important environmental and community features;
d)	Location of high-voltage transmission and distribution lines in less populated areas, where possible;
e)	Burying transmission or distribution lines when power must be transported through dense residential or commercial areas
D.	**Noise and Ozone**
a)	The acoustic noise produced by transmission lines is greater with high voltage power lines (400-800 kilo volts [kV]) and even greater with ultra-high voltage lines (1000 kV and higher). Noise from transmission lines reaches its maximum during periods of precipitation, including rain, sleet, snow or hail, or as the result of fog. The sound of rain typically masks the increase in noise produced by the transmission lines, but during other forms of precipitation (e.g., snow and sleet) and fog, the noise from overhead power lines can be troubling to nearby residents.
b)	Measures to mitigate this impact may be addressed during project planning stages to locate rights-of-way away from human receptors, to the extent possible. Use of noise barriers or noise canceling acoustic devices should be considered as necessary
E.	**Aircraft Navigation Safety**
a)	Avoiding the siting of transmission lines and towers close to airports and outside of known flight path envelopes;
b)	Consultation with regulatory air traffic authorities prior to installation;
c)	Adherence to regional or national air traffic safety regulations;
d)	Use of buried lines when installation is required in flight sensitive areas

2.8 Comparison with Good International Industry Practice (GIIP) Standards

The World Bank Group (WBG) Environmental, Health, and Safety (EHS) Guidelines are technical reference documents of Good International Industry Practice (GIIP). They are comprised of the General EHS Guidelines and Industry-Sector EHS Guidelines. When one or more members of the World Bank Group are involved in a project, the EHS Guidelines are applied as described in their respective policies and standards. Bangladesh and WBG/GIIP environmental standards and guidelines relevant to the construction and operation of the project cover the following issues[3]:

- Atmospheric emissions and ambient air quality;
- Water Quality;
- Liquid effluent discharges to the aquatic environment;
- Noise emissions and ambient noise levels.

2.8.1 Ambient Air Quality Standards

As per IFC EHS Guidelines "the ambient air quality standards are ambient air quality levels established and published through national legislative and regulatory processes and ambient quality guidelines refer to ambient quality levels primarily developed through clinical, toxicological, and epidemiological evidence (such as those published by the World Health Organization-WHO)". The current Air Quality Guidelines are:

Table 15: Ambient Air Quality Guidelines

Parameter	Averaging Period	Guideline value in µg/m^3
Sulphur Dioxide (SO_2)	24-hours	125 (Interim Target-1)
		50 (Interim Target-2)
		20 (Guideline)
	10-minutes	500 (Guideline)
Nitrogen dioxide (NO_2)	1-year	40 (Guideline)
	1-hour	200 (Guideline)
Particulate Matter PM_{10}	1-year	70 (Interim Target-1)
		50 (Interim Target-2)
		30 (Interim Target-3)
		20 (Guideline)
	24-hours	150 (Interim Target-1)
		100 (Interim Target-2)
		75 (Interim Target-3)
		50 (Guideline)
Particulate Matter $PM_{2.5}$	1-year	35 (Interim Target-1)
		25 (Interim Target-2)
		15 (Interim Target-3)
		10 (Guideline)
	24-hours	75 (Interim Target-1)
		50 (Interim Target-2)
		37.5 (Interim Target-3)
		25 (Guideline)
Ozone	8-hours daily	160 (Interim Target-1)
	Maximum	100 (Guideline)

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

[3] *When host country regulations differ from the levels and measures presented in the EHS Guidelines, Project is expected to achieve whichever is more stringent.*

As per the provisions of ECR 2023, the MoEFCC is responsible for laying down environmental quality standards (pertaining to air, water, sound, odour and other components) and standards for discharge and emission of waste. Ambient air quality standards have been stipulated in Schedule 2 (Standards for Air) of the Rules. However, these standards were revised by MoEFCC in 2022. The revised standards have been illustrated in Table 16.

Table 16: Air quality Standards of Bangladesh

Pollutant	Unit	Averaging Time	Concentration
Carbon Monoxide (CO)	mg/m^3	8 hours	5
		1 hour	20
Lead (Pb)	$\mu g/m^3$	Annual	0.25
		24 hours	0.50
Oxides of Nitrogen (NO_2)	$\mu g/m^3$	Annual	40
		24 hours	80
Coarse Particulates (PM_{10})	$\mu g/m^3$	Annual	50
		24 hours	150
Fine Particulates ($PM_{2.5}$)	$\mu g/m^3$	Annual	35
		24 hours	65
Ozone (O_3)	$\mu g/m^3$	1 hours	180
		8 hours	100
Sulphur dioxide (SO_2)	$\mu g/m^3$	1 hour	250
		24 hours	80
Ammonia (NH_3)	$\mu g/m^3$	Annual	100
		24 hours	400

Source: Air Pollution Control Rules, 2022

Table 17: Emissions and Effluents Guidelines of ICNIRP exposure limits for general public exposure to electric and magnetic fields

Frequency	Electric Field (V/m)	Magnetic Field (μ/T)
50 Hz	5000	100
60 Hz	4150	83

Source: ICNIRP (1998): "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz).

2.8.2 Water Quality Standards

As per Schedule 2 (Rules 31) of the ECR 2023, designated best use classification has been prescribed for inland surface water as given in Table 18.

Table 18: Standards for Inland Surface Water

Sl	Parameters	Best Practice based classification					
		Source of drinking water for supply only after disinfecting	Water usable for recreational activity	Source of drinking water for supply after conventional treatment	Water usable by fisheries	Water usable by various process and cooling industries	Water usable for irrigation
1.	pH	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
2.	BOD (mg/l)	≤ 2	≤ 3	≤ 3	≤ 6	12	≤ 12
3.	COD (mg/l)	10	10	25	50	100	100
4.	NH4-N	0.1	0.3	0.3	0.3	2.7	1.5
5.	Total Cr (mg/l)	0.02	0.2	0.02	0.05	0.1	0.1
6.	Pb (mg/l)	0.03	0.05	0.03	0.1	0.1	0.1
7.	Hg (mg/l)	0.001	0.001	0.001	0.004	0.05	0.002

Sl	Parameters	Best Practice based classification					
		Source of drinking water for supply only after disinfecting	Water usable for recreational activity	Source of drinking water for supply after conventional treatment	Water usable by fisheries	Water usable by various process and cooling industries	Water usable for irrigation
8.	NO_3-N (mg/l)	7	7	7	7	-	5
9.	TDS (mg/l)	1000	1000	1000	1000	1000	1000
10.	DO (mg/l)	≥ 6	≥ 5	≥ 5	≥ 5	≥ 1	-
11.	Total Coliform CFU/100ml	≤ 100	≤ 50	≤ 5000	≤ 5000	-	≤ 50000

Notes:
Electrical conductivity for irrigation water: 2250 µ S/cm (at a temperature of 25 ° C); Sodium less than 26%; boron less than 0.2%.

The standards for drinking water have been presented in Table 19 as per Schedule 2 of ECR-2023.

Table 19: Standards for Drinking Water

SN	Parameters	Unit	DOE Standards (Drinking Water Standards)
1.	Faecal Coliform	CFU/100 ml	-
2.	Total Coliform	CFU/100 ml	-
3.	Chlorine (residual)	mg/l	0.20
4.	Nitrate	mg/l	45
5.	Arsenic	mg/l	0.05
6.	Turbidity	NTU	5
7.	Aluminium	mg/l	0.20
8.	Ammonia	mg/l	1.50
9.	Barium	mg/l	0.70
10.	Benzene	mg/l	0.10
11.	Boron	mg/l	1.0
12.	Cadmium	mg/l	0.003
13.	Calcium	mg/l	75
14.	Chlorides	mg/l	250
15.	Carbontetrachloride	mg/l	0.005
16.	1, 1 Dichloroethylene $C_2H_4Cl_2$	mg/l	0.03
17.	1, 2 Dichloroethylene $C_2H_4Cl_2$	mg/l	0.03
18.	Tetrachloroethylene $C_2H_3Cl_4$	mg/l	0.04
19.	Trichloroethylene $C_2H_3Cl_3$	mg/l	0.02
20.	Pentachlorophenol	mg/l	0.009
21.	2,4,6 Trichlorophenol	mg/l	0.20
22.	Chloroform	mg/l	0.09
23.	Total Chromium	mg/l	0.05
24.	Color	Hazen	15
25.	Copper	mg/l	1.5
26.	Cyanide	mg/l	0.05
27.	Fluorides	mg/l	1.0
28.	Hardness as $CaCO_3$	mg/l	500
29.	Iron	mg/l	0.3-1.0
30.	Total Kjeldahl Nitrogen	mg/l	1.0
31.	Lead	mg/l	0.01
32.	Magnesium	mg/l	30-35
33.	Manganese	mg/l	0.4
34.	Mercury	mg/l	0.001
35.	Nickel	mg/l	0.05
36.	Nitrite	mg/l	1.0
37.	Odor	mg/l	Odorless
38.	Oil and Grease	mg/l	0.01
39.	pH		6.5-8.5
40.	Phenols	mg/l	0.002
41.	Potassium	mg/l	12
42.	Radioactive materials (gross alpha activity)	BQ/l	0.1
43.	Radioactive materials (gross beta activity)	BQ/l	1.0

SN	Parameters	Unit	DOE Standards (Drinking Water Standards)
44.	Selenium	mg/l	0.01
45.	Silver	mg/l	0.02
46.	Sodium	mg/l	200
47.	Suspended Solids	mg/l	10
48.	Sulfide as H_2S	mg/l	0.05
49.	Sulphate	mg/l	250
50.	TDS	mg/l	1000
51.	Temperature	^0C	20-30
52.	Tin	mg/l	2.0
53.	Zinc	mg/l	5.0
54.	Aldrin/Dieldrin	µg/l	0.30
55.	Anionic Detergents	µg/l	0.2

2.8.3 Liquid Effluent Discharges

As per Schedule 4 of ECR 2023, standards for Waste from Industrial Units or Project Waste have been described. The same has been detailed in Table 20.

Table 20: Standards for Liquid Effluent Discharge

SN	Parameter	Unit	Places for determination of standards		
			Inland Surface Water	Public Sewerage System connected to treatment at second stage	Irrigated Land
1.	Ammonical Nitrogen (as elementary N)	mg/l	50	50	50
2.	Ammonia (as free ammonia)	mg/l	5	5	5
3.	Arsenic (as)	mg/l	0.2	0.2	0.2
4.	BOD 5 at 20°C	mg/l	30	250	100
5.	Boron	mg/l	2	2	4
6.	Cadmium (as Cd)	mg/l	2	1	2
7.	Chloride	mg/l	600	600	-
8.	Chromium (as total Cr)	mg/l	0.5	1.0	1.0
9.	COD	mg/l	200	400	250
10.	Chromium (as hexavalent Cr)	mg/l	0.1	2.0	1.0
11.	Copper (as Cu)	mg/l	3.0	3.0	3.0
12.	Fluoride (as F)	mg/l	2	15	15
13.	Sulfide (as S)	mg/l	1	-	5
14.	Iron (as Fe)	mg/l	3	3	3
15.	Total Kjeldahl Nitrogen (as N)	mg/l	100	-	100
16.	Lead (as Pb)	mg/l	0.1	1.0	2.0
17.	Manganese (as Mn)	mg/l	2	2	2
18.	Mercury (as Hg)	mg/l	0.01	0.01	0.01
19.	Nickel (as Ni)	mg/l	1.0	2.0	5.0
20.	Nitrate (as elementary N)	mg/l	10	-	20
21.	Oil and Grease	mg/l	10	20	20
22.	Phenolic Compounds (as C_6H_5OH)	mg/l	1.0	5	5.0
23.	Dissolved Phosphorus (as P)	mg/l	5	-	-
24.	Radioactive substance	To be specified by Bangladesh Atomic Energy Commission			
25.	pH	-	6-9	6-9	6-9
26.	Selenium (as Se)	mg/l	0.05	0.05	0.05
27.	Zinc (as Zn)	mg/l	5	15	15
28.	Temperature	^0C	≯ 5^{0}C of Pond	-	≯ 5^{0}C of Pond
29.	Suspended Solids (SS)	mg/l	100	500	100
30.	Cyanide (as Cn)	mg/l	0.1	2.0	0.2
31.	Total Residual Chlorine	mg/l	1.0	-	1.2
32.	Bio Assay Test	-	90% fish remain alive in the treated liquid effluent after 96 hrs	90% fish remain alive in the treated liquid effluent after 96 hrs	90% fish remain alive in the treated liquid effluent after 96 hrs

Notes:
(1) These standards shall be applicable to all industries or Projects other than those specified under the heading "Standards for sector-wise industrial effluent or emission."
(2) Compliance with these standards shall be ensured from the moment an industrial unit starts trial production, and in other cases, from the moment a Project starts operation.
(3) These standards shall be inviolable even in case of any sample collected instantly at any point of time. These standards may be enforced in a more stringent manner if considered necessary in view of the environmental conditions of a particular situation.
(4) Inland Surface Water means drains/ponds/tanks/water bodies/ditches, canals, rivers, springs and estuaries.
(5) Public sewerage system means treatment facilities of the first and second stage and also the combined and complete treatment facilities.
(6) Irrigable land means such land area which is sufficiently irrigated by waste water taking into consideration the quantity and quality of such water for cultivation of selected crops on that land.
(7) Inland Surface Water Standards shall apply to any discharge to a public sewerage system or to land if the discharge does not meet the requirements of the definitions in notes 5 and 6 above.

As per the IFC EHS guidelines, the treated sanitary sewage discharge is required to meet the following guideline values.

Table 21: Treated Sewage Discharge Guideline Values of IFC

SN	Parameters	Guideline Value
1.	pH	6 – 9
2.	BOD	30mg/l
3.	COD	125mg/l
4.	Total Nitrogen	125mg/l
5.	Oil and Grease	10 mg/l
6.	Total Suspended Solids	50 mg/l
7.	Total coliform bacteria	400 MPN/100 ml

IFC Wastewater and Water Quality Monitoring Programme

A wastewater and water quality monitoring program with adequate resources and management oversight should be developed. The following elements to be considered while setting up the programme:

- *Parameters*: The parameters selected for monitoring should be indicative of the pollutants of concern from the process, and should include parameters that are regulated under compliance requirements.
- *Monitoring type and frequency*: Wastewater monitoring should take into consideration the discharge characteristics from the process over time. Effluents from highly variable processes may need to be sampled more frequently or through composite methods. Grab samples or, if automated equipment permits, composite samples may offer more insight on average concentrations of pollutants over a 24-hours period.
- *Monitoring locations*: Effluent sampling stations may be located at the final discharge, as well as at strategic upstream points prior to merging of different discharges.
- *Data Quality*: Sampling should be conducted by or under the supervision of trained individuals. Analysis should be conducted by entities permitted or certified for this purpose. QA/QC documentation should be included in monitoring reports.

2.8.4 Ambient Noise Standards

As per IFC EHS Guidelines, noise impacts should not exceed the levels presented in Table 22 below, or result in a maximum increase in background levels of 3dB at the nearest receptor location off-site.

Table 22: Noise Level Guidelines as per IFC

Receptor	One Hour L_{eq} (dBA)	
	Daytime 07:00 - 22:00	Night time 22:00 - 07:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

The MoEFCC under the provisions of ECR, 2023 is responsible for laying down ambient noise standards. Noise Pollution (Control) Rules, 2006 were laid down by the Ministry through a Gazette notification dated September 7, 2006. Ambient noise standards established as per the provisions Rule 5(2) of the aforementioned Rules have been furnished in Table 23.

Table 23: Ambient Noise Standards as per DOE

SN	Type of Area	Limits in dB(A)L_{eq}	
		Day	Night
1.	Silent Zone	50	40
2.	Residential area	55	45
3.	Mixed area	60	50
4.	Commercial area	70	60
5.	Industrial area	75	70

Note:

1. dB(A) L_{eq} represents time-weighted average noise level on the Decibel-A scale
2. Day time is from 6am to 9pm, Night time is form 9pm to 6 am
3. Mixed area is mainly residential area, and also simultaneously used for commercial and industrial purposes
4. Area up to a radius of 100 m around hospitals/educational institutions/special institutions/ establishments identified/to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

2.8.5 Soil Quality Standards

Dutch standards for soil quality are based on a risk-based approach, using Target and Intervention Values to assess contamination levels. These values, adjusted for organic matter and soil fraction, help classify soil as clean, slightly contaminated, or seriously contaminated. Remediation is required for seriously contaminated sites, with urgency determined by site-specific risks. There are no parameters and standards found in ECR 2023.

Table 24: Dutch Standards for Soil Quality

Sl	Component	MPA_{Soil} (mg/kg)
1.	Antimony (Sb)	0.53
2.	Arsenic (As)	0.9
3.	Barium (Ba)	180
4.	Cadmium (Cd)	0.79
5.	Chromium (Cr)	0.38
6.	Cobalt (Co)	2.4
7.	Copper (Cu)	3.4
8.	Mercury (Hg)	1.9
9.	Lead (Pb)	55
10.	Molybdenum (Mo)	39
11.	Nickle (Ni)	0.26
12.	Selenium (Se)	0.11
13.	Tin (Sn)	34
14.	Vanadium (V)	1.1
15.	Zinc (Zn)	16

MPA= Maximum Permissible Addition

2.9 Comparison of Environmental Safeguard Principles between International agencies and Bangladesh

The Bangladesh Environmental Conservation Rules (ECR) of 2023 replace the ECR of 1997, strengthening environmental regulations in Bangladesh. The EDCF (Economic Development Cooperation Fund) Safeguard Policy and the Environmental Conservation Rules 2023 of Bangladesh both aim to ensure environmentally and socially responsible development, but they operate at different levels and with different focuses. The EDCF policy provides guidelines for projects funded by the EDCF, emphasizing environmental and social risk management. The ECR 2023 rules aim to align with the government's vision for sustainable development and address issues like pollution control and resource conservation. In contrast, the Environmental Conservation Rules 2023 are a broader set of regulations, applicable to all development projects in Bangladesh, focusing on environmental impact assessment, clearance procedures, and pollution control.

Table 25: Comparison between EDCF Safeguard Policy and Bangladesh Environmental Conservation Rules

Sl	Basic Parameters	EDCF Safeguard Policy	Environmental Conservation Rules 2023
1.	Scope	Applies specifically to projects funded by the EDCF, outlining environmental and social safeguards.	A comprehensive set of regulations applicable to all development projects in Bangladesh.
2.	Focus	Emphasizes due diligence in assessing and mitigating environmental and social risks associated with EDCF-funded projects.	Addresses various aspects of environmental protection, including pollution control, environmental impact assessment, and conservation of natural resources.
3.	Key Aspects	Includes guidelines for environmental and social impact assessments (ESIA), stakeholder engagement, and development of Environmental Management Plans (EMP).	Categorizes projects based on their potential environmental impact (Green, Yellow, Orange, and Red). Outlines procedures for obtaining Environmental Clearance Certificates (ECC). Establishes ambient standards for air, water, and noise pollution.
4.	Objective	Includes guidelines for environmental and social impact assessments (ESIA), stakeholder engagement, and development of Environmental Management Plans (EMP).	To protect the environment, improve environmental standards, and control pollution.

A. Key Differences:

(a) Applicability:
EDCF policy is project-specific, while the Environmental Conservation Rules are broadly applicable to all development projects in Bangladesh.

(b) Level of Detail:
The EDCF policy provides detailed guidelines for risk management, while the Environmental Conservation Rules focus on regulatory procedures and standards.

(c) Enforcement:
The EDCF policy is enforced by the EDCF, while the Environmental Conservation Rules are enforced by the Department of Environment (DoE).

B. Similarities:

(a) Common Goal:

Both aim to promote environmentally sound and socially responsible development.

(b) Emphasis on Mitigation:
Both emphasize the importance of identifying and mitigating potential negative environmental and social impacts.

(c) Need for Compliance:
Both require adherence to specific guidelines and regulations for successful implementation.

In essence, the EDCF Safeguard Policy provides a framework for managing environmental and social risks within EDCF-funded projects, while the Environmental Conservation Rules 2023 establish a broader legal and regulatory framework for environmental protection in Bangladesh.

2.10 Applicable International Conventions

Environmental problems which migrate beyond the jurisdiction (Trans-boundary) require power to control such issues through international co-operation by becoming a Contracting Party (CP) i.e., ratifying treaties or as Signatory by officially signing the treaties and agreeing to carry out provisions of various treaties on environment and social safeguards. Bangladesh has signed and ratified various Multilateral Environmental Agreements (MEAs), and International Labor Organization (ILO) Conventions, etc. The relevant international conventions have been summarized in the Table 26.

Table 26: Applicable International Conventions

SN	International Conventions	Salient Features
Multilateral Environmental Agreements (MEAs)		
1.	Rio Declaration, 1992	Bangladesh is a signatory to Principle 4 of the declaration 1992 a global action program for sustainable development called *Rio Declaration* and *Agenda 21* was adopted in the annual United Nations Conference on Environment and Development (UNCED) held in Rio De Janeiro, Brazil.
2.	Convention on Biological Diversity, 1992	It was adopted on June 5, 1992. The signatory has an obligation of: • Introducing appropriate procedures requiring environmental impact assessments of its proposed Projects that are likely to have significant adverse effects on biodiversity, with a view to avoiding or minimizing such effects, and where appropriate allow for public participation in such procedures; and • Introducing appropriate arrangements to ensure that environmental consequences of its programs and policies, that are likely to have significant adverse impacts on biodiversity, are duly taken into account. As per the convention, ESIA shall consider impacts on biodiversity due to Project activities.
3.	Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar (1971)	This is an intergovernmental treaty, which provides the framework for international co-operation for the conservation of wetlands habitat. Obligation for Contracting Parties include the designation of wetlands to the "List of Wetlands of International Importance", the provision of wetland considerations within their national land use planning, and the creation of Natural Reserves. Parts of Sundarbans Reserved Forest (Southwest of Bangladesh) are one of the Ramsar Sites.
4.	Kyoto Protocol	The protocol is aimed at reducing greenhouse gas (GHG) emissions from various industrial activities and curbing its effects on the environment. Seven GHGs have been identified for targeted emission reduction namely: • Carbon dioxide (CO_2) • Methane (CH4) • Sulphur hexafluoride (SF6) • Nitrous Oxide (N_2O) • Nitrogen trifluoride (NF3)

SN	International Conventions	Salient Features
		• Hydrofluorocarbons • (HFCs) • Perfluorocarbons (PFC) The parties to the protocol shall reduce their GHG emissions through one or more of the three flexible mechanisms laid down under the protocol viz.: 1. Clean Development Mechanism 2. Joint Implementation 3. International Emissions Trading The protocol formulated in 1997 and came into force in 2008. It's currently under its second commitment period which terminates in 2020. Bangladesh signed the protocol October 22, 2001. However, it has no binding emission reduction target as it's a developing nation.
5.	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.	It was formulated to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). It does not, however, address the movement of radioactive waste. The Convention is also intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate. The wastes under the Convention's scope are listed under its Annex – I, II and III. In addition to conditions on the import and export of wastes, there are stringent requirements for notice, consent and tracking for movement of wastes across national boundaries. The Convention came into force on May 5, 1992. Bangladesh acceded it on April 1, 1993.
6.	Trans-boundary pollutants issues and related conventions of UNFCCC	Transboundary pollutants, substances that cause adverse effects in one country due to emissions from another, are addressed by international agreements like the UNECE's Convention on Long-Range Transboundary Air Pollution (CLRTAP). The UNFCCC (United Nations Framework Convention on Climate Change) primarily focuses on climate change and greenhouse gas emissions, but transboundary pollution issues are relevant as climate change can exacerbate existing pollution problems and affect the effectiveness of pollution control measures. Transboundary air pollution occurs when pollutants released in one country are carried by wind or other means to another, causing harm. The CLRTAP, established in 1979, is a regional framework for European, North American, and some former Soviet countries to address transboundary air pollution. It focuses on reducing emissions of specific pollutants like sulfur dioxide, nitrogen oxides, and heavy metals. CLRTAP promotes scientific collaboration, policy negotiation, and the development of protocols that set emission limits for participating countries. The CLRTAP has contributed to significant reductions in air pollution emissions in the UNECE region, demonstrating the effectiveness of international cooperation on this issue. he UNFCCC primarily addresses climate change through reducing greenhouse gas emissions and promoting adaptation to climate impacts. While the UNFCCC and CLRTAP have distinct focuses, there are synergies between them. Actions to reduce greenhouse gas emissions, such as switching to cleaner energy sources, can also lead to reductions in air pollutants.

SN	International Conventions	Salient Features
7.	Policy and Guidance for Polychlorinated Biphenyl (PCBs)	PCBs are a group of man-made organic chemicals consisting of carbon, hydrogen and chlorine atoms. The number of chlorine atoms and their location in a PCB molecule determine many of its physical and chemical properties. PCBs have no known taste or smell, and range in consistency from an oil to a waxy solid. PCBs belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. PCBs were domestically manufactured from 1929 until manufacturing was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including: • Electrical, heat transfer and hydraulic equipment • Plasticizers in paints, plastics and rubber products • Pigments, dyes and carbonless copy paper • Other industrial applications
International Labour Organization (ILO) Conventions		
8.	International Labour Organization	Bangladesh has ratified many of the International Labour Organization conventions that are relevant to the Project including: • C1 Hours of Work (Industry) Convention, 1919 (14:07:1921, ratified); • C5 Minimum Age (Industry) Convention, 1919 (09:09:1955, ratified): • C11 Right of Association (Agriculture) Convention, 1921 (11:05:1923, ratified): • C14 Weekly Rest (Industry) Convention, 1921 (11:05:1923, ratified); • C29 Forced Labour Convention, 1930 (30:11:1954, ratified) & C105 Abolition of Forced Labour Convention, 1957 (18:05:2000, ratified); • C100 Equal Remuneration Convention, 1951 (25:09:1958, ratified); • C107 Indigenous and Tribal Populations Convention, 1957; • C111 discrimination (Employment and Occupation) Convention, 1958 (03:06:1960, ratified) This Convention limits the hours of work in industrial undertaking to eight (8) in the day and forty-eight (48) in the week.
9.	Convention Concerning the Protection of the World Cultural and natural Heritage	This convention was held in Paris in 1972; accepted in 03.08.1983 and ratified in 03.11.1983. The relevancy of this convention is: • Prevention of damage or destruction of culturally and/or historically significant sites, monuments, etc
10.	International Plant Protection Convention (Rome, 1951) & Plant Protection Agreement for SE Asia and Pacific (1999 Revision)	This convention was ratified in 01.09.1978 with the following relevancy • Ensuring that the Project work or construction materials do not introduce plant pests
11.	Convention on the Law of the Non-Navigational Uses of International Watercourses	The Convention on the Law of Non-Navigational Uses of International Watercourses, commonly referred to as the UN Watercourses Convention, is an international treaty, adopted by the United Nations on 21 May 1997, pertaining to the uses and conservation of all waters that cross international boundaries, including both surface and groundwater. "Mindful of increasing demands for water and the impact of human behavior", the UN drafted the document to help conserve and manage water resources for present and future generations. From the time of its

SN	International Conventions	Salient Features
		drafting, the Convention took more than 17 years to enter into force on 17 August 2014. With the treaty having been ratified by just 36 states, the majority of countries, especially the key ones, remain outside its scope. The convention, however, is regarded as an important step in establishing international law governing water.
International Migratory Birds		
12.	"The Asia-Pacific Migratory Waterbird Conservation Strategy" 2001-2005,	Bangladesh is a member of Central Asian Flyway (CAF). "The Asia-Pacific Migratory Waterbird Conservation Strategy" 2001-2005, identified 50 species of migratory waterbirds as threatened, out of which 14 species occur in Bangladesh. In addition to that eleven species of resident waterbirds are also identified as threatened. Some recommendations of CAF Meeting for Bangladesh part is as follows, and Power Grid shall comply with flyway. o Extensive survey of migratory as well as resident waterbirds o Inventory and assessment of waterbird habitats o Establishment of bird sanctuary o Awareness related to conservation of waterbirds and their habitats o Support for capacity building in terms of technical and management aspect o Resource mobilization for waterbird conservation

Chapter 3
Project Description

3.1 Background

Bangladesh, being a developing country, electricity demand is growing very rapidly. For meeting this growing electricity demand government is giving priority to generation of electricity. But owing to inadequacy of primary fuel/energy resources in the country, government has already taken up plan to install imported LNG and coal-based power plants, especially at Barishal, Khulna and Chattogram zones as these are very effective areas for transportation of coal and LNG. As a part of an imported fuel-based generation, government has also planned to construct LNG and coal-based power plants in Matarbari, Moheshkhali and Bashkhali areas of Chattogram zone. The Moheshkhali and Matarbari areas are also known for their potential for renewable energy projects, particularly in the field of solar and wind energy. Developing a renewable energy-based power plant in this region can be an effective way to harness its natural resources and contribute to the country's sustainable energy goals. The government has planned many renewable energy-based power plants in Moheshkhali and Matarbari areas.

According to the recent power generation plan of BPDB, about 4,920 MW of coal and LNG-based power plant will be installed at Moheshkhali area in phases within 2031 (draft IEPMP report). To evacuate this massive power from the upcoming Power Plants to the load centers (Dhaka and Chattogram) several high-capacity transmission lines will be required from Moheshkhali towards Chattogram and Dhaka.

The main objective of the project is to construct transmission infrastructure for evacuation of power to be generated from proposed power plants at Moheshkhali and Matarbari and to provide reliable power all over the country. The 765kV Madunaghat - Maheshkhali Transmission Line is a project to construct a high-capacity transmission line in Bangladesh, specifically to connect the power generated at Maheshkhali (Cox's Bazar) to the national grid. It's a key component of the country's efforts to upgrade and strengthen its transmission network and improve reliable electricity access. The line will initially operate at 400kV and is planned to be completed by 2030. The project aims to establish a high-capacity transmission corridor between Chattogram (Madunaghat) and Dhaka, evacuating power from the Maheshkhali region to the national grid. The project includes the construction of a 765kV double-circuit line and related substation extensions. The line will be initially charged at 400 kV. This line is Bangladesh's first 765kV transmission system project and is intended to save land, minimize social impacts, and improve reliability by transmitting high volumes of electricity.

Two studies have been conducted for power evacuation of Moheshkhali Power Hub planned generation: 1) Power System Master Plan 2016 by JICA study team and 2) a Study on an upcoming Power plant in Moheshkhali area by STEAG Energy Services Ltd. It can be envisaged that in addition to 400 kV network, 765 kV systems will also be inevitable for bulk power evacuation from Moheshkhali to load centers.

So, it is mandatory to construct a 765 kV line (initially to be charged at 400 kV) from Moheshkhali – Madunaghat - Bhulta as soon as possible since managing the ROW for new transmission line at the narrow Feni area shall be tough. Depending on the development of Moheshkhali Power Hub generation scenario the whole Moheskahli - Madunaghat - Bhulta 765kV line will operate as an expressed gateway to evacuate power to Dhaka. By that time Moheshkhali - Madunaghat 400 kV double circuit line is inevitable as one coal-based and renewable energy-based plant is expected to be put in operation before 2030. It may be noted that this 765 kV hexa bundled line will be capable

of carrying around 6,000 MW of power complying with N-1 criteria from Moheshkhali. Furthermore, high-capacity lines could be constructed in future as per recommendation of the studies to evacuate power from Moheshkhali area.

With the foregoing in purview, Power Grid has conceived a Project titled, Moheshkhali – Modunaghat 765kV Transmission Line Project and allocated funds for the cost of "EIA/ESIA, IESE, Route Survey, Initial Environmental Examination (ESIA) and Resettlement Plan (RP) for the Project.

3.2 Major Components of the Project

The Madunaghat-Moheshkhali 765kV transmission line project primarily involves the construction of a 765kV transmission line, the extension of existing substations (400kV Bay Extension), and potentially new substation construction. The line itself will likely use high-capacity conductors like the Hexa Bundle ACSR Cardinal. The project also includes feasibility studies, power sector assessments, and environmental impact assessments. Major components of the project are:

(a) 765kV Double Circuit Line:

The core component is the high-voltage transmission line itself comprises of 95.5-km with 272 nos. of tower, designed to carry a large volume of electricity over a significant distance.

(b) Conductors:

The project will likely use high-capacity conductors like the Hexa Bundle ACSR Cardinal, known for its ability to handle high voltage and current.

(c) Support Structures:

These include towers, insulators, and other hardware necessary to support the conductors and maintain the necessary clearance.

3.3 Project Location

Proposed high-voltage 765kV transmission line passes over 02 districts, 07 upazilas, 38 unions, 02 wards and 72 mouzas, comprises of 95.5-km with 272 nos. of tower.

Table 27: Location of the project

District	Upazila	Union	Mouza
Cox's Bazar	Moheskhali	Kalarmarchhara	Kalarmarchhara
			Jhapua
			Younuskhali
			Uttar Nalbila
	Pekua	Ujantia	Kariadia
			Ujantia
		Pekua	Pekua
		Barabakia	Barabakia (Part)
		Taitang	Tetang
		Rajakhali	Rajakhali
		Taitang	Taitang
Chattogram	Banshkhali	Puichhari	Puichhari
		Sekherkhil	Sekherkhil
		Chambal	Pashchim Chambal
		Shilkup	Shilkup
			Mankirchar
	Banshkhali Paurashava	Ward No. 07	Dakkhin Jaldi (Part)
		Ward No. 02	Uttar Jaldi (Part)
	Banshkhali	Saral	Jaliaghata

District	Upazila	Union	Mouza
			Pairang
		Bailchhari	Chechuria
		Katharia	Katharia
			Manik Pathan
		Baharchhara	Maijpara
		Kalipur	Kokdandi
			Gunagari
		Baharchhara	Chapachhari
		Sadhanpur	Sadhanpur
			Bholamara
			Banigram
			Bailgaon
		Pukuria	Hajigaon
			Chandrapur
			Chandpur
			Natmura
			Pukuria
	Anwara	Haildhar	Char Pukuria
		Barakhain	Naidandi
			Barakhain
		Haildhar	Olghar
			Ichhakhali
		Anwara	Bilpur
		Haildhar	Dumuria
		Paraikora	Saitpetua
			Bhingrol
			Paraikora
	Patiya	Kashiaish	Kashiaish
			Pingala
		Ashia	Ashia
		Baralia	Belkhain
			Karttala
			Baralia
			Baraikara
			Perala
		Janglukhain	Ujirpur
			Tiarkul
		Dhalghat	Gairala
			Mukutnait
			Tekota
			Karankhain
			Bagdandi
	Boalkhali	Saroatali	Kanjuri
		Popadia	Bidgram
			Popadia
			Akalia
			Popadia
		Sreepur Kharandwip	Kharandwip
		Charandwip	Charandwip
	Raozan	Bagoan	Bagoan
		Pahartali	Dewanpur
		Bagoan	Gashchi
		Purba Guzara	Purba Guzara (Part)

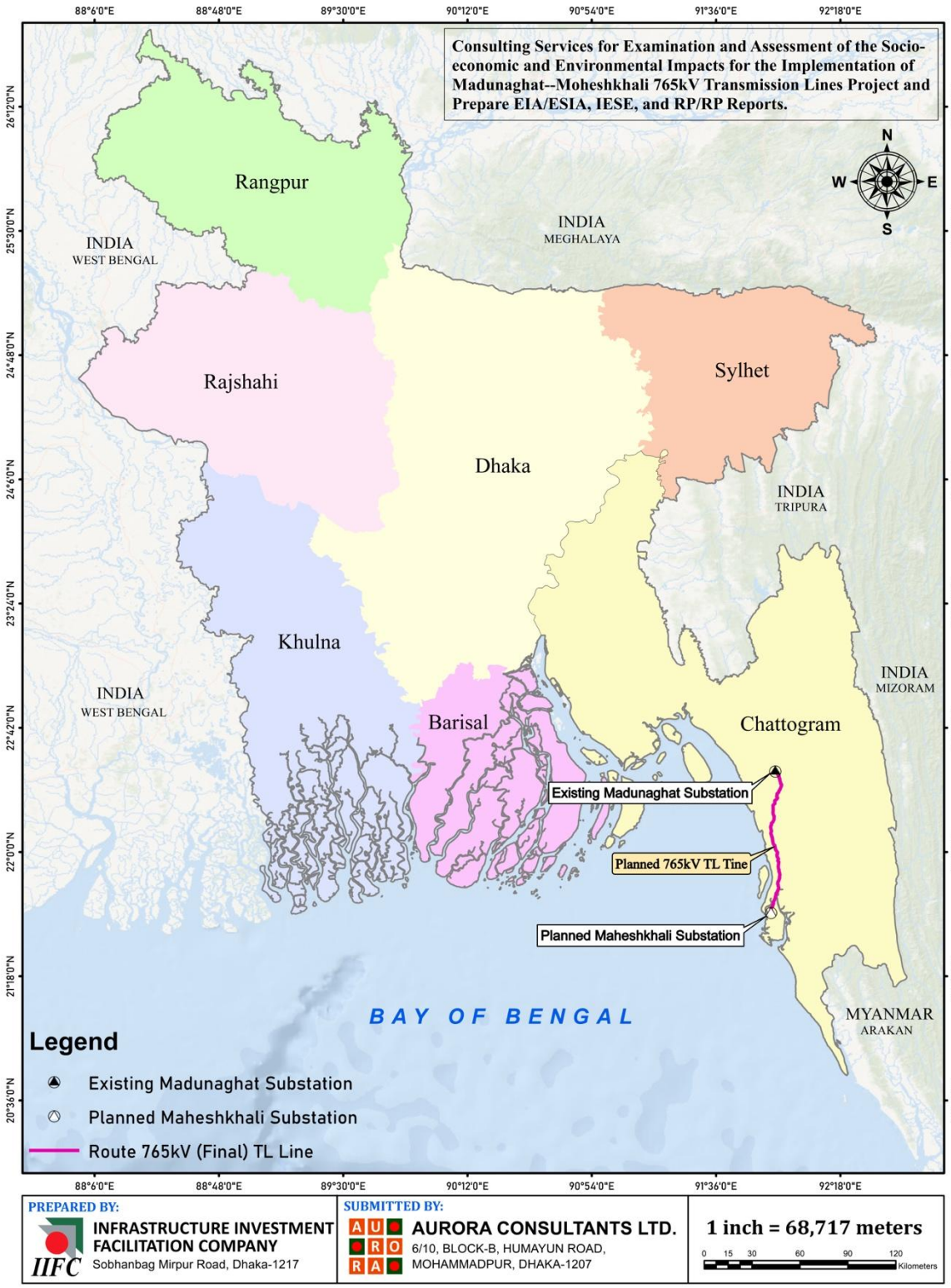


Figure 5: Location of proposed transmission lines

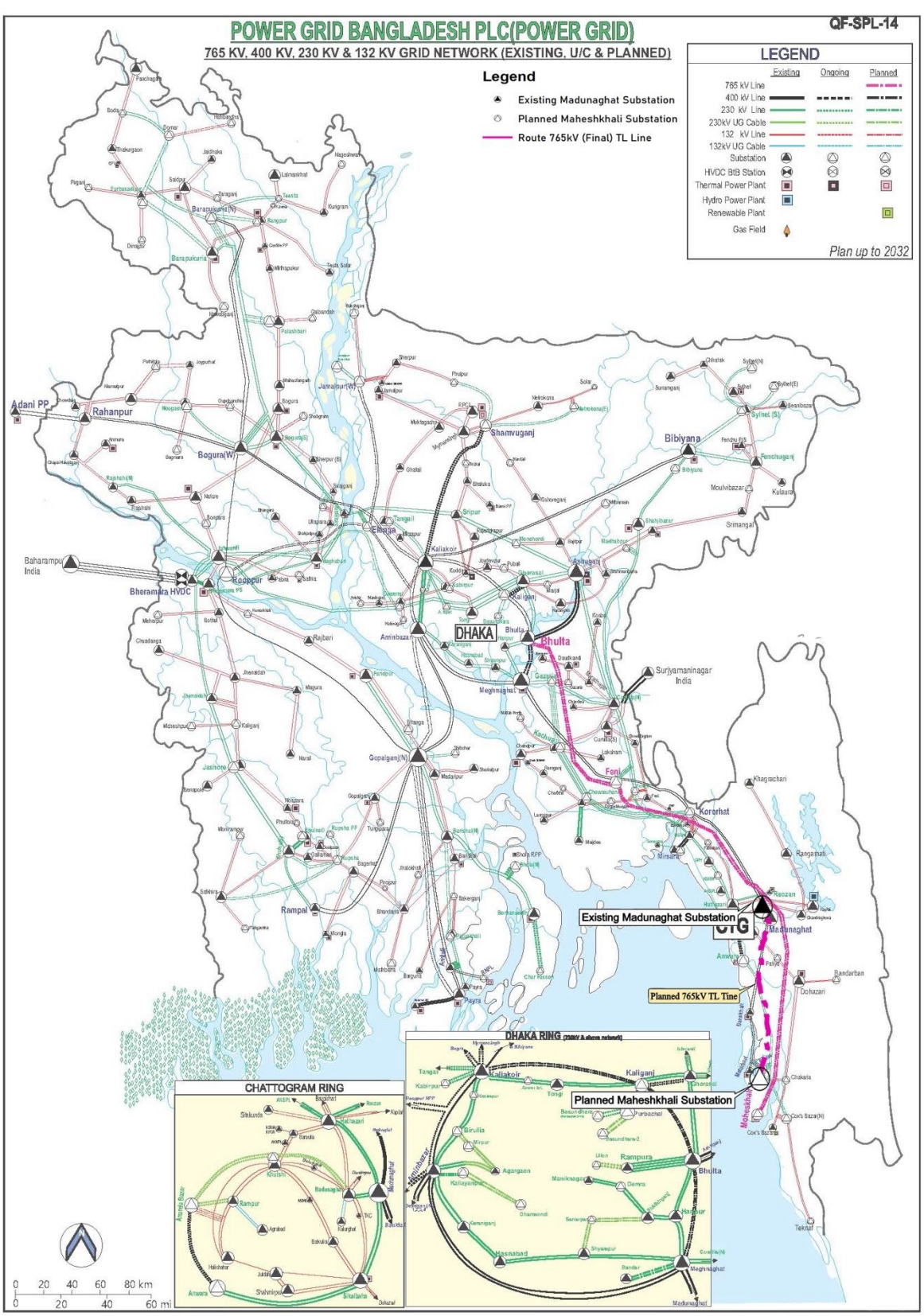


Figure 6: Proposed 765 kV Grid Network of Power Grid in Bangladesh

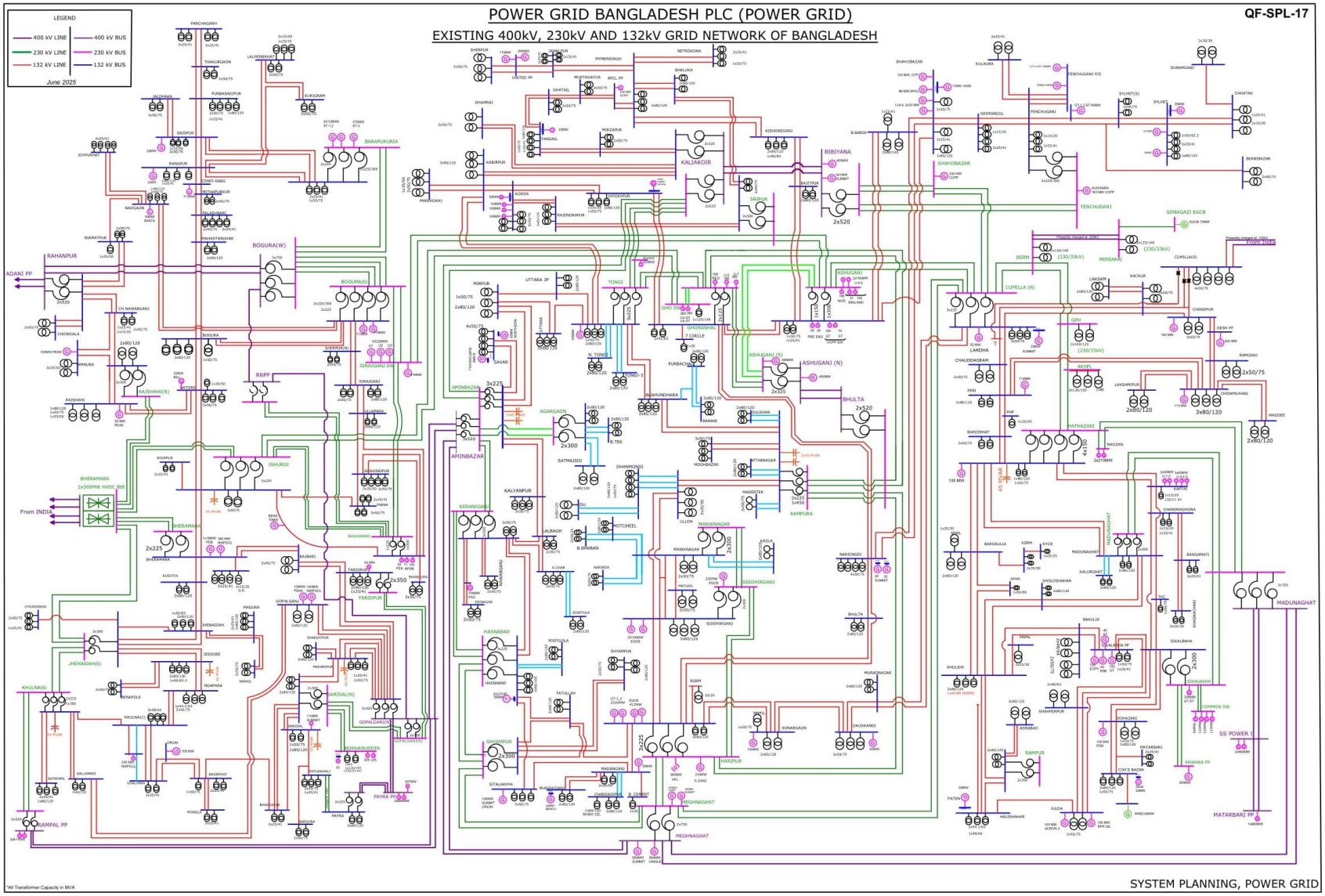


Figure 7: Existing 400, 230 and 132 kV Grid Network of Bangladesh

3.4 Tower Digital Survey

The objectives of the proposed tower topographic/digital survey are—(a) to accurate the depiction of tower site, existing land use, including property, area of land and demarcation of boundary in terms of spatial considerations summary of on-site and off-site objects related to the project (b) to superimpose the tower area on the mauza map in order to identify the landowners. A total of 272 nos. of tower has been surveyed by the team comprises of 95.5-km.

Topcon Hyper GA unit	Ground Control Activities	Auto Level Instrument

The survey has been carried out using Total Station (Leica: 667362 and Colida: KTS442RO) and labelling machine (Topcon: AT-B2) consists of nine manpower for the period of 90 days from December 25, 2024 to March 25, 2025. The equipment was set with respect to the Mother Benchmark (BM) of Survey of Bangladesh (SoB). The coordinates (X, Y) and elevation (Z) of the BM was used for the reference point of Temporary Benchmark (TBM) set at several points of project site. Spot height data was collected at 10m grid due to plain site topography. The collected mauza maps has been digitized and superimposed to get the mauza-wise dag number as well as land classification of the proposed tower site. All necessary object in and around the tower site (i.e., access road, utility network, natural vegetation, canal, households, ponds, etc.) has been considered during the survey.

Table 28: Tower digital survey activities

For survey data acquisition and downloading, a few software and processing units has been used. All data coming from field has been downloaded and processed and quality checked using software. Among the software, Topcon tools, Common Data Set (CDS) and AutoCAD has been used. All the data was imported to AutoCAD format to construct the profile and cross section. Necessary legends of different objects within the surveyed tower site used in the AutoCAD mapping. Moreover, KMZ files using GIS Software generated for the preparation contour map. Details of the tower base area is provided in Annex-III.

3.5 Project Affected Households

According to the tower digital survey and Inventory of Loss (IoL) survey, there is no structure (either residential or commercial) fall/ will be directly affected by the construction of transmission towers. However, within the 70-meter Right of Way (RoW) of the transmission lines, a total of 970 structures were identified. These include 232 pucca, 239 semi-pucca, 374 tin-shed structures, and 13 classified as 'others' (Table 29). Since all of these are single-story structures and located outside the tower footing areas, there will be no requirement for relocation or physical displacement of the affected household.

However, if any changes occur in the transmission line alignment during the construction phase, or if any structures are impacted due to project interventions, the Resettlement Plan (RP) will be revised accordingly by the implementing NGO or consulting firm. The updated RP will incorporate the necessary adjustments, and compensation will be provided in line with the entitlements and policies outlined in this RP. The below tables show the number of structures falling within the right of way (RoW).

Table 29: Status of structures fall under the RoW of T/L

Name of Route	Length (km)	Types of Structures					Total
		Pucca	Semi-pucca	Tin Shed	Katcha	Others	
Madunaghat—Moheshkhali 765kV Transmission Line	95.5	232	239	374	112	13	970

3.6 Status of Land Ownership

A total of 43.47 acres of land is required for the base area of 272 transmission towers. Of this, 43.43 acres have been identified as private land, while the remaining 0.05 acres are government land currently occupied by the Shekherkhil Union Parishad under Banshkhali Upazila in Chattogram District.

Table 30: Status of Land Ownership

Name of Transmission Line	Land requires for Tower Footing	Landownership (Acre)	
		Private	Government Land
Madunaghat—Moheshkhali 765kV Transmission Line	43.47	43.43	0.05

3.7 Key Aspects of Proposed Transmission Lines

The proposed transmission lines would be overhead transmission line consists of 765kV. Changes in the transmission line's route under IEPMP-2023 avoided forest reserves. The impacts were reduced by applying raised chimney foundations for crossing salt farm areas and limiting the towers' height to 100 meters or less near the airport's runway. The following is a summary of the revised status.

Table 31: Main Characteristics of Proposed Transmission Line Route

SL	Attributes	Route Features
A.	**Route Characteristics**	
1.	Route Length (km)	95.5
2.	Route Length in Plain Land (km)	51.2
3.	Route Length along the Forest Land (km)	13.8
4.	Route Length in Salt Farm (km)	30.5
5.	Total no. of Tower	272
6.	Angle Tower	88
7.	Suspension Tower	184
8.	Difficulty of Implementation with respect to trenching/ excavations	Medium
9.	Meet present demand	Yes
10.	Meet future demand	Yes
11.	Power system growth	Yes
12.	Implementation expense	Moderate
B.	**Environmental Impact**	
1.	Adjacent to Town Area (km)	30
2.	Forest Involvement (km)	0
3.	Distance from Reserve Forest (km) Chunati Wildlife Sanctuary (CWS)	2 to 3
4.	Ecologically Critical Area (ECA)	No
5.	Bird habitat and declared IBA	No
6.	Construction related impacts (such as dust, noise, air emissions, OHS and public safety issues)	Moderate
C.	**Major Crossings**	
1.	River Crossings (Nos.)	3 (Karnaphuli, Sangu and Matamuhuri)
2.	Transmission Lines (Nos.)	3
3.	Distribution Lines	11kV and 33kV
4.	Railway Crossings (Nos.)	1 (Dhaka-Cox's Bazar)
5.	National Highways (Nos.)	4
6.	Reserve Forest Crossing (Nos.)	0
7.	Gas Pipeline (Nos.)	5
8.	Gas Pipeline Crossing Proposed Tower area (Nos.)	0
D.	**Social Impact**	
1.	Tower on the Road (Nos.)	0
2.	Tower on the Graveyard (Nos.)	0
3.	Tower on the Structure (Nos.)	0
4.	Structure within RoW-70m (Nos.)	829 (approx.)
E.	Economic Aspect	Reduced by 9.5 km by straightening the route (advantageous due to reduction in construction quantity and time)
F.	Environmental aspect	Bypass the entire forest protection area (increased environmental conservation impact)
G.	Social Aspect	Due to the continuous development of residential areas, the project will inevitably pass through some scattered

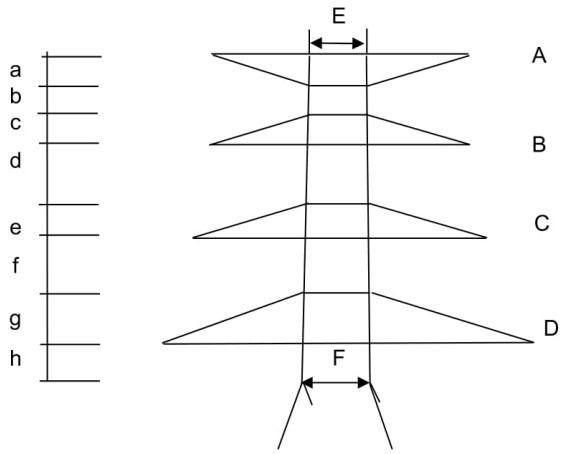
SL	Attributes	Route Features
		residential areas (reducing social impact by avoiding densely populated areas)
H.	Technical Aspect	Design must consider coastal areas, areas adjacent to the runway of the airport, and salt farm areas (impact reduction and response may be possible via engineering designs)

Source: IIFC ESIA Study, 2025; Feasibility Study, 2024

The following summarizes the technical feasibility analysis

Table 32: Summary of Technical Analysis

Field	Analysis Content	Analysis Result
Background and Necessity of Project	• Necessity of 765 kV Transmission line construction	• Requires a grid system that can transport large amounts of electricity by large-scale power generation plans m southern Chattogram • Due to the development of many residential areas, a single line 765 kV is valid instead of two to three 400 kV Lines.
Review of Transmission Line Route	• It is necessary to select a line route for the 765 kV transmission line based on bypassing densely populated residential areas and forest protection areas due to continuous development in the project area.	• Complete avoidance of possible obstacles through consultation with the project execution agency of the recipient country
Basic Design	• Design changes for coastal passage of the line route due to bypassing residential areas and forest protection areas • Need for measures to address increased salt farm sections	• Change the salt pollution design standard from the existing Medium to Heavy and reflect it in the design • The salt farm section is reinforced with a Raised Chimney foundation and reflected in the design
	• Design of equipment and materials	* Transmission ○ Tower: lattice steel ○ Conductor: ACSR/AW 480 mni ○ Cardinal 6B ,, ○ Insulator: Porcelain Insulator 210kN Fog, 300kN Fog & Normal * Civil Engineering ○ Normal area: Pile foundation ○ A salt farm area: Raised Chimney Foundation
Review of the Project Implementation Plan	• Construction period	• A minimum construction period of 60 months is required considering 4 months of rainy season per year
	• Reviewing the employment plan of consultants	• Evaluate participating engineers by dividing the consultant service into the 1st stage basic design and bidding support and the 2nd stage construction supervision service



Unit : mm

TYPE DIMEN.	7DL	7D1	7D25	7D45	7D60	7DT25
A	23,000	23,000	26,000	26,000	26,000	30,000
B	34,000	34,000	24,000	24,000	24,000	30,000
C	35,000	35,000	25,000	25,000	25,000	29,000
D	36,000	36,000	26,000	26,000	26,000	27,000
E	3,400	3,400	3,600	3,800	3,800	3,800
F	6,300	6,300	7,300	7,500	7,500	7,600
a	2,500	2,500	4,000	4,000	4,000	4,000
b	-	-	4,000	4,000	4,000	4,000
c	3,500	3,500	4,000	4,000	4,000	4,000
d	13,500	13,500	12,500	12,500	12,500	13,000
e	3,500	3,500	4,000	4,000	4,000	4,000
f	13,500	13,500	12,500	12,500	12,500	13,000
g	3,500	3,500	4,000	4,000	4,000	4,000
h	7,000	7,000	7,000	7,000	7,000	7,000
a -> g	40,000	40,000	45,000	45,000	45,000	46,000
a -> h	47,000	47,000	52,000	52,000	52,000	53,000
Double Slope(%)	26	26	30	30	30	30
Std.Tower Height	**80,000**	**110,000**	**80,000**	**80,000**	**80,000**	**80,000**
Base Width	14,880	22,680	15,700	15,900	15,900	15,700

Maximum Tower Base Widths

Tower Type	Std. Height	Max. Base Width (m)							
		Std.	E4	E8	E10	E12	E15	E18	E20
7DL	80.00	14.88	15.92	16.96		18.00	18.78	19.56	20.08
7D1	110.00	22.68			25.28				27.88
7D25	80.00	15.70	16.90	18.10		19.30	20.20	21.10	21.70
7D45	80.00	15.90	17.10	18.30		19.50	20.40	21.30	21.90
7D60	80.00	15.90	17.10	18.30		19.50	20.40	21.30	21.90
7DT25	80.00	15.70		18.10					

Figure 8: 765kV Tower Skeleton Diagram for Madunaghat – Moheshkhali T/L

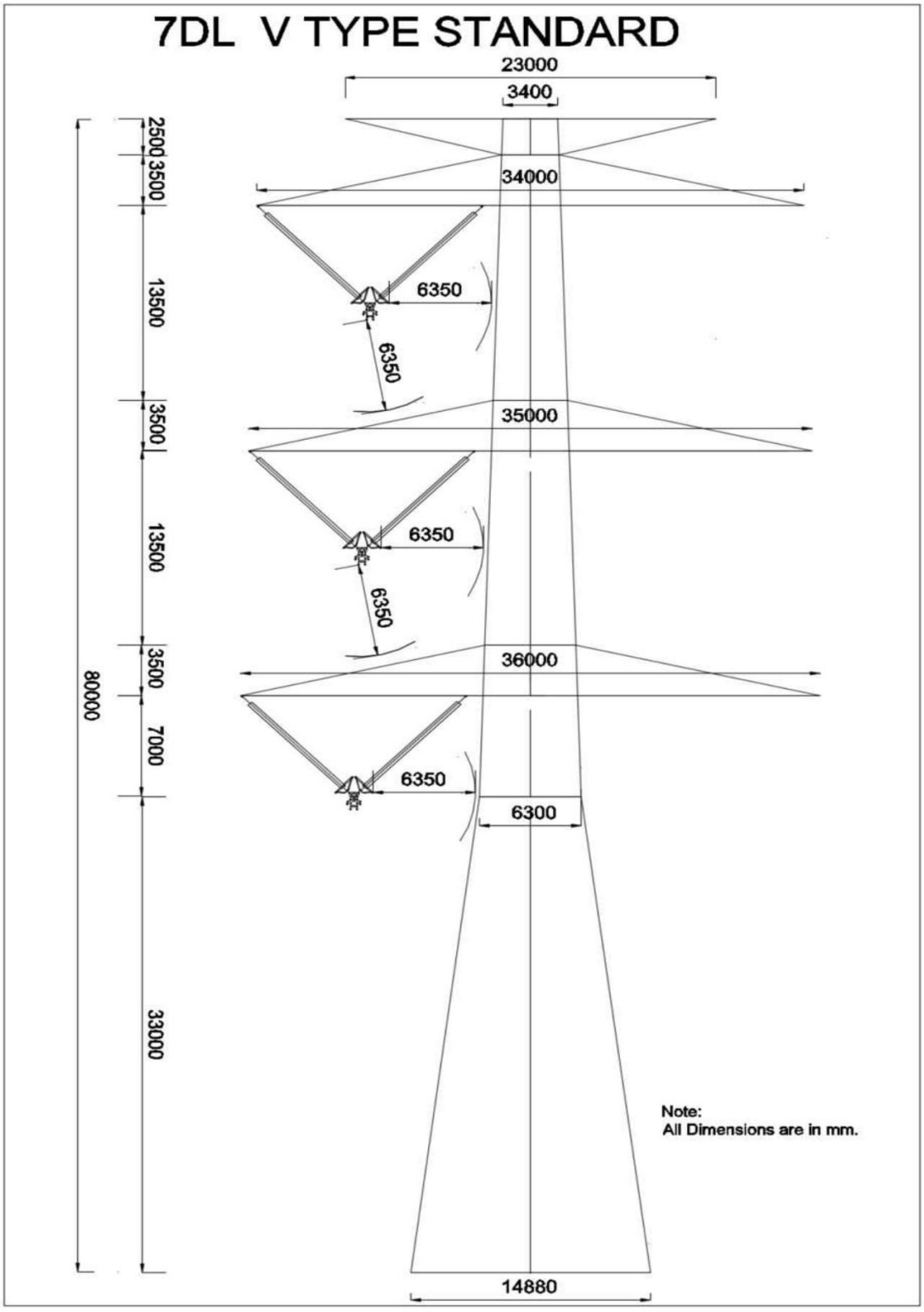


Figure 9: Schematic Drawing of 7DL V Type Standard 765kV Tower

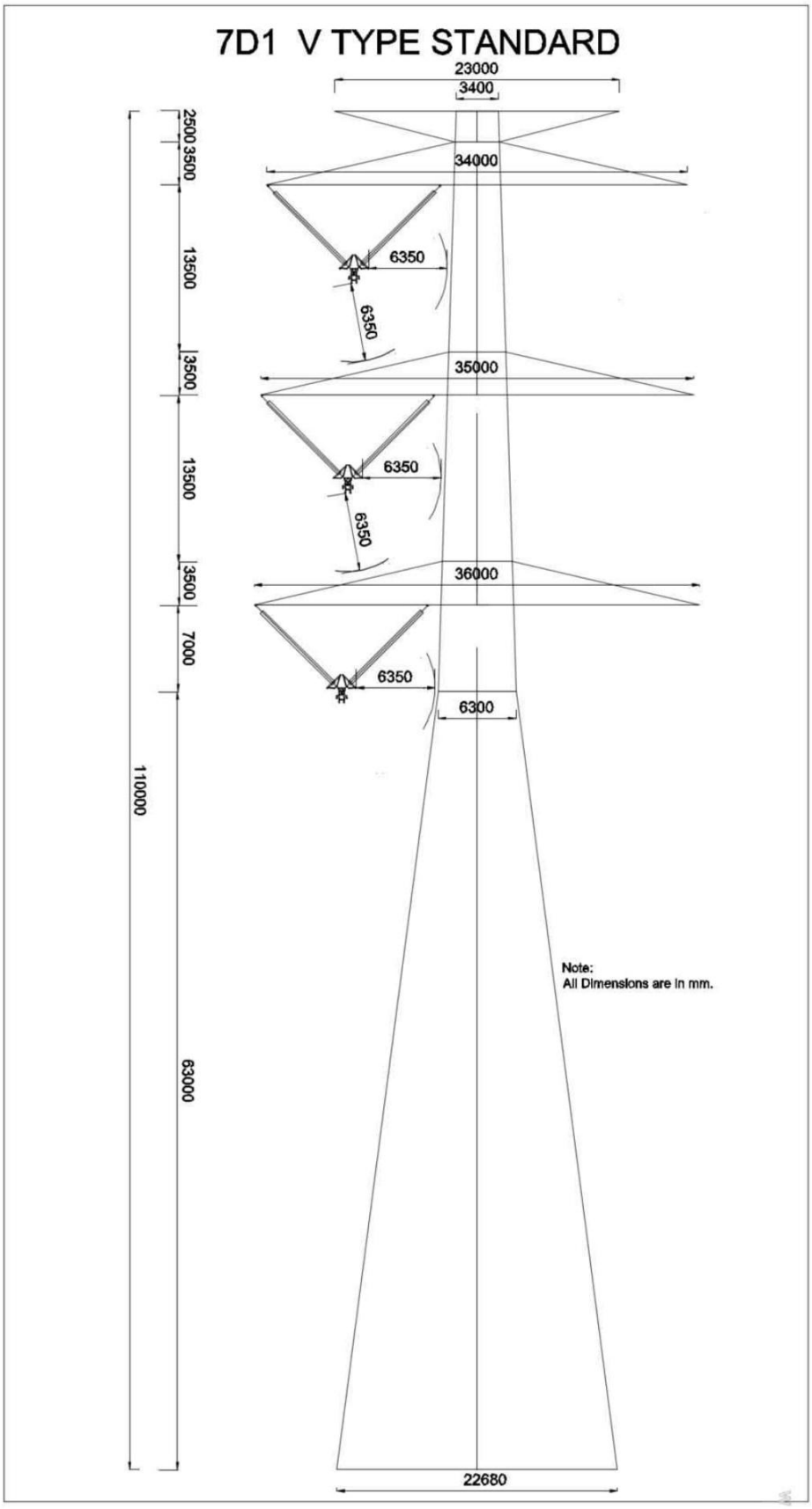


Figure 10: Schematic Drawing of 7D1 V Type Standard 765kV Tower

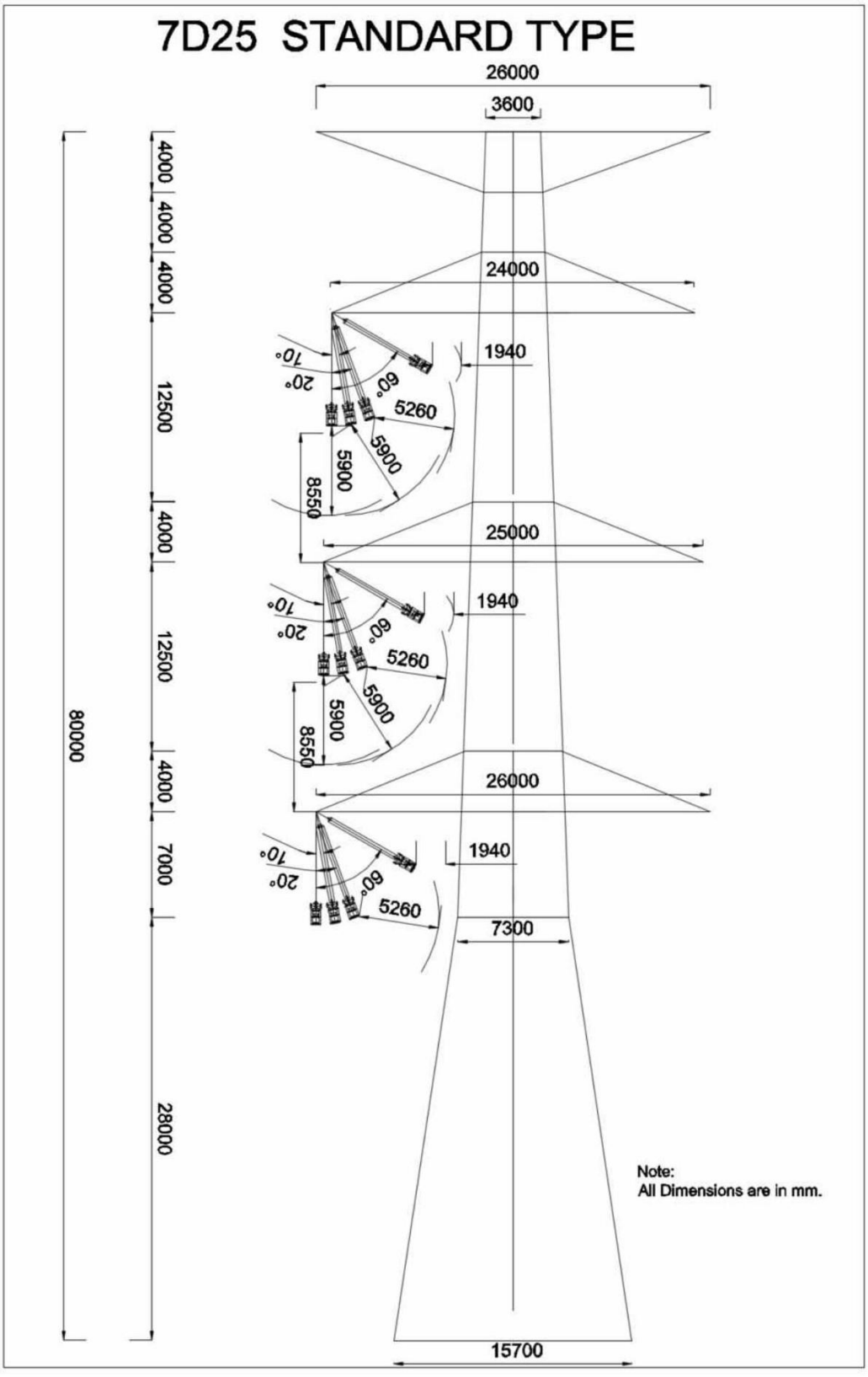


Figure 11: Schematic Drawing of 7D25 Type Standard 765kV Tower

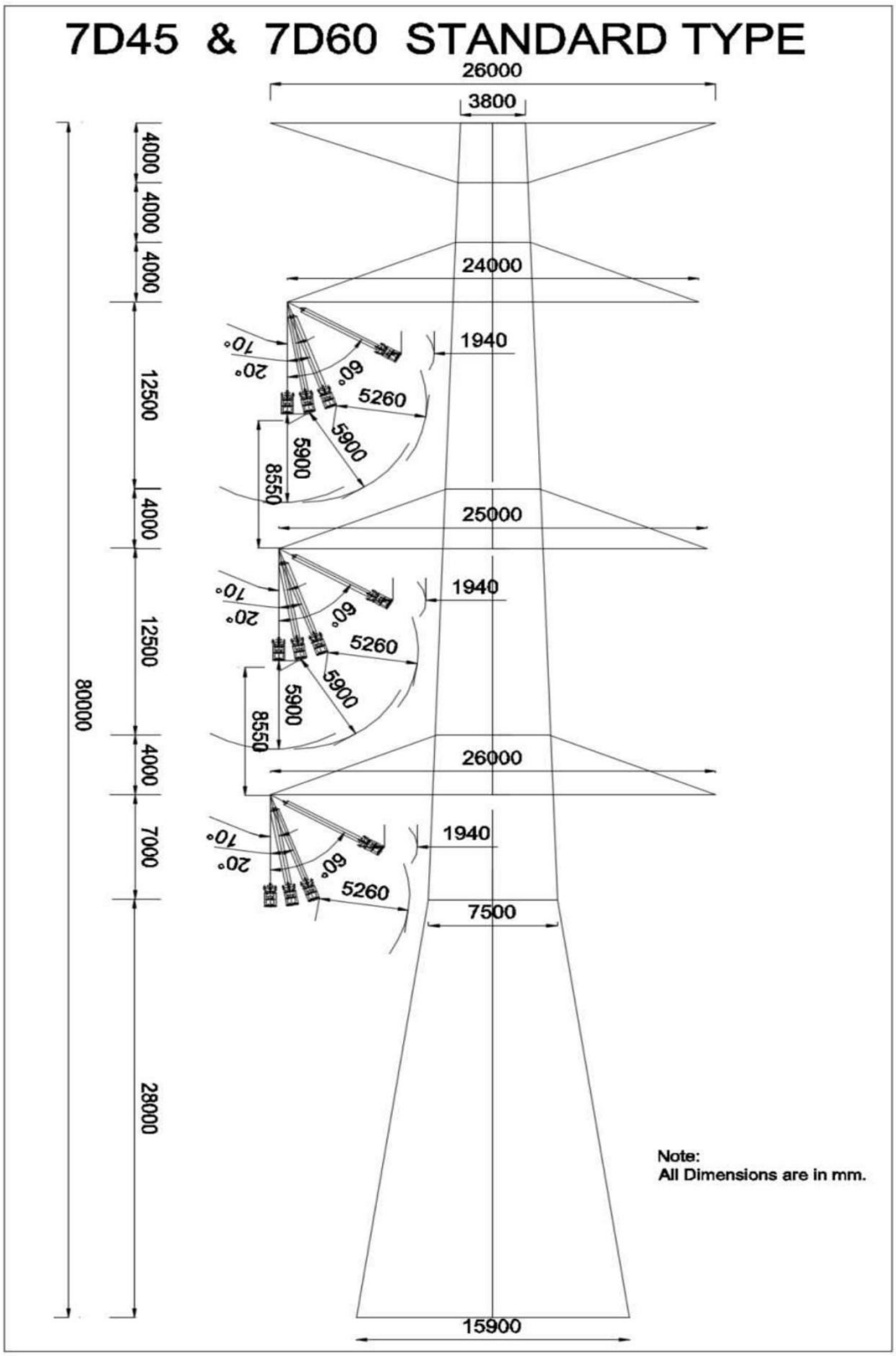


Figure 12: Schematic Drawing of 7D45 and 7D60 Type Standard 765kV Tower

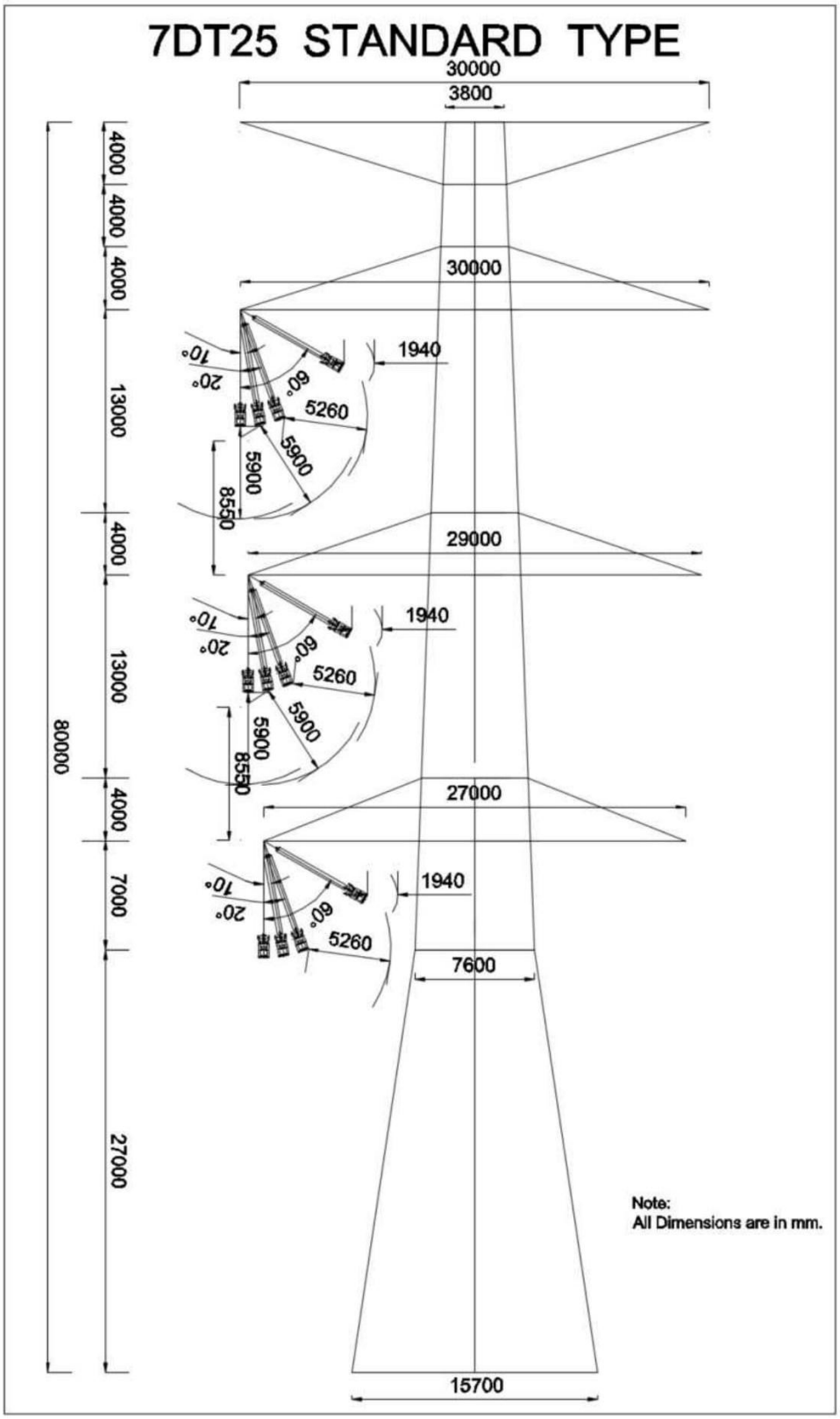


Figure 13: Schematic Drawing of 7DT25 Type Standard 765kV Tower

3.8 Construction Activities

The phase wise major activities of construction work in transmission line is stated in the Table 33.

Table 33: Phase-wise construction activities

Components	Activities		
	Pre-construction	During Construction	Post construction/ Operation period
Overhead Transmission Line (OHTL)	Check (Route) survey	Contractor and manpower recruitment	Regular clearing of RoW
	Tender Documents preparation	Establishment of construction camps for workers and transportation to work site (if required);	Operation and maintenance (O&M) of OHTL
	Plans for OHTL construction activities such as tower erection, conductor stringing, connection to substation, obtain clearance/permissions, utilities shift, etc.	Establishment of temporary access tracks	Dealing with accidental health and safety related to O&M of OHTL
		Clearing of RoW of OHTL route	
		Establishment of temporary material storage areas and work sites for OHTL components and construction equipment;	
		Civil works (foundation works, reinforced cement concrete (RCC) works etc.);	
		Provide compensation to land owner for tower footings land, and tower erection	
		Overhead conductor stringing;	

Source: Feasibility Study of the Project

3.8.1 Construction Related works for Transmission Lines

Site Preparation

Tower locations shall be cleared of vegetation prior to construction of the towers. Access roads may need to be upgraded or new roads constructed to accommodate construction vehicles and equipment access to each tower site.

Piling Work

The basement of the lattice tower will be piling foundation. There will be piles and at the top, a pile cap in each leg of the tower. For piling work a boring will be made in the soil using drilling rig. Bentonite Slurry or steel tube will be used to stabilize the bore hole. Reinforcement cage will be placed and consequent concrete casting will be performed. For pile foundation, at least 3 piles and mostly 4 piles are cast in general. The number and depth of pile will depend on the results of geotechnical investigation.

Excavation

After the completion of piling work, the top soil of the piles will be excavated up to specified depth. The excavation work could be done using local instrument or using excavator.

Pile Cap Casting

At the finishing of excavation, top and bottom reinforcements will be placed. Then concreting of pile cap will be performed. The pile cap transfer load to the sub soil through the piles.

Tower Erection

The steel sections of the tower will be joined by bolt to erect the tower. Crane may be used to lift the steel sections at different elevation.

Figure 14: Placing steel ring bunds

Figure 15: Welding of reinforcements

Figure 16: Tower Pilling Work

Figure 17: Pile Cap Reinforcement

Figure 18: Striping the tower footing with steel

Figure 19: Providing detail reinforcements

Figure 20: Casting CC into tower foundation

Figure 21: Placing Tower on its foundation

Electrical Works

Installation of equipment will include circuit breakers, transformer, lightning arrester, panel boards, batteries and battery chargers' insulators, current Transformer, Potential Transformer etc. After completion of the building, all equipment will be installed at the substation as per design specification and standard. For this project, all local materials will be used for civil construction, and mechanical and electrical items would be foreign. Therefore, use of domestic materials will be less; only local materials like bricks, sand, cement, rods, etc. will be used for the installation works. Transformers are heavy equipment. Therefore, the transportation of such equipment may require grading of river embankment and skidding through open field. Compensation may be provided to the land owners who would be affected.

Erection of Tower

The towers will be constructed to take the load of the tower itself, conductors, accessories as well as wind load and earthquake load. The towers in paddy fields will have proper clearance to maintain sag (lowest point on line). At homesteads, if any, the sag will be maintained as per standards. Guard structures for OHL may be required in certain locations.

Figure 22: Tower Erection Work

Figure 23: Tower Erection Work

Drawing of Transmission Line

The transmission line will be drawn keeping suitable clearance at all locations. During stringing work, the lowest sag point will be maintained as per approved drawing and design. Stringing under OHL activities are but not limited to pilot line, conductor, pulling, sagging, splicing, removing rollers, final insulators, etc.

Figure 24: Conductor Stringing

3.9 River Crossing Procedures of Transmission Lines

River Crossing involved in any transmission line, is most important link of the line. It has to be safe & sound from design considerations to take care of field conditions, vagaries of nature such as cyclones/storms, whirl winds, flood & change of course of rivers etc.

The major River crossings should be done on Suspension Type Towers, suitably designed for all wind conditions i.e., for transverse load incorporating wind load depending upon the height of the tower and upon the height of clamping point of Conductor and Earth wire, Vertical load, and longitudinal load including the effect of diagonal wind (at 45°) load conditions. The 'Anchor Towers' designed for Dead-end conditions should be provided on both the sides of crossing. The main points considered for design of river crossing and anchor towers are described below:

- The normal Transmission Line Towers are designed with the assumption that wind would be acting on conductor, Insulator & tower structure in longitudinal transverse direction. But,

for very high towers/structures of river crossing, the load on towers is evaluated after taking into account height factor and basic wind pressure etc. The towers for river crossing should be designed for diagonal wind load conditions also, which is an additional feature to take care of high velocity winds during severe storms/cyclones etc. Behavior of wind will, however, depend on the river crossing locations and the profile of crossing.

- The towers are so designed that the minimum factor of safety of individual member as well as overall structure is not less than 2.5.
- Shielding angle is; 8° for 765 kV towers.
- Overload factor for vertical loads is taken as 1.29
- The wind on, towers is assumed to be acting at an angle to the line which may produce the maximum combined effect of conductor and tower loadings in the tower members.
- Longitudinal load under broken wire condition due to power conductor and ground wire for Rx towers is taken as 100% of the tension of conductor and ground wire at 32°C with no wind. This is multiplied by Impact Load Factor of 2.65.

Broken wire conditions should be assumed as follows:

- **Suspension Towers (Rx Towers)**: Ground wire or any one conductor broken whichever is more stringent for a particular' member in the tower
- **Anchor Towers**: Dead-end type towers designed for any combination of ground wire and two conductors on the same side or three conductors on the same side and on the same span whichever is more stringent for a particular member in the tower.

Guideline for Preparation of River Crossing

The river crossing proposal should be submitted from the field covering following details: —

D. Profile:

- Profile of river crossing and Anchor towers along with position of adjacent towers of the line of either side of the river crossing.
- The profile should clearly indicate reduced level of HFL mark, Rx and Anchor tower locations, nearby roads, bunds/embankment, etc. if any.
- The year of HFL mark and source of information.
- Sag curve of 75° and no wind for each span from anchor-to-anchor towers.
- Clearance of lowest power conductor from HFL mark for maximum sag calculated at 75° and no wind. The minimum clearance required is 9.9 meters for 765kV lines for non-navigable rivers.

E. Plan:

- Plan showing Rx Towers, Anchor towers, adjacent tower with span, roads, bridges, bunds and other important structures etc.
- Type of soil and its bearing capacity.
- Meandering zone of the river.
- Whether Rx and/or Anchor towers will remain normally submerged in water, should also be indicated clearly.

F. Calculations for Uplift:

On Anchor towers shall also be submitted on the profile & plan sheet itself.

G. Narrative:

Narrative about the geographical conditions of the area and whether there would be any problem for right of way etc. should also be submitted along with the proposal.

3.10 Crossing Wetland/Waterbody

Proposed transmission line shall pass various rivers and canals. Crossing of major rivers are presented below. There are no government declared specific wetlands and/or beels or haors fall under the RoW of transmission lines. Standard guidelines, mentioned above, shall be followed while crossing these rivers and khals. However, it can be concluded that navigation and natural water flow shall not be disturbed due to the construction of transmission lines.

Table 34: Proposed transmission lines crossing over the rivers

SN	Rivers	Crossing Width	Location of Crossing Section AP-AP
1.	Karnaphuli River	512.2 m	257-258
2.	Sangu River	374.5 m	173-174
3.	Matamuhuri River	436 m	37-38

Source: IIFC Field Survey, 2024-25

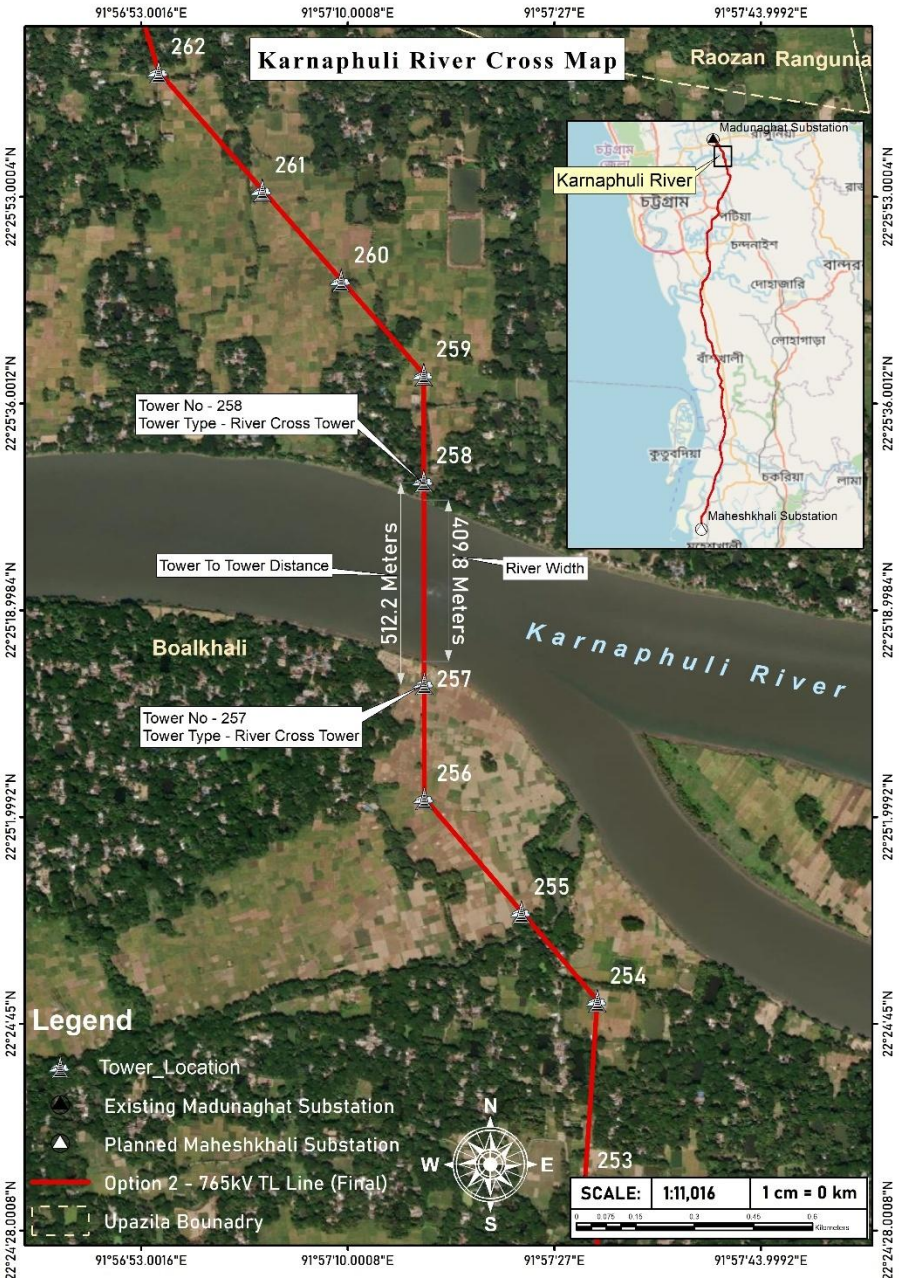


Figure 25: Crossing over the Karnaphuli River

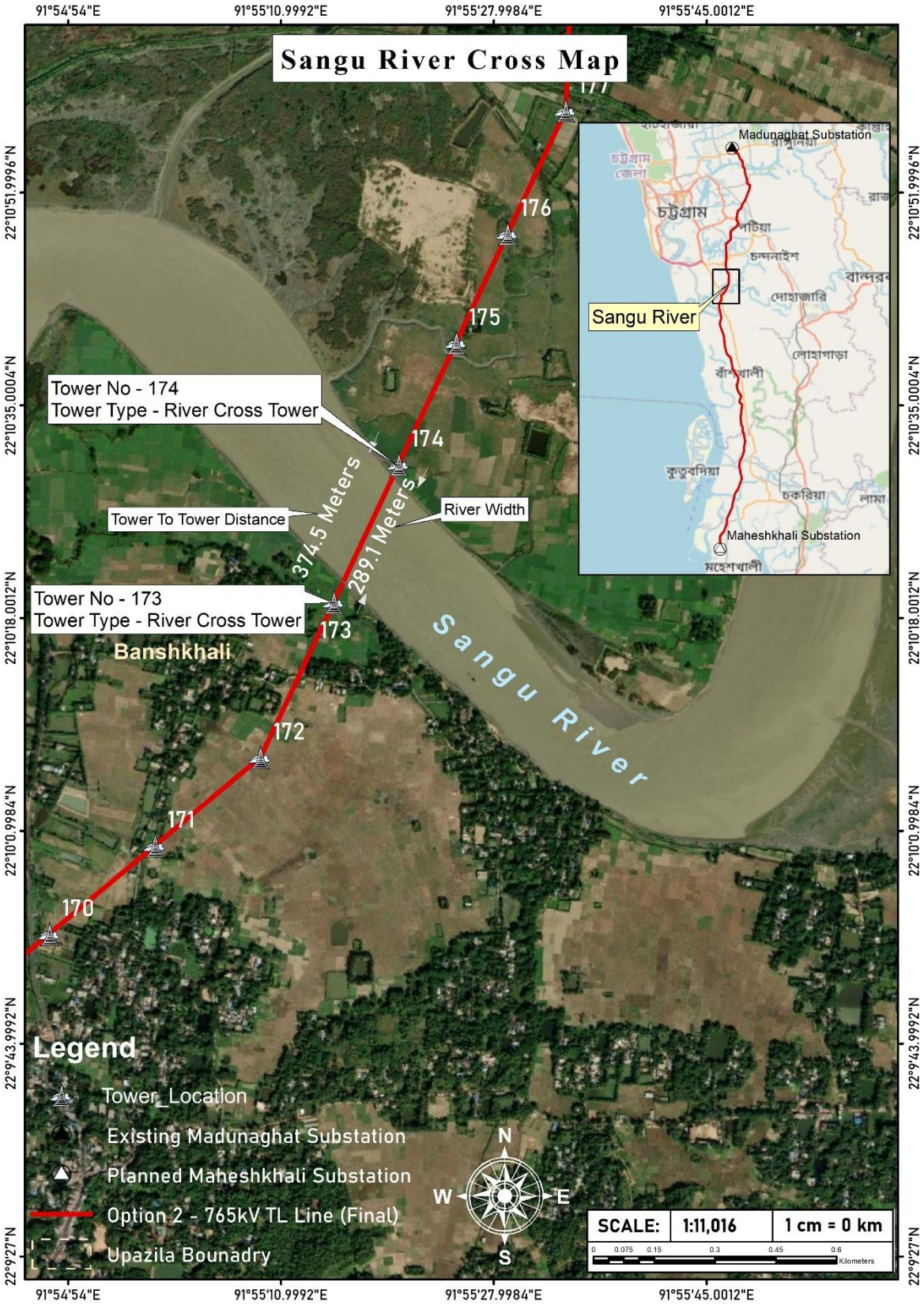


Figure 26: Crossing over the Sangu River

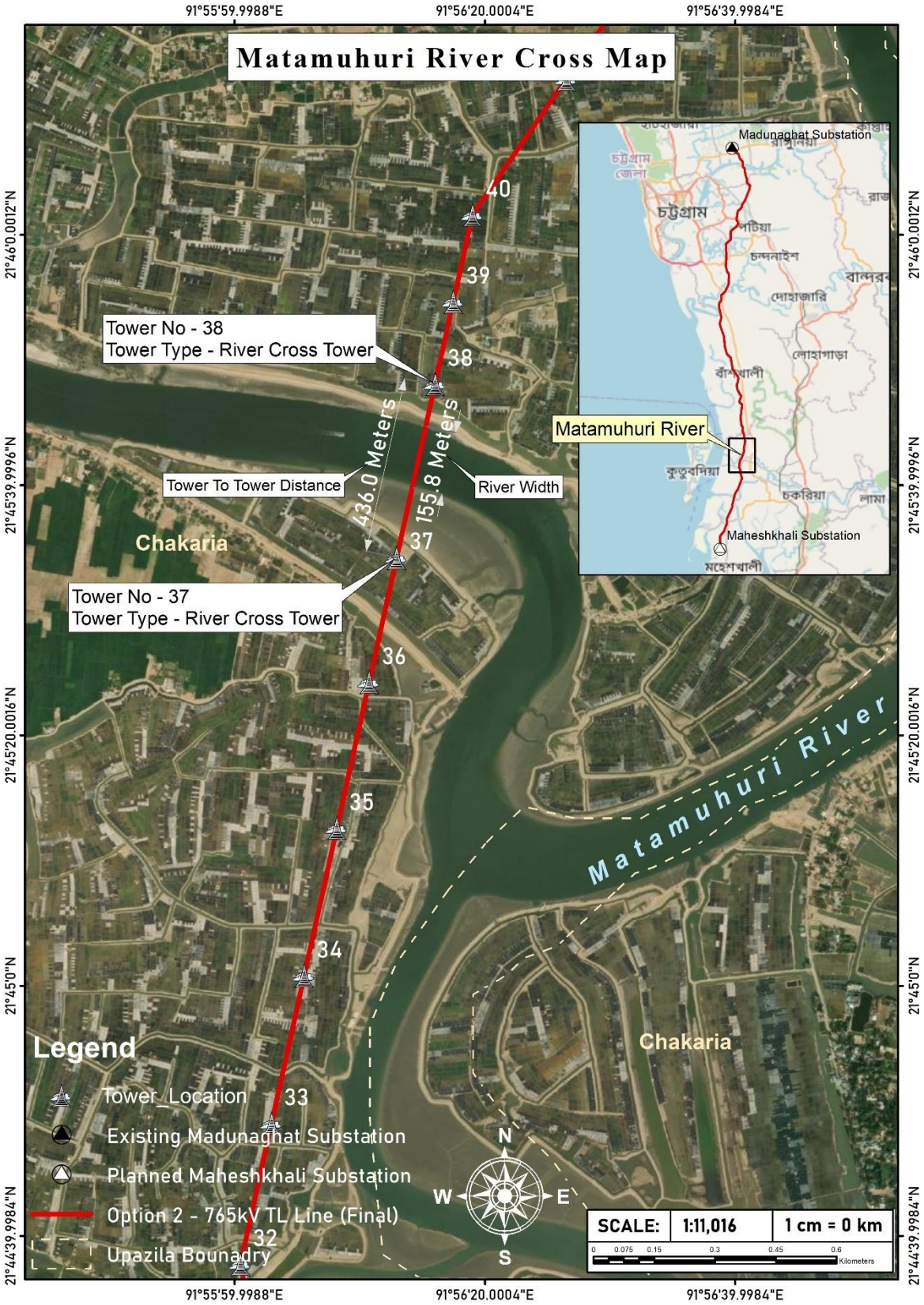


Figure 27: Crossing over the Matamuhuri River

3.11 Construction Equipment and Materials

Equipment required for construction of the proposed transmission lines will include bulldozer, motorized water truck, boring machine, sand carrying truck, concrete mixing truck, crane, fork lift, cable drum, trailer, boom truck, drum puller, sagging dozer, static wire reel, trailer and dump truck. Construction equipment requirements for substations are auger, backhoe front loader, concrete truck, water truck, dump truck, excavator, trailer, crew truck/car hauler, skid steer loader, batching plant, drill rig truck with trailer, compressor, construction fork loader, vibrating roller, light pickup, crane, bucket truck, boom truck, trailer, fork lift, and overhead line rig.

The construction materials required for bay extension and transmission line construction include cement, coarse and fine aggregates, sand, reinforcement steel, rough sawn timber, bellies and steel-bar, checker-plate, anchor-bolts, and electric cables. Construction equipment and materials may be kept on lands which will be requisition through DC or lease land with negotiated settlement which may cause temporary impacts to the land owners and share croppers.

3.12 Construction Waste and Hazardous Materials Disposal

Hazardous materials and waste produced during construction works need proper storage, handling, in accordance with local regulations. In order to ensure the proper management of these materials, a certain place within the project boundary will be selected where the materials would be deposited temporarily and then moved within the shortest possible time. Basically, the dumping zone will be selected near the boundary line where the main project entrance would be located for easy transport of these materials away from the site. Dumping site near the entrance assures easy loading and unloading of those disposed materials into the disposal carrying vehicles. In case of the project boundary being comparatively small and therefore, not having the available space for waste disposal, then disposal site should be selected beside the project location with the approval of the appropriate authority.

3.13 Construction Manpower and Work Schedule

Power Grid usually constructs the transmission line and substation through engineering, procurement and construction (EPC) contractors. The EPC contractor will engage skilled manpower as per their requirements to complete the work within given timeline. During different phases of construction work, excavators, pile-workers, foundation and superstructure laborers, carpenters, electricians, heavy equipment operators, ironworkers, masons, plasterers, plumbers, pipefitters, sheet metal workers, steel fixers, and welders will be engaged whenever necessary. The technical staff will include civil engineers, electrical engineers, supervisors, and technicians of various trades. The unskilled labor will be hired from the local community to avoid labor influx.

3.14 Source of Power and Its Impact Analysis

The Madunaghat-Moheshkhali 765kV transmission line is a key part of Bangladesh's efforts to strengthen its power transmission network and ensure reliable electricity access, particularly in the Chattogram and Dhaka regions. The primary source of power will be electricity generated in the Chattogram Division, including from the planned Matarbari Ultra Super Critical Coal-Fired Power Project, and transmitted to the Dhaka Metropolitan Area. The project aims to upgrade and strengthen the transmission network to meet the growing demand for electricity and facilitate the reliable delivery of power from new generation sources.

Sources of Power:

(a) Matarbari Ultra Super Critical Coal-Fired Power Project:

This project, located in Cox's Bazar, is a major component of the Southern Chattogram Region's infrastructure development and is expected to contribute significantly to the power supply.

(b) Other Power Plants in Chattogram:

The Chattogram Division is expected to see further expansion of power generation capacity, including from imported fuels like coal and natural gas, as outlined in the Power System Master Plan 2010.

(c) Diversification of Energy Sources:

The project acknowledges the need to diversify away from reliance on domestic natural gas for power generation due to growing demand and potential resource limitations.

Impact Analysis:

(a) Improved Grid Reliability:

The 765kV line is designed to enhance the stability and reliability of the transmission network, ensuring a more consistent and dependable electricity supply.

(b) Support Economic Growth:

By facilitating the transmission of power to the Dhaka Metropolitan Area, the project aims to support economic development in key industrial and commercial centers.

(c) Reduced Dependence on Gas:

The project contributes to the diversification of energy sources, potentially reducing reliance on domestic natural gas and mitigating the risk of supply shortages.

(d) Environmental Considerations:

The project includes an Environmental and Social Impact Assessment (ESIA) to address potential environmental concerns associated with the transmission line construction and operation.

(e) Economic Evaluation:

Studies have examined the techno-economic aspects of the project, including power transfer capacity, line parameters, and potential cost-effectiveness.

In essence, the Madunaghat-Moheshkhali 765kV transmission line project is a crucial step in Bangladesh's efforts to modernize its power infrastructure, ensuring a more reliable and sustainable electricity supply to meet the nation's growing energy needs.

3.15 Temporary Facilities and Associated Facilities

Temporary Facilities

The contractor’s temporary facilities including construction camp, labor camp, material storage yard, and machinery/yard are established by the contractor near the tower premises. Construction of towers is a complicated and time-consuming work (generally it takes 2-3 years) therefore site engineers and construction workers engaged by the EPC contractor have to stay close to the construction site. Camp with all necessary facilities like sanitation, safe water supply, and power supply are established for the workers. Site of camp should not be within nature reserves/protected areas.

Associated Facilities

The Madunaghat-Moheshkhali 765kV transmission line project includes associated facilities to enhance power transmission capacity and reliability. These facilities include the 765kV transmission line itself, extensions to the Madunaghat and Bhulta 400kV substations, and potentially new 765kV

substations at both locations in the future. The project aims to facilitate the evacuation of power from Moheshkhali and Chattogram to Dhaka and other parts of the country. Key associated facilities are:

(a) 765kV Transmission Line:

The core infrastructure, initially charged at 400kV, will be upgraded to 765kV to handle increased power flow.

(b) 400kV Substation Extensions:

Both Madunaghat and Bhulta substations will be extended with additional 400kV bays to accommodate the increased power flow and facilitate integration with the existing grid.

(c) Potential 765kV Substations:

While not initially included, the project may involve the construction of new 765kV substations at Madunaghat and Bhulta in the future to further enhance capacity and grid stability.

(d) Consulting Services:

The project includes consulting services for feasibility studies, environmental and social impact assessments, and project preparation assistance.

3.16 Development Needs and Aspirations of the Community along the RoW

The development needs and aspirations of communities living along the right-of-way of power transmission lines often revolve around balancing the benefits of reliable electricity with the desire for safe and productive land use. These communities may seek compensation for land taken or affected, improved infrastructure like roads and drainage, and access to resources that enhance their livelihoods. They also often express concerns about potential health and safety risks associated with living near high-voltage power lines and the visual impact of the infrastructure.

(a) Economic Development:

Communities, specifically, landowners of towers will get compensation as per Electricity Rules 2020 (amended 2022) as well as will get compensation against loss of crops, trees, etc. within the RoW. Vulnerable households will get allowance, if any, as well as livelihood training from the project. They may, also, aspire to create businesses or access employment opportunities related to the power transmission infrastructure or the broader energy sector.

(b) Improved Infrastructure:

Access to improved roads, drainage, and other basic infrastructure can significantly enhance the quality of life for residents along the right-of-way (RoW). For that, clear and open communication, and coordination between different local government institutions (e.g., LGED, Union Parishad, power distribution entities, etc.) and the community is vital for addressing the concerns. Moreover, investing in infrastructure projects that benefit the community can help mitigate the negative impacts of the power lines.

(c) Safety and Health:

Addressing concerns about potential health risks associated with electromagnetic fields (EMF) and ensuring the safety of the area, especially for children, is crucial. In addition, fair and equitable compensation for land use, property damage, and livelihood disruptions is crucial.

(d) Environmental Considerations:

Communities may want to ensure that the RoW is managed responsibly, with minimal impact on the surrounding environment and natural resources. Implementing measures to protect the environment and natural resources is essential.

(e) Community Engagement:

Meaningful participation in the planning and decision-making processes related to the power transmission lines is essential for addressing community needs and aspirations effectively. However, involving community members in the planning and design phases can help identify priorities and potential solutions.

3.17 O&M Activities for Transmission Lines

Operation and Maintenance (O&M) activities of transmission lines are largely dependent on built-in monitoring system of the overhead and underground cables which allows detecting short circuit or open circuit conditions. Short circuit generally occurs when cable insulation and or cable splice works are compromised and the conductors get exposed. Open circuit occurs in case of breaking of end connections, splice or conductor itself. Presently, advanced technology allows automatic disconnection of the faulty line(s) from the system within few milliseconds. Once the disconnection occurs, the next step followed is to determine the trigger of the fault (whether it is a false trigger or not), location of the fault (by sending and receiving signals) and mobilizing personnel after identifying the location and cause of the fault. For OHTL, fault maintenance works include replacing or repairing the damaged conductor, insulator, or any other component. Below is the list of O&M works usually conducted for transmission line:

- Evacuation/ transmission or distribution of electric power from power plants/ substations to substations/ load centres in controlled manner;
- Monitoring of the transmission line from the control room of associated power plants/ substations;
- Periodical (for example, quarterly) visual inspection of transmission line routes;
- Fault detection in case of any occurrence of faults;
- Fault correction through replacement or repair works;
- In case of emergency works, commence work immediately following safety procedures and notify authorities immediately upon completion of work (Electricity Act, 2018 and Electricity Rules 2020 and amendment 2022);
- In case of regular schedule maintenance works, commence work following safety procedures only after notifying authorities before commencement of work (Electricity Act, 2018 and Electricity Rules 2020 and amendment 2022);
- Complete any civil works after completion of repair/ replacement works such as refilling, levelling and or rebuilding (excavated roads, sidewalks, pavements, and manholes) to the pre-repair/replacement work conditions.

3.18 Project Schedule and Cost

The completion of works will take approximately 60 months from July 2026 to June 2031. The life span of the project is 30 years. The estimated cost of the project 329,681.70 Lakh BDT

Chapter 4
Analysis of Alternatives

4.1 Introduction

The purpose of the analysis of alternatives as part of the ESIA process is to assess the environmental and social impacts among all possible project options. The ES assessment is then combined with the economic and financial feasibility to select the most reasonable alternative. The assessments and recommendations made by the ESIA team are presented below.

4.2 Alternate Analysis

Project alternative is required, if the impact of the project design is significant in terms of environment and social components. Normally, Power Grid goes for analyzing spots for the tower footing of transmission line which involves several key steps, including preliminary route selection, environmental impact assessment, detailed route survey, and final selection based on technical, economic, and environmental considerations. In addition, tower spots also selected on the basis of accessibility for raw materials transportation, availability of manpower during construction work, considerable distance from the settlements, land use pattern, natural habitats and vulnerability to natural and manmade disasters, etc. However, it is important to analyze the comparative analysis of proposed routes. Moreover, the following may be the possible alternative of the project.

(a) Alternative routes:

Thoroughly evaluating alternative routes for the transmission line could minimize environmental impact and social disruption. This would involve detailed surveys and assessments of different potential paths.

(b) Lower voltage levels:

While 765kV is necessary for high capacity, exploring the possibility of using a lower voltage (like 400kV) on certain sections or for specific purposes could be an alternative. This would depend on the specific load requirements and transmission distance.

(c) Increased substation capacity:

Instead of solely focusing on transmission lines, increasing the capacity of existing substations or building new ones could help manage the flow of electricity. This might involve upgrading equipment or adding new bays.

(d) Distributed generation:

Promoting more distributed generation (smaller power plants closer to load centers) could reduce reliance on long-distance transmission lines. This could involve exploring renewable energy sources like solar or wind power.

(e) Energy storage:

Integrating battery energy storage systems (BESS) could help manage the intermittency of renewable energy sources and improve grid stability.

(f) Smart grid technologies:

Implementing smart grid technologies, including advanced metering infrastructure (AMI) and demand-side management (DSM), could optimize electricity usage and reduce the need for massive infrastructure upgrades.

Demand-side management:
Encouraging energy conservation and efficiency measures could help reduce overall electricity demand, potentially delaying or minimizing the need for major transmission infrastructure projects.

(g) Regional cooperation:

Exploring opportunities for cross-border electricity trade with neighboring countries could provide additional sources of power and reduce the need for large-scale domestic infrastructure projects.

(h) Phased approach:

Instead of implementing the entire project at once, a phased approach could be adopted, prioritizing the most critical sections and allowing for adjustments based on performance and changing needs.

4.2.1 Without Project Alternative

The 'without project' or 'no project' alternative would imply that no transmission lines would be added would be established that are envisaged under the project. This would imply that proposed Madunaghat - Moheshkhali 765kV transmission line project in Bangladesh is designed to enhance the country's power transmission network, particularly to support the growing energy needs of the Chattogram and Dhaka economic zones. While the project aims to improve reliability and transmit high volumes of electricity, it's important to consider potential alternatives. The advantages of such a scenario would include no environmental and social impacts associated with laying of transmission lines and associated activities. Similarly, the capital investment required for the project would also be not needed, nor would any O&M activities need to be carried out. The main disadvantage of the 'no project' scenario would be the development of severe capacity constraint in the electricity network of the area. The network would not be able to handle the additional electricity generation nor would it be able to meet the increasing demand in the area.

The Madunaghat-Moheshkhali 765kV transmission line project is crucial for ensuring reliable and efficient power delivery in Bangladesh, particularly for evacuating power from upcoming power plants in the Moheshkhali region. This project, part of a larger initiative to upgrade Bangladesh's transmission network, will create an ultra-high voltage corridor between Chattogram and Dhaka, facilitating the transfer of large amounts of electricity from coastal power plants to major load centers. As the country develops day by day and various industry spreads rapidly over the country and the living standard of people is also develops in parallel. The proposed project has been envisaged to address the above-described growth in electricity demand. If this project is not implemented, the electricity network would not be able to support the rapidly growing commercial and industrial activities as well as residential areas, nor would any growth in the region's commercial and industrial activities be possible; and as a result, the country will also not be able to sustain economic growth. However, proposed project has following importance:

(i) Power Evacuation:

Handling Increased Capacity: The project is designed to handle the massive power generation expected from upcoming coal and LNG-based power plants in Moheshkhali and Banshkhali.

Reducing Congestion: It aims to alleviate congestion on existing transmission lines, especially the 400 kV line connecting Matarbari and Madunaghat, by providing an alternative high-capacity route.

(j) Strengthening the Grid:

Ultra-High Voltage: The 765kV line represents a significant upgrade in transmission voltage, allowing for more power to be transmitted over longer distances with lower losses compared to lower voltage lines.

Reliability and Stability: By creating a more robust transmission system, the project enhances the overall reliability and stability of Bangladesh's electricity grid.

(k) Economic Development:

Supporting Industrial Growth: The project will help ensure a stable and reliable power supply to support industrial growth, particularly in the Chattogram and Dhaka regions.

Attracting Investment: A dependable power supply is a key factor in attracting both domestic and foreign investment, further contributing to economic development.

(l) Environmental Considerations:

Minimizing Land Use: Utilizing higher voltage transmission lines allows for the transmission of more power with fewer towers and lines, potentially minimizing land use and associated social impacts.

Reducing Losses: Higher voltage transmission reduces line losses, leading to more efficient power delivery and potentially lower overall emissions.

(m) Project Scope:

765kV Line: The project includes constructing a 765kV transmission line from Madunaghat to Bhulta, initially operating at 400kV, along with related substation expansions.

Therefore, the 'no project' scenario is not a viable option and therefore it is rejected.

4.2.2 Alternatives for Transmission Lines

Two types of transmission lines have been considered for the proposed project: overhead transmission lines using bare conductors; and underground transmission lines using insulated cable. The technical, financial, economic, environmental and social aspects of these alternatives are presented in Table 35.

Table 35: Comparative analysis of overhead and underground transmission lines

SN	Description	Overhead	Underground
A.	**Technical Aspects**		
1.	Construction activities	Extensive, requiring tower foundation construction, erection of towers, conductor stringing, and installation of insulators and other devices.	Less extensive, involving trench excavation, laying of cables, laying of sand over cables, and covering the trench,
2.	Fault Occurrence/ outage	Very high due to the exposed nature.	Very low due to the concealed nature.
3.	Fault Detection	Relatively easy as it is exposed and can be visibly identified;	Relatively difficult due to the concealed nature of the line;
4.	Replacement and Repair Works	Easy replacement and repair works; can be completed within 24 hours and less expensive;	Difficult to do replacement and repair works as it would require careful excavation, breaking of road/ pavements, sidewalks etc.; may take several weeks to complete and more expensive;
5.	Regular maintenance works	More, typically every year, maintenance is significantly high	Very low. Typically, once in every 5-10 years, low maintenance expenses, usually visual inspections, marking
6.	Terrain Preference	Flat terrain is preferred; however, can be implemented in hilly terrain as well;	Flat terrain is preferred; not recommended for hilly terrain which would add more cost in tunneling and trenching works.

SN	Description	Overhead	Underground
7.	Water bodies	Easy to implement in case of stringing over water bodies; for wider water bodies, a few numbers of towers can be erected on the water to string transmission lines.	Extremely difficult to implement in case of passing a water body as it would require very high intervention and thus usually avoided when tower erection is possible.
8.	Insulation	It usually uses porcelain discs for insulation between the conductor and the towers, and air gap from conductor to conductor which are less expensive;	The buried cables come with expensive insulation compounds covering the conductors; the insulations are also covered by jackets/braids/ sheath/ screens to avoid damage and thus they are more expensive;
9.	Interference	Due to the exposed nature of the conductors, OHTL introduces significant interference to receivers/ antennas, disrupts mobile or internet communication networks.	Due to the buried/sheathed nature of the UGTL, it does not introduce any interference to receivers/ antennas, and thus does not disrupt mobile or internet communication networks.
B.	**Economic and Financial Aspects**		
10.	Implementation expenditure	Significantly low compared to UGTL, usually only 10-20% of the expenditure of the same capacity and length;	Very high, typically 5-10 times for same capacity and length;
C.	**Environmental considerations**		
11.	Safety (Public)	Due to the fact that OHTL are exposed, they pose higher public safety risks; OHTL are more prone to accidents for the same reason.	UGTL are buried and as a result they are inaccessible and thus do not pose safety issues; UGTL are thus less prone to accidents.
12.	Safety (Maintenance)	Most of the OHTL maintenance work such as replacement of insulators, clearing of vegetation etc. involve working in significantly alleviated height (25m+) resulting in higher safety risks for the maintenance crew.	UGTL maintenance works are carried out at ground level or in shallow depth (2~3m) and as such it poses lower safety concerns.
13.	Natural Calamity	Can be affected by thunderstorms, lightning, cyclones, floods, mudslide and earthquakes.	Can be affected by floods, mudslides and earthquakes.
14.	Vegetation	OHTL allows vegetation under certain height underneath the RoW.	UGTL does not allow vegetation of any types (irrespective of voltage ratings) above the buried cables along the route; UGTL is not recommended for fallow lands.
15.	Threat to wildlife	Although very rare, climbing mammals can be electrocuted by bridging live conductors with the steel towers.	Shielding (sheath and screen) protects earth excavating animals such as rodents to enter live conductors.
16.	Threat to birds	Overhead transmission lines pose risks of electrocution and also bird hits.	Underground transmission lines pose no such risks.
D.	**Social Considerations**		
17.	Land Requirement	Requires land acquisition of the tower footings, which can be significant depending on the size (governed by voltage ratings, terrain type, soil quality etc.) and type of the tower (suspension, angular).	Public roadside space, under the sidewalks or pavements are usually selected for UGTL thus it normally does not require land acquisition.
18.	Structures	OHTL allows public and private structures under it up to a certain height; sometimes to allow existing	UGTL only allows limited public structures such as roads, pavements and sidewalks above it.

SN	Description	Overhead	Underground
		structures to be under the Right of Way (RoW), tower heights are increased.	
19.	Locality Preference	Rural areas with fallow lands have low height structures and crop fields thus OHTL is more suited for these areas.	Urban and suburban areas have more roads that are suitable for UGTL and taller structures that can be avoided if UGTL is used, thus UGTL is preferable for such localities.
20.	Visual Preference	Erected towers, danger signs posted, and strung conductors affect the visual aesthetics of the area.	Buried nature of the UGTL means that they are out of sight and hence no aesthetic issues.

Source: ESIA Study of Power System Upgrade and Expansion Project (PSUEP), Power Grid, 2021, Bangladesh

In view of the above considerations, the underground cables have been used under the proposed project primarily where the availability of space is an issue because of the congested urban setting; for all other locations, overhead transmission lines have been used.

4.3 Alternative of Transmission Line Routes

The following criteria were considered for selecting the alignment of the route:

- Existence of open agricultural land;
- Distance from connecting road not to be more than 1 km;
- Avoiding settlement areas as much as possible;
- Avoiding urban areas as much as possible;
- Avoiding river crossings;
- Considering railway crossings;
- Avoiding water bodies;
- Considering the existing power distribution lines;
- Considering natural habitats (like reserve forests, wildlife sanctuary, national parks, etc.);
- Considering restricted area (like cantonment, KPI, etc.);

Two alternatives transmission line routes are considered for the proposed 765kV new transmission lines from Madunaghat - Moheshkhali. For this alternate route, technical, financial, economic, environmental, and social aspects were considered through consultation with local stakeholders, analyzing of maps and underground utilities, satellite images, traffic condition. After detailed route survey and analysis, most suitable route has been selected considering the technical and financial aspects as well as environmental and social issues/impacts. The routing options are analyzed in the table below.

Table 36: Routing options for proposed 765kV transmission line

SL	Attributes	Option-1	Option-2 (Final)	Option-3
A.	**Technical Aspects**			
1.	Route Length (km)	94.82	95.5	92.5
2.	Route Length in Plain Land (km)	94.82	95.5	92.5
3.	Route Length in Hilly Land (km)	0	0	0
4.	Route Length in Salt Farm (km)	30.5	30.5	29.4
5.	No. of Tower	273	272	247
6.	Angle Tower	79	88	38
7.	Difficulty of Implementation with respect to trenching/ excavations	High	Medium	High
8.	Meet present demand	Yes	Yes	Yes
9.	Meet future demand	Yes	Yes	Yes
10.	Power system growth	Yes	Yes	Yes
11.	Implementation expense	High	Moderate	High

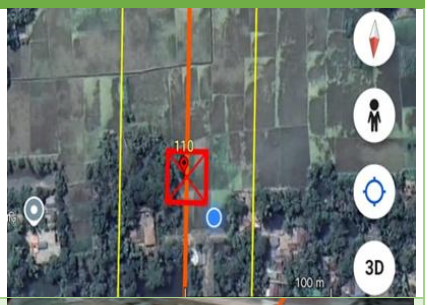
SL	Attributes	Option-1	Option-2 (Final)	Option-3
B.	**Environmental Aspects**			
7.	Adjacent to Tower Area (km)	30	30	35
8.	Forest Involvement (km)	0	0	0
9.	Distance from Reserve Forest (km) Chunati Wildlife Sanctuary (CWS)	2 to 3	2 to 3	1
10.	Ecologically Critical Area (ECA)	No	No	No
11.	Bird habitat and declared IBA	No	No	No
12.	Construction related impacts (such as dust, noise, air emissions, OHS and public safety issues)	Moderate	Moderate	High
C.	**Major Crossings**			
9.	River Crossings (Nos.)	3 (Karnaphuli, Sangu and Matamuhuri)	3 (Karnaphuli, Sangu and Matamuhuri)	3 (Karnaphuli, Sangu and Matamuhuri)
10.	Transmission Lines (Nos.)	3	3	3
11.	Distribution Lines	11kV and 33kV	11kV and 33kV	11kV and 33kV
12.	Railway Crossings (Nos.)	1 (Dhaka-Cox's Bazar)	1 (Dhaka-Cox's Bazar)	1 (Dhaka-Cox's Bazar)
13.	National Highways (Nos.)	4	4	5
14.	Reserve Forest Crossing (Nos.)	0	0	0
15.	Gas Pipeline (Nos.)	5	5	5
16.	Gas Pipeline Crossing Proposed Tower area (Nos.)	0	0	0
D.	**Social Aspects**			
5.	Tower on the Road (Nos.)	4	0	10
6.	Tower on the Graveyard (Nos.)	3	0	0
7.	Tower on the Structure (Nos.)	1	0	10
8.	Structure within RoW-70m (Nos.)	970 (approx.)	829 (approx.)	1545 (approx..)

Source: Team Study, 2025

Inference: Although Option-1 (route provided by Power Grid) and Option 2 offer almost same route length and angle towers. Option-3 has comparatively less length and towers. But social damage is significantly high if we consider it and implementation will be very difficult. However, based on the route survey, it is identified that Option-2 will have the least difficulty with respect to excavation related activities due to its alignment and location of nearby structures. Impact on the settlements is high for Option-1 and Option-2. All other environmental and social issues are quite similar for Option-1 and Option-2. Option-3 is closer to Chunati WS while it is quite away from CWS. Therefore, Option-2 has been selected for the proposed 765kV transmission line project. The routing options for the Madunaghat - Moheshkhali transmission line are shown in the below figure. In order to change 08 proposed tower locations of routing option-1, a total of 30 tower location has been changed.

Table 37: Objects found on the proposed tower location

SL	Tower No.	Object	Photographs	
1.	77	Road		

SL	Tower No.	Object	Photographs	
2.	110	Graveyard		
3.	115	Structure		
4.	185	Graveyard		
5.	224	Graveyard		
6.	225	Road		
7.	235	Road		
8.	254	Road		

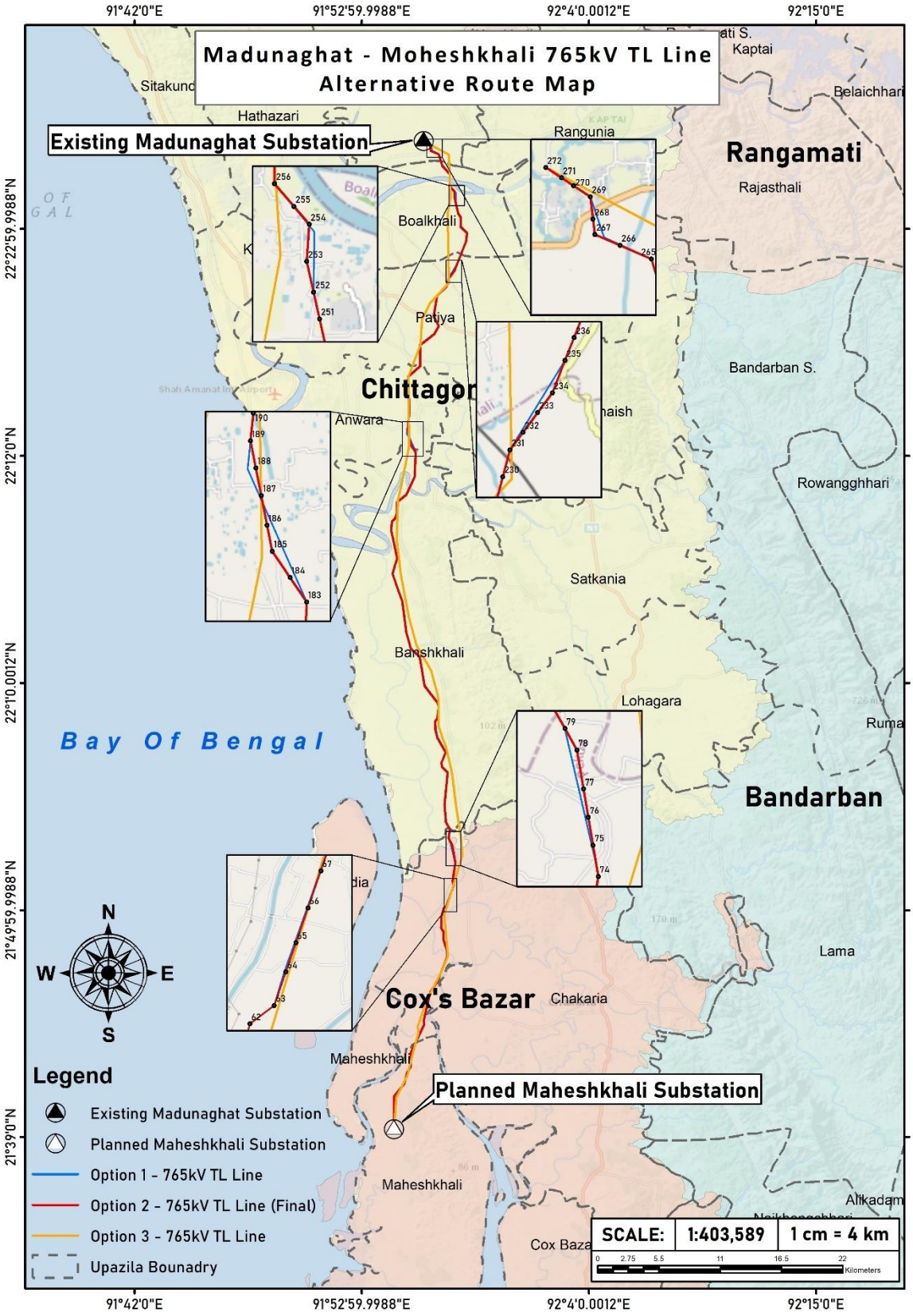


Figure 28: Routing options of Madunaghat – Moheshkhali 765kV transmission line

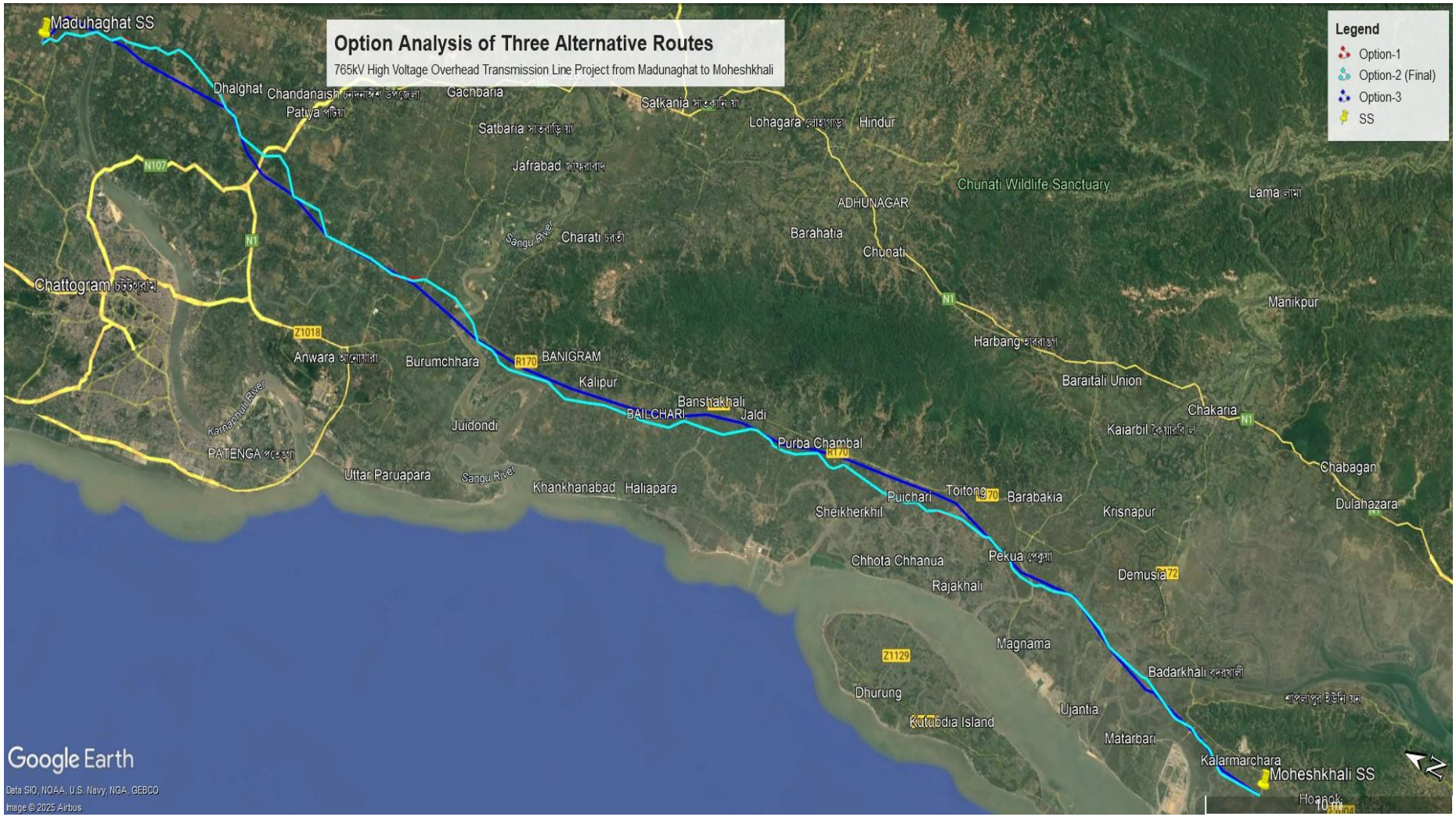


Figure 29: Option analysis of three alternative routes

Chapter 5
Environmental Baseline

The environmental baseline is the existing status of environment around the proposed Project site. It has been analyzed through assessment of environmental components like air, water, land, noise, soil, etc. and environmental characteristics like physical, and biological status of the study area. The baseline condition of water and land resources, agriculture, fisheries and ecological resources prevailing in the study area has been established by collecting data from secondary as well as primary sources. The secondary sources included Bangladesh Inland Water Transport Authority (BIWTA), Bangladesh Water Development Board (BWDB), National Water Resources Database (NWRD), Bangladesh Meteorological Department (BMD) and Bangladesh Bureau of Statistics (BBS).

5.1 Physical Environment

The physical environment is an important determinant of the environment. The term Physical environment means the material and tangible conditions in which we live. The baseline conditions of physical environment of the study area in terms of meteorology, seismicity, environmental quality, and natural disaster are presented in the following sections. The purpose of depiction is to analyze the climate related risks and later in chapter 7, need to propose the adaptation measures accordingly.

5.1.1 Meteorology

The project comprises construction of transmission lines. The places of construction will be in the southern coastal part of Chattogram and Cox's Bazar. As such various meteorological data like rainfall, temperature, relative humidity, wind speed, evaporation and sunshine hours were collected from relevant and available weather stations of BMD within the study area. The data were analyzed and their status are discussed briefly in the following sections.

(a) Rainfall

Cox's Bazar

The average monthly rainfall variation at Cox's Bazar Station (from 1990 to 2024) is shown in below table. The table shows that the highest and lowest values of rainfall are observed during the months of July (972 mm) and January (6 mm) respectively.

Table 38: Monthly and Yearly total rainfall in Cox's Bazar Station

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Spt.	Oct.	Nov.	Dec.	Annual
1990	0	69	174	135	261	1201	1211	277	272	294	255	19	4168
1991	4	0	22	175	210	1297	878	782	497	211	88	13	4177
1992	1	45	0	1	149	767	824	451	328	237	99	6	2908
1993	34	86	98	96	508	835	677	736	248	165	39	0	3522
1994	5	18	239	237	309	1022	768	520	265	88	32	0	3503
1995	0	3	8	24	401	565	977	559	463	46	409	0	3455
1996	0	83	2	77	279	671	946	702	528	446	8	0	3742
1997	2	20	40	28	283	390	1277	613	640	173	37	33	3536
1998	15	19	20	148	381	365	1257	1154	323	184	87	0	3953
1999	0	0	0	8	578	853	919	1134	391	277	1	124	4285
2000	1	2	96	65	589	841	1300	870	503	424	16	0	4707
2001	0	26	0	6	379	1373	903	534	426	236	131	0	4014
2002	26	0	43	92	494	503	1236	658	316	330	219	1	3918
2003	0	4	68	10	574	1349	896	655	347	207	0	3	4113

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Spt.	Oct.	Nov.	Dec.	Annual
2004	0	0	1	204	250	705	751	686	438	247	0	0	3282
2005	6	0	27	113	178	848	608	957	342	257	23	25	3384
2006	0	0	0	114	800	662	802	385	678	78	10	0	3529
2007	0	65	0	100	373	640	1274	526	409	492	127	0	4006
2008	15	50	4	0	244	1318	1275	664	387	184	3	0	4144
2009	0	0	0	130	241	324	971	944	485	130	58	0	3283
2010	0	0	15	12	717	982	496	501	257	375	15	68	3438
2011	11	0	4	123	296	926	877	1226	692	280	0	5	4440
2012	0	0	109	148	254	1102	1130	801	302	263	14	0	4123
2013	0	0	0	54	700	876	772	1000	237	420	0	0	4059
2014	0	29	1	4	139	677	717	611	264	41	0	0	2483
2015	10	0	16	72	96	1573	1400	657	618	207	40	27	4716
2016	0	0	25	22	359	538	1113	472	309	418	41	0	3297
2017	0	0	216	361	143	541	1437	531	524	149	13	36	3951
2018	26	0	0	56	172	984	1246	398	341	395	8	8	3634
2019	0	12	82	16	98	225	951	412	628	256	80	0	2760
2020	27	1	0	56	189	936	934	1068	426	430	34	0	4101
2021	0	0	0	46	160	731	1097	995	206	208	0	39	3482
2022	8	30	4	52	237	726	167	328	412	85	0	15	2064
2023	0	0	30	53	154	335	251	872	278	317	95	5	2390
2024	7	0	15	0	214	538	1672	1541	924	156	17	0	5084

Source: BMD, 2025

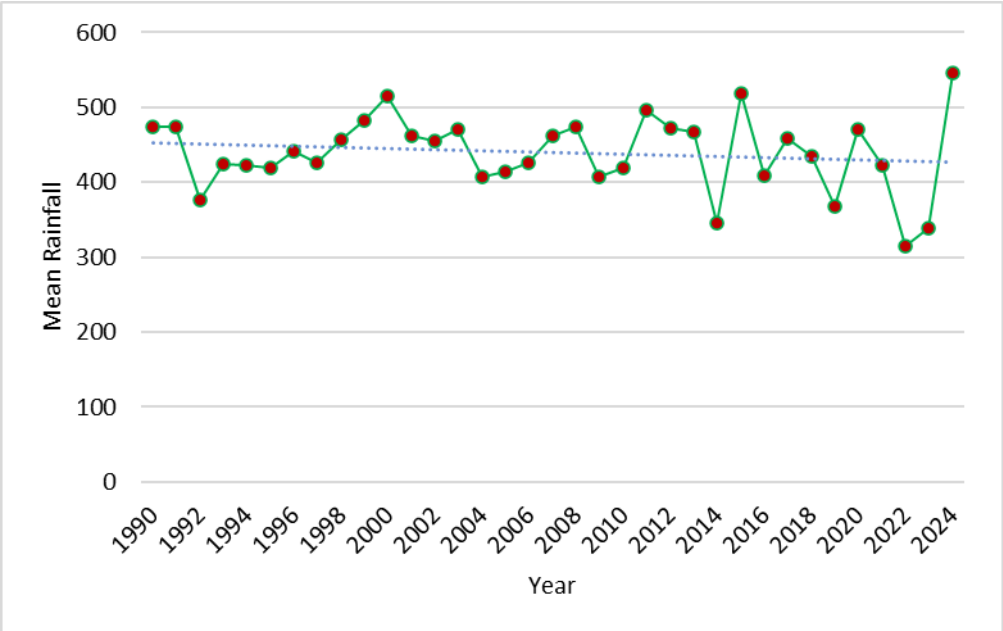


Figure 30: Year-wise mean rainfall in Cox's Bazar station from 1990 - 2024

Chattogram

The average monthly rainfall variation at Chattogram Station (from 1990 to 2024) is shown in below table. The table shows that the highest and lowest values of rainfall are observed during the months of July (770 mm) and January (8 mm) respectively.

Table 39: Monthly and Yearly total rainfall in Chattogram Station

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Spt.	Oct.	Nov.	Dec.	Annual
1990	0	39	53	250	205	668	1038	115	141	233	74	36	2852
1991	19	0	43	****	****	774	818	357	360	211	99	13	****
1992	0	119	0	1	127	571	412	280	292	435	4	34	2275
1993	9	71	223	100	667	791	437	638	273	129	14	0	3352

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Spt.	Oct.	Nov.	Dec.	Annual
1994	7	8	194	262	208	581	380	397	100	101	20	0	2258
1995	0	12	18	51	268	359	685	546	129	53	323	0	2444
1996	0	106	91	234	251	476	465	584	350	343	3	1	2904
1997	0	32	118	40	267	425	1033	383	530	134	49	4	3015
1998	37	103	97	184	387	132	1291	1194	193	122	93	0	3833
1999	0	0	0	0	463	879	491	848	203	201	2	107	3194
2000	17	0	16	108	748	643	713	689	138	416	15	0	3503
2001	0	12	1	41	423	****	385	238	224	242	81	0	****
2002	1	0	70	67	453	366	920	456	145	129	128	10	2745
2003	0	0	53	167	198	1209	372	260	210	234	0	66	2769
2008	64	7	6	1	244	538	963	757	250	171	31	0	3032
2009	0	2	3	114	373	434	1244	693	281	300	17	0	3461
2010	0	8	40	46	346	747	267	516	116	294	38	19	2437
2011	0	0	35	133	276	481	562	806	762	46	0	0	3101
2012	0	0	30	192	188	1337	788	299	170	636	3	0	3643
2013	0	0	3	58	773	513	405	267	173	369	0	0	2561
2014	0	37	18	43	304	1494	395	692	363	104	0	0	3450
2015	6	0	18	218	92	713	1555	568	331	193	7	12	3713
2016	5	6	77	39	253	201	568	398	323	249	89	0	2208
2017	0	0	102	296	275	845	1008	523	560	123	2	17	3751
2018	13	0	20	72	388	667	807	325	148	306	2	4	2752
2019	0	5	8	73	206	152	1110	466	365	123	83	10	2601
2020	49	5	0	129	119	399	605	680	350	338	125	0	2799
2021	0	0	0	2	130	793	1071	735	364	234	0	95	3424
2022	1	11	0	44	345	582	271	116	386	154	0	20	1930
2023	1	0	29	89	162	466	95	1110	283	194	84	9	2522
2024	9	2	9	32	586	261	750	1121	583	160	11	0	3524

Source: BMD, 2025

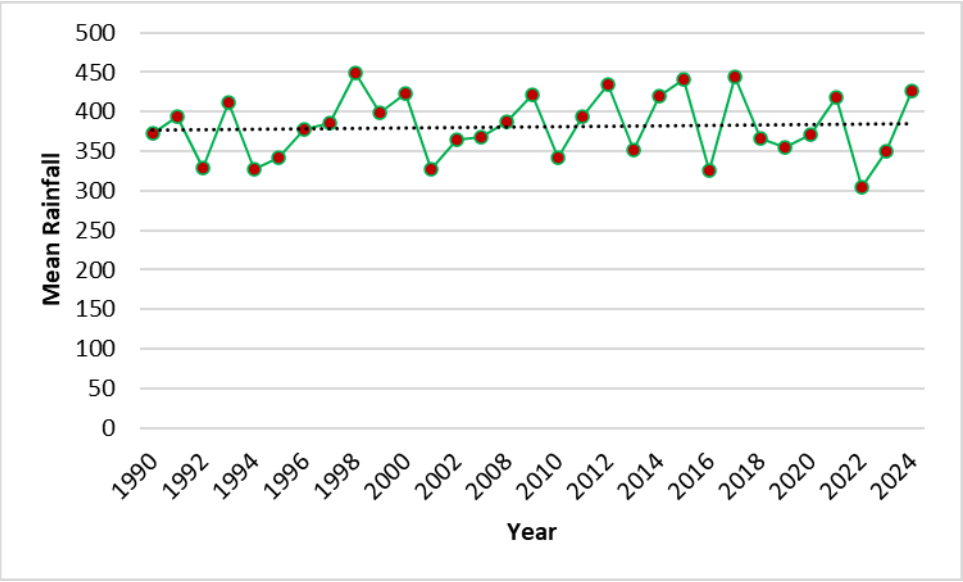


Figure 31: Year-wise mean rainfall in Chattogram station from 1990 – 2024

(b) Temperature

Cox's Bazar

Table below shows the variations in average temperature of Cox's Bazar BMD station (from 1990 to 2024). The average maximum temperature is 29.05°C (May) and minimum is 20.51 (January).

Table 40: Monthly average temperature of Cox's Bazar Station

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1990	20.6	23.2	24.2	27.2	28.8	27.7	26.8	27.9	27.8	27.2	25.7	21.6
1991	20.4	23.3	27.1	28.2	28.6	27.2	27.5	27.3	27.6	27.5	24	21
1992	19.5	21.5	26	28.8	28.7	28.5	27	27.6	27.6	26.9	24.9	20.5
1993	20	22.3	24.7	27.6	27.7	27.3	27.8	27.3	27.5	27.6	24.4	21.6
1994	20.9	22.4	25.8	27.8	29.3	27.8	27	27.4	28	27.4	25	20.9
1995	20.2	22.1	26.3	28.8	29.9	28	27.4	27.8	27.6	28.2	25.1	21.7
1996	20.7	22.7	26.3	28.2	29	28	27.8	27	27.9	27.4	24.8	22.3
1997	20	21.8	25.7	26.5	28.8	27.7	27.2	27.9	27.5	27.3	25.7	21.6
1998	19.9	22.6	25.2	27.9	29.3	29.3	27.6	27.6	28.5	28.8	27.4	22.6
1999	21.1	24.5	26.9	29.6	27.9	27.7	27.3	26.9	27.2	27.5	25	22.1
2000	20.6	22.6	25.6	28.5	27.5	27.6	27.2	27.6	27.5	27.6	25	21.2
2001	19.7	22.9	26.5	29.4	28.1	26.8	27.3	27.9	27.8	27.8	25.1	21.2
2002	21.3	23.2	26.6	27.7	27.8	28	27.6	27.7	28.2	27.4	25	21.3
2003	19.6	23.2	24.8	29	29	26.5	27.9	27.8	27.8	28	24.5	22.2
2004	20.5	22.3	26.3	27.5	29.4	28.1	27.3	27.4	27.7	27.2	24.2	22.3
2005	20.7	23.9	26.5	28.8	29.5	29	27.6	27.2	27.8	28.1	24.6	23
2006	20.8	24.1	27.2	28.9	28.5	28.2	27.4	27.5	27.7	28.1	25.6	21.6
2007	19.8	22.5	25.7	27.9	28.9	28.5	27.1	27.8	27.6	27	25.8	21.8
2008	20.8	21.4	26.2	29.2	29.1	27.8	26.9	27.4	27.6	27.9	25	22.4
2009	21.2	23.6	26.8	29.1	29.4	28.7	27.2	27.6	28.1	27.7	25.6	21.3
2010	20.3	23.1	27.5	29.9	29.5	28.5	28.2	28.3	28.1	28	25.9	21.8
2011	19.9	23.3	26.1	28.2	28.4	27.7	27.9	27.4	27.4	27.5	24.2	21.3
2012	20.9	23.2	26.2	28	29.4	28.3	27.1	27.6	28.1	27.6	25.1	20.2
2013	19.3	23.5	26.3	28.7	27.6	28.4	27.6	27.8	27.9	27.1	25.2	21.3
2014	20.4	22.5	26	29.7	30.3	28.9	28.2	27.4	28.1	28.1	25.2	21.6
2015	21.2	22.7	26.5	28.4	29.7	27.8	27.1	27.9	28.3	27.3	24.9	21.4
2016	19.9	24.3	27.4	29.3	29	28.4	27.3	27.8	28.2	27.9	24.9	23
2017	21.3	23.7	25.2	27.6	29.7	28.2	27.3	27.6	27.9	27.5	26	22.7
2018	19.5	23.3	26.7	28.6	28.4	27.9	27.5	28.1	28.2	26.4	24.5	21.6
2019	20.9	23.1	25.8	28.8	30.4	29	27.7	28.2	27.9	28.2	25.9	21.4
2020	20.3	21.8	26.6	28.3	29.3	28.2	28	27.7	28.6	28.6	25.6	21.6
2021	21.6	22.8	27.3	28.8	29.6	27.5	27.8	27.9	28.3	28.5	26.5	22.6
2022	21	22	26.9	29.3	28.8	27.8	28.7	28.4	28.3	28.4	26.6	23.1
2023	21.6	23.8	27.1	29.6	29	28.6	28.8	27.8	28.6	27.9	26.5	23.4
2024	20.4	23.7	26.6	30.7	30.2	29.1	27.8	27.5	28.8	28.9	26.9	23.6

Source: BMD, 2025

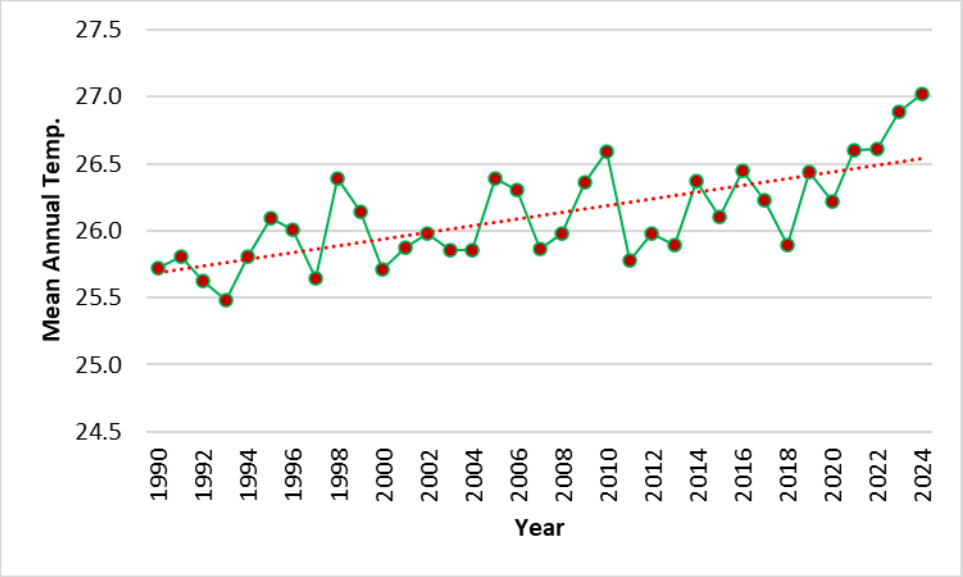


Figure 32: Mean annual temperature of Cox's Bazar station from 1990 to 2024

Chattogram

Table below shows the variations in average temperature of Chattogram BMD station (from 1990 to 2024). The average maximum temperature is 28.94°C (May) and minimum is 19.94 (January).

Table 41: Monthly average temperature of Chattogram Station

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1990	19.9	23	23.9	26.7	28.8	28.3	27.2	28.5	28.4	27.2	25.6	21.1
1991	19.2	22.7	27	****	29	28	28.3	28.4	28.1	27.5	23.3	20.2
1992	18.8	21.2	26.1	29	28.6	28.9	28	28.5	28.2	27.4	24.8	19.9
1993	19.5	22.2	24.4	27.3	27.7	27.9	28.3	27.8	27.8	27.7	24.2	21.1
1994	20.3	21.9	25.7	27.9	29.3	28.5	28.1	28.2	28.7	27.6	24.5	20.3
1995	19.3	21.7	26.2	28.7	29.9	28.8	28.1	28.4	28.4	28.5	25	21
1996	19.9	22.4	26.4	28.2	29.5	28.8	28.7	27.6	28.8	27.6	24.9	21.8
1997	19.3	21.4	25.5	26.1	28.7	28.5	27.9	28.8	28	27.3	25.3	20.6
1998	19.1	22.1	24.7	27.4	29.1	29.9	28.1	28	29	29.1	26.9	22.1
1999	20.5	24.3	26.8	29.6	28.1	28.1	28.2	27.7	28.1	27.9	24.8	21.5
2000	20	21.8	25.6	28.1	27.9	28.4	28.2	28.3	28.2	27.8	24.5	20.6
2001	19	22.6	26	28.6	27.5	27.7	28	28.6	28.3	28.3	25.8	22.4
2002	21.5	23.5	26.9	28	28.3	28.9	28.2	28.4	28.9	28.5	26.8	23.5
2008	19.9	20.9	25.8	28.4	28.9	28.3	27.3	27.6	27.9	27.6	24.6	21.9
2009	20.9	23.2	26.6	28.7	28.9	28.8	27.7	28	28.3	27.5	25.4	21.1
2010	19.8	23.1	27.2	29.1	29	28.4	28.7	28.5	28.5	28.2	25.6	21.1
2011	19	22.7	25.5	27.6	28.4	28	28.2	27.5	27.7	27.7	24.1	20.6
2012	20.4	22.8	26.2	27.2	29.1	28.2	27.5	28.1	28.3	27.3	24.2	19
2013	18.4	22.9	25.9	28.2	27.2	28.6	28.3	27.9	28.2	26.9	24.2	20.8
2014	19.7	22.2	25.7	29.4	29.5	28.5	28.4	27.9	28.2	27.5	25.2	21.5
2015	20.9	22.7	26.7	28	29.9	28.9	27.8	28.6	29.2	27.6	24.8	21.2
2016	19.7	24.1	27.5	29.5	29.1	29.3	28.3	28.8	29.1	28.4	24.5	22.6
2017	21.1	23.7	25.2	27.7	30.1	28.6	28.1	28.8	28.5	27.9	25.8	22.4
2018	19.2	23.2	26.7	28.3	28.2	28.5	28.5	28.9	29.1	26.8	24.5	21.1
2019	20.8	22.9	26.1	28.8	30.3	29.8	28.3	29.1	28.6	28.5	25.6	20.9
2020	19.9	21.5	26.6	28.1	29.3	28.9	28.7	28.5	29.1	29.1	25.4	21.1
2021	21	22.6	27.6	29.5	29.9	28.1	28.4	28.4	29	29	26.1	22.2
2022	20.7	22	27.1	29.3	29	28.5	29.6	29.5	28.8	28.5	26.5	22.8
2023	21	23.4	26.7	29.6	29.2	29.1	29.7	28.3	29.3	28.1	26.2	22.9

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
2024	19.6	23.2	26.5	30.6	29.9	29.7	29	27.9	29.2	29	26.5	22.7

Source: BMD, 2025

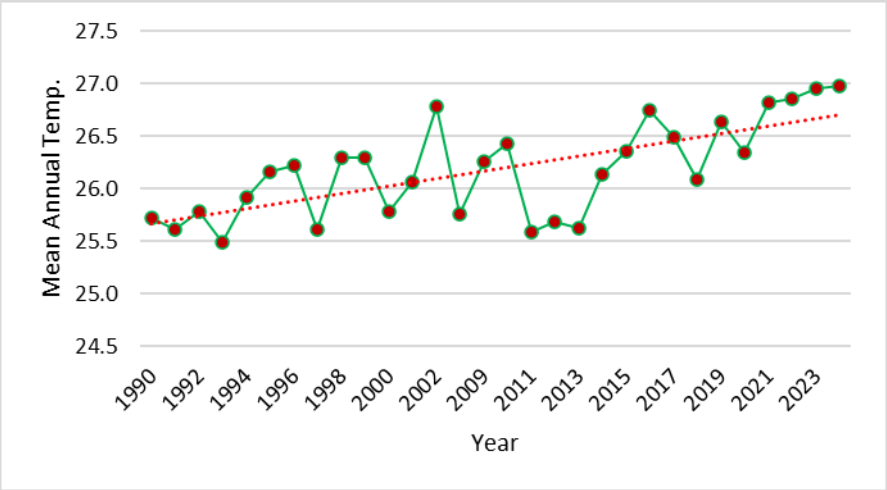


Figure 33: Mean annual temperature of Chattogram station from 1990 to 2024

(c) Relative Humidity

Cox's Bazar

Relative humidity is the ratio of the partial pressure of water vapor in an air-water mixture to the saturated vapor pressure of water at a prescribed temperature. The value depends on temperature and the pressure of the system of interest. As the temperature of the atmosphere increases, the vapor carrying capacity in water increases, and thus the atmospheric vapor pressure also increases. Table below shows the variation of monthly relative humidity, as recorded by the Cox's Bazar BMD station (1990-2024). It shows an increasing trend from April to July and after that a decreasing pattern is observed. A significant fluctuation is observed as relative humidity values start to increase from April (start of summer) due to the increase in atmospheric water vapors coupled with temperature rise.

Table 42: Monthly and Yearly Relative Humidity (%) of Cox's Bazar Station

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1990	77	77	78	79	80	87	90	84	84	81	79	77	81
1991	71	72	76	77	81	88	87	88	86	82	76	73	79
1992	74	76	82	77	78	83	88	86	85	83	78	74	80
1993	71	74	73	77	81	88	87	88	85	81	76	72	79
1994	71	65	77	80	81	87	89	87	83	81	75	70	78
1995	68	74	69	77	78	86	88	87	86	81	84	74	79
1996	69	70	80	77	80	84	86	88	85	82	78	74	79
1997	68	71	78	76	78	85	90	86	86	78	75	74	78
1998	77	75	69	78	80	84	89	89	84	81	77	73	79
1999	71	68	76	76	83	88	90	90	87	85	76	76	80
2000	73	66	75	78	85	87	89	88	87	84	76	72	80
2001	69	73	71	75	82	91	89	88	87	87	83	75	80
2002	76	68	73	82	84	88	91	87	84	83	82	77	81
2003	77	71	75	78	83	90	87	88	87	84	75	77	81
2004	79	72	76	81	80	85	88	88	86	83	75	71	80
2005	70	71	78	76	75	84	87	90	86	82	76	77	79
2006	72	75	68	72	80	86	89	86	85	81	74	73	78
2007	72	72	67	76	79	83	89	86	86	83	80	71	78
2008	72	66	78	71	76	85	89	87	86	81	74	75	78
2009	70	66	73	76	75	82	89	88	85	80	73	71	77

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
2010	71	64	74	75	77	86	85	84	85	84	76	74	77
2011	67	67	69	77	80	87	85	88	87	82	74	77	78
2012	66	62	77	77	79	86	89	87	85	82	76	77	78
2013	70	66	75	77	85	85	86	86	85	83	73	73	78
2014	73	71	73	76	79	86	85	88	84	79	77	76	78
2015	76	71	69	80	78	88	91	87	86	84	79	77	80
2016	74	76	75	77	79	82	89	86	84	82	78	77	79
2017	68	67	76	81	78	85	89	87	87	83	76	76	79
2018	72	71	75	74	79	87	90	87	85	85	75	72	79
2019	69	68	72	75	76	82	89	85	85	81	76	71	77
2020	73	67	66	75	77	86	88	88	85	82	77	72	78
2021	67	69	71	75	75	88	88	88	83	83	70	72	77
2022	73	65	70	76	80	86	82	83	85	79	72	70	76
2023	67	68	66	71	77	83	83	89	85	81	75	75	76
2024	70	65	66	72	75	84	88	89	85	79	70	65	75

Source: BMD, 2025

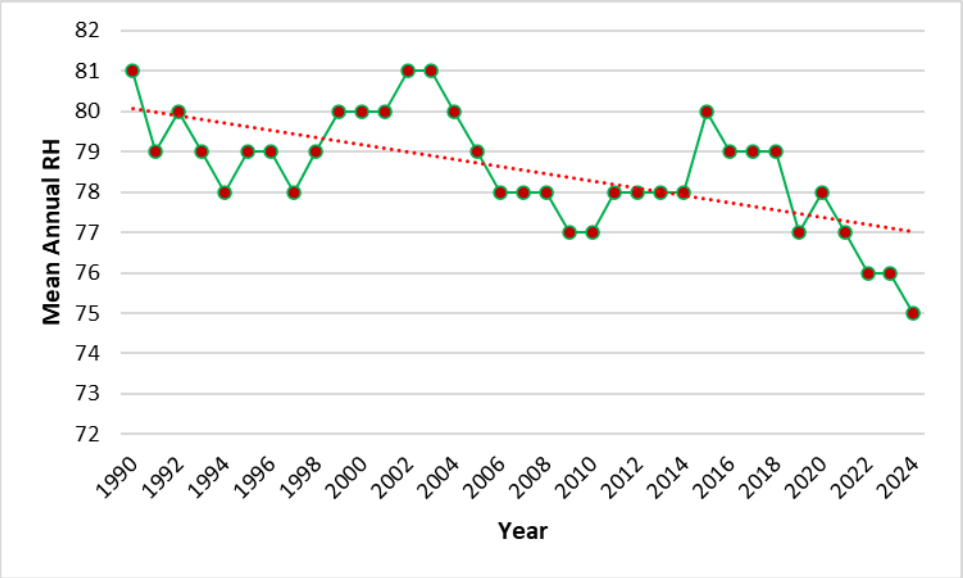


Figure 34: Annual relative humidity of Cox's Bazar station from 1990 to 2024

Chattogram

Table below shows average monthly humidity 1990-2024 at Chattogram BMD Station. These range from 73 to 80 in Chattogram, with lower values (< 81 per cent) from November to May and higher values from June to October.

Table 43: Monthly and Yearly Relative Humidity (%) of Cox's Bazar Station

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1990	76	74	74	77	78	83	87	81	82	80	80	78	79
1991	76	74	74	***	***	84	84	84	84	83	78	75	***
1992	77	76	82	77	78	83	85	83	85	83	78	78	80
1993	75	74	73	78	81	85	84	85	84	81	77	74	79
1994	73	65	76	77	79	84	85	86	82	81	78	74	78
1995	68	73	67	77	79	83	84	85	83	81	85	77	78
1996	74	71	78	79	79	81	84	87	83	81	81	76	79
1997	71	73	80	77	80	82	88	84	85	79	77	78	79
1998	80	75	70	79	81	82	88	88	83	81	80	77	80
1999	77	70	76	78	82	86	85	87	84	84	78	79	80
2000	77	69	76	79	82	84	85	85	85	85	81	76	80
2001	73	74	67	72	77	81	81	80	81	79	77	70	76

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
2002	71	67	66	72	75	78	83	80	76	74	73	69	73
2008	77	67	79	73	77	83	87	87	85	81	75	79	79
2009	71	67	72	79	79	82	87	86	84	80	74	73	77
2010	72	63	74	78	80	86	83	85	84	82	77	73	78
2011	68	67	69	77	80	85	84	87	85	80	74	77	77
2012	68	62	76	80	80	86	88	86	85	84	77	80	79
2013	72	64	77	77	85	84	84	86	84	85	78	77	79
2014	72	69	68	76	79	85	85	87	84	80	72	73	77
2015	71	68	62	77	77	82	88	84	81	80	75	76	76
2016	75	72	72	77	78	79	84	82	81	79	76	75	77
2017	65	65	72	78	77	84	87	84	84	79	75	77	77
2018	71	72	76	76	79	85	85	82	81	80	73	72	77
2019	69	70	70	74	78	81	89	83	85	82	78	73	77
2020	73	65	63	76	76	84	86	86	84	81	74	74	76
2021	70	67	66	72	74	85	86	87	82	80	68	73	75
2022	72	63	69	78	81	86	80	80	84	78	69	71	75
2023	67	69	68	71	77	86	84	90	88	84	81	79	78
2024	75	70	68	76	83	87	86	89	84	79	68	65	77

Source: BMD, 2025

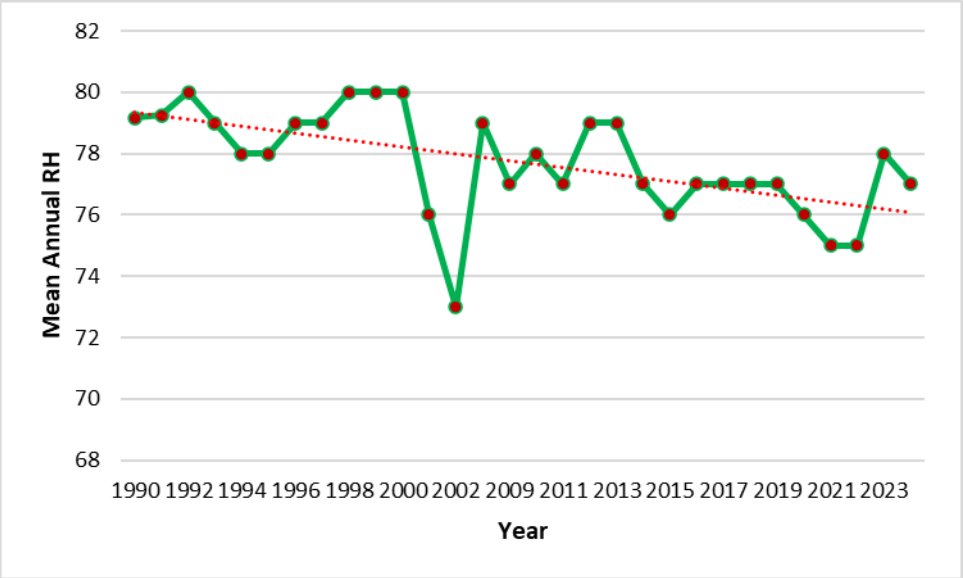


Figure 35: Annual relative humidity of Chattogram station from 1990 to 2024

(d) Wind Speed

Cox's Bazar

Table below shows the distribution of average monthly wind speed; at the Cox's Bazar BMD station (from 1990 - 2024). Wind speed is the highest in April and the lowest in December. During cyclone Sidr (2007) and Aila (2009), 1-minute sustained wind speeds were recorded as 260 kph and 120 kph respectively, the former one created devastating impacts due to the high wind speed whereas the latter one is related more to the increased storm surge.

Chattogram

Table below shows the average monthly wind speed 1990-2024 at Chattogram. The highest value occurred in May and the lowest in January.

Table 44: Monthly Prevailing Wind Speed in Knots and Direction of Cox's Bazar

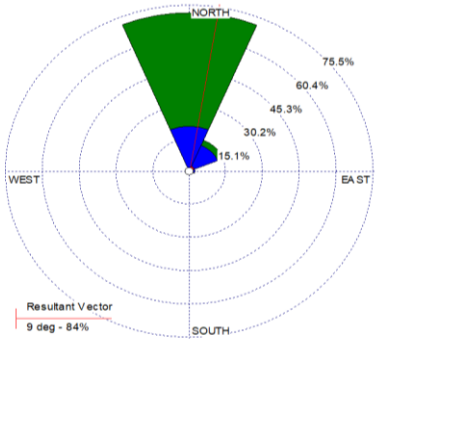
Year	Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.	
	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir
1990	5	NE	4.6	NE	7.7	S	7.8	S	6.7	S	6.7	S	7.4	S	7.3	S	6.5	S	5.1	N	4.2	NNE	5.8	N
1991	5.7	N	7.7	N	5.9	N	6.4	S	7.5	S	7.3	S	6.8	S	6.7	S	5.7	S	7.3	S	5.2	N	5.2	N
1992	4.9	N	6.1	S	6.1	S	6.8	S	7.6	S	7.2	S	7.9	S	7.8	S	7	S	5.5	N	3.9	E	3.7	E
1993	3.6	E	12.4	S	8.1	S	7.3	SSW	9	S	7.3	S	8.3	S	7.5	S	7.1	S	4.7	N	5.1	N	3.1	E
1994	6.5	N	6.9	N	7.6	S	6.8	S	6	S	7	S	6.9	S	7.1	S	6.3	S	4.8	N	5.1	N	6.2	N
1995	6.8	N	5.2	N	8.4	N	7.9	S	9.6	S	6.7	S	7.6	S	6.8	S	6.7	S	3.5	E	4.7	NE	4.3	NE
1996	6.3	N	5.9	NNE	9.2	SSW	5.6	SSW	8.4	S	7.6	S	7.7	S	6.5	S	6.7	SSW	5.5	N	4.8	NNE	5.2	N
1997	6.3	N	7	NNW	7.2	SSW	6.4	SSW	8.1	S	7.3	S	6.7	S	6.8	S	6	SE	5.7	N	4.7	N	5.5	N
1998	5.7	N	7.1	NNW	6.7	N	6.3	S	8.5	S	7.8	S	9.2	S	8.1	S	8.3	S	8.6	S	6.3	N	6.1	N
1999	5.5	N	7.7	NNW	8.6	S	5.4	SSW	7.9	S	8.1	S	7.3	S	6	S	6.8	S	5.9	SSE	5.8	N	5.9	NNE
2000	6.3	N	7.1	N	8.1	S	7.3	S	6.8	S	6.9	S	7.1	S	7.1	S	6	S	3.7	W	7.5	N	5.3	N
2001	5.3	N	7	S	6.9	N	7.1	S	6.4	S	6.7	SSE	7.2	S	6	S	6.1	S	5.8	S	4.8	N	4.8	NNE
2002	5.2	N	5.6	N	6.7	N	5.7	S	8.6	S	7.2	S	5.7	S	6.3	S	6	S	4.2	E	4.2	N	5.7	N
2003	4.8	N	5.2	N	4.4	W	5.6	S	6.1	S	6.7	S	6.1	S	6.5	S	5.5	S	6.8	S	4.8	N	6.1	N
2004	5.5	N	6.6	N	6.5	S	9.5	S	5.6	S	4.9	S	5.9	S	6.5	S	6.5	S	7.4	S	6.6	NNE	6.5	NNE
2005	6.8	N	6	N	7.2	S	5.6	W	5.8	S	7.5	S	5.3	SSE	7.3	S	6.4	SSE	5.6	S	4.5	N	4.1	NNE
2006	4.9	N	4.9	S	6.5	N	6.1	SSW	7.5	S	6.5	S	6.1	S	5.9	S	5.8	S	3.7	NNE	4.4	N	5.6	N
2007	5.6	N	5	N	5	N	5	S	5.7	S	5.4	S	5.3	S	6.9	S	5.7	S	6.6	S	5.3	NNE	4.8	NNE
2008	3.9	NNE	6.7	NNW	3.5	WSW	4.4	SSW	4.7	S	5.8	S	4.6	S	5	S	5.3	SSE	3.9	NNW	4.5	NNW	3.8	NNW
2009	3.1	NNE	5.8	NNW	5.1	N	6.8	S	5.5	SSW	5.1	S	4.9	SSE	4.3	S	5.1	SSE	3	SSE	3.2	N	4.3	NNE
2010	3.7	N	5.4	N	6.1	S	6.1	S	4.9	S	4.7	S	4.1	S	4.2	S	3.3	S	3.9	S	3.5	NNE	2.9	NNE
2011	3.3	NNE	4.6	N	4.8	S	3.5	SSW	4.7	S	3.9	S	3.8	S	3.8	S	3.3	S	4	NE	2.8	NNE	2.6	N
2012	3.4	N	3.3	N	3.1	SSW	4.3	SSW	3.3	S	5.1	S	4.6	S	4.2	S	3.9	S	4.2	NNE	4.5	NNE	4.8	NNE
2013	4.2	NNE	4.6	N	3.3	S	3.4	S	4.6	S	3.5	S	2.9	S	3.2	S	3.3	S	2.8	S	2.8	WNW	2.4	WNW
2014	4.2	NNW	4.8	N	4.5	N	3.5	S	3.3	S	5	S	4.7	S	4.3	S	3.5	S	3.1	W	2.5	N	3.2	N
2015	3.8	N	4.2	N	4.4	N	4.1	S	4	S	3.9	S	4.7	S	3.2	S	3.3	S	2.8	NNE	2.3	N	3.2	N
2016	3.5	N	3.5	S	2.7	SSW	4.8	S	5	S	4.8	S	4.9	SSE	5.5	SSE	3.6	S	3.2	NNW	5	NNW	3.8	NNE
2017	5	N	4.9	N	4.8	S	5.6	S	3.8	S	7	SSE	5.5	S	4.6	SSE	4.3	S	6.3	SSE	4.8	N	3.9	N
2018	4.1	N	4.8	N	4	SSW	4.3	S	4.4	S	5.4	S	5.3	S	5.2	S	5	S	3.9	WNW	3.7	N	3.8	N
2019	3.9	N	6.2	N	5.2	N	5.2	SSW	4.5	S	3.6	S	4.8	S	4.7	S	4.6	SSE	3.4	S	4.3	N	4.4	N
2020	4.7	N	5	N	5	N	3.3	S	5	S	3.9	S	4.4	S	5.2	SSE	4.4	S	4.4	S	4.8	N	5.6	N
2021	4.6	N	5.2	N	5.4	N	4.6	S	4.7	S	4.5	S	4.8	S	3.4	SSE	3.8	SSE	3.8	SSE	4.2	N	5	NNW
2022	3.3	N	5.1	NNW	5.2	NNW	4.5	S	4.6	S	4.1	SSE	4.7	SSE	5	SSE	3.4	SSE	3.3	NNE	4.7	N	2.8	N
2023	4.8	N	5.3	N	5.8	N	4.2	SSW	5.5	NNW	4.3	SSE	4.1	SSE	5.6	S	6	S	4.8	SSE	5.6	N	6.1	NNE
2024	4	NNE	3.4	NNE	5.1	NNW	3.8	SSE	7.8	S	4.6	S	4	SSE	3.9	SSE	4.7	SSE	3	SSE	4.2	NNW	4.4	N

Source: BMD, 2025

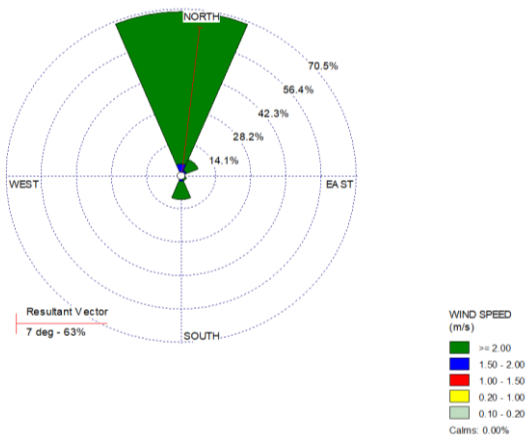
Table 45: Monthly Prevailing Wind Speed in Knots and Direction of Cox's Bazar

Year	Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.	
	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir	Spd	Dir
1990	4.9	NW	7.2	NW	4.4	NE	10.1	S	5.9	SE	7.6	SE	6.3	SE	5.3	SE	4.8	SE	10.2	SE	3.4	NE	4.5	NE
1991	3.2	NW	3.4	NE	5.1	W	****	***	4.7	E	8	S	8.7	S	8.6	SE	6	SE	9.4	SE	2.3	NE	2.7	NE
1992	3.1	N	7.8	S	8.7	S	10.2	S	10.2	S	7.4	SE	8	SE	8.5	SE	6	SE	4.5	SE	4.1	N	2.9	WNW
1993	4.2	W	16.2	S	8.4	S	7.8	S	8.9	S	10	SE	8.4	SE	8.7	SE	7.6	SE	5.4	SE	4.2	NE	4.1	NE
1994	6.5	NW	6	NW	12.1	S	11.8	S	9	S	10.2	SE	10.5	SE	11	SSE	11.2	S	3.7	E	4.7	N	4.8	NW
1995	6	N	4.3	W	8.9	NW	9.3	S	10.9	S	13.7	S	13	SSE	7.2	SE	10.6	SSE	4.5	NE	6.6	NE	3.8	NNE
1996	4.7	NNE	4.4	NNE	14.5	S	8.6	S	11.7	SSE	15	S	9.9	S	9.5	SSE	6.8	SSE	5.7	N	4.2	N	4.9	N
1997	4	N	5.6	W	10.6	S	6.6	S	10.3	S	10.6	S	11	S	10.3	S	7	SSE	4.9	NNW	4.3	N	4.3	N
1998	4.6	N	3.7	N	5.6	NW	6.4	S	9.5	S	10	S	9.7	S	7.5	SSE	9	S	7.9	SSE	4.4	N	3.3	NNE
1999	4.4	W	4.7	N	9.2	S	6.9	S	10	S	9.9	S	9.1	S	9.2	S	8.1	S	5.7	S	3.7	NNE	3.4	NNE
2000	3.4	N	4	N	7.4	S	9.5	S	5.3	SE	7.7	S	8	SSE	5.3	SE	5.9	S	4.4	W	3.4	NNE	3.4	N
2001	2.7	N	8.1	S	4.8	W	8.3	S	5.2	SE	8.2	SE	10.3	S	6.7	SE	6.1	SE	5.2	W	5	NNE	4.1	NE
2002	4.2	NE	6.5	W	6.2	W	8.6	S	10.1	S	7	SE	8.3	S	8.8	S	5.3	SE	5.3	WNW	4.3	NE	4	NE
2008	5.2	N	5.6	N	5.7	WSW	5.2	S	7.2	SSE	8.6	SSE	8.6	SE	8.4	ESE	6	E	4.8	NNW	5	NNW	4.8	NNW
2009	6.3	WSW	7.5	WSW	6.3	WSW	8.6	SSE	7.2	SSE	6.5	E	8.7	E	7.3	E	6.8	E	5.6	NNW	4.9	NNW	5.5	NNW
2010	6.3	NW	7.2	W	8.6	E	7.9	ESE	6.3	ESE	7.5	ESE	7.4	ESE	5.7	ESE	5.2	ESE	4.5	E	5.3	NNW	5.1	NNW
2011	5.5	NNW	6.3	NNW	6.7	WSW	6.4	WSW	6.2	ESE	7	ESE	6.2	ESE	5.5	ESE	5.8	ESE	4.2	ESE	6.7	W	5.2	NNW
2012	6	NNW	6.2	NNW	6.6	SSE	6.8	S	6	S	7.5	S	6.8	SE	6.2	SSE	6.5	SSE	6.2	W	5	NNE	5.8	N
2013	5.9	NNE	7.3	N	7.2	W	6.7	SSW	7.4	S	7	SSE	6.3	SSE	6.1	SSE	5.3	SSE	5.2	NNE	5.1	NNE	4.6	NNE
2014	6.8	N	7.6	N	11.2	WNW	6.7	S	8.3	SSW	4.7	ESE	7.1	SSE	6.9	S	5.4	SSE	5.7	N	6.3	W	5	N
2015	6	N	6.5	W	7.4	W	7.5	S	6.8	SSW	6.5	SSE	5.3	SSE	6.2	SSE	5.6	SSE	4.7	E	5.1	NNE	5.4	NNE
2016	6.1	W	8.7	S	6.7	SSW	11.4	S	10	SSW	6.1	SSE	9.5	S	6.7	SSE	5.1	SSE	4.3	SSE	7.9	NNW	6	NNW
2017	8.5	NNW	8.7	NNW	10.7	S	9.8	S	8.3	WSW	9.6	S	6.5	SSE	8.1	S	5.6	SSE	6.4	W	7.2	NNW	5.8	NNW
2018	7.8	NNW	7.2	NNW	6.4	SSW	8.6	W	8.4	S	8.8	S	8.4	S	8.3	S	7.3	S	4.9	NNW	5.5	NNW	7.6	NNW
2019	7.9	NNW	10.3	NNW	7.3	W	7	WSW	7.5	WSW	6.4	S	7.8	S	6.5	S	5.6	SSE	4.1	WNW	4.5	WNW	5.7	NNW
2020	4.7	WNW	7.3	NNW	7.2	W	7.4	WSW	9.1	S	8.2	S	8.6	S	8.4	SSE	7.5	SSE	7.2	W	5	NNE	7.9	NNW
2021	5.3	NNE	10.6	NNW	9.2	WNW	6.4	WSW	7.6	WSW	7.3	S	7.6	S	7.6	S	6.1	WSW	5.7	WSW	4.4	NNE	5.8	NNW
2022	4.3	N	6.3	NNW	8.3	S	9.2	SSW	7.9	S	8.3	S	10.7	SSW	8.2	SSE	6	SSE	7.5	W	7.2	NNW	6.8	NNW
2023	8.3	NNW	7.4	W	10	NNW	8.5	S	9.6	WSW	10.5	S	9.6	S	5.5	SSE	6.8	SSE	3.7	E	4.4	NNE	4.1	NE
2024	5.4	NNE	5.2	N	4.4	NNE	8.7	SSW	10.4	SSW	6.4	S	6.9	SSE	6.4	SSE	5.5	ESE	3.8	ESE	4.3	NE	5	NNE

Source: BMD, 2025



January (1990-2024)



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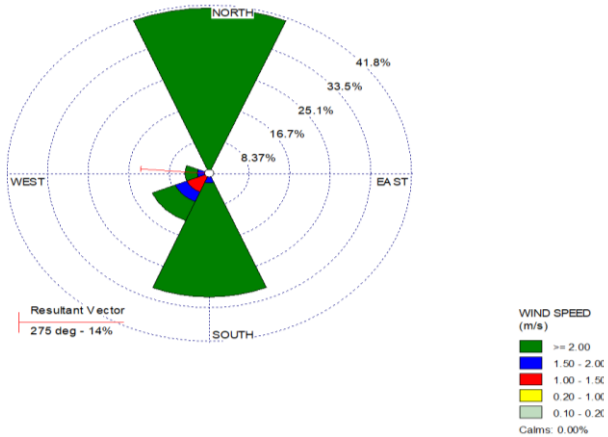
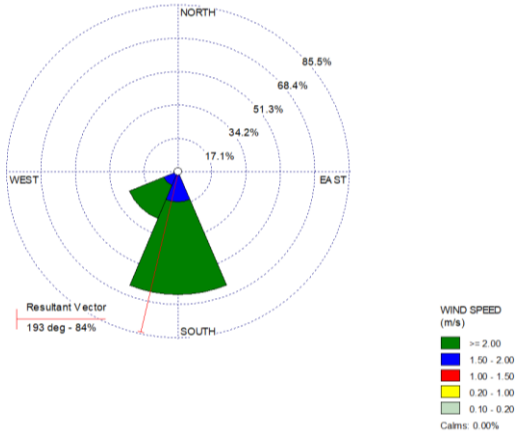
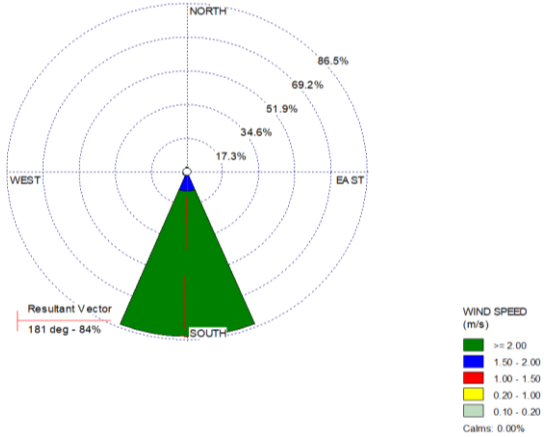


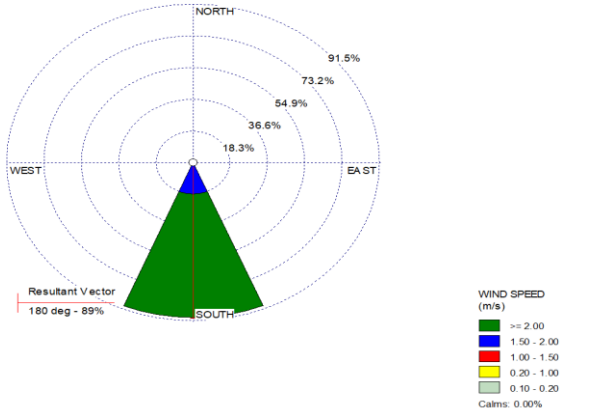
March (1990-2024)



April (1990-2024)



May (1990-2024)



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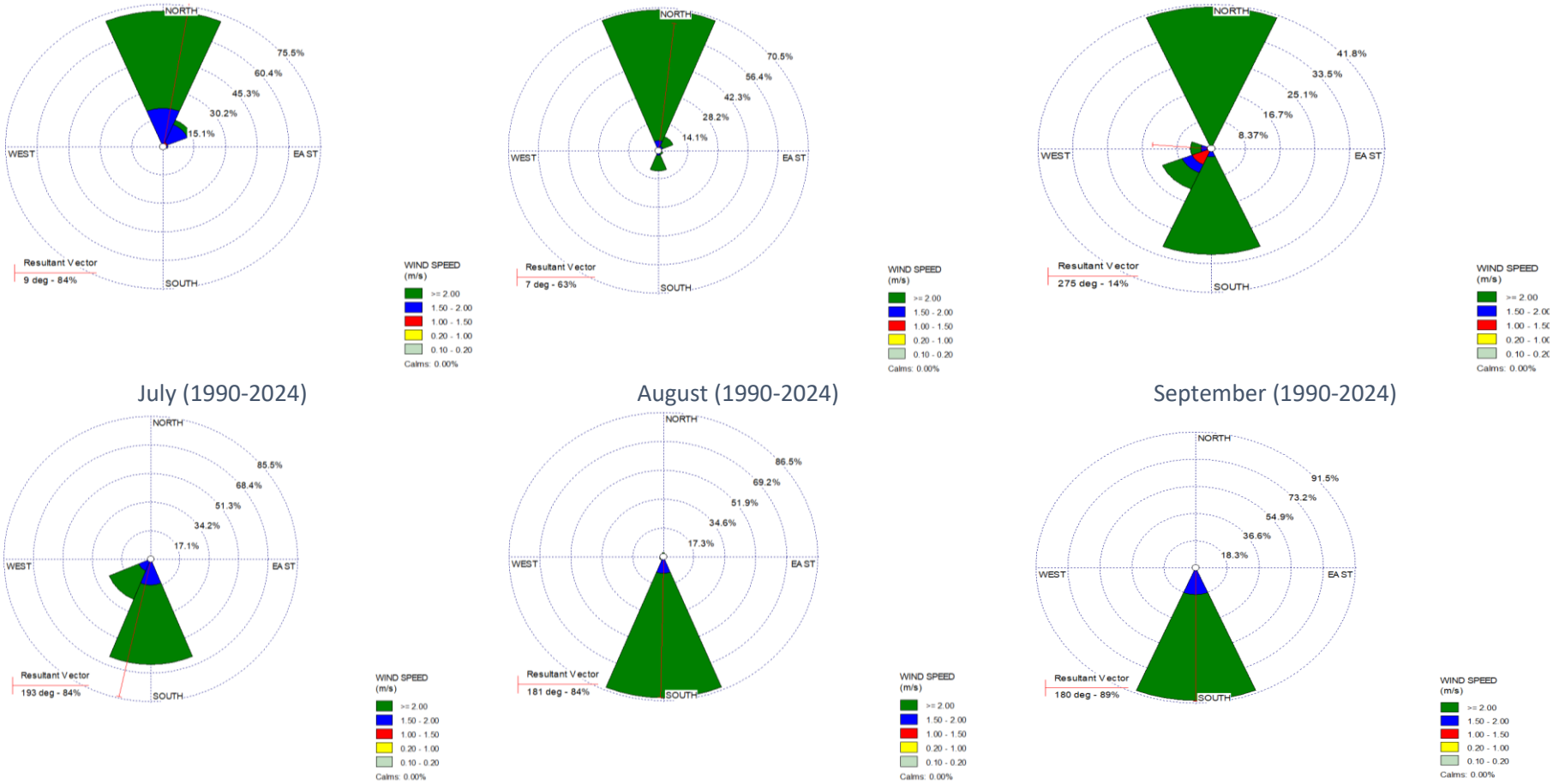
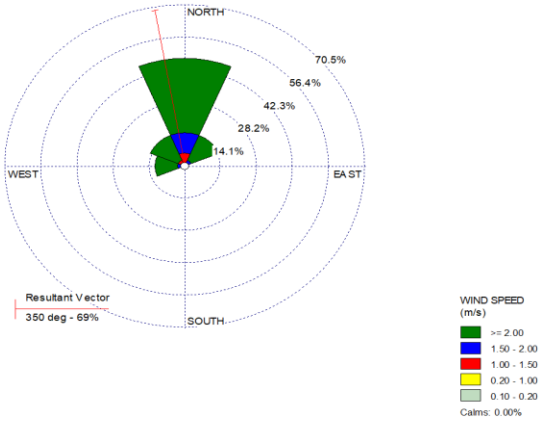


Figure 36: Monthly Wind Rose Diagram of Cox's Bazar BDM Station from 1990-2024



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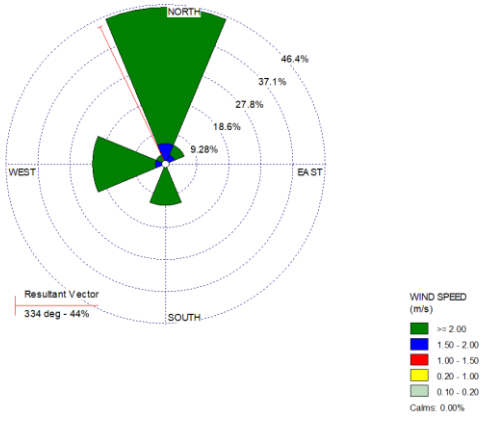

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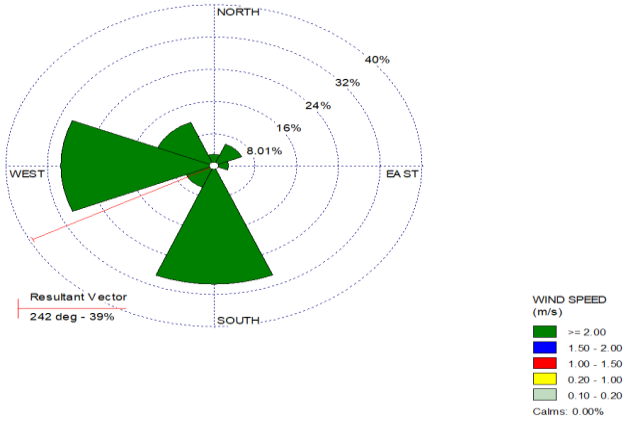

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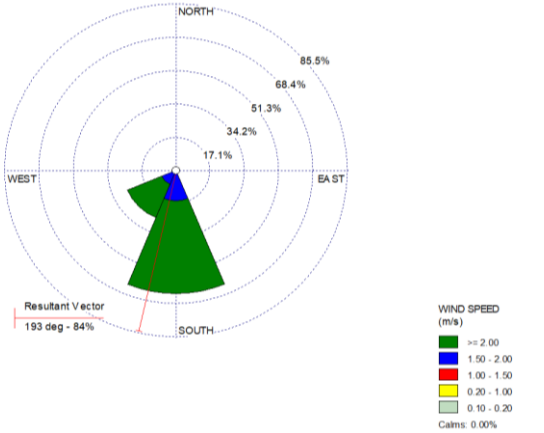
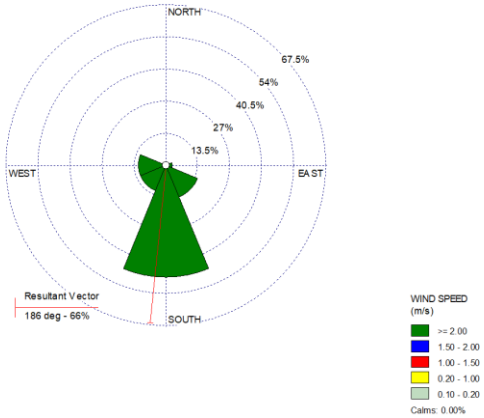
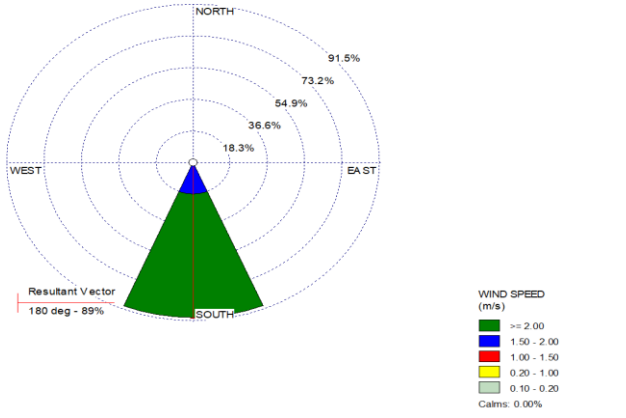


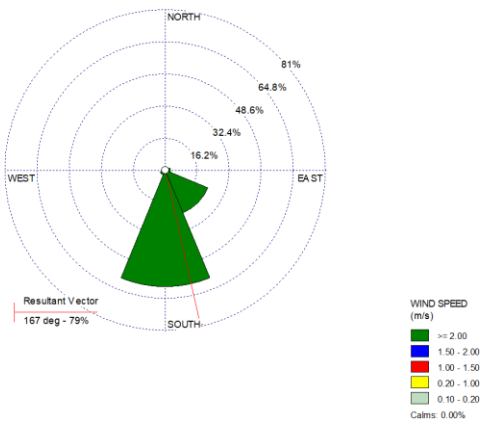
April (1990-2024)



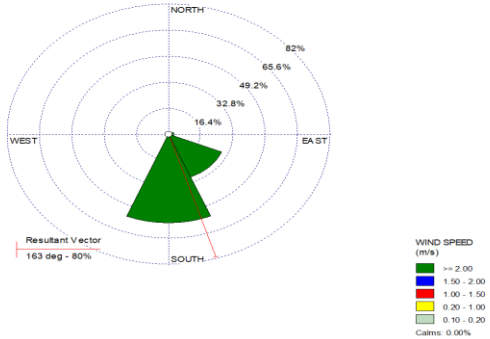
May (1990-2024)



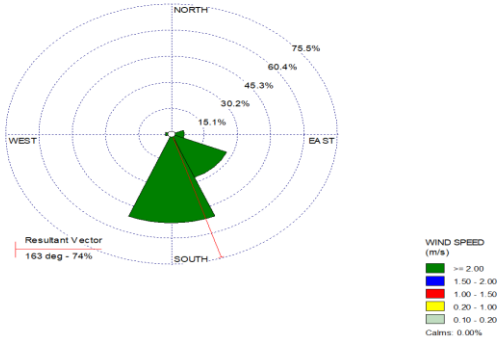
June (1990-2024)



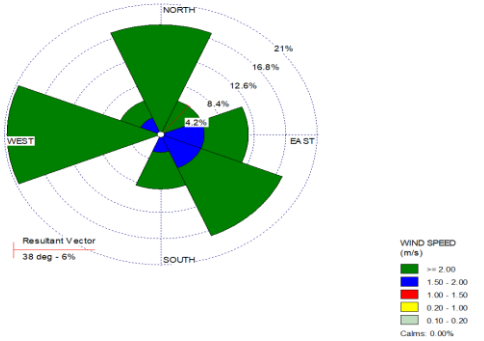
July (1990-2024)



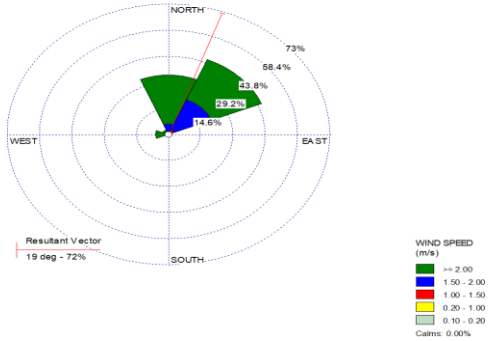
August (1990-2024)



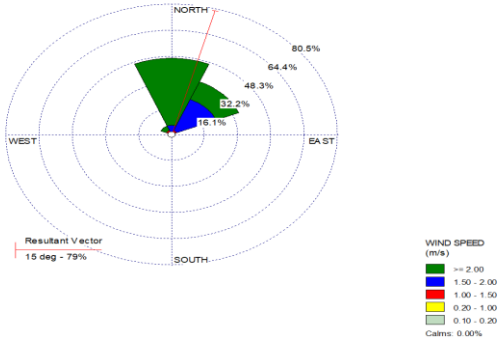
September (1990-2024)



October (1990-2024)



November (1990-2024)



December (1990-2024)

Figure 37: Monthly Wind Rose Diagram of Chattogram BDM Station from 1990-2024

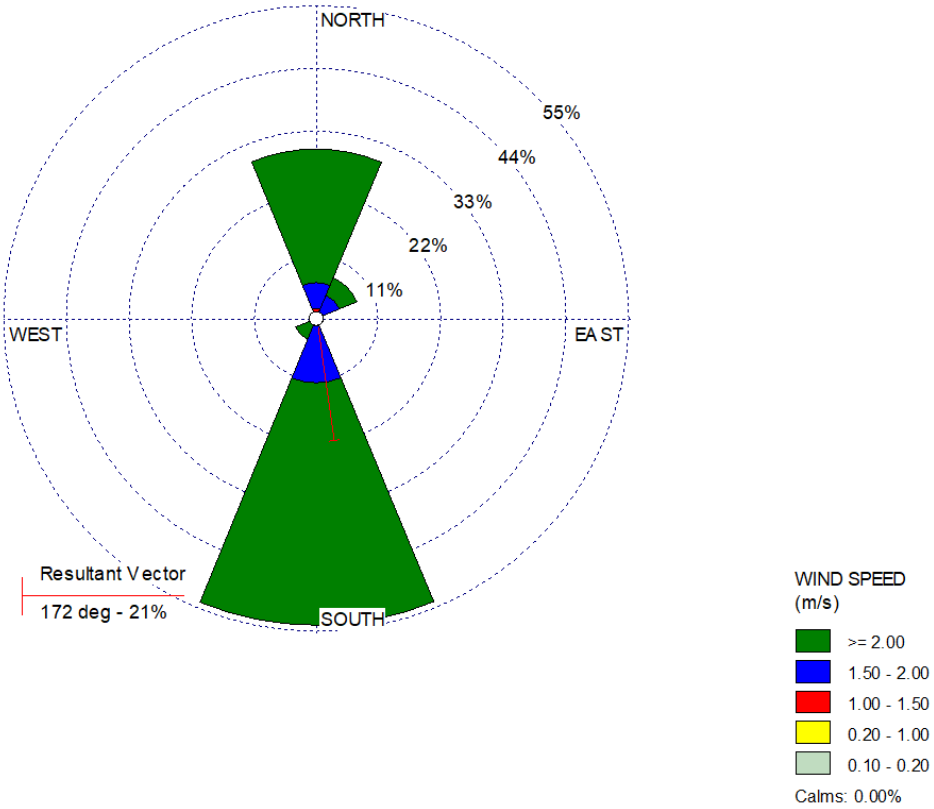


Figure 38: Wind rose diagram of Cox's Bazar from 1990-2024

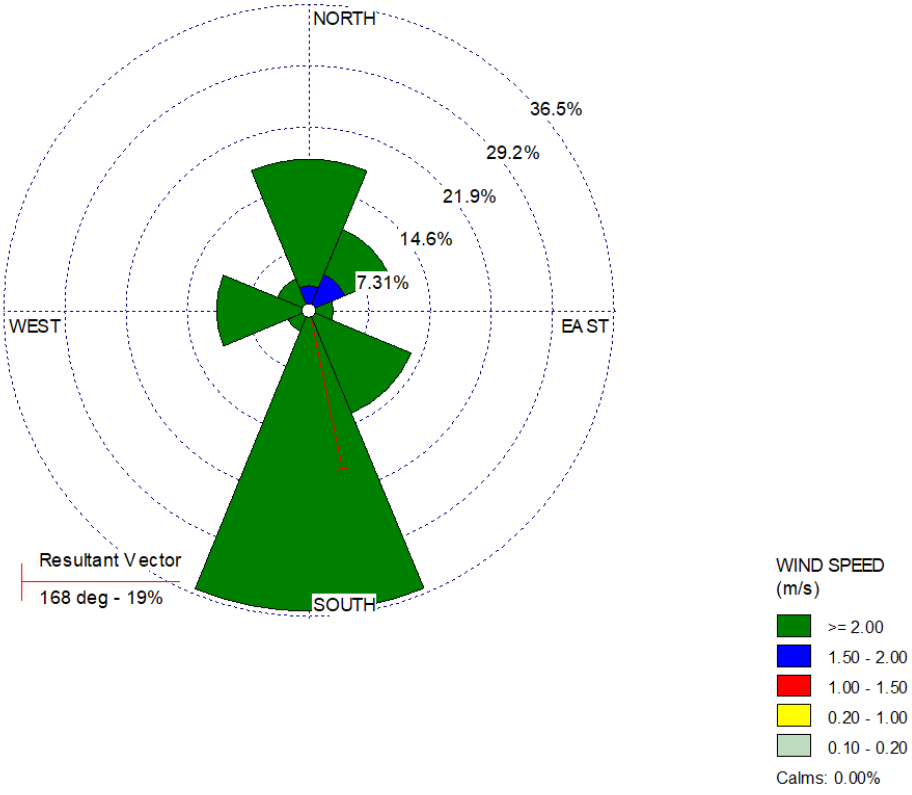


Figure 39: Wind rose diagram of Cox's Bazar from 1990-2024

5.1.2 Surface Geology

Bangladesh constitutes major parts of the Bengal Basin and has been evolved by formation of successive delta systems developed by the two great rivers of the Ganges and the Brahmaputra. The Bengal Basin is a structurally complex area formed due to the presence of an active Himalayan folded belt (thrust belt) in the north and Indo-Burman fold belt in the east. It is surrounded by the Archean (3.8 to 2.6 billion years old) Indian Platform (Shield) in the west, Tertiary (time range between 65 to 1.6 million years) and, in part, Mesozoic (225 to 65 million years) metamorphic Indo-Burman ranges in the east and the Archean basement of the Shillong Plateau in the north. Tectonically, Bangladesh is divided broadly into the following divisions, on the basis of basement behavior and fault characteristics:

a) Indian Platform and Shelf

- **Dinajpur Slope (Himalayan Fore Deep)-** The Himalayan Fore deep lies south of the Main Boundary Thrust (MBT) all along the foothills of the Himalayas. It lies at the North West (NW) tip of Bangladesh and the basement occurs at 2500 m depth.
- **Rangpur Saddle-** The basement is most uplifted and covered with thin sedimentary deposits. The tentative boundary of the Rangpur Saddle at the northern and the southern slopes has been seismically defined by the approximately 700 m depth contour.
- **Bogura Slope-** the Bogura Shelf (Bogura slope) represents the southern slope of the Rangpur Saddle which is a regional monocline plunging gently towards south east to the Hinge zone. This zone marks the transition between the Rangpur Saddle and the Bengal Fore deep.

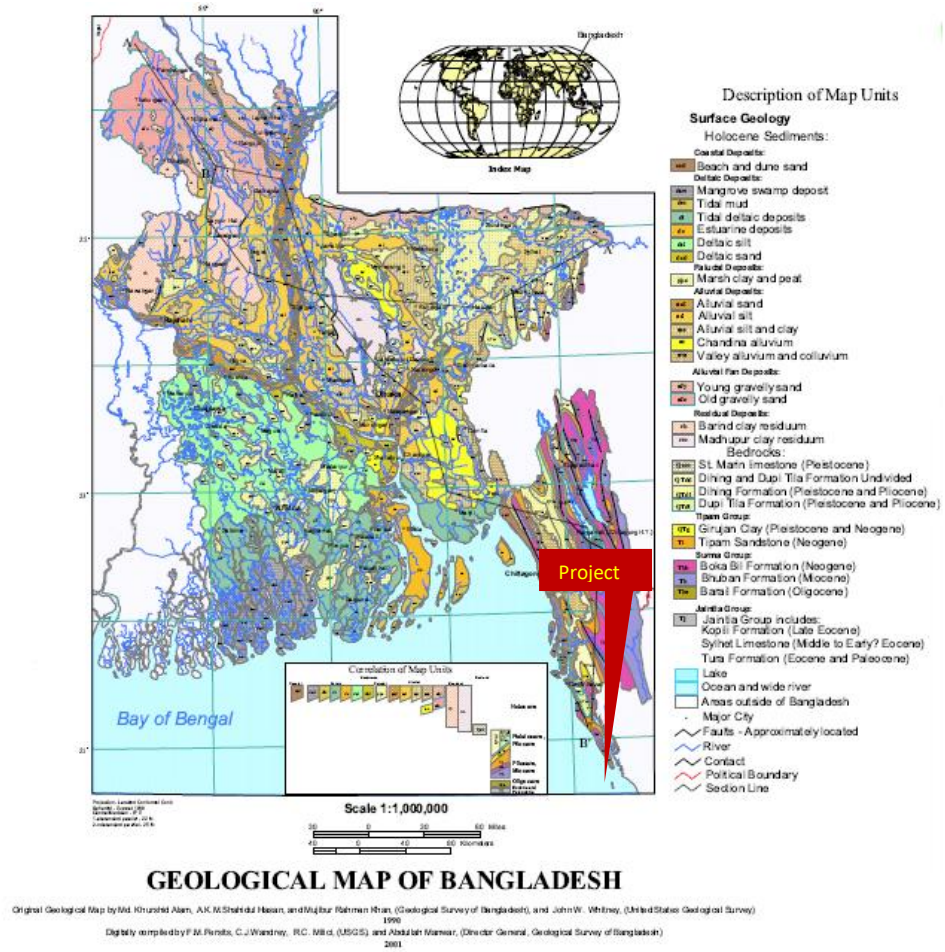


Figure 40: Geology of the Project Area

b) Hinge Zone (Eocene slope break)

It is a narrow zone trending SSW-NNE from Sylhet-Mymensingh-Pabna-Calcutta and further to the southwest along the coastline of Odisha. It is bound by the Bogura Shelf (or south slope of the Rangpur Saddle) by the seismic depth of 3,500m to the top of the Eocene Sylhet Limestone, the most prominent sedimentary reflector in Bangladesh and West-Bengal.

c) Bengal Fore Deep

The Bengal Foredeep is flanked by Hinge Line in west and the Arakan Yoma Folded System in east which plays the most important role in the tectonic history of Bengal Basin. The Bengal Foredeep can be divided into two major regions: A Western Platform Flank and an Eastern Folded Flank. The Western Platform flank is further subdivided into the Faridpur Trough, the Barishal-Chandpur High, the Hatiya Trough, the Madhupur High and Sylhet Trough.

d) Eastern Folded Flank

The Folded belt extends S-N within Bangladesh for 450 km and is about 150 km wide, covering an area of 35 000 km^2 of on-shore area. The study area is situated in the Chattogram Tripura Folded Belt which is the youngest structural province along the western flank of the Indo-Burma Ranges. The Eocene flysch (marine sedimentary rock) sequences of the Indo-Burma Range constitute the eastern limit of this tectonic province. The age of the sediments outcropping in the folded belt ranges from Lower Miocene (about 24 million years before the present) to recent age. The Miocene sediments were deposited under marine and predominantly deltaic conditions in a rapidly subsiding, unstable basin, while the depositional environments were governed by subaqueous to sub-aerial, fluviatile to lacustrine conditions in Plio-Pleistocene times (5 million years to 0.1 million years before the present).

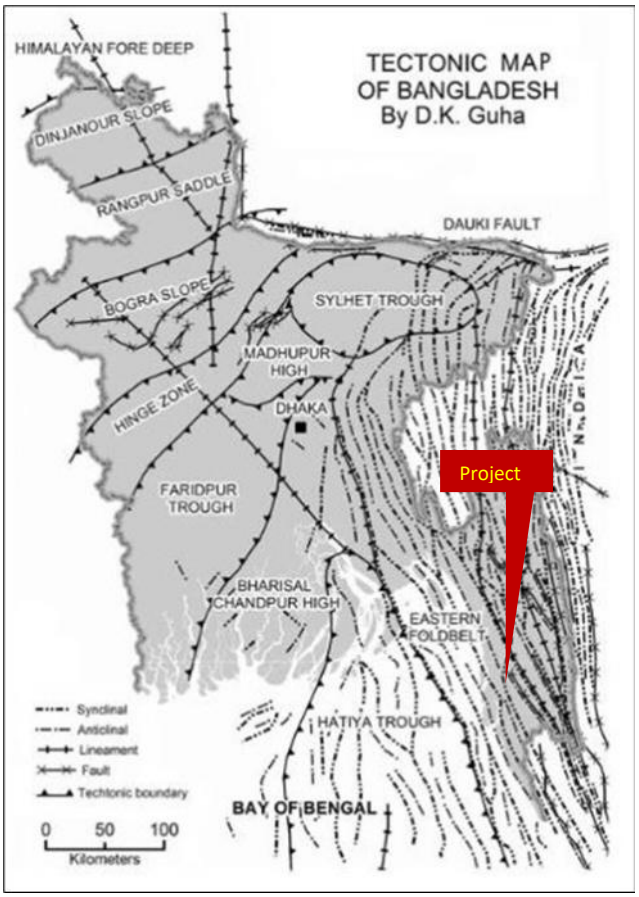


Figure 41: Tectonic Elements of Bangladesh
Source: http://217.174.128.43/web_data/iga_db/Bangladesh.pdf

5.1.3 Physiography and Topography

Physiography is the terrain condition of a particular tract of land and reveals the surface condition of the land. Physiographic region/unit refers to a region in which all land tracts are similar in terms of physical characteristics, with a uniform geomorphic history, and whose pattern of topographical features or landforms differs significantly from that of adjacent regions.

In the context of physiography, Bangladesh may be classified into three distinct regions-floodplains, terraces, and hills, further divided into twenty physiographic units. The study area of the proposed project forms a part of the (a) Chattogram Coastal Plain Land (b) North Eastern Hills. This physiographic unit comprises of gently sloping, mainly loamy, alluvial flats adjoining the north-eastern hills, and extensive level clay plains. Tidal clay plains occupy most of the off-shore islands in the south.

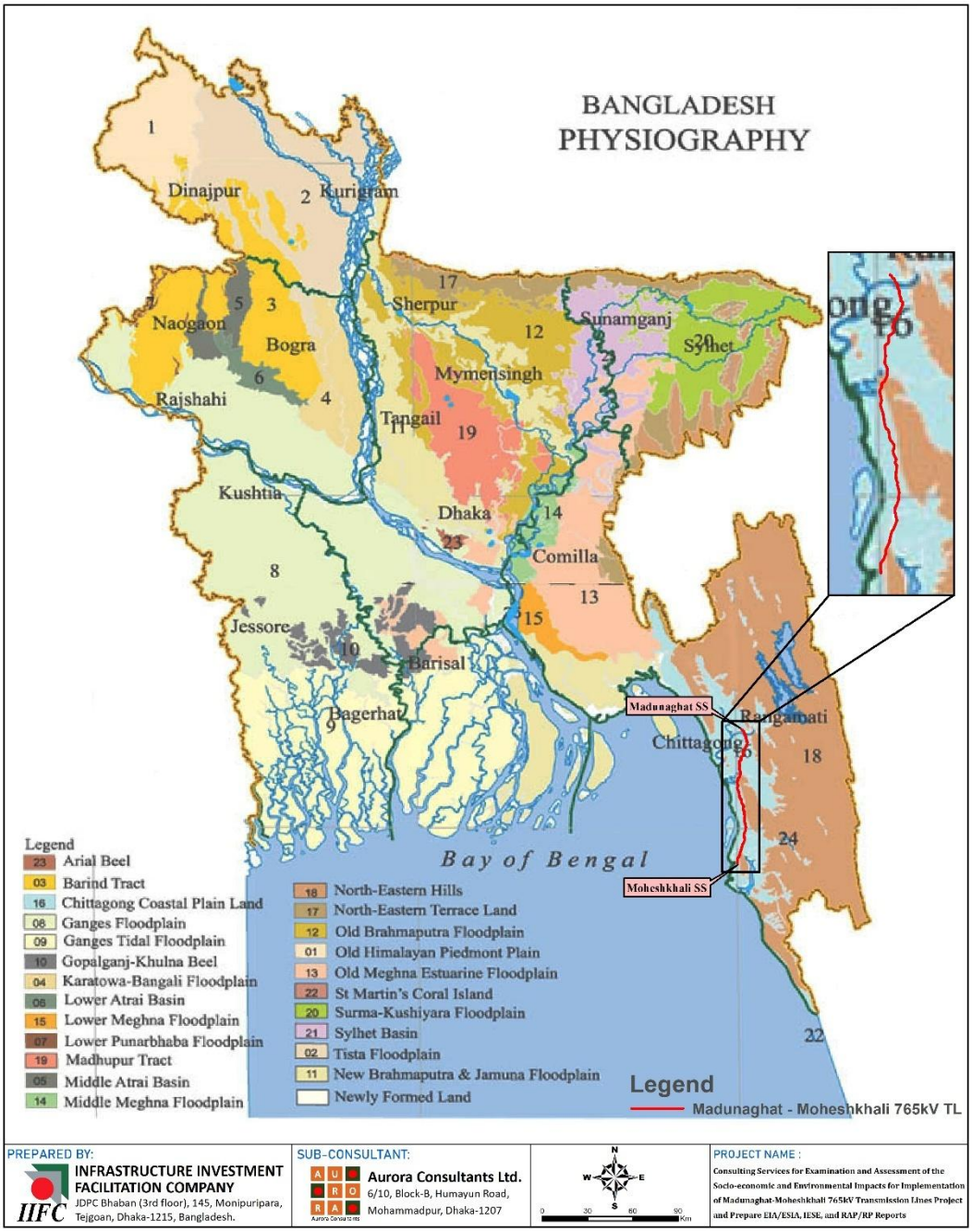


Figure 42: Proposed Transmission Lines

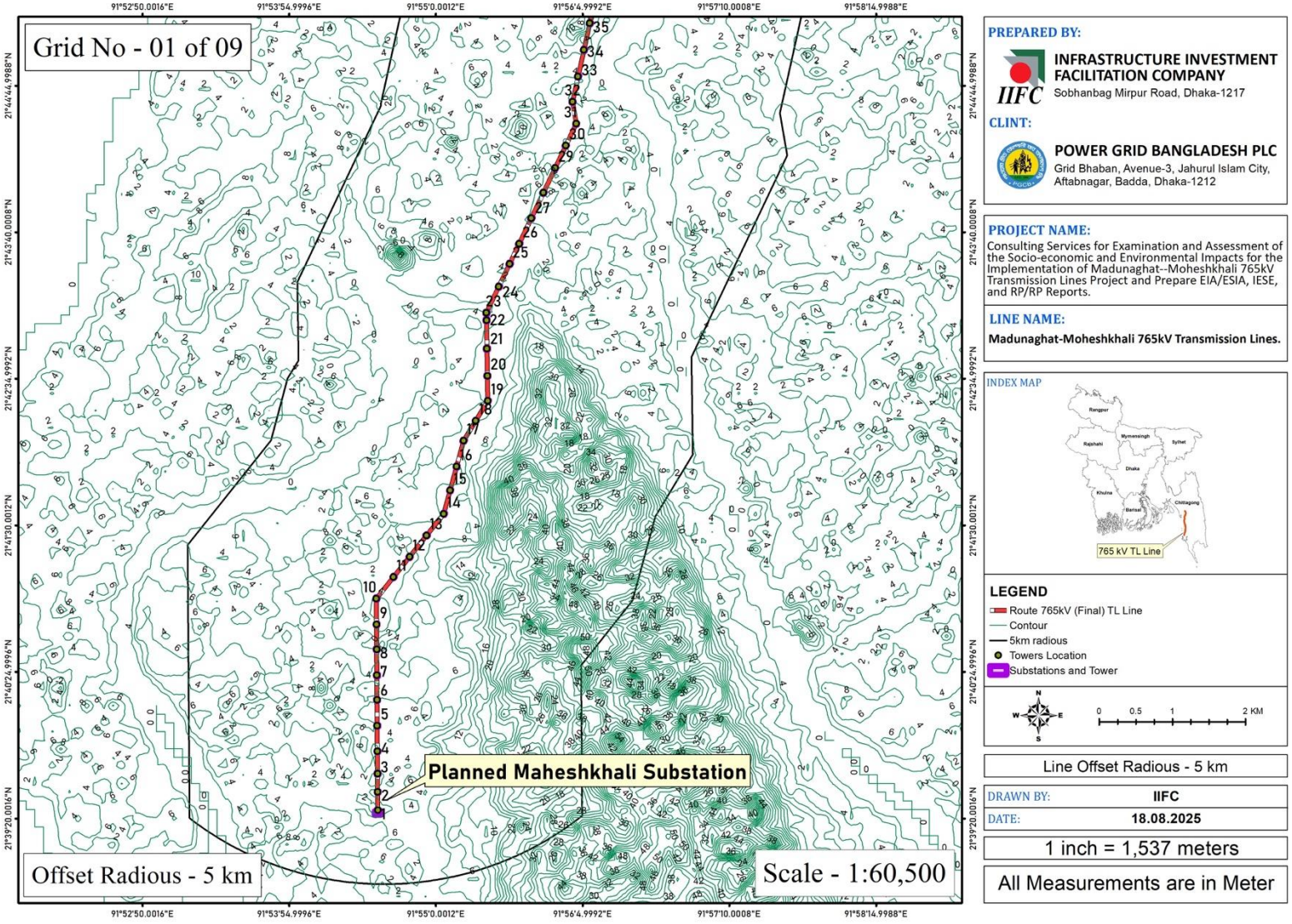


Figure 43: Contour Map of proposed transmission line from Tower 1-35

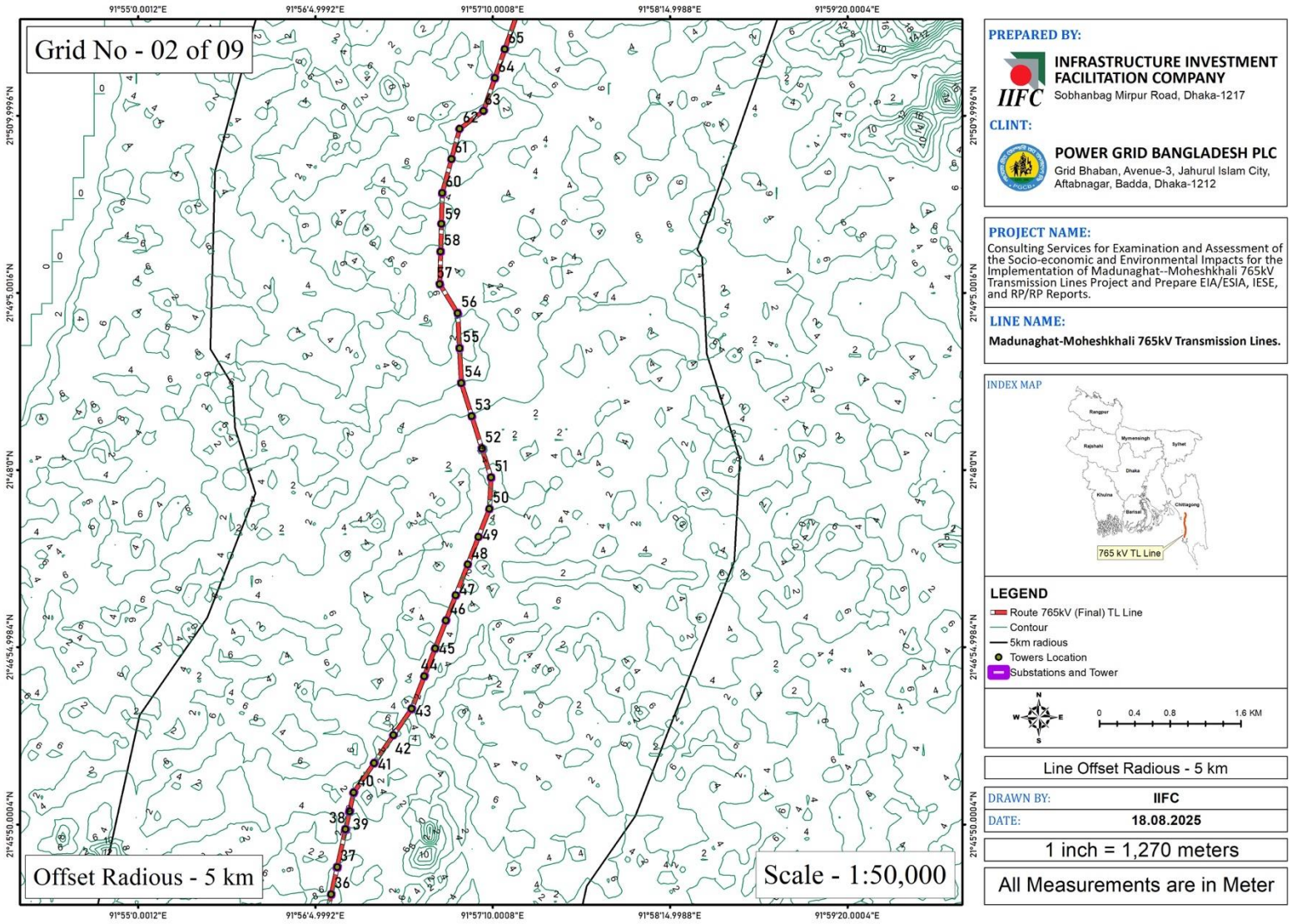


Figure 44: Contour Map of proposed transmission line from Tower 36-65

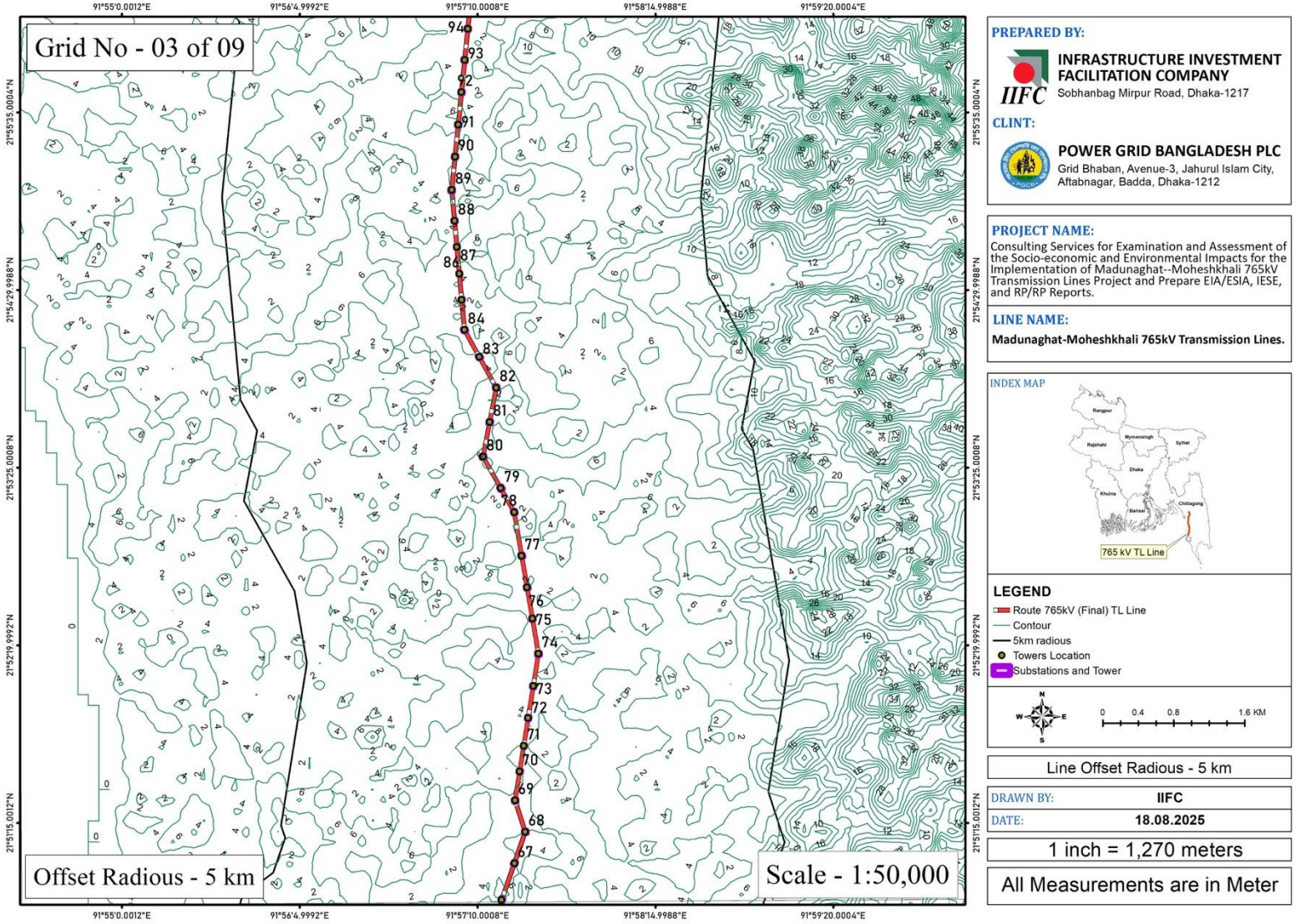


Figure 45: Contour Map of proposed transmission line from Tower 66-94

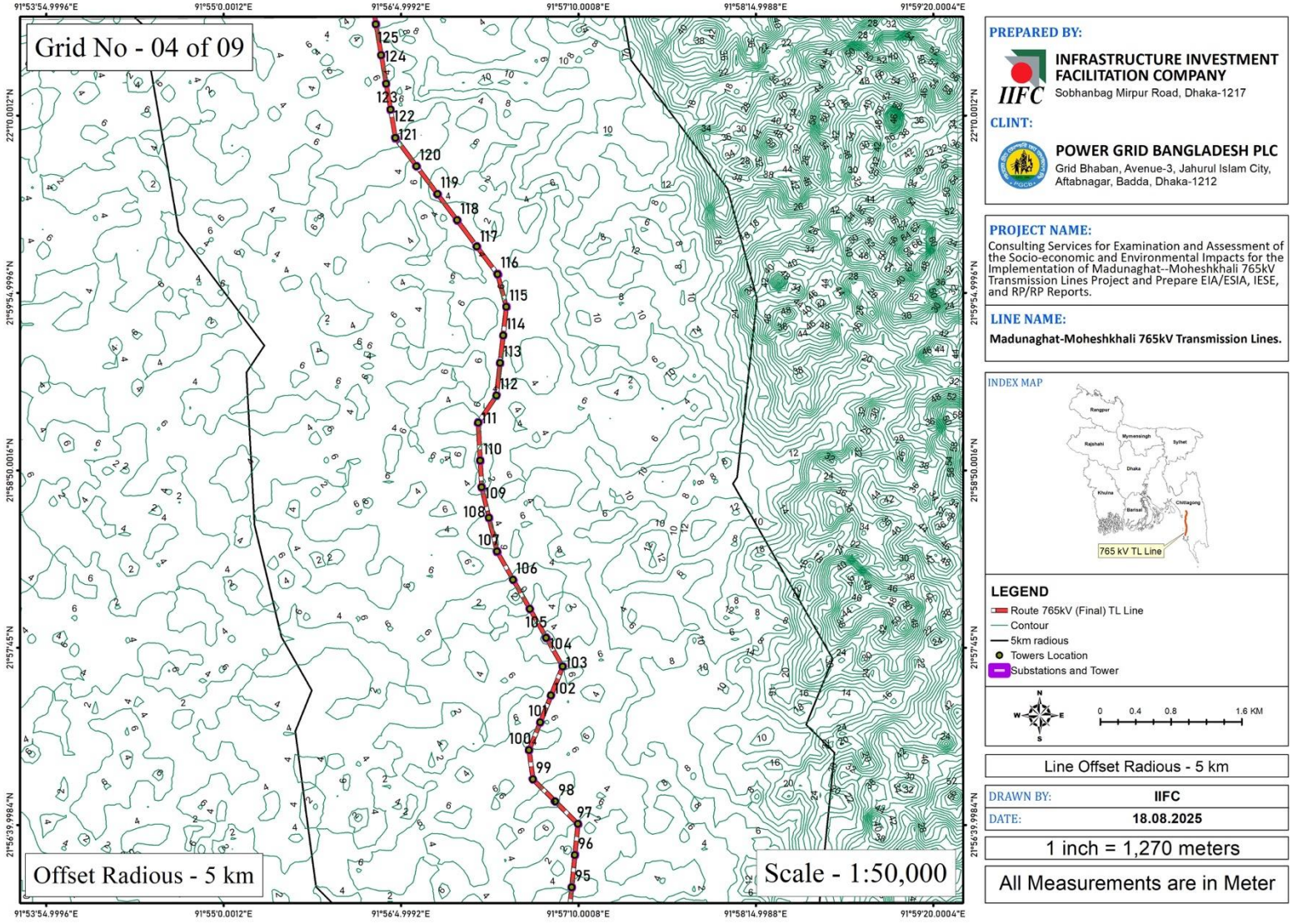


Figure 46: Contour Map of proposed transmission line from Tower 95-125

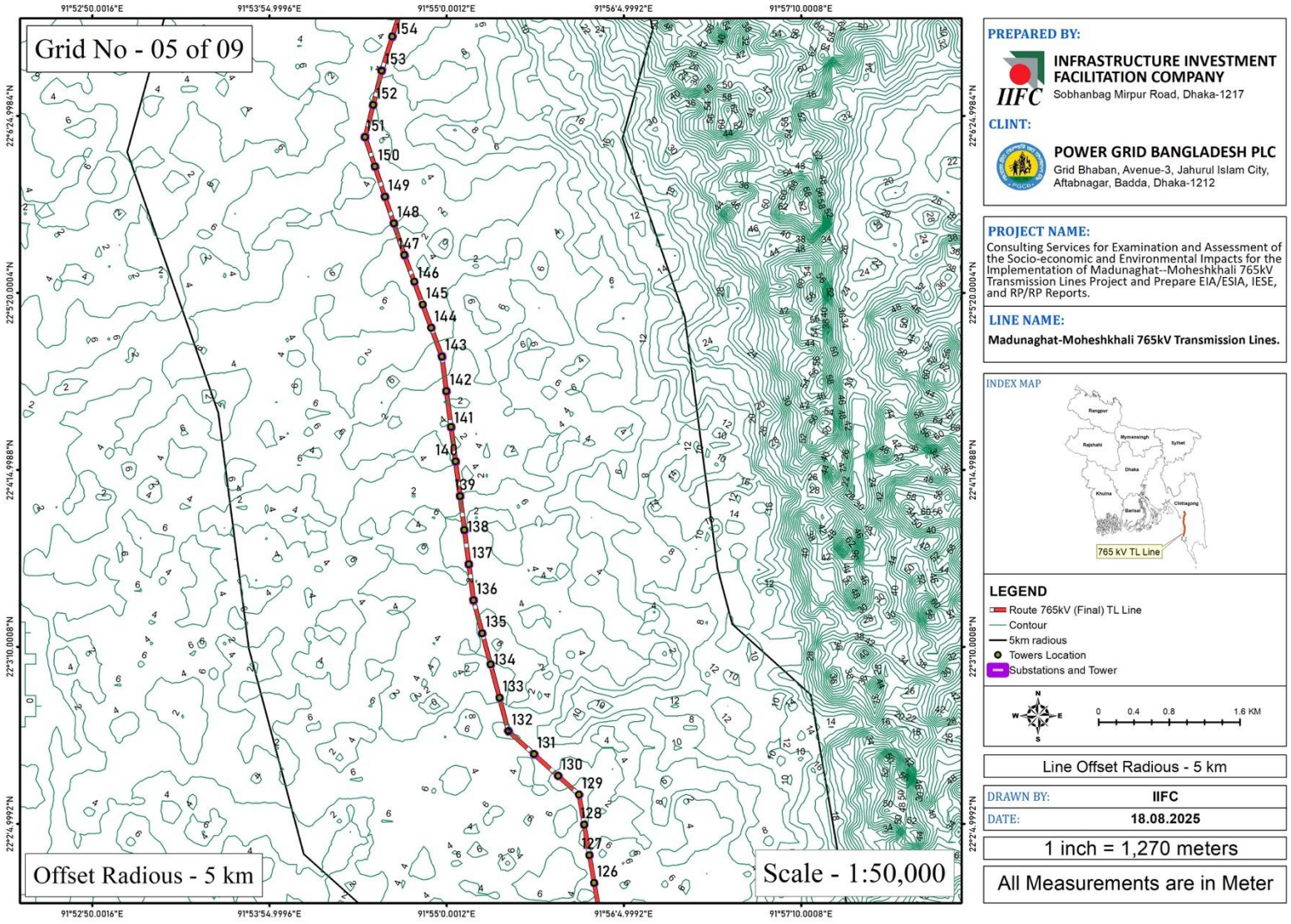


Figure 47: Contour Map of proposed transmission line from Tower 126-154

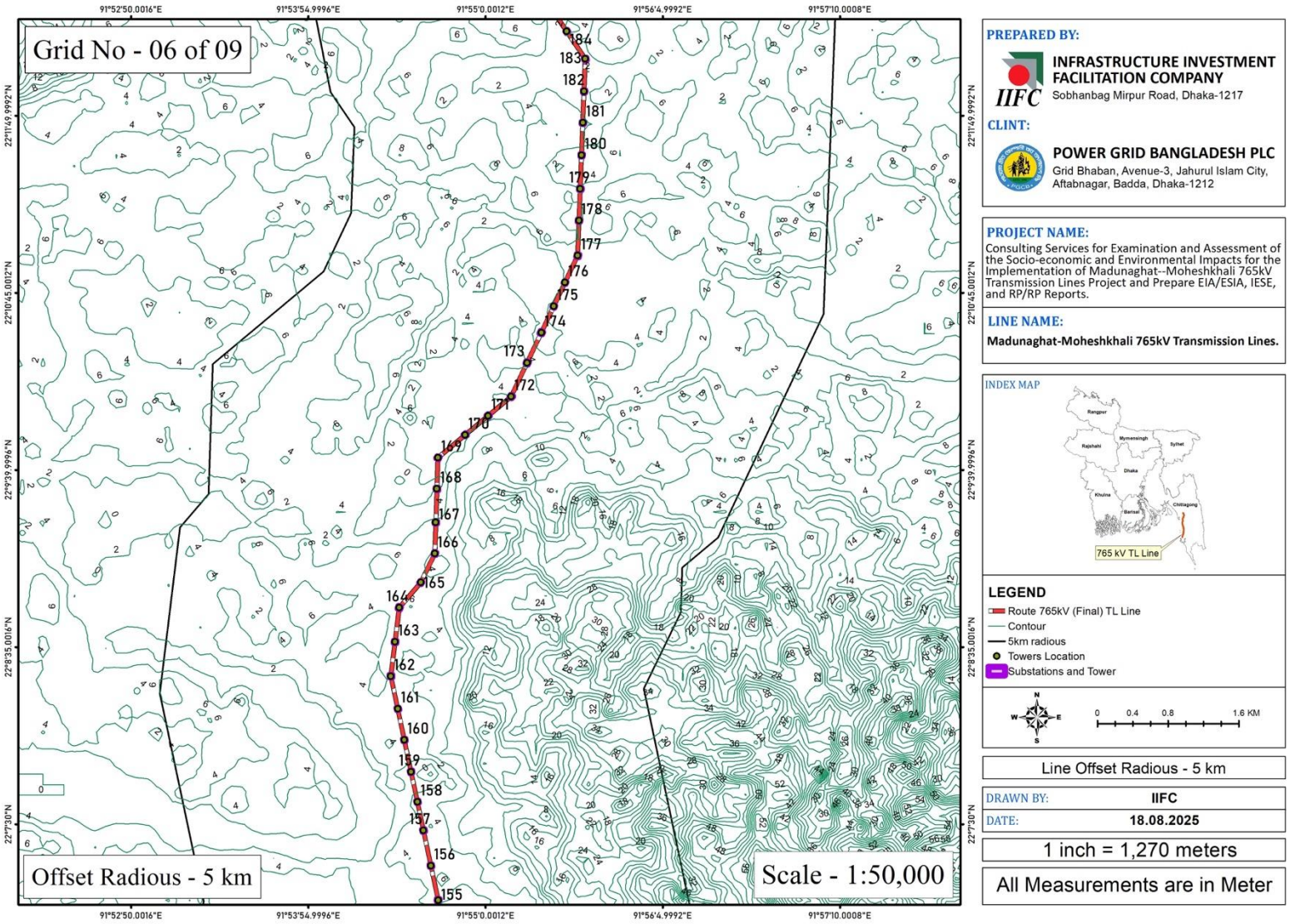


Figure 48: Contour Map of proposed transmission line from Tower 155-184

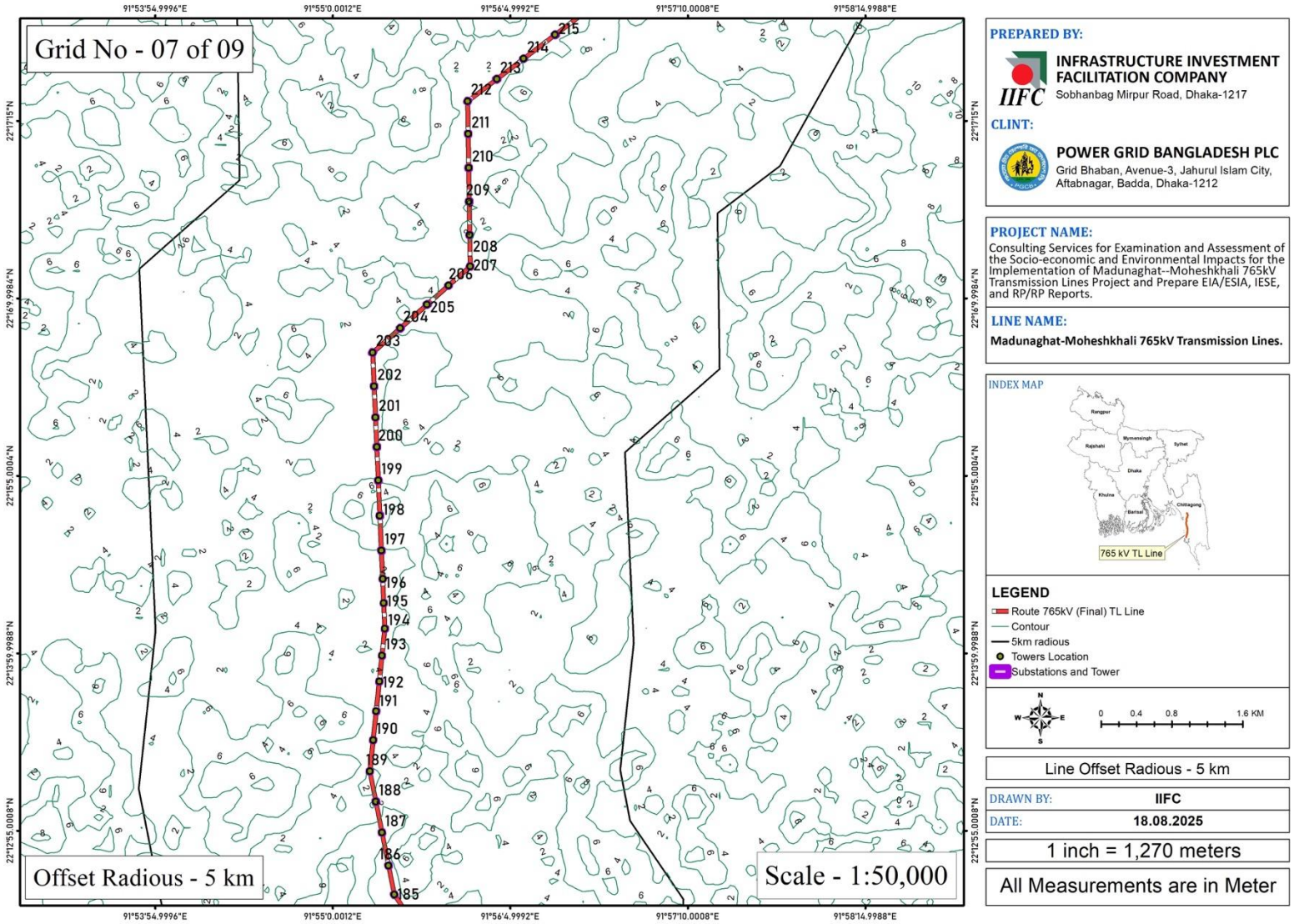


Figure 49: Contour Map of proposed transmission line from Tower 185-215

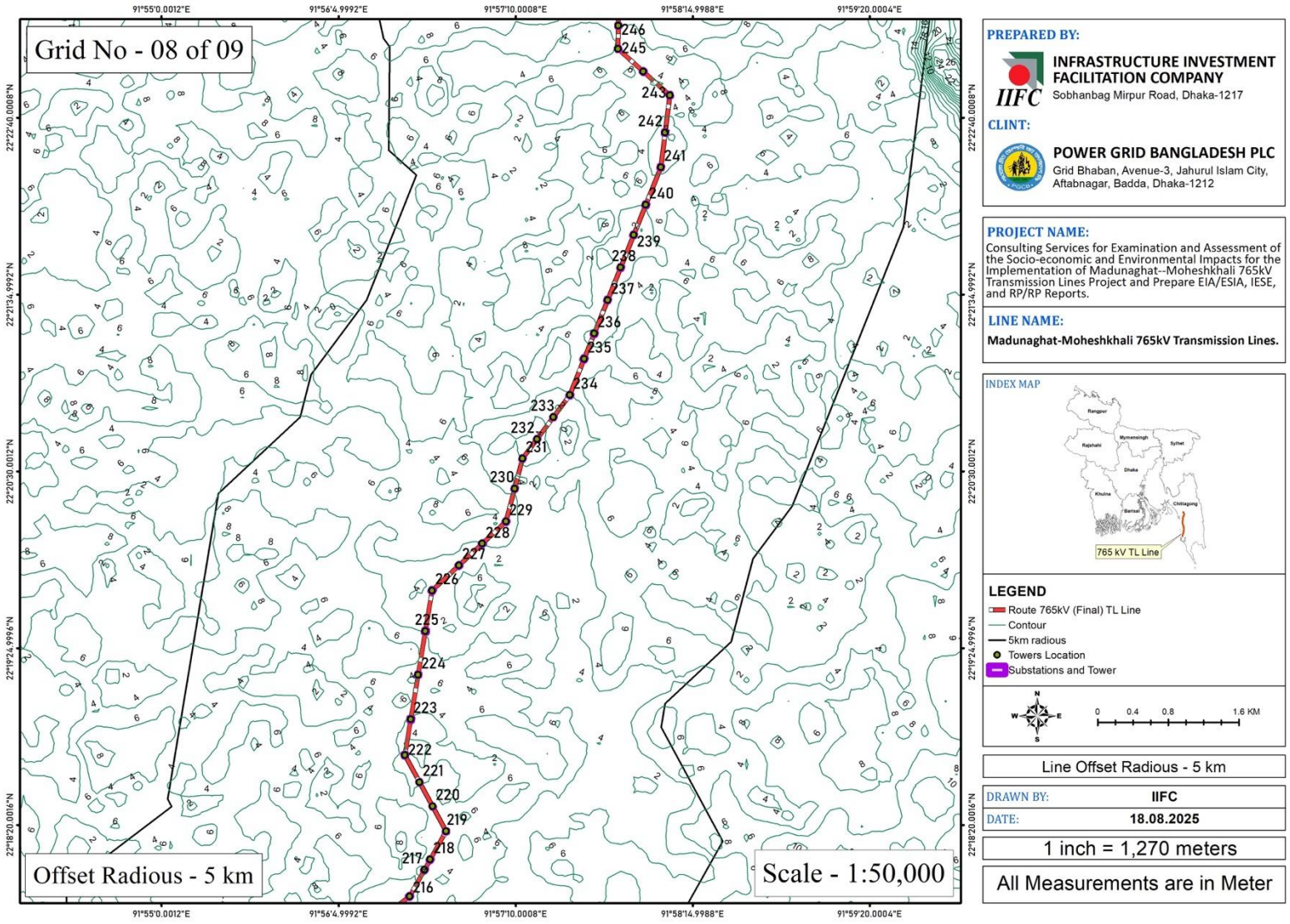


Figure 50: Contour Map of proposed transmission line from Tower 216-246

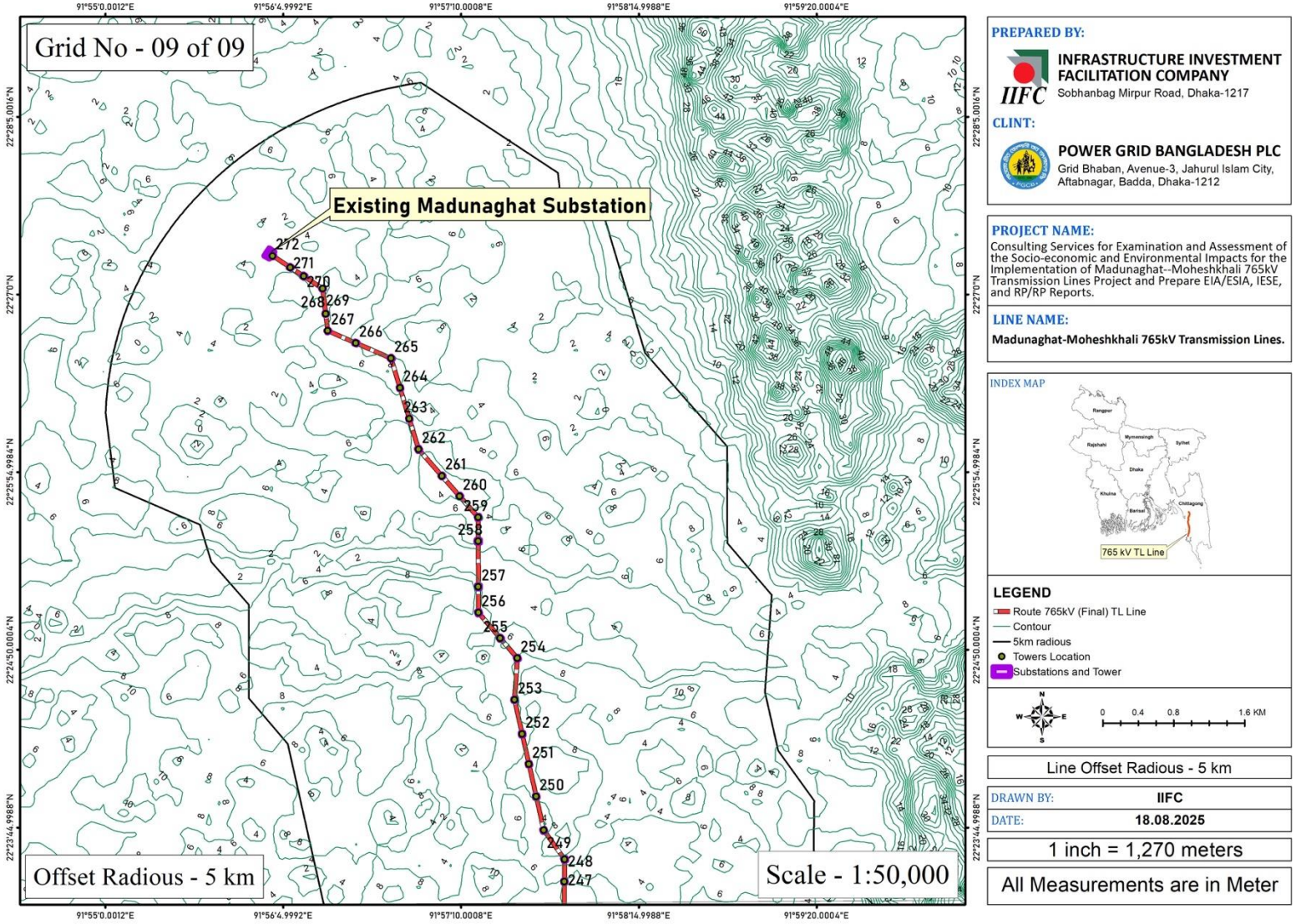


Figure 51: Contour Map of proposed transmission line from Tower 247-272

5.1.4 Natural Hazards

Seismicity

The Geological Survey of Bangladesh (GSB) has divided the country into three seismic zones, as illustrated in Figure 52, accompanied by an outline of a code for earthquake resistant design. According to the map, the Project site falls in Seismic Zone I, II, IV where the possible maximum earthquake magnitude in Richter's scale is 8.0, and the suggested Basic Seismic Coefficient is 0.12g, 0.20g, and 0.36g respectively. However, for design, the seismic loads acting on the structures shall be calculated according to Indian Standard IS 1893 with a seismic zone 5 and an importance factor of 1.5. Major earthquakes experienced in Bangladesh till date is provided in the Table 46.

Table 46: Major Earthquakes in the Region

Date	Name/ Type of the Earthquake	Magnitude (Richter)	Epicentral Distance from Dhaka (km)	Epicentral Distance from Sylhet City (km)	Epicentral Distance from Chattogram (km)
10th January, 1869	Cachar Earthquake	7.5	25	70	280
14th July, 1885	Bengal Earthquake	7	170	220	350
12th June, 1897	Great Indian Earthquake	8.7	230	80	340
8th July, 1918	Earthquake	7.6	150	60	200
2nd July, 1930	Dhubri Earthquake	7.1	250	475	415
15th January, 1934	Bihar-Nepal Earthquake	8.3	510	530	580
15th August, 1950	Assam Earthquake	8.5	780	580	540

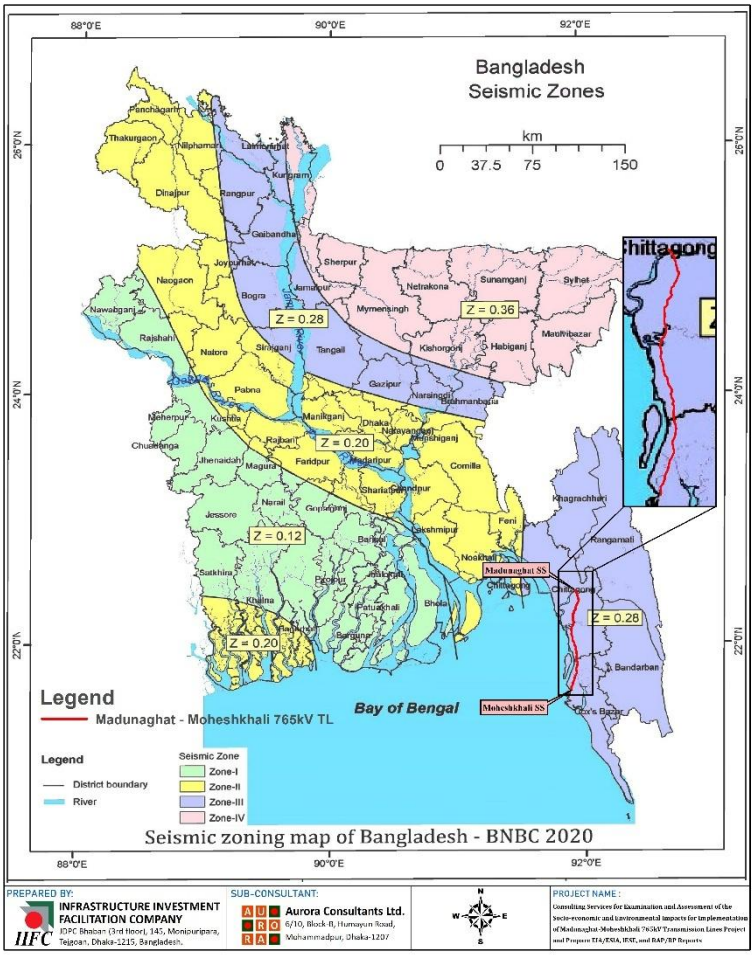


Figure 52: Seismic Zones of Bangladesh

Cyclonic Disasters

Chattogram and Cox's Bazar, as part of coastal Bangladesh, have faced numerous severe cyclones historically, with the 1991 cyclone being a major disaster affecting the Chattogram region, causing widespread destruction and thousands of deaths. The region was also impacted by the 1970 Bhola Cyclone, one of the deadliest natural disasters ever recorded, though its primary impact was further southwest. Other notable events include the 1966 cyclonic storm and the 1994 cyclone, both of which caused significant damage and casualties in the southeastern coastal areas, including Teknaf, which is near Cox's Bazar. The average daily rise in the tide is about two meters. The study area is susceptible to storm surges associated with cyclones. The coastal areas of Bangladesh experience major cyclones primarily in the months of May and October. The range of astronomical tides along the coast is so large during this period that the storm induced sea level becomes very high, resulting in a storm surge. During the years 1797 to 1991, Bangladesh has been hit by 59 severe cyclones, 32 of which were accompanied by storm surges. Various studies suggest that the height of the surges limited to a maximum of 10 meters in the bay have an occurrence frequency of approximately once per 20 years while surges with frequency of approximately once in 5 years have a height of about 7 m. Below table provides a list of major cyclones and storm surges in Bangladesh in the past.

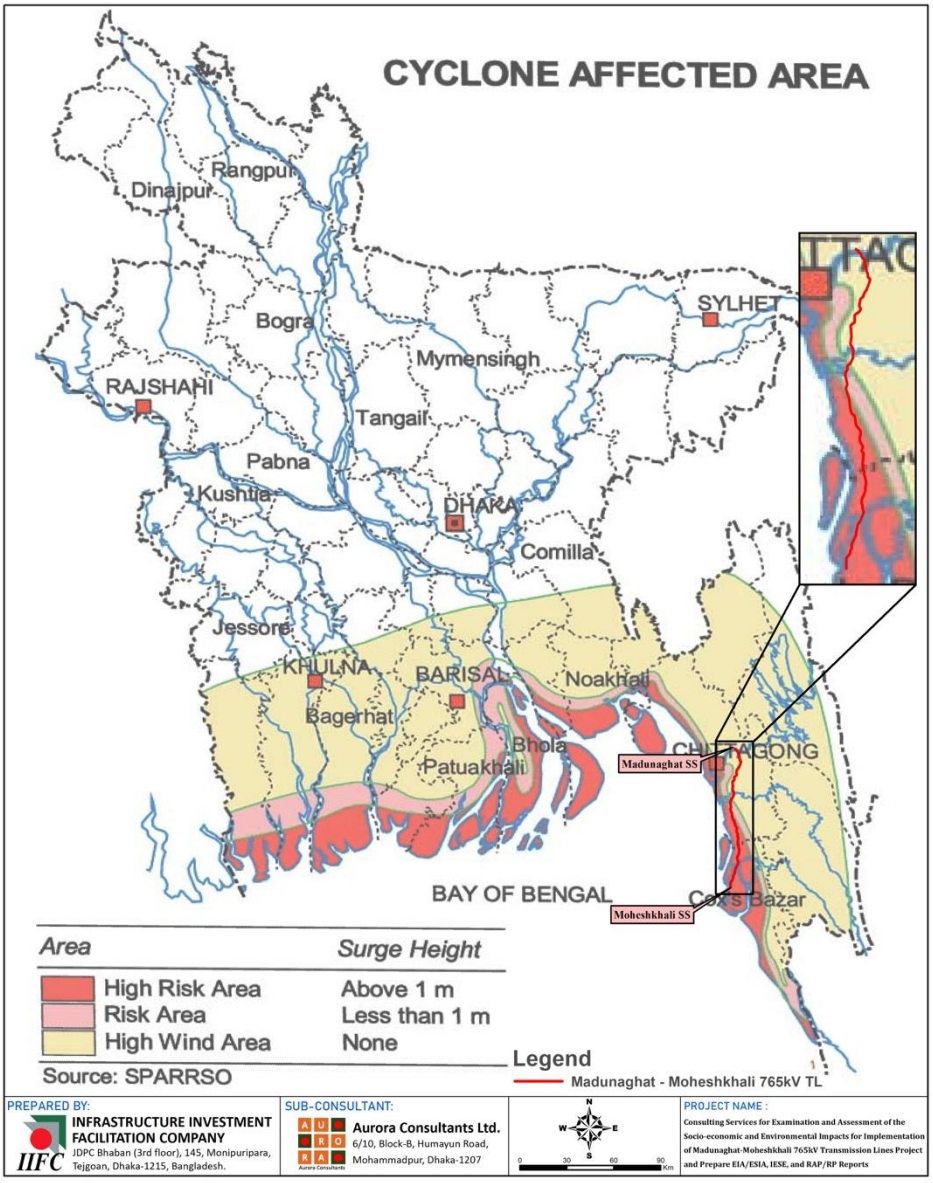


Figure 53: Cyclone Surge Susceptibility

Source: Disaster Management Board (DMB), Bangladesh

Table 47: Major Cyclones occurred in Bangladesh

Date	Nature of Phenomena	Approx. Loss/ Damage
1797, May-June	Most severe cyclone	Every hut leveled to ground and 2 vessels sunk in the Chattogram port
1876, 27th Oct-1st Nov	More severe storm surge	400,000 lives were lost and 1st Nov
1897, October	Hurricane with surge	175,000 lives were lost
1909, October	Cyclonic storm surge	Damage data not available
1948, 17th -19th May	Cyclonic storm	Damage data not available
1960, 30th– 31st October	Severe cyclonic storm, w=161 to210 km/h, s=4.2m and t=1.8m.	70% buildings in Hatia blown-off and 8,149 lives lost
1961, 27th -30th May	Cyclonic storm, w=95 to 145 km/h and total water level was 7m at Chattogram.	10,466 people killed
1962, 26th – 30th October	Cyclonic storm, w=200 km/h, s=5.8m and t=0.0m.	50,000 people killed
1963, 28-29th May	Severe cyclonic storm, w=201 km/h, s=5m and t=0.3m at Chattogram.	11,520 people killed
1965, 10-12th May	Severe cyclonic storm, w=161 km/h, s=4.0m and t=1.2m.	19,270 people killed
1965, 31st May – 1st June	Tide plus surge was 7.1m at Companiganj. At Chattogram 1.6m surge on tide	12,000 people killed
1966, 1st October	Severe cyclonic storm, w=145 km/h, tide plus surge was 6-7m.	850 people killed
1967,23-24th October	Cyclonic storm, w=130 km/h, s=2m and t=0.0m.	128 people killed
1970, 5-7th May	Cyclonic storm, w=148 km/h, s=2.3m and t=0.2m.	18 people killed
1970, 12-13th November	Most severe cyclonic storm, w=222 km/h, s=5.5m and t=2.1m.	300,000 lives lost and innumerable animals were killed, widespread damage to crops and properties
1971, 5-6th November	Cyclonic storm, w=105 km/h, s=2.1m and t=0.0m.	Damage data not available
1973, 16th -18th November	Cyclonic storm, w=165 km/h, s=3.5m and t=1.0m.	Damage data not available
1974, 24-28th November	Severe cyclonic storm, w=161 km/h, s=3.1m and t=0.2m.	20 people killed
1975, 9-12th May	Severe cyclonic storm, w=110km/h.	5 people killed
1977, 9-12th May	Cyclonic storm, w=113 km/h, s=0.6m and t=0.7m	Damage data not available
1983, 15th October	Cyclonic storm, w=122 km/h.	43 persons were killed, 1000 fishermen missing and 20% Aman crops destroyed
1983, 9th November	Severe cyclonic storm, w=136 km/h, s=2.5m.	300 fishermen with 50 boats missing; 2000 houses, 22 institutions destroyed
1986, 9th November	Cyclonic storm, w=110 km/h.	14 lives lost and huge damage to crops and properties
1991, 29th April	Most severe cyclonic storm w=235 km/h, s=5.8m and t=1.7m.	145,000 people killed, 70,000 cattle killed, crops were damaged
1997, 19th May	Severe cyclonic storm, w=232 km/h, s=3.1-4.6m	Death toll of about 155
2007, 15th Nov	Severe cyclonic storm, w=223 km/h, s=4.2-4.6m	Death toll of about 3363
2009, 25th May	Cyclonic storm, w=92 km/h	Death toll of about 190
2012, 16th May	Cyclonic storm, w=130 km/h	Death toll of about 16

Note: w= Wind Speed; s= Surge height; t= Tidal height
Source: Asian Disaster and Preparedness Center (ADPC); Asian Disaster Reduction Center (ADRC)

Flood

The flood inundation history of the Chattogram and Cox's Bazar coastal belt is marked by recurring events, primarily driven by riverine floods, cyclones, and storm surges. These areas have been historically vulnerable due to their location in a river delta and near the Bay of Bengal. Major floods have impacted the region, with the 2024 floods causing significant damage and casualties, highlighting the ongoing threats of heavy rainfall, storm surges, and flash floods exacerbated by factors like increased embankment severity and changing climate patterns.

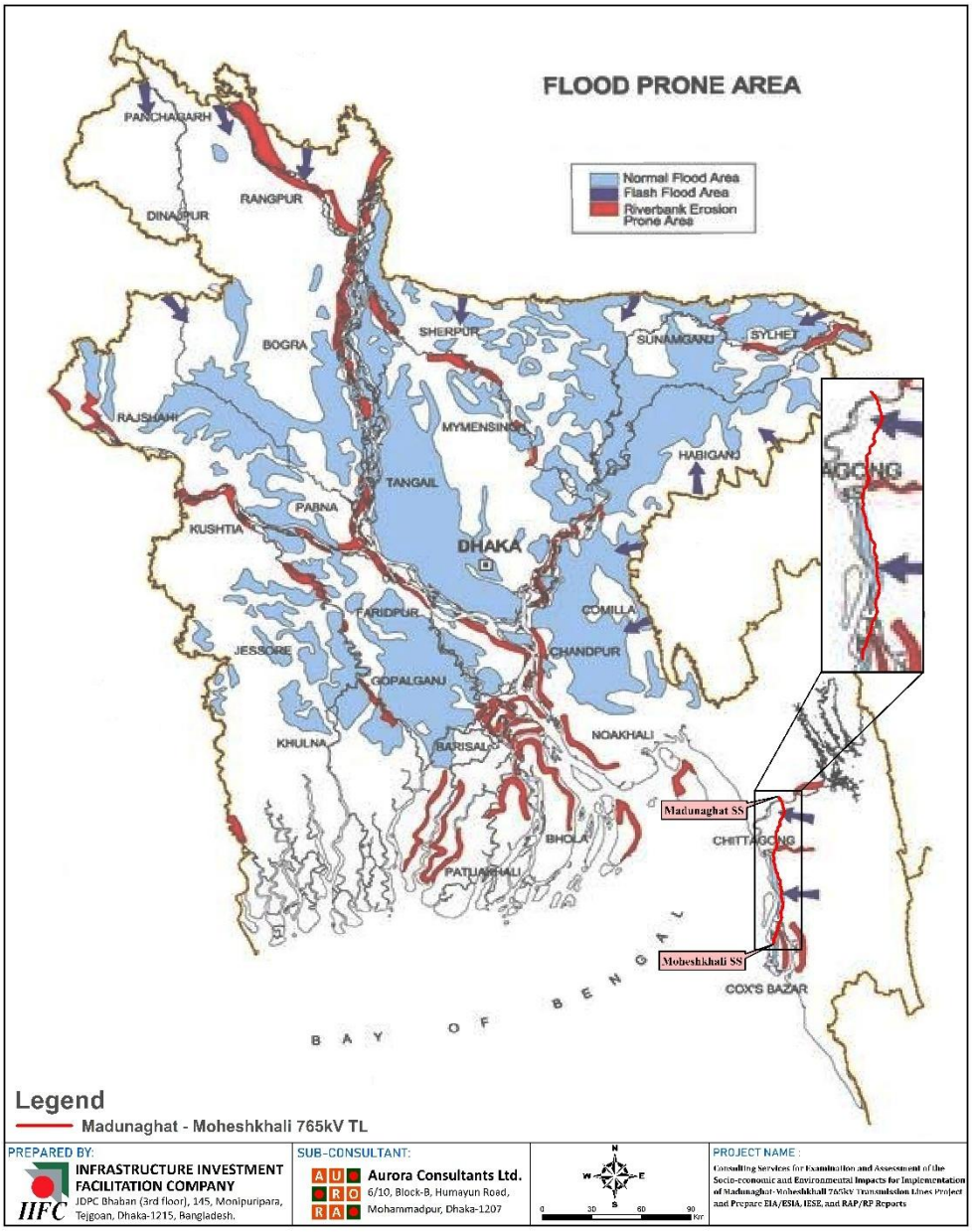


Figure 54: Flood inundation map of Bangladesh

Heavy monsoon rains, particularly in the upstream areas of the Ganges, Brahmaputra, and Meghna rivers, lead to rapid water level rises and widespread flooding. The coastal belt is frequently hit by cyclones and associated storm surges from the Bay of Bengal, causing significant inundation. While specific dates for Chattogram and Cox's Bazar are not detailed, major floods have occurred with alarming regularity, including significant events in 2004, 2007, 2009–2014, and 2020. However, the proposed transmission line falls normal flood prone area of Bangladesh.

Lightning

A thunderstorm is basically a storm, characterized by lightning and thunder. When the temperature rises, hot moist air rises upwards- known as updrafts. At the same time, the cool air sinks downwards, and this is called downdrafts. Collision between the updrafts and downdrafts creates cumulonimbus clouds and it produces lightning and thunder. Thunderstorms occur almost everywhere on the earth's surface, one of the most dangerous convective weather events. An estimated more than 1600–2400 thunderstorms occur at any moment and 50,000 each day, around the globe. All thunderstorms produce lightning. Lightning injury is a global public health problem representing the leading cause of weather-related death after tornadoes, flash floods and hurricanes. The injuries cause high mortality and significant long-term morbidity. The following map shows some areas of the proposed lines fall under the lightning sensitive areas. However, proper measures shall be taken by Power Grid during the planning and design stage of the project.

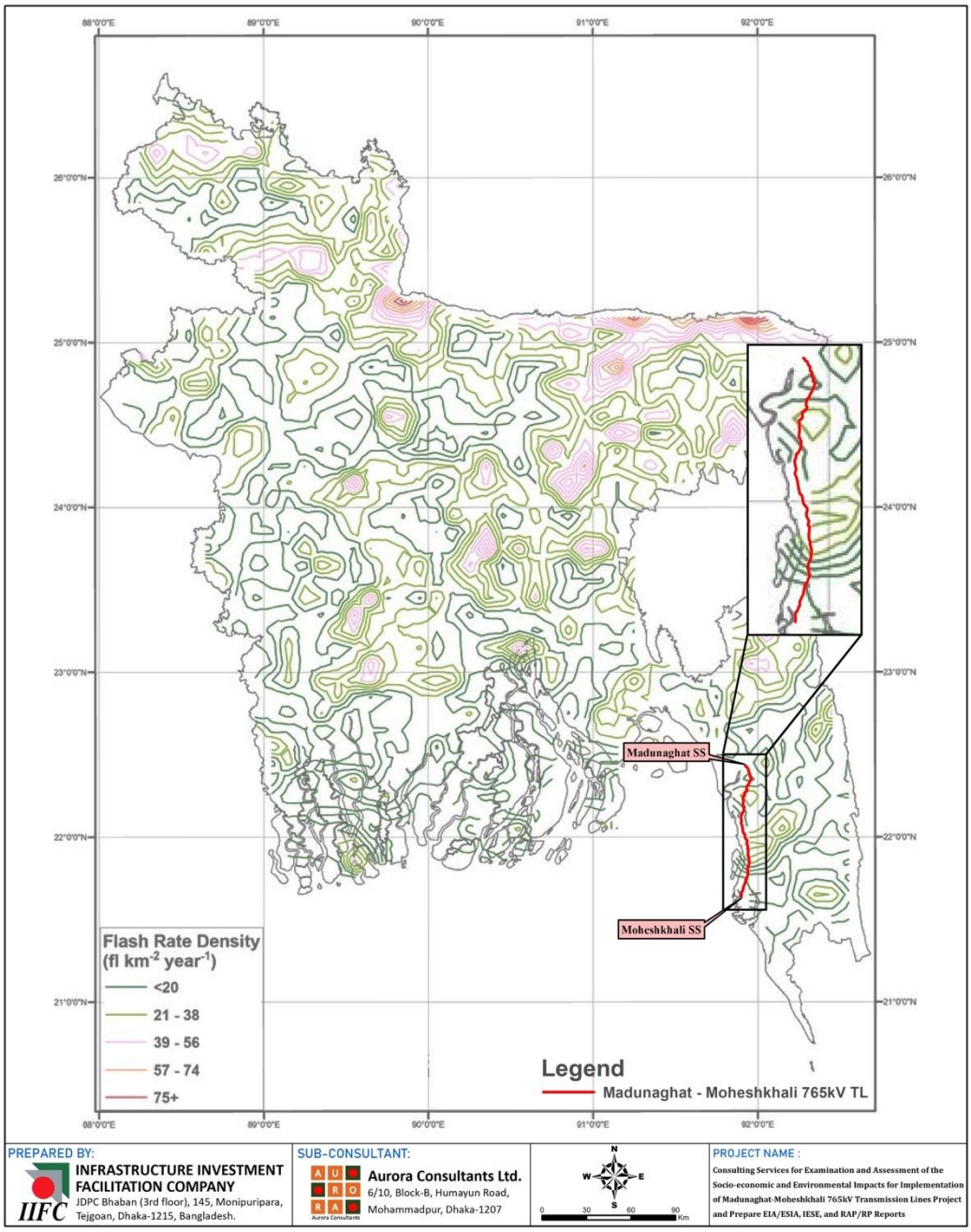


Figure 55: Overlapping TL on Lightning Flash Rate Density Map of Bangladesh

Based on the long-term data (1990–2024), a clear seasonal and temporal trend of thunderstorms is observed in Cox's Bazar. Thunderstorm frequency and days are very low or almost absent during winter months (November–February), then gradually increase from March, rise sharply during the pre-monsoon and early monsoon period (April–June), and often remain relatively high through September–October before declining again. The highest activity consistently occurs between May and June, indicating this as the peak thunderstorm season. Interannually, thunderstorm frequency and days were generally higher during the early–mid 1990s and mid-2000s, showing several peak years (e.g., 1993, 1995, 2006), followed by a noticeable declining tendency after 2015, with particularly low values during 2020–2022. Although some recovery appears in 2024, the recent decades overall suggest reduced thunderstorm occurrence compared to earlier years, while the seasonal pattern remains consistent.

Table 48: Monthly total frequency and Thunderstorm days data of Cox's Bazar

Year	Thunder	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1990	Frq.	0	9	12	21	22	5	0	9	11	11	4	0	104
1990	Days	0	4	6	7	10	3	0	4	6	5	1	0	46
1991	Frq.	0	0	3	20	23	19	0	6	24	38	0	0	133
1991	Days	0	0	2	7	10	7	0	3	10	10	0	0	49
1992	Frq.	1	4	2	1	27	25	5	11	28	36	5	4	149
1992	Days	1	2	1	1	11	11	2	6	10	10	3	1	59
1993	Frq.	2	10	25	12	47	50	25	6	23	19	6	0	225
1993	Days	1	3	8	5	19	12	11	2	8	9	2	0	80
1994	Frq.	1	2	17	34	34	14	5	11	15	15	1	0	149
1994	Days	1	1	5	12	8	10	2	5	4	6	1	0	55
1995	Frq.	0	0	4	2	25	34	37	26	21	25	16	0	190
1995	Days	0	0	3	2	7	13	13	12	9	8	3	0	70
1996	Frq.	0	7	14	7	51	17	8	6	41	21	8	0	180
1996	Days	0	2	4	4	16	7	4	2	16	9	2	0	66
1997	Frq.	0	0	11	18	28	26	8	11	21	11	2	0	136
1997	Days	0	0	5	11	9	12	3	5	9	3	1	0	58
1998	Frq.	0	0	4	17	14	12	4	3	14	10	7	0	85
1998	Days	0	0	2	6	6	4	2	2	8	5	2	0	37
1999	Frq.	0	0	0	3	21	9	5	2	8	12	0	0	60
1999	Days	0	0	0	1	11	4	3	2	4	8	0	0	33
2000	Frq.	0	0	0	7	33	22	11	14	13	13	0	0	113
2000	Days	0	0	0	7	16	11	5	6	7	6	0	0	58
2001	Frq.	0	2	0	2	33	21	5	9	12	12	0	0	96
2001	Days	0	1	0	1	14	12	3	7	7	6	0	0	51
2002	Frq.	0	0	2	10	42	19	8	5	13	12	5	0	116
2002	Days	0	0	2	4	17	9	4	3	8	5	2	0	54
2003	Frq.	0	0	7	7	18	35	2	8	4	12	0	0	93
2003	Days	0	0	4	4	8	11	2	5	4	9	0	0	47
2004	Frq.	0	0	0	16	18	31	19	0	13	23	0	0	120
2004	Days	0	0	0	7	9	11	9	0	5	9	0	0	50
2005	Frq.	0	0	3	5	16	14	2	1	20	9	0	0	70
2005	Days	0	0	2	3	12	7	1	1	10	5	0	0	41
2006	Frq.	0	0	0	5	61	49	14	12	21	15	3	0	180
2006	Days	0	0	0	3	18	16	4	7	8	7	1	0	64
2007	Frq.	0	2	0	14	23	36	7	14	9	19	4	0	128
2007	Days	0	1	0	5	12	11	4	9	6	9	2	0	59
2008	Frq.	0	0	2	0	36	22	8	5	35	15	0	0	123
2008	Days	0	0	2	0	20	11	6	3	16	5	0	0	63
2009	Frq.	0	0	4	15	21	31	10	30	28	20	3	0	162
2009	Days	0	0	2	4	10	12	6	13	13	9	2	0	71
2010	Frq.	0	0	5	1	28	29	8	8	6	8	3	0	96
2010	Days	0	0	1	1	13	12	6	4	3	4	1	0	45
2011	Frq.	3	0	1	2	34	27	5	9	6	9	0	0	96
2011	Days	1	0	1	1	13	12	2	6	5	6	0	0	47

Year	Thunder	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
2012	Frq.	0	0	6	20	18	32	9	6	8	14	2	0	115
2012	Days	0	0	2	9	6	11	3	3	5	6	1	0	46
2013	Frq.	0	0	0	9	44	8	4	4	10	9	0	0	88
2013	Days	0	0	0	3	14	5	3	2	5	4	0	0	36
2014	Frq.	0	0	4	5	14	14	4	2	9	8	3	0	63
2014	Days	0	0	1	3	6	8	2	1	3	4	1	0	29
2015	Frq.	0	0	1	9	7	27	10	3	13	15	0	0	85
2015	Days	0	0	1	5	3	9	4	3	7	7	0	0	39
2016	Frq.	0	0	3	5	19	24	11	6	14	22	3	0	107
2016	Days	0	0	2	2	10	9	7	3	6	9	3	0	51
2017	Frq.	0	0	7	20	11	17	9	2	16	13	0	0	95
2017	Days	0	0	3	9	6	10	7	1	8	7	0	0	51
2018	Frq.	0	0	0	6	20	17	0	1	9	4	0	0	57
2018	Days	0	0	0	4	10	9	0	1	5	2	0	0	31
2019	Frq.	0	1	0	9	9	7	1	13	20	14	2	1	77
2019	Days	0	1	0	6	5	3	1	5	9	4	2	1	37
2020	Frq.	0	0	0	12	5	6	0	2	5	2	0	0	32
2020	Days	0	0	0	5	2	3	0	2	3	1	0	0	16
2021	Frq.	0	0	0	3	9	13	0	3	9	10	0	0	47
2021	Days	0	0	0	2	5	7	0	2	5	5	0	0	26
2022	Frq.	0	0	0	1	13	8	2	1	2	2	0	0	29
2022	Days	0	0	0	1	9	3	1	1	2	1	0	0	18
2023	Frq.	0	0	3	7	9	11	3	3	1	0	0	0	37
2023	Days	0	0	3	3	4	6	2	2	1	0	0	0	21
2024	Frq.	0	0	2	0	19	14	8	4	20	21	0	0	88
2024	Days	0	0	2	0	9	12	5	2	10	7	0	0	47

Source: BMD 2025

The dataset presents monthly and annual records of thunderstorm activity in Chattogram, Bangladesh, expressed as both total thunderstorm frequency and the number of thunderstorm days from 1990 to 2024. It clearly shows a strong seasonal pattern, with thunderstorm activity concentrated mainly in the pre-monsoon and early monsoon months, particularly April, May, and June, when high temperature and humidity favor convective storm development. During this period, both the number of occurrences and the number of affected days reach their maximum values, while activity remains moderate in July to September and becomes very low or absent from November to February. The difference between frequency and days indicates that multiple thunderstorms often occur on the same day. Considerable year-to-year variability is also evident, with some years experiencing exceptionally high totals, reflecting natural climatic fluctuations and possible changes in observation or weather conditions over time.

Table 49: Monthly total frequency and Thunderstorm days data of Chattogram

Year	Thunder	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1990	Frq.	0	9	12	32	20	21	1	5	26	12	0	0	138
1990	Days	0	5	5	14	7	11	1	2	9	4	0	0	58
1991	Frq.	0	0	8	***	***	4	5	7	37	32	0	0	****
1991	Days	0	0	3	***	***	2	3	2	12	10	0	0	****
1992	Frq.	0	6	2	2	33	24	7	5	25	35	3	0	142
1992	Days	0	4	1	2	14	12	3	3	12	12	2	0	65
1993	Frq.	3	4	28	19	51	45	20	2	19	17	1	0	209
1993	Days	1	2	8	9	17	15	8	2	9	8	1	0	80
1994	Frq.	0	0	20	36	36	6	18	13	14	8	1	0	152
1994	Days	0	0	6	12	15	2	8	6	7	7	1	0	64
1995	Frq.	0	1	6	9	2	16	8	16	6	14	0	0	78
1995	Days	0	1	3	4	2	7	4	7	3	6	0	0	37
1996	Frq.	0	9	13	11	29	9	2	5	34	14	0	0	126
1996	Days	0	3	5	4	14	5	1	4	14	4	0	0	54
1997	Frq.	0	0	19	23	16	25	21	13	29	6	6	0	158

Year	Thunder	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1997	Days	0	0	6	9	9	9	9	5	13	2	3	0	65
1998	Frq.	0	3	11	22	26	12	5	9	21	13	0	0	122
1998	Days	0	1	4	6	11	7	3	4	9	6	0	0	51
1999	Frq.	1	0	0	0	37	16	10	10	14	17	0	0	105
1999	Days	1	0	0	0	12	9	4	5	9	8	0	0	48
2000	Frq.	4	0	0	17	45	28	4	15	13	10	0	0	136
2000	Days	3	0	0	9	17	10	4	6	5	7	0	0	61
2001	Frq.	0	2	0	3	36	15	0	10	9	18	2	0	95
2001	Days	0	1	0	2	15	7	0	5	5	9	1	0	45
2002	Frq.	0	0	7	21	49	8	3	10	12	6	0	0	116
2002	Days	0	0	4	7	18	5	2	5	10	4	0	0	55
2008	Frq.	2	0	3	3	36	9	6	12	24	8	0	0	103
2008	Days	1	0	2	3	23	6	4	9	14	4	0	0	66
2009	Frq.	0	0	5	3	30	28	8	5	8	20	0	0	107
2009	Days	0	0	2	2	13	14	4	4	6	9	0	0	54
2010	Frq.	0	0	10	5	20	19	0	6	15	10	0	0	85
2010	Days	0	0	4	2	9	7	0	4	7	6	0	0	39
2011	Frq.	0	0	10	12	24	4	6	8	12	20	0	0	96
2011	Days	0	0	5	5	14	2	3	3	6	9	0	0	47
2012	Frq.	0	1	4	30	22	28	1	2	11	18	2	0	119
2012	Days	0	1	2	12	8	9	1	1	6	6	1	0	47
2013	Frq.	0	0	0	12	38	12	0	1	7	12	0	0	82
2013	Days	0	0	0	5	15	6	0	1	5	9	0	0	41
2014	Frq.	0	0	3	6	16	22	3	3	6	12	0	0	71
2014	Days	0	0	2	4	7	10	3	2	4	5	0	0	37
2015	Frq.	0	0	8	28	11	14	12	3	8	18	0	0	102
2015	Days	0	0	4	13	4	6	4	3	4	6	0	0	44
2016	Frq.	0	2	6	4	16	11	7	11	17	6	4	0	84
2016	Days	0	1	4	1	6	5	5	6	8	2	1	0	39
2017	Frq.	0	0	8	22	12	24	4	4	16	2	0	0	92
2017	Days	0	0	4	8	7	9	1	2	6	1	0	0	38
2018	Frq.	0	0	1	10	19	10	1	7	10	8	0	0	66
2018	Days	0	0	1	6	10	5	1	3	5	4	0	0	35
2019	Frq.	0	4	2	6	17	12	3	6	10	8	0	0	68
2019	Days	0	2	2	4	8	7	2	4	4	4	0	0	37
2020	Frq.	0	0	0	9	4	6	0	2	3	9	2	0	35
2020	Days	0	0	0	6	2	3	0	1	1	5	1	0	19
2021	Frq.	0	0	0	1	8	17	5	2	8	5	0	0	46
2021	Days	0	0	0	1	5	7	2	1	4	2	0	0	22
2022	Frq.	0	0	0	6	18	15	3	3	14	8	0	0	67
2022	Days	0	0	0	2	8	6	2	2	8	3	0	0	31
2023	Frq.	0	0	8	8	8	18	2	7	5	2	0	0	58
2023	Days	0	0	5	4	5	9	1	3	4	1	0	0	32
2024	Frq.	0	0	5	4	36	17	5	21	11	10	0	0	109
2024	Days	0	0	2	2	13	9	2	7	5	4	0	0	44

Source: BMD 2025

While there is no extensive historical record, recent data shows a worrying increase in lightning-related deaths in Chattogram and Cox's Bazar, with reports of fatalities occurring during the pre-monsoon season, such as May. In May 2024, two people died from lightning strikes in Cox's Bazar while working in a salt field, highlighting the vulnerability of farmers and other outdoor workers in these coastal and hilly regions. The overall trend across Bangladesh, including these districts, is a rise in lightning frequency attributed to climate change. Bangladesh is currently experiencing scattered thunderstorms, which are typical during the pre-monsoon and monsoon seasons (March–September). Experts note a significant increase in the frequency and intensity of thunderstorms in recent decades, particularly in the northeastern part of the country.

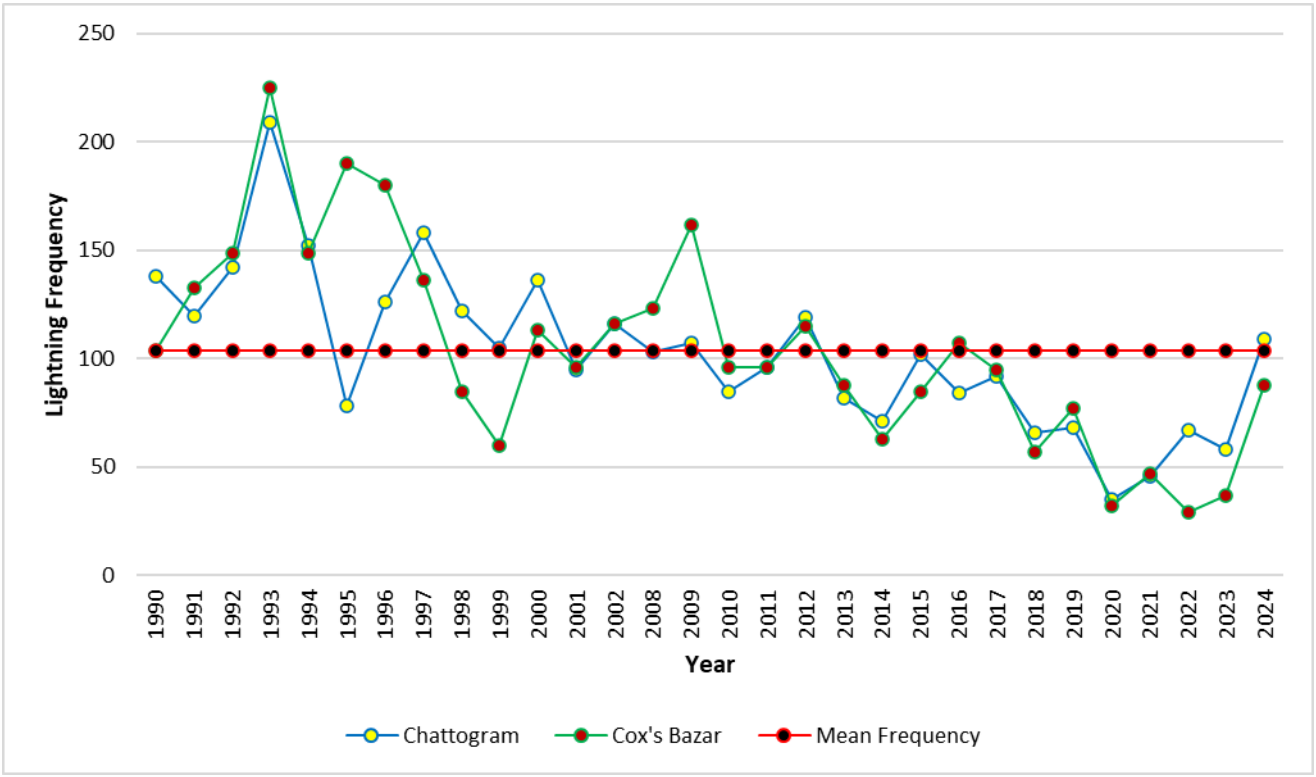


Figure 56: Lightning frequency of Chattogram and Cox's Bazar from 1990 t0 2024

Seasonal and regional trends:

Bangladesh's unique geography, with the Bay of Bengal to the south and the Meghalaya plateau to the northeast, makes it highly vulnerable to severe weather.

- Monsoon and pre-monsoon: The pre-monsoon (March–May) and monsoon (June–September) periods are the most dominant seasons for thunderstorms.
- Pre-monsoon storms are locally known as Kalbaishakhi or "Nor'westers" because they often arrive from the northwesterly direction, and they are noted for their high intensity and casualty rates.
- Peak months: Historically, May experiences the highest number of thunderstorm days on average, followed by June and September.
- Vulnerable regions: The northeastern part of the country, particularly the Sylhet region, experiences the highest annual frequency of thunderstorms. The central-western and northwestern parts also see moderate to high activity, while the southeastern areas typically have the lowest frequency.

Trend and climate change:

Long-term data shows a significant increase in the annual and seasonal frequency of thunderstorms. This trend is linked to climate change, with rising temperatures and increased atmospheric moisture contributing to more frequent and intense storms.

5.2 Water Resources

The transmission line will passe Karnaphuli, Sangu and Matamuhuri rivers. These rivers inside the study area carry water throughout the year. Similarly, there are a number of khals and rivers within and around the transmission lines of study area. Table 50 shows the crossing locations and width of the transmission lines over the rivers. A total of 10-15 shallow tube-wells falls under the RoW of transmission lines but no deep tube-wells exist in the project area which provide irrigation water to the crops of the area.

Table 50: Proposed transmission lines crossing over the rivers

SN	Proposed Transmission Lines	Rivers	Crossing/River Width	Location of Crossing Section AP-AP
1.	Madunaghat – Moheshkhali 765kV TL	Karnaphuli River	512.2 m	257-258
		Sangu RIver	374.5 m	173-174
		Matamuhuri River	436.0 m	37-38

Source: IIFC Field Survey, 2024-25

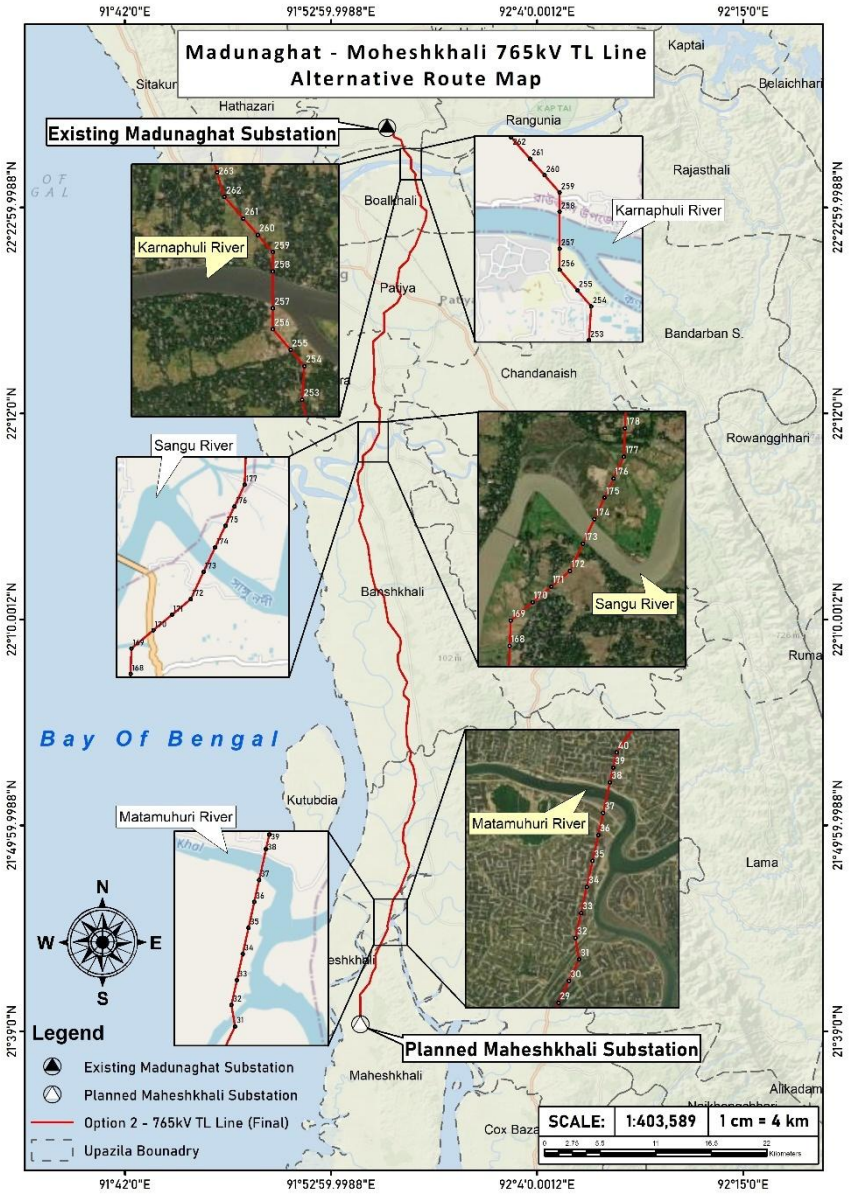


Figure 57: Transmission line crossing over the rivers

Table 51: Proposed transmission lines crossing over the canals

SN	Proposed Transmission Lines	Canals	Crossing Width	Location of Crossing Section AP-AP
1.	Madunaghat – Moheshkhali 765kV TL	Boakkhali Canal	70m	229-230
2.		Unknown	48m	208-209
3.		Murari Canal	160m	199-200
4.		Gobhder Canal	201m	86-87
5.		Toitong Canal	175m	76-77
6.		Toitong Canal	155m	74-75
7.		Hirabunia Canal	130m	68-69
8.		Fashiakhali	213m	57-58

Source: IIFC Field Survey, 2024-25

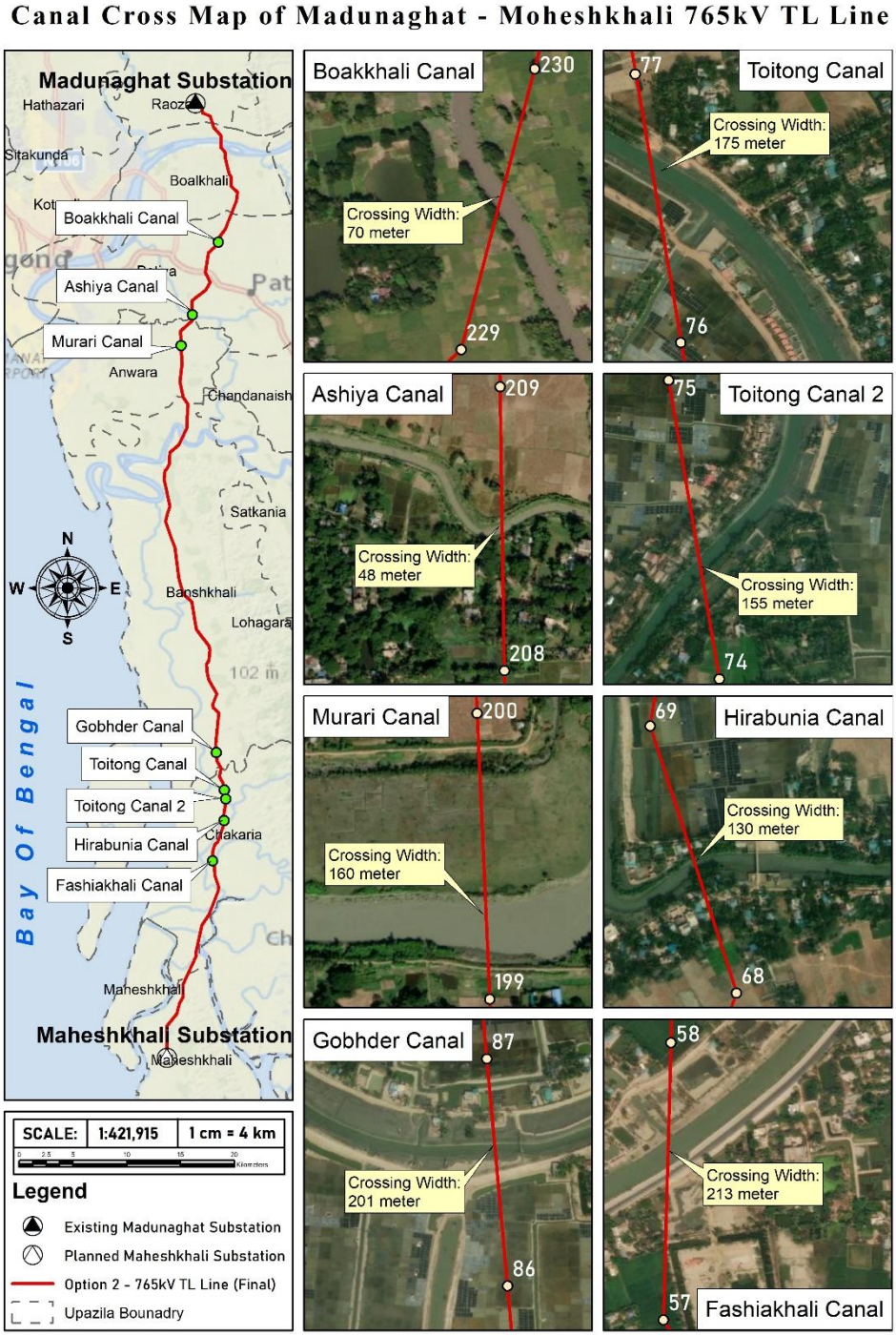


Figure 58: Transmission line crossing different canals

5.2.1 Flooding and Drainage Pattern

The drainage patterns of the Chattogram and Cox's Bazar coastal areas are characterized by dendritic and trellis patterns formed by major rivers like the Karnaphuli, Sangu, and Matamuhuri, and numerous smaller, parallel streams. The region's geography, which includes hills, a narrow piedmont zone, and a uniform east-west slope, facilitates these patterns. Smaller streams and canals also contribute to the overall drainage network.

A. Chattogram Coastal Area

(a) Dominant Patterns: The area features a combination of dendritic and trellis drainage patterns, especially in areas with underlying structural control.
(b) River Systems: Major rivers such as the Karnaphuli and Sangu flow through the region, draining into the Bay of Bengal and contributing to the drainage network.
(c) Piedmont Zone: A narrow piedmont zone at the western base of the Chattogram Hills is dissected by small, generally parallel streams that flow from the hills to the sea.

B. Cox's Bazar Coastal Area

(a) Dominant Patterns: The drainage network is predominantly dendritic in major areas, though some higher stream areas may show rectangular or trellis patterns.
(b) Stream Characteristics: The drainage basin includes streams of varying orders, such as fourth, fifth, and sixth order streams.
(c) Geological Influence: The absence of strong structural control in some areas leads to homogeneous, dendritic patterns, while structural control in the eastern upstream regions contributes to trellis and rectangular patterns.

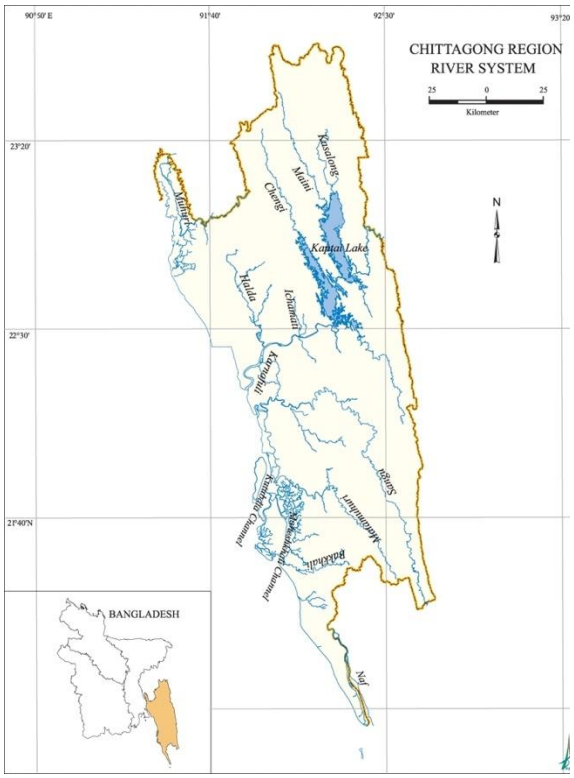


Figure 59: Chattogram Region River System

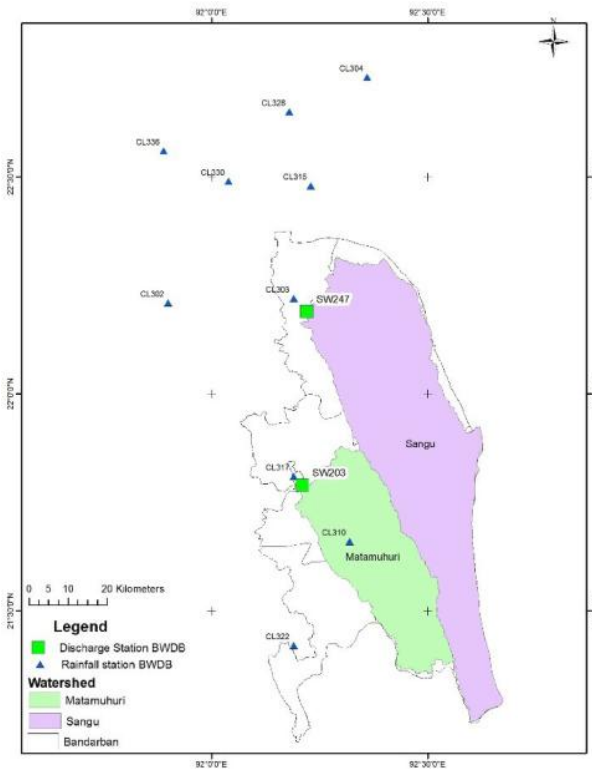


Figure 60: Sangu-Matamuhuri Watershed

Chronology of Big Floods

Flooding in Bangladesh is a recurring phenomenon. Recurrent floods between 1787 and 1830 changed the old course of the Brahmaputra. After a major flood in northern Bengal in 1922, a Flood Committee was formed and a report was published in 1927 on the north Bengal floods between 1870 and 1922. Statistical analysis of available records revealed that severe floods can occur every 7 years, and catastrophic floods every 33-50 years. Some severe monsoon floods of this region starting from the late 18th century are described here chronologically:

- 1781 Serious flood, which was more pronounced in the western part of Sylhet district. The cattle suffered much from the loss of fodder.
- 1786 Floods in the Meghna wrought havoc to the crops and immense destruction of the villages on the banks. It was followed by a famine, which caused great loss of life at Bakerganj. At Tippera the embankment along the Gumti gave way. At Sylhet the parganas were entirely under water, the greater part of the cattle drowned and those surviving were kept on bamboo rafts.
- 1794 The Gumti embankment burst again, causing much damage around Tippera.
- 1822 Bakerganj division and Patuakhali subdivision were seriously affected, 39,940 people died and 19,000 cattle perished and properties worth more than 130 million taka were destroyed. barisal, Bhola and Manpura were severely affected.
- 1825 Destructive floods occurred at Bakerganj and adjoining regions. There were no important embankments or other protective works against inundation in the district.
- 1838 Heavy rainfall caused extensive inundation at Rajshahi and a number of other districts. The cattle suffered much from loss of fodder and the people were greatly inconvenienced when driven to seek shelter on high places and when the water subsided cholera broke out in an epidemic form.
- 1853 Annual inundation was more pronounced than usual in the west of Sylhet district, partly the result of very heavy local rainfall and partly caused by the overflow of the Meghna.
- 1864 Serious inundation when the embankment was breached and the water of the Ganges flooded the greater part of Rajshahi town. There was much suffering among the people who took shelter with their cattle on the embankment.
- 1865 Extensive inundation caused by the annual rising of the Ganges flooded Rajshahi district. Excessive rainfall seriously affected Rajshahi town.
- 1867 Destructive flood also affected Bakerganj. Crop was partially destroyed. But no general distress resulted.
- 1871 Extensive inundation in Rajshahi and a few other districts. Crops, cattle and valuable properties were damaged. This was the highest flood on record in the district. Cholera broke out in an epidemic form.
- 1876 Barisal and Patuakhali were severely affected. Meghna overflowed by about 6.71m from the sea level. Galachipa and Bauphal were damaged seriously. A total of about 215,000 people died. Cholera broke out immediately after flood.
- 1879 Flooding of the Tista when the change in the course of the Brahmaputra began.
- 1885 Serious floods occurred due to the bursting of an embankment along the Bhagirathi, affected areas of Satkhira subdivision of Khulna district.
- 1890 Serious flood at Satkhira caused enormous damage to cattle and people.
- 1900 Due to the bursting of an embankment along the Bhagirathi, Satkhira was affected.
- 1902 At Sylhet the general level of the river went so high that there was terrible flood. Crops and valuable properties were damaged.
- 1904 The crops in some parts of cox's bazar subdivision and Kutubdia island were damaged due to an abnormally high tide. This flood was exceptional in severity in Mymensingh. The distress caused on this occasion is probably the nearest parallel to that which resulted from the flooding of the Tista in 1879, when the change in the course of Brahmaputra began.

- 1954 On August 2, Dhaka district went under water. On August 1 flood peak of the Jamuna River at Sirajganj was 14.22m and on August 30 flood peak of the Ganges River at Hardinge bridge was 14.91m.
- 1955 More than 30% of Dhaka district was flooded. The flood level of the Buriganga exceeded the highest level of 1954.
- 1962 The flood occurred twice, once in July and again in August and September. Many people were affected and crops and valuable properties were damaged.
- 1966 One of the most serious floods that ever-visited Dhaka occurred on 8 June 1966. The flood level was almost the highest in the history of Sylhet district too. A storm on the morning of 12 June 1966 made the situation grave. About 25% of houses were badly damaged, 39 people died and 10,000 cattle were lost, and about 1,200,000 people were affected. On September 15 Dhaka city became stagnant due to continuous rainfall for 52 hours, which resulted in pools of water 1.83m deep for about 12 hours.
- 1968 Severe flood in Sylhet district and about 700,000 people were badly affected.
- 1969 Chattogram district fell in the grip of flood caused by heavy rainfall. Crops and valuable property were damaged
- 1974 In Mymensingh about 10,360 sq km area was flooded. People and cattle were severely affected and more than 100,000 houses were destroyed.
- 1987 Catastrophic flood occurred in July-August. Affected 57,300 sq km (about 40% of the total area of the country) and estimated to be a once in 30-70-year event. Excessive rainfall both inside and outside of the country was the main cause of the flood. The seriously affected regions were on the western side of the Brahmaputra, the area below the confluence of the Ganges and the Brahmaputra, considerable areas north of Khulna and finally some areas adjacent to the Meghalaya hills.
- 1988 Catastrophic flood occurred in August-September. Inundated about 82,000 sq km (about 60% of the area) and its return period is estimated to be 50-100 years. Rainfall together with synchronization of very high flows of all the three major rivers of the country in only three days aggravated the flood. Dhaka, the capital of Bangladesh, was severely affected. The flood lasted 15 to 20 days.
- 1989 Flooded Sylhet, Sirajganj and maulvi bazar and 600,000 people were trapped by water.
- 1993 Severe rains all over the country, thousands of hectares of crops went under water. Twenty-eight districts were flooded.
- 1998 Over two-thirds of the total area of the country was flooded. It compares with the catastrophic flood of 1988 so far as the extent of flooding is concerned. A combination of heavy rainfall within and outside the country, synchronization of peak flows of the major rivers and a very strong backwater effect coalesced into a mix that resulted in the worst flood in recorded history. The flood lasted for more than two months.
- 2000 Five southwestern districts of Bangladesh bordering India were devastated by flood rendering nearly 3 million people homeless. The flood was caused due to the outcome of the failure of small river dykes in West Bengal that were overtopped by excessive water collected through heavy downpour.

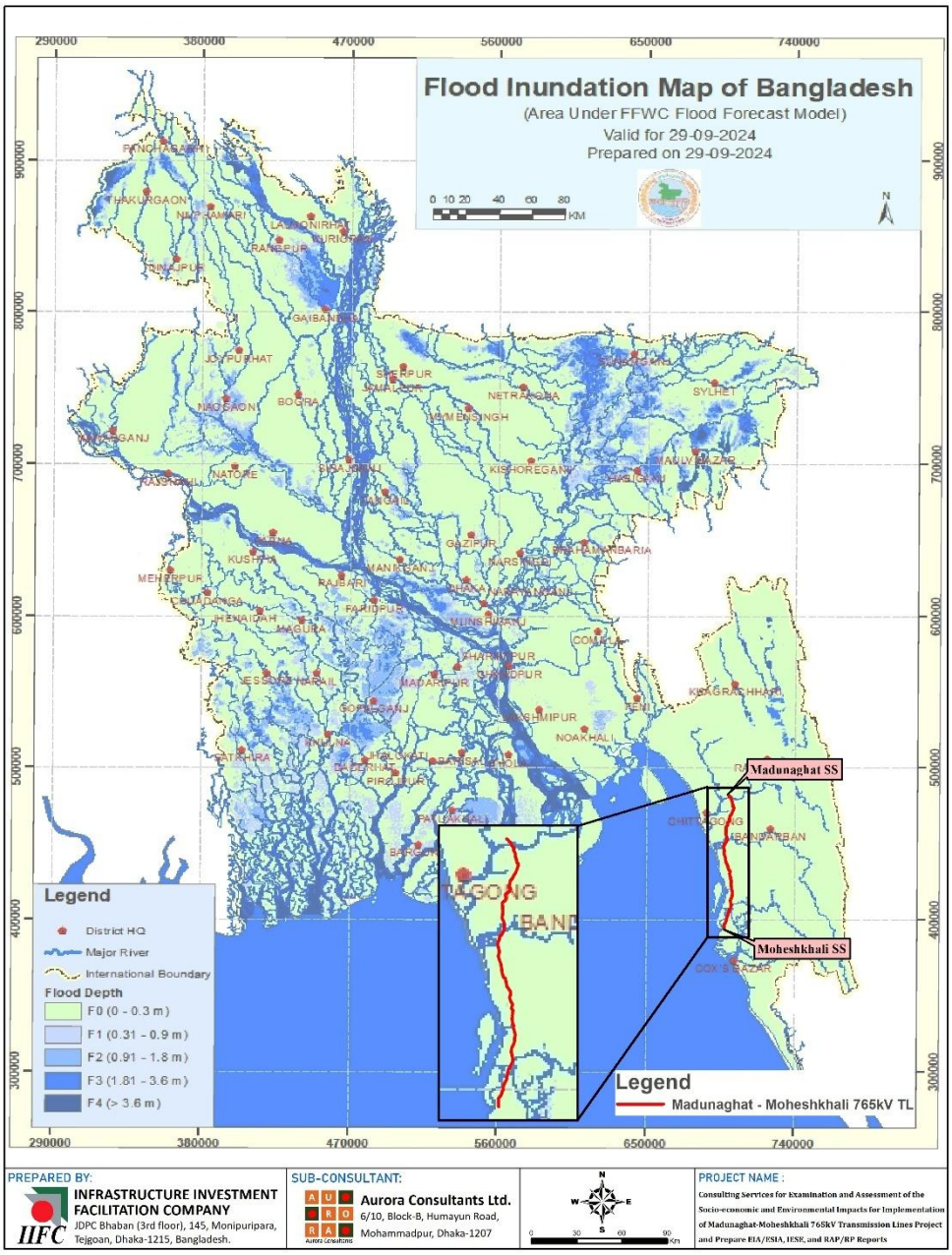


Figure 61: Overlapping TLs on the Flood Inundation Map of Bangladesh

5.2.2 Characteristics of River Navigation

Bangladesh with 24000 km waterways has a navigable network varying from 5968 km during the monsoon to 3865 km during the dry season. According to the traffic and economic importance, the inland waterways have been classified into four classes of routes. In these routes various navigational aids are provided to make night-navigation possible.

Class I	:	Arterial/trunk routes maintain at a depth of 3.6 m throughout the year. Length of Class I route is 683 km or equivalent to only 11 per cent of the total network and links the two main seaports of Bangladesh Chattogram and Mongla and the inland ports of Dhaka, Barisal and Khulna.
Class II	:	Secondary routes maintain at a depth of at least 1.8 m throughout the year. This class of route comprises kilometer of secondary route or equivalent to only 17 per cent of the total river network and is kept open for passenger launches and cargo barges.
Class III	:	These are feeder routes of regional importance. The mean depth of the route is 90 cm, which is equivalent to 32 per cent of the total network, and having a length of 1885 km.

Class IV	:	Seasonal routes of less than 90 cm depth. Its total length of 2400 km is equivalent to 40 per cent of the total network.

Minimum vertical and horizontal clearance of these river routes are described in below table.

Table 52: Minimum vertical and horizontal clearance of Inland routes of Bangladesh

Name of Route	Minimum Vertical Clearance	Minimum Horizontal Clearance
Class-I	18.30m	76.22m
Class-II	12.20m	76.22m
Class-III	7.62m	30.48m
Class-IV	5.00m	20.00m

Inference: From the above data, it is Karnaphuli, Sangu, Matamuhuri Rivers fall under the Class I, which need detail morphological analysis, river traffic, etc. during detail planning stage by Power Grid.

5.3 Environmental Quality

Data on air quality, water quality and noise level were collected to assess the environmental quality at baseline condition which is discussed in the following sections.

5.3.1 Air Quality

Ambient air quality has been monitored on 27 February to 02 March 2025 for 1st Round at four (04) locations and 20 to 25 July, 2025 at twelve (12) locations in the project site. The portable OCEANUS AQM-09 Air Quality Monitoring Station & Combined PM $_{10/2.5}$ Sampler Lata Envirotech Single Head (APM 154) shown in below Figure was used to collect, measure and document critical pollutants including SPM, PM_{10}, $PM_{2.5}$, NOx, SO_x, CO, CO_2, Pb, & O_3.

Table 53: Sample location of air quality monitoring

Season	Sample	GPS	Sample Location	Date
1st Round (Pre-monsoon)	AAQ-1	22°27’00.3” N 91°55’49.2” E	Gerila Para	27.02.2025
	AAQ-2	22°26’58.8” N 91°56’07.7” E	Boro Thakur Para	28.02.2025
	AAQ-3	21°40’14.3” N 91°55’12.7” E	Brahman Ghat	01.03.2025
	AAQ-4	22°25’31.1” N 91°56’40.8” E	Dokkhin Rawjan	02.03.2025
2nd Round (Monsoon)	AAQ-1	21°39'28.03"N 91°54'55.41"E	Adharghona (Moheshkhali),	20.07.2025
	AAQ-2	21°42'21.46"N 91°55'21.86"E	Uttar Nalbila (Moheshkhali)	20.07.2025
	AAQ-3	21°48'26.76"N 91°57'0.91"E	Pekua	21.07.2025
	AAQ-4	21°55'7.09"N 91°57'2.53"E	Puichai, Napura	21.07.2025
	AAQ-5	21°58'31.01"N 91°56'38.08"E	Baraliapara, Banshkhali	22.07.2025
	AAQ-6	22° 3'12.91"N 91°55'15.94"E	Moddhomanik Pathan, 4 no. Word, Bashkhali	22.07.2025
	AAQ-7	22° 8'23.46"N 91°54'29.06"E	South Hajigaon	23.07.2025

Season	Sample	GPS	Sample Location	Date
	AAQ-8	22°13'18.19"N 91°55'14.68"E	Khaskhama	23.07.2025
	AAQ-9	22°17'55.11"N 91°56'35.53"E	Jangalkhain	24.07.2025
	AAQ-10	22°22'48.15"N 91°58'9.32"E	Amuchia	24.07.2025
	AAQ-11	22°25'35.44"N 91°57'15.22"E	Ramburhat	25.07.2025
	AAQ-12	22°27'5.76"N 91°56'6.08"E	Madhunaghat	25.07.2025

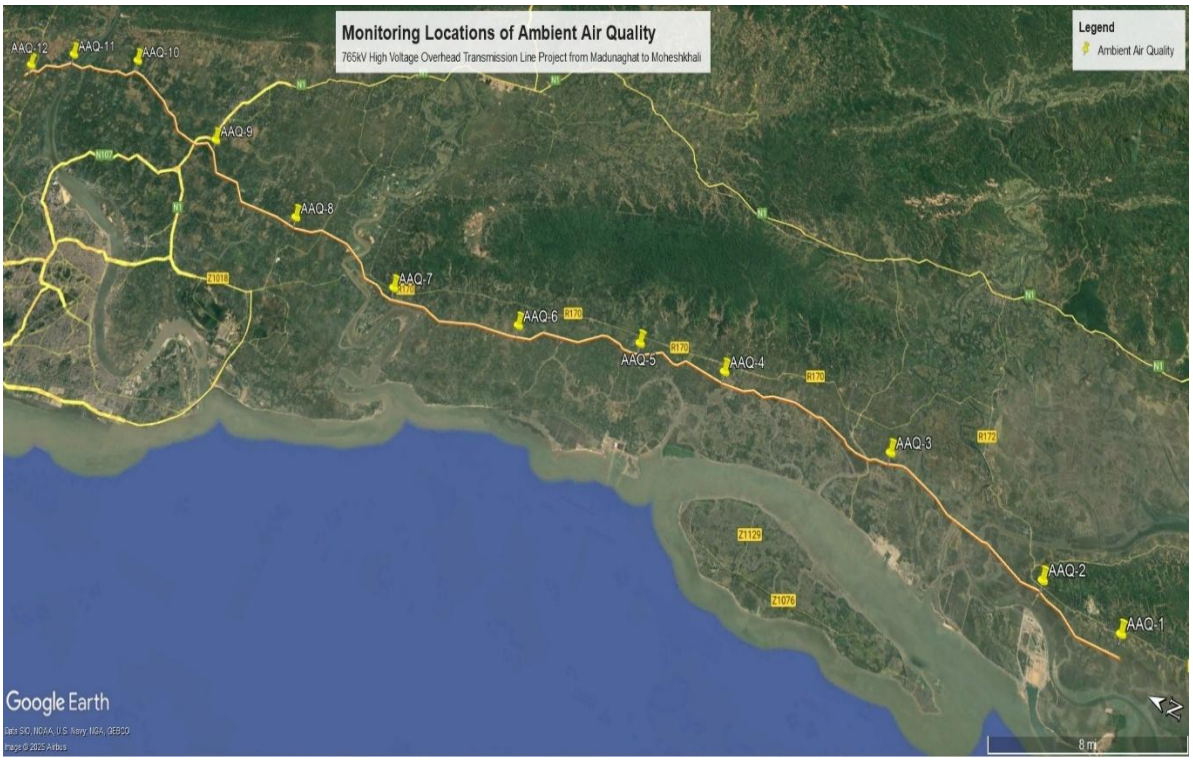


Figure 62: Baseline air quality monitoring locations

Figure 63: Ambient Air Quality Monitoring Equipment (OCENAUS: AQM-09) & Combined PM 10/2.5 Sampler Lata Envirotech Single Head (APM 154)

Sampling and analysis of ambient air quality was conducted by referring to the recommendation of the United States Environmental Protection Agency (USEPA). Air quality data was measured

automatically every one minute and directly recorded onsite for measured parameters (PM_{10}, $PM_{2.5}$, SO_x, NO_x, O_3, NH_3, and CO) as shown in below Table. Continuously, automatically and real-time monitoring methods were used for particulate matters (SPM, PM_{10}, $PM_{2.5}$), and gaseous particles (NO_x, SO_x, O_3, NH_3, and CO) respectively. Atomic Absorption Spectroscopy (AAS) method was applied to analyze the concentrations of Lead (Pb). Two monitoring principle was applied while monitoring the sample. One is Light scattering technique for PM_{10}, $PM_{2.5}$ & another is High Precision Electrochemical sensor for NO_x, SO_x, O_3, NH_3 and CO.

As per the national standard of ambient air quality, no monitoring duration has been set out by DOE for NH_3. However, other parameters such as Particulate Matter (PM_{10}, and $PM_{2.5}$), gaseous pollutants (NOx and SOx), CO, Pb, and O_3 were monitored for 8 hours and 24 data were measured through 20 minutes' interval. Data were analyzed following the descriptive statistical method using MS Excel. After analyzing the data, the results were compared with up-to-date DOE (APCR 2022) Standard.

Table 54: Analysis Methods of Air Quality Sampling and Analysis

Parameters	Instrument Name	Methods of Monitoring	Monitoring Principle	Analysis Method
PM_{10}, $PM_{2.5}$	OCENAUS AQM-09	*Continuously, Automatically, and Real-time*	*Light scattering technique*	Descriptive Statistical Analysis using MS Excel
Sulfur Oxides (SO_x), Oxides of Nitrogen (NO_x), Carbon monoxide (CO), Ozone (O_3), Ammonia (NH_3)			*High precision Electrochemical sensor*	
Lead (Pb)	Combined PM 10/2.5 Sampler Lata Envirotech Single Head (APM 154)	Analyze Method: In House Lab, ECIL, Atomic Absorption Spectroscopy (AAS)		

As per the national standard of ambient air quality, no monitoring duration has been set out by DOE for NH_3. However, other parameters such as Particulate Matter (PM_{10}, and $PM_{2.5}$), gaseous pollutants (NOx and SOx), CO, Pb, and O_3 were monitored for 8 hours and 24 data were measured through 20 minutes' interval. Data were analyzed following the descriptive statistical method using MS Excel. After analyzing the data, the results were compared with up-to-date DOE (APCR 2022) Standard.

Table 55: Ambient air quality monitoring results of 1st round collected on February 2025

SN	Monitoring Locations	Concentration of different parameters in ambient air					
		SO_x	**NO_x**	**O_3**	**CO**	**$PM_{2.5}$**	**PM_{10}**
1	AAQ-1 (Gerila Para) 22°27'00.3" N 91°55'49.2" E	8.51	8.74	5.56	1.36	12.73	31.03
2	AAQ-2 (Boro Thakur Para) 22°26'58.8" N 91°56'07.7" E	7.06	13.33	6.47	1.74	17.23	37.20
3	AAQ-3 (Brahman Ghat) 21°40'14.3" N 91°55'12.7" E	16.28	23.60	9.10	1.61	21.45	44.76
4	AAQ-4 (Dokkhin Rawjan) 22°25'31.1" N	9.05	13.53	4.27	1.05	14.18	32.55

SN	Monitoring Locations	Concentration of different parameters in ambient air					
		SO_x	NO_x	O_3	CO	$PM_{2.5}$	PM_{10}
	91°56'40.8" E						
	Unit	µg/m³	µg/m³	µg/m³	mg/m³	µg/m³	µg/m³
	Monitoring Duration as per APCR'2022	-	24	24	-	8	24
	Monitoring Principle	*High precision Electrochemical sensor*				*Light scattering technique*	*AAS*
	Bangladesh Standard	80	80	100	5	65	150
	IFC EHS Guidelines' 30 April 2007	20	200/1 hr.	100	NYS	25	50

Table 56: Ambient air quality monitoring results of 2nd round collected on July 2025

SN	Monitoring Locations	Concentration of different parameters in ambient air							
		SO_x	NO_x	O_3	CO	NH3	$PM_{2.5}$	PM_{10}	Pb
1	AAQM-1 (Nunachori Paschimpara, (Moheshkhali, Cox's Bazar) 21°39'28.03"N 91°54'55.41"E	8.51	8.74	5.56	1.36	55.40	12.73	31.03	BDL
2	AAQM-2 (Afjali para, Yunus Khali Road) 21°42'21.46"N 91°55'21.86"E	7.06	13.33	6.47	1.74	78.68	17.23	37.20	BDL
3	AAQM-3 (Jaliakhali, Pekua, Cox's Bazar) 21°48'26.76"N 91°57'0.91"E	16.28	23.60	9.10	1.61	94.93	21.45	44.76	BDL
4	AAQM-4 (9 no. word, Shekherkhil, Laljibon, Bashkhali, Chattogram) 21°55'7.09"N 91°57'2.53"E	9.05	13.53	4.27	1.05	59.49	14.18	32.55	BDL
5	AAQM-5 (Maizpara, 9 no. Shilcock, Bashkhali, Chattogram) 21°58'31.01"N 91°56'38.08"E	13.63	18.01	6.47	1.21	29.72	23.73	46.47	BDL
6	AAQM-6 (Moddhomanik Pathan, 4 no. Word, Bashkhali, Chattogram) 22° 3'12.91"N	15.49	20.57	5.39	1.28	88.19	16.36	34.65	BDL

SN	Monitoring Locations	Concentration of different parameters in ambient air							
		SO_x	NO_x	O_3	CO	NH3	$PM_{2.5}$	PM_{10}	Pb
	91°55'15.94"E								
7	AAQM-7 (Uttar Boilgaon, 2 no. Sadanpur, Bashkhali, Chattogram) 22° 8'23.46"N 91°54'29.06"E	7.05	10.12	7.64	1.61	67.57	12.12	22.89	BDL
8	AAQM-08 (Bilpur, Dumuria, Anowara, Chattogram) 22°13'18.19"N 91°55'14.68"E	9.63	22.42	6.09	1.61	92.82	21.22	34.42	BDL
9	AAQM-09 (6 no. Word, Poschim Perula, Borolia, Pothia, Chattogram) 22°17'55.11"N 91°56'35.53"E	6.14	7.96	4.21	0.96	34.40	12.73	23.15	BDL
10	AAQM-10 (In front of Tajpark, Collegepara, Kanungopara, Boalkhali, Chattogram) 22°22'48.15"N 91°58'9.32"E	10.49	18.57	4.39	1.28	63.19	18.36	33.65	BDL
11	AAQM-11 (Kuipara, Baguan, Rawjan, Chattogram) 22°25'35.44"N 91°57'15.22"E	12.37	16.60	8.22	1.38	77.64	17.07	35.55	BDL
12	AAQM-12 (Goschi Area, Rawjan, Chattogram) 22°27'5.76"N 91°56'6.08"E	9.05	11.12	6.64	1.61	54.57	11.12	22.89	BDL
Unit		µg/m^3	µg/m^3	µg/m^3	mg/m^3	mg/m^3	µg/m^3	µg/m^3	mg/m^3
Monitoring Duration as per APCR'2022		-	24	24	-	24	8	24	8
Monitoring Principle		*High precision Electrochemical sensor*					*Light scattering technique*		*AAS*
Bangladesh Standard		80	80	100	5	400	65	150	0.5

SN	Monitoring Locations	Concentration of different parameters in ambient air							
		SO_x	NO_x	O_3	CO	NH3	$PM_{2.5}$	PM_{10}	Pb
	IFC EHS Guidelines' 30 April 2007	20	200/1 hr.	100	NYS	NYS	25	50	NYS

*Air Pollution Control Rules (APCR) On 26th July 2022; Vide S.R.O No. 255-Law/2022, Schedule 1 (Ambient Air Quality Standards). Primary Data Source: (*ECIL)* Laboratory, August, 2025.

Interpretation of Ambient Air Quality Analysis

A total of Twelve (12) samples were collected from the project corridor, and the data were analyzed in the ECIL laboratory. All area categorically falls in the residential, silent and mixed zone. Sample was collected in the rainy season. The average temperature and humidity were recorded at a range from 27.5 to 30.6 degree Celsius and 67.3 to 79.8%.

According to the latest update Air Pollution Control Rules (APCR) On 26th July 2022, Schedule 1 (Ambient Air Quality Standards), and IFC EHS Guidelines' 30 April 2007, PM10, PM2.5, NOx, SOx, NH3, CO, and O3 are considered as the priority air pollutants in Bangladesh. That's why, these parameters are recorded and analyzed to monitor the air condition in the project boundary. However, the detail interpretations are given below:

SOx (Sulfur Oxides):

The concentration of SOx across all 12 monitoring locations ranges from 7.05 µg/m³ to 15.49 µg/m³. These levels are well within the Bangladesh standard of 80 µg/m³ and also comply with the stricter IFC guideline of 20 µg/m³ at every location. The highest value is recorded at AAQM-6 (Moddhomanik Pathan, 4 no. Word, Bashkhali, Chattogram).

NOx (Nitrogen Oxides):

NOx concentrations vary between 7.96 µg/m³ and 23.6 µg/m³, all of which are within the Bangladesh standard of 80 µg/m³. Compared to the IFC short-term guideline of 200 µg/m³ (1-hour average), these 24-hour values are significantly lower and thus acceptable. The highest NOx level is found at AAQM-3 (Jaliakhali, Pekua, Cox's Bazar), which may indicate localized combustion activities or vehicular emissions.

O_3 (Ozone):

Ozone levels range from 4.21 µg/m³ to 9.10 µg/m³, which are far below both the Bangladesh and IFC standards of 100 µg/m³. The highest value is seen at AAQM-3 (Jaliakhali, Pekua, Cox's Bazar), yet it is still well within permissible limits.

CO (Carbon Monoxide):

CO concentrations recorded range between 0.96 mg/m³ and 1.74 mg/m³, all of which are well under the Bangladesh standard of 5 mg/m³. Although the IFC does not specify a general limit for ambient CO, all values observed indicate safe levels with no immediate health risks. The peak value is found at AAQM-2 (Afjali para, Yunus Khali Road).

PM2.5 (Fine Particulate Matter ≤2.5 µm):

PM2.5 levels range from 11.12 µg/m³ to 23.73 µg/m³. All values are within the Bangladesh standard of 65 µg/m³ and the IFC guideline of 25 µg/m³, indicating safe levels with no immediate health risks.

PM10 (Coarse Particulate Matter ≤10 µm):

The observed PM10 values range from 22.89 µg/m³ to 46.47 µg/m³. All locations are below the Bangladesh standard of 150 µg/m³ and the IFC guideline of 50 µg/m³. These observed values indicate safe levels with no immediate health risks.

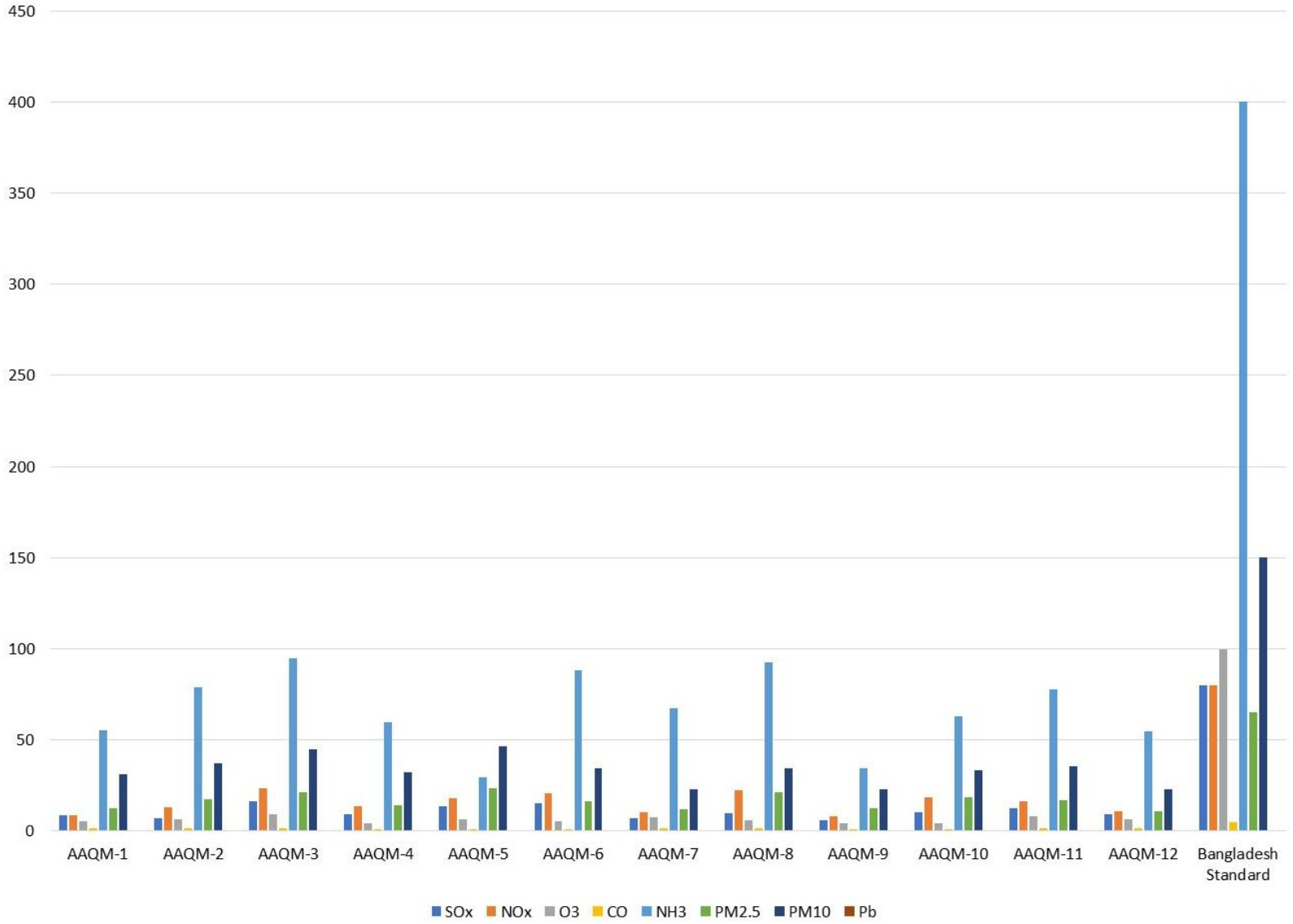


Figure 64: Scenario of Ambient Air Quality Results of 2nd Round (monsoon season)

NH_3 (Ammonia):

NH3 concentrations range from 29.72 mg/m³ to 94.93 mg/m³ which are far below both the Bangladesh Air Quality Control Rules 2022

Pb (Lead):

In all 12 monitoring locations, lead (Pb) is Below Detection Limit (BDL), which is a positive sign. This indicates absence of heavy metal contamination in ambient air and compliance with the Bangladesh standard of 0.5 mg/m³.

Table 57: The possible significant reason behind remaining all the parameters within the Bangladesh standard level

Monitoring Points	Relevant Possible Reason as the sample maintain the standard level
AQ-1 to AQ-12	Monitoring time was Rainy season. During this season, the concentration of air pollutants could be found lower than other seasons due to suppression & washed away by rain water. But due to low or no emission source and presence of greenery may help to remain all the parameters within standard limit. In conclusion, all parameters in the monitoring locations were observed within in the BD/DOE standard level which mean no negative aspects might be occurred in the project corridor.

Comparison between 1st and 2nd Round Results:

There is a clear comparison between the 1st round (February 2025) and 2nd round (July 2025) ambient air quality monitoring data, focusing on trends, similarities, and differences.

The 1st round (February 2025) monitoring covered 4 locations, while the 2nd round (July 2025) expanded to 12 locations, providing a broader spatial representation of air quality conditions. For the common parameters (SOx, NOx, O_3, CO, $PM_{2.5}$, and PM_{10}), the concentration ranges in both rounds are very similar, indicating no significant seasonal deterioration in ambient air quality. SOx and NOx levels remained well below the Bangladesh National Ambient Air Quality Standards in both rounds. Ozone (O_3) and carbon monoxide (CO) concentrations also stayed far below their respective limits, suggesting limited influence from traffic or industrial combustion sources during both monitoring periods.

Particulate matter ($PM_{2.5}$ and PM_{10}) showed slightly higher maximum values at some locations in the 2nd round, likely due to monsoon-season activities, increased humidity, and localized dust resuspension; however, all measured values remained within national standards. A key difference in the 2nd round is the inclusion of additional parameters (NH_3 and Pb), which were not monitored in the 1st round. Overall, the comparison shows that ambient air quality remained stable between the two rounds, with all monitored parameters complying with Bangladesh standards and IFC EHS guideline values where applicable.

AAQM-1

AAQM-2

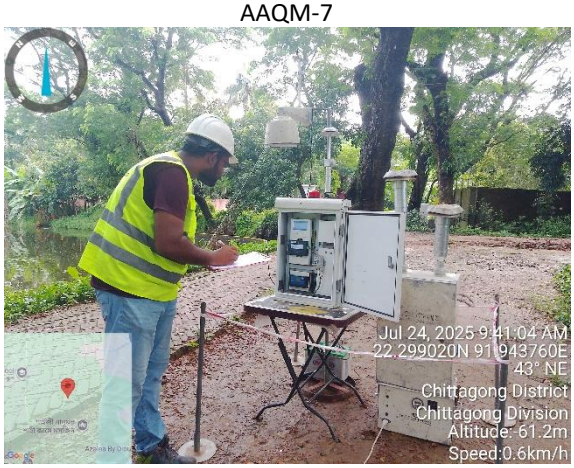
AAQM-3

AAQM-4

AAQM-5

AAQM-6

AAQM-7



AAQM-8

AAQM-9

AAQM-10

AAQM-11 AAQM-12

Figure 65: Ambient air quality monitoring for proposed transmission line project

5.3.2 Noise Level

Noise level was measured at Twelve (12) locations in the monitoring period from the project boundary on 20 to 25 July, 2025. The Lutron SL-4033SD noise level meter shown in Figure 2 was used for noise level monitoring. Therefore, the survey team conducted the noise measurements from different areas and stations same as the locations for Air Quality Monitoring. The parameters were L-max, L-min, Leq-day, Leq-night. Noise level monitoring was carried out at both day time and at night time. The sampling duration was 15 minutes. Measurements were taken at 1-min intervals over the period. The following Table 8 mention the instrument character that was used for noise level monitoring and method of measurement. The device was recorded data throughout the monitoring period. After getting the raw data from the device, descriptive statistical analysis was applied to calculate L_{eq} for every monitoring location.

Figure 66: Noise Level Monitoring Equipment (Lutron SL-4033SD)

Table 58: Analysis Methods of Noise Level Monitoring

Parameters	Device Name	Laboratory	Analysis Method
L-max, L-min, Leq-day, Leq-night	Lutron SL- 4033DS	In House	Descriptive Statistical Analysis by MS Excel.

The **ISO 1996/1 (1987)** defines Leq, in dBA, as described by below Equation...

$$Leq = 10 \times \log\left[\frac{1}{T} \times \sum_{i=1}^{n} t_i \times 10^{\frac{Li}{10}}\right]$$

Where,

n = the total numbers of samples taken;
T = Total time in hours;
L_i = Sound level in dB;
t_i = fraction of total sample time

The Leq measure is usually used in the environmental noise analysis. The Equivalent Level of Sound (L_{eq}) is the level of continuous noise that people can be exposed.

Table 59: Noise Monitoring Results of 1st and 2nd Round

Location	Concentration Present (dBA)						Category
	Day			Night			
	L_{eq}	L_{max}	L_{min}	L_{eq}	L_{max}	L_{min}	
1st Round Results (Pre-Monsoon, February 2025)							
NL-1 (Gerila Para) 22°27'00.3" N 91°55'49.2" E	41.0	46.5	37.2	37.5	42.5	35	Residential Zone
NL-2 (Boro Thakur Para) 22°26'58.8" N 91°56'07.7" E	43.0	43.5	43.0	40.0	43.5	37.5	Residential Zone
NL-3 (Brahman Ghat) 21°40'14.3" N 91°55'12.7" E	42.1	45.4	44.9	40.4	45.4	38.9	Residential Zone
NL-4 (Dokkhin Raujan) 22°25'31.1" N 91°56'40.8" E	41.9	43.2	42.5	39.4	43.2	37.0	Residential Zone
2nd Round Results (Monsoon, July 2025)							
NL-1, (Nunachori Paschimpara, (Moheshkhali, Cox's Bazar) 21°39'29.32"N; 91°54'34.50"E	50.17	65.42	41.02	41.10	58.2	34.8	Residential Zone
NL-2, (Afjali para, Yunus Khali Road) 21°42'21.57"N; 91°55'20.36"E	52.35	68.6	39.2	39.26	57.3	33.0	Residential Zone
NL-3, (Jaliakhali, Pekua, Cox's Bazar) 21°48'26.29"N, 91°56'59.96"E	49.37	61.58	37.18	38.87	59.9	34.6	Residential Zone
NL-4, (9 no. word, Shekherkhil, Laljibon, Bashkhali, Chattogram) 21°55'8.54"N; 91°57'0.53"E	46.83	60.07	32.07	37.19	55.1	31.7	Silent Zone
NL-5, (Maizpara, 9 no. Shilcock, Bashkhali, Chattogram) 21°58'29.84"N; 91°56'38.76"E	51.29	67.54	43.14	42.73	60.7	35.5	Residential Zone
NL-6, (Moddhomanik Pathan, 4 no. Word, Bashkhali, Chattogram) 22° 3'8.32"N; 91°55'14.63"E	51.79	66.04	39.64	38.43	56.4	31.2	Residential Zone
NL-7, (Uttar Boilgaon, 2 no. Sadanpur, Bashkhali, Chattogram) 22° 8'20.15"N; 91°54'27.65"E	50.47	66.72	33.32	40.81	59.8	31.9	Residential Zone
NL-8, (Bilpur, Dumuria, Anowara, Chattogram) 22°13'18.07"N; 91°55'13.66"E	52.80	70.05	36.65	39.54	57.5	32.3	Residential Zone

Location	Concentration Present (dBA)						Category
	Day			Night			
	L_{eq}	L_{max}	L_{min}	L_{eq}	L_{max}	L_{min}	
NL-9, (6 no. Word, Poschim Perula, Borolia, Pothia, Chattogram) 22°18'0.83"N; 91°56'35.15"E	47.35	59.6	36.2	38.76	55.3	31.0	Silent Zone
NL-10, (In front of Tajpark, Collegepara, Kanungopara, Boalkhali, Chattogram) 22°22'49.66"N; 91°58'8.52"E	57.64	70.92	54.52	47.52	67.5	43.6	Mixed Zone
NL-11, (Kuipara, Baguan, Rawjan, Chattogram) 22°25'35.53"N; 91°57'16.97"E	48.27	65.52	32.12	38.50	56.3	32.5	Residential Zone
NL-12, (Goschi Area, Rawjan, Chattogram) 22°27'5.93"N; 91°56'5.05"E	50.17	68.42	34.02	38.65	56.3	31.1	Residential Zone

Bangladesh Standard	Day Time	Night Time
Industrial area	75	70
Commercial	70	60
Mixed area	60	50
Residential area	55	45
Silent Area	50	40
World Bank / IFC Standard		
Industrial area	70	70
Residential; Intuitional; Educational	55	45

* Noise Pollution Control Rules 2006, Schedule 1 (Zone Based Noise Level Standard): *ECIL* Laboratory, August, 2025

Interpretation on Seasonal Variation

The 1st round was carried out during the pre-monsoon period (February 2025), while the 2nd round was conducted during the monsoon period (July 2025). The 1st round covered four locations, all categorized as residential zones, whereas the 2nd round included twelve locations representing residential, silent, and mixed zones. As such, the second round provides broader spatial representation and includes areas with potentially higher human and traffic activity.

Overall, the comparison indicates that noise levels were consistently higher during the monsoon period than in the pre-monsoon period. The increase may be attributed to seasonal factors such as higher traffic flow, economic activity, population movement, and operational conditions during monsoon months. The 2nd round noise monitoring results demonstrates a notable increase in ambient noise levels compared to the 1st round, highlighting the influence of seasonal and activity-related factors. Continuous monitoring and implementation of appropriate noise mitigation measures are recommended, particularly for residential, mixed, and silent zones during high-activity periods.

Daytime Noise Levels:

During daytime, the Bangladesh noise standard varies based on zone type: 75 dBA for industrial, 70 dBA for commercial, 60 dBA for mixed, 55 dBA for residential, and 50 dBA for silent zones. According to IFC standards, the acceptable limit for residential, institutional, or educational areas is 55 dBA.
In the mixed zone areas, such as NL-10 (In front of Tajpark, Collegepara, Kanungopara, Boalkhali, Chattogram) daytime noise level is 57.64 dBA, remaining within both Bangladesh (60 dBA) and IFC limits.

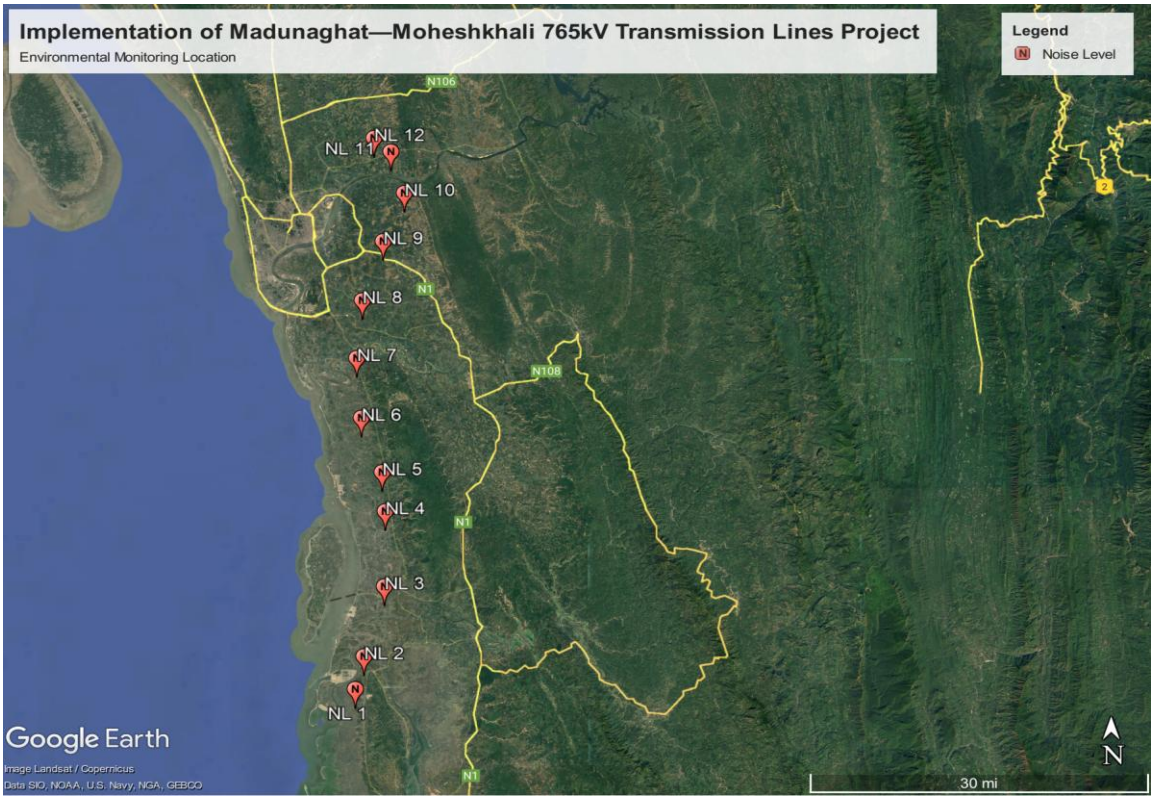


Figure 67: Monitoring Locations of Noise Level

In the residential zones, such as as NL-1 (Nunachori Paschimpara, (Moheshkhali, Cox's Bazar), NL-2, (Afjali para, Yunus Khali Road), NL-3, (Jaliakhali, Pekua, Cox's Bazar), NL-5, (Maizpara, 9 no. Shilcock, Bashkhali, Chattogram) NL-6, (Moddhomanik Pathan, 4 no. Word, Bashkhali, Chattogram), NL-7, (Uttar Boilgaon, 2 no. Sadanpur, Bashkhali, Chattogram), NL-8, (Bilpur, Dumuria, Anowara, Chattogram), NL-11, (Kuipara, Baguan, Rawjan, Chattogram), and NL-12, (Goschi Area, Rawjan, Chattogram), which are within both the Bangladesh standard of 55 dBA and IFC standard of 55 dBA. For silent zones like NL-4 (9 no. word, Shekherkhil, Laljibon, Bashkhali, Chattogram), and NL-9, (6 no. Word, Poschim Perula, Borolia, Pothia, Chattogram), daytime levels are 46.83 dBA and 47.35 dBA respectively, which comply with the Bangladesh silent zone limit of 50 dBA.

For night conditions, the Bangladesh standard sets limits at 70 dBA (industrial), 60 dBA (commercial), 50 dBA (mixed), 45 dBA (residential), and 40 dBA (silent zones). IFC sets 45 dBA as the maximum for residential, institutional, and educational zones.

Across mixed zone, night noise level, such as at NL-10 (In front of Tajpark, Collegepara, Kanungopara, Boalkhali, Chattogram) is 47.52 dBA, staying well within both national (Bangladesh mixed zone limit of 50 dBA) and IFC's 45 dBA limits standards.

In residential areas like NL-1 (Nunachori Paschimpara, (Moheshkhali, Cox's Bazar), NL-2, (Afjali para, Yunus Khali Road), NL-3, (Jaliakhali, Pekua, Cox's Bazar), NL-5, (Maizpara, 9 no. Shilcock, Bashkhali, Chattogram) NL-6, (Moddhomanik Pathan, 4 no. Word, Bashkhali, Chattogram), NL-7, (Uttar Boilgaon, 2 no. Sadanpur, Bashkhali, Chattogram), NL-8, (Bilpur, Dumuria, Anowara, Chattogram), NL-11, (Kuipara, Baguan, Rawjan, Chattogram), and NL-12, (Goschi Area, Rawjan, Chattogram), night time noise values meet both the Bangladesh (45 dBA) and IFC (45 dBA) standards, indicating compliance and a relatively quiet nighttime environment.

For silent zones, including NL-4 (9 no. word, Shekherkhil, Laljibon, Bashkhali, Chattogram), and NL-9, (6 no. Word, Poschim Perula, Borolia, Pothia, Chattogram), nighttime values are around 37.19 dBA

to 38.76 dBA, remaining just below the Bangladesh limit of 40 dBA, and thus compliant with both standards. These areas appear to maintain proper silence levels at night.

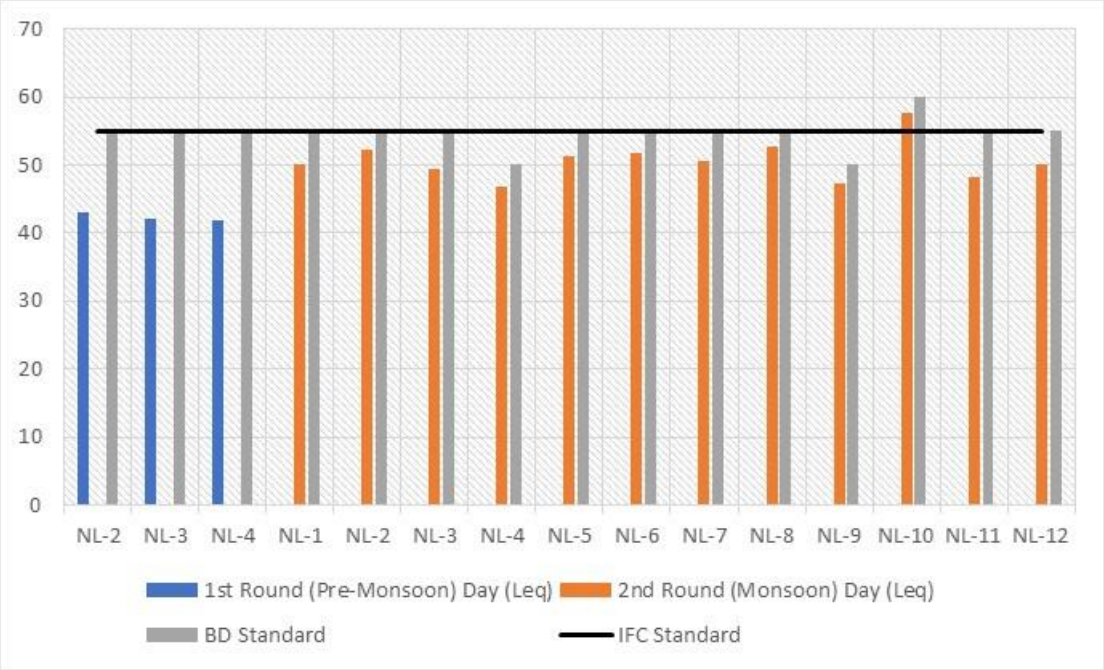


Figure 68: Linear relationship between 1st and 2nd noise level (day time) with BD and IFC Standard

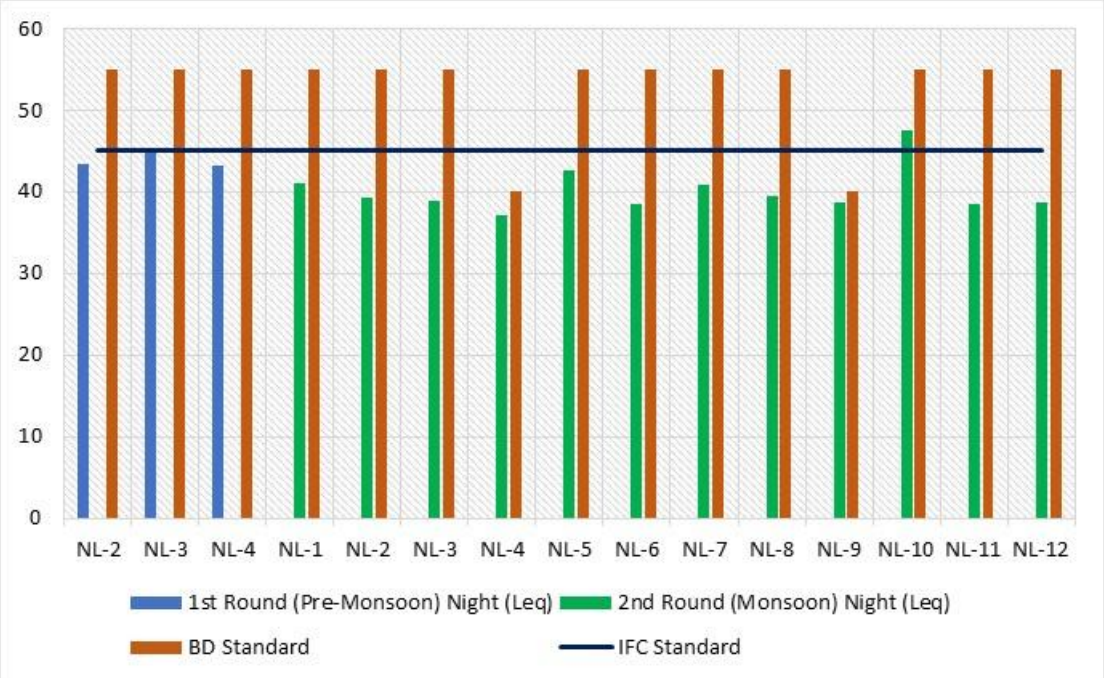


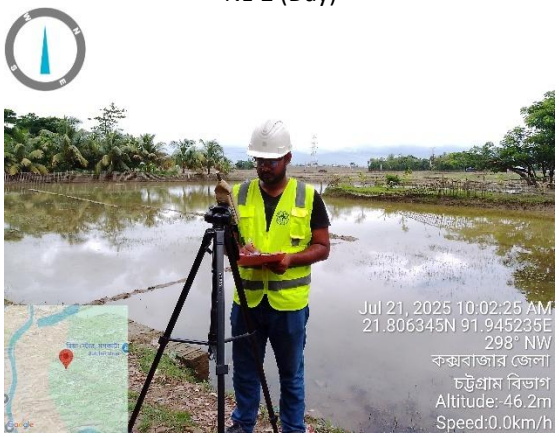
Figure 69: Linear relationship between 1st and 2nd noise level (night time) with BD and IFC Standard

NL-1 (Day)

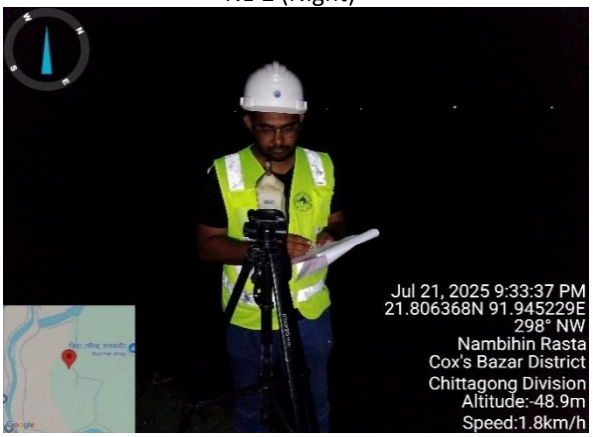
NL-1 (Night)

NL-2 (Day)

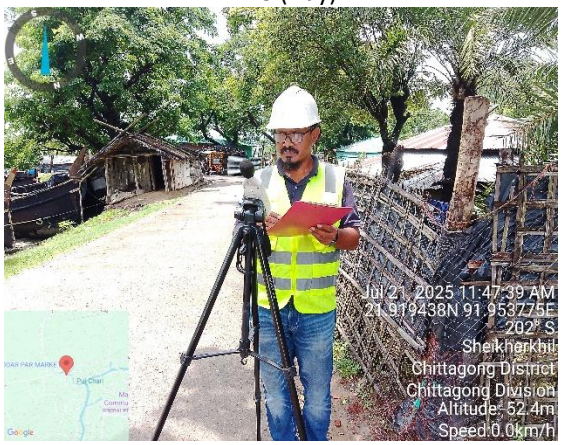
NL-2 (Night)



NL-3 (Day)



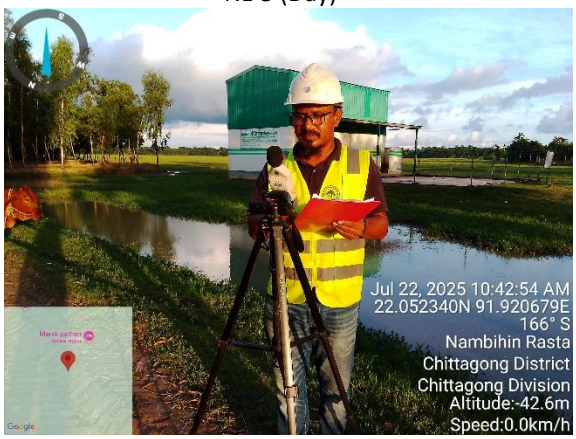
NL-3 (Night)



NL-4 (Day)

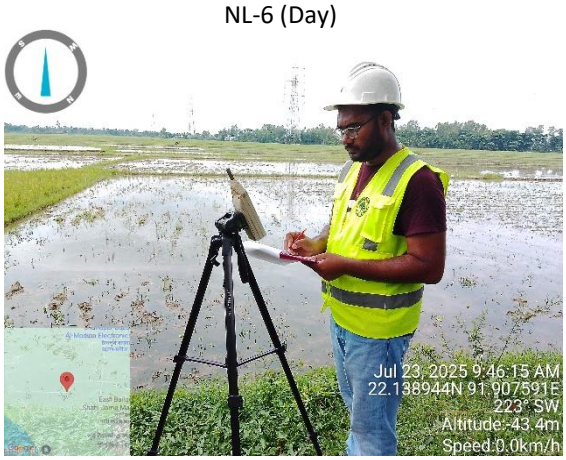
NL-4 (Night)

NL-5 (Day)



NL-5 (Night)

NL-6 (Day)

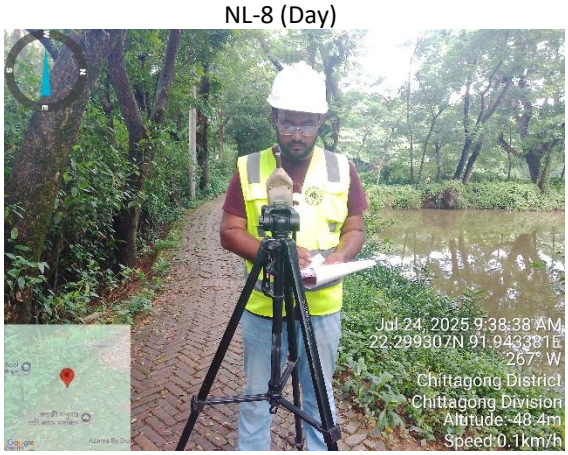


NL-6 (Night)

NL-7 (Day)

NL-7 (Night)

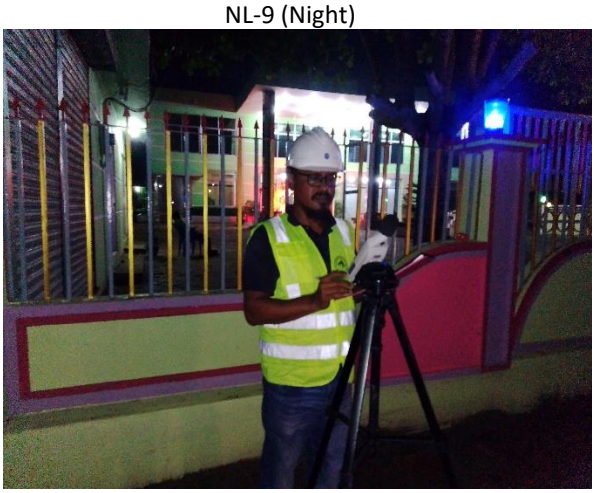
NL-8 (Day)



NL-8 (Night)

NL-9 (Day)

NL-9 (Night)

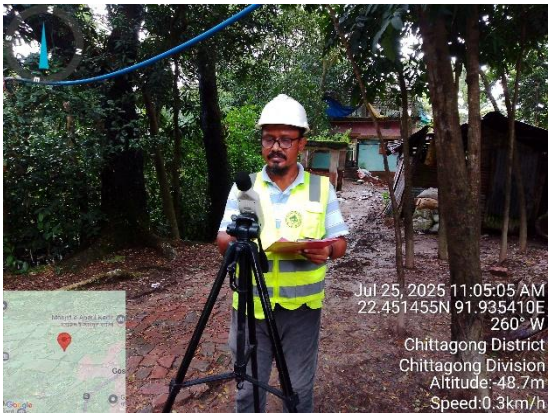


NL-10 (Day)

NL-10 (Night)

NL-11 (Day)

NL-11 (Night)



NL-12 (Day)

NL-12 (Night)

Figure 70: Noise Level Monitoring Activities for proposed Transmission Line

5.3.3 Groundwater Quality

Ground water has been collected only during monsoon season on July 2025. The sample was collected by maintaining standard procedures from ten (10) locations of the project corridor on 20 to 23 July, 2025. After collected, the samples were placed into appropriate and labeled black bottle and kept in an ice cooler. Then the samples were submitted to DPHE laboratory for analysis of parameters. Groundwater results have been compared with national standard [ECR, 2023-Schedule 2 (B)]. The analysis methods of different parameters of groundwater are given in the following in the table.

Table 60: Analysis methods of ground water quality monitoring

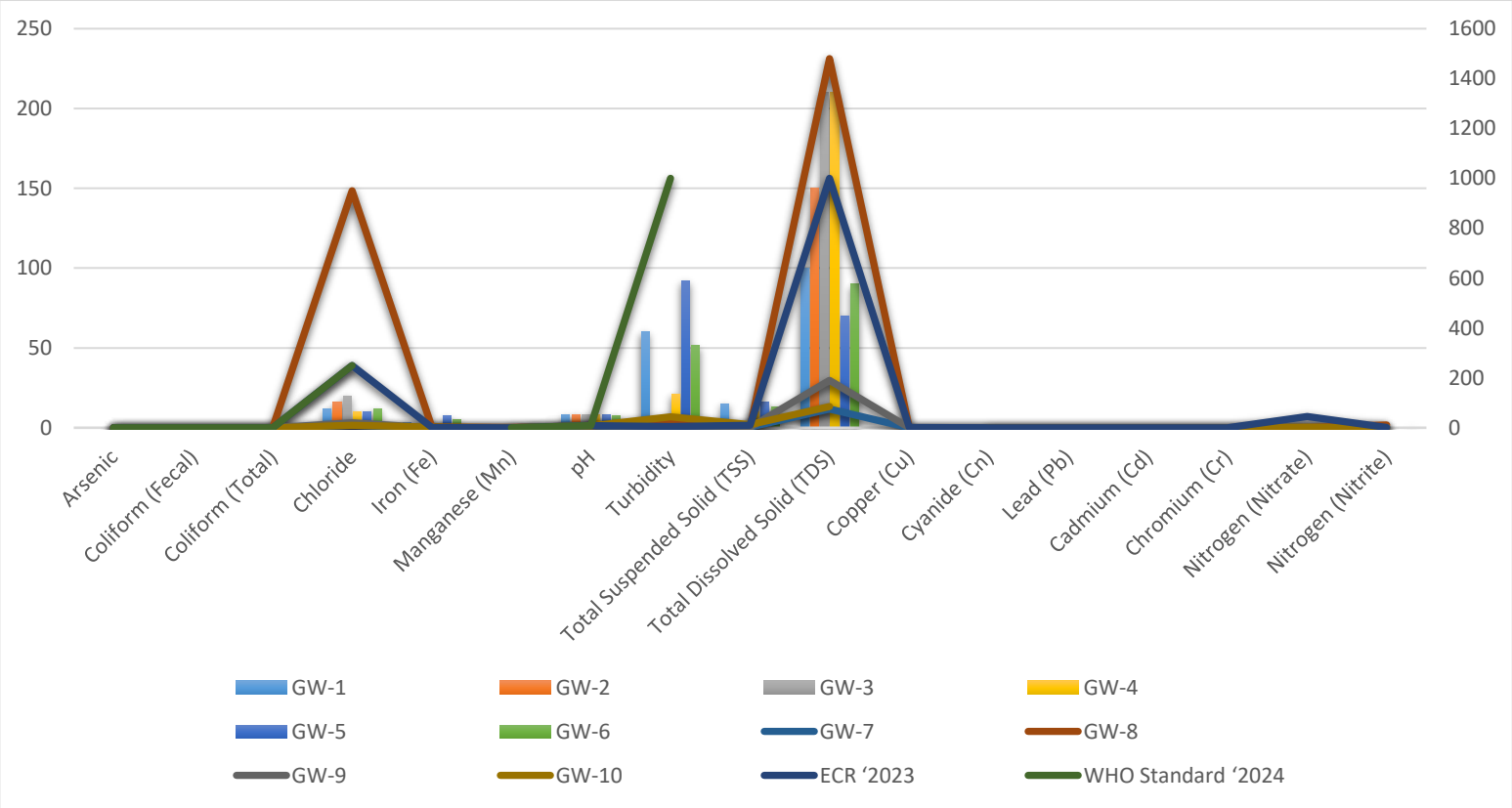
SN	Parameters	Unit	Referred Laboratory	Analysis Method	ECR '2023	WHO Standard '2024
1	Arsenic	mg/L	DPHE	AAS	0.05	0.01
2	Coliform (Fecal)	CFU/100ml	BEETLSL	MFM	0	0
3	Coliform (Total)	CFU/100ml	BEETLSL	MFM	0	0
4	Chloride	mg/L	DPHE	Titrimetric	250	250
5	Iron (Fe)	mg/L	DPHE	AAS	0.3-1.0	-
6	Manganese (Mn)	mg/L	DPHE	AAS	0.4	0.08
7	pH	-	DPHE	pH Meter	6.5-8.5	6.5-8.5
8	Turbidity	NTU	DPHE	Turbidity Meter	5	<1
9	Total Suspended Solid (TSS)	mg/L	DPHE	Gravimetric method	10	NYS
10	Total Dissolved Solid (TDS)	mg/L	DPHE	Multimeter	1000	NYS
11	Cu	mg/L	DPHE	AAS	1.5	NYS
12	Cyanide (Cn)	mg/l	BEETLSL	Colorimetry	0.05	NYS
13	Lead (Pb)	mg/l	BEETLSL	AAS	0.01	NYS
14	Cadmium (Cd)	mg/l	BEETLSL	AAS	0.003	NYS
15	Chromium (Cr)	mg/l	BEETLSL	AAS	0.05	NYS
16	Nitrogen (Nitrate)	mg/l	DPHE	UVS	45	NYS
17	Nitrogen (Nitrite)	mg/l	DPHE	UVS	1.0	NYS

*The Environment Conservation Rules (ECR) 2023, Schedule-2B Standard for Safe Drinking Water

* NYS = Not Yet Set

Table 61: Groundwater Monitoring Results

SN	Parameters	Unit	Analysis Method	Concentration										ECR '2023	WHO Standard '2024
				GW-1	GW-2	GW-3	GW-4	GW-5	GW-6	GW-7	GW-8	GW-9	GW-10		
1	Arsenic	mg/L	AAS	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.05	0.01
2	Coliform (Fecal)	CFU/100ml	MFM	0	0	0	0	0	0	0	0	0	0	0	0
3	Coliform (Total)	CFU/100ml	MFM	0	0	0	0	0	0	0	0	0	0	0	0
4	Chloride	mg/L	Titrimetric	12	16	20	10	10	12	10	950	20	10	250	250
5	Iron (Fe)	mg/L	AAS	3.44	0.07	0.17	2.81	7.39	4.85	0.33	2.34	0.09	2.56	0.3-1.0	-
6	Manganese (Mn)	mg/L	AAS	0.33	0.06	0.03	0.03	0.12	0.38	0.55	0.60	0.03	0.35	0.4	0.08
7	pH	-	pH Meter	8.1	8.4	8.4	8.0	7.9	7.7	7.6	7.9	8.4	8.0	6.5-8.5	6.5-8.5
8	Turbidity	NTU	Turbidity Meter	60.2	1.8	2.5	21.1	92.3	51.4	4.2	22.8	1.1	43.7	5	500-1000
9	Total Suspended Solid (TSS)	mg/L	Gravimetric method	15	1	1	10	16	13	2	1	1	12	10	-
10	Total Dissolved Solid (TDS)	mg/L	Multimeter	100	150	210	210	70	90	75	1480	190	85	1000	<1
11	Copper (Cu)	mg/L	AAS	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		1.5	-
12	Cyanide (Cn)	mg/l	Colorimetry	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05	-
13	Lead (Pb)	mg/l	AAS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	-
14	Cadmium (Cd)	mg/l	AAS	BDL	0.0001	BDL	0.0001	0.0002	0.0018	BDL	0.002	0.0022	0.002	0.003	-
15	Chromium (Cr)	mg/l	AAS	BDL	BDL	0.002	BDL	0.002	0.012	BDL	0.018	0.016	0.018	0.05	-
16	Nitrogen (Nitrate)	mg/l	UVS	1.2	1.7	2.1	0.91	0.82	1.0	1.2	1.7	1.6	1.9	45	-
17	Nitrogen (Nitrite)	mg/l	UVS	0.22	0.28	0.30	0.22	0.18	0.40	0.36	10.80	1.0	0.26	1.0	-



Primary Data Source: BEETLSL and DPHE-2025.

Figure 71: Linear relationship between the groundwater collected during monsoon season with BD Standard and WHO Standard

Interpretation

A total ten (10) sample was collected from the project corridor only during monsoon season on July 2025. The test result represents those maximum parameters value lies within the standard. All lab test report has been incorporated in annexure.

Arsenic

The concentration of arsenic in all groundwater samples is 0.001 mg/L, which is far below both the ECR 2023 standard of 0.05 mg/L and the WHO 2024 guideline of 0.01 mg/L. This indicates that arsenic contamination is not a concern in the tested wells, and the water is safe from arsenic-related health risks.

Chloride

Chloride levels are mostly low (10–20 mg/L) across the wells, but GW-8 stands out with a very high concentration of 950 mg/L, far exceeding the permissible limit of 250 mg/L. This suggests that GW-8 is affected by salinity intrusion, making it unsuitable for drinking without treatment. (See Graph 7)

Coliform (Total) & Coliform Fecal

Both fecal and total coliform counts were recorded as zero in all groundwater samples, indicating the absence of microbiological contamination. This suggests effective natural filtration or protection of the groundwater source from pathogenic intrusion, making the water bacteriologically safe for consumption.

Iron (Fe)

Iron concentrations vary widely between the samples, ranging from 0.07 mg/L (GW-2) to 7.39 mg/L (GW-5). Most of the wells exceed the ECR acceptable range of 0.3–1.0 mg/L, with particularly high values in GW-5 (7.39 mg/L) and GW-6 (4.85 mg/L). Elevated iron levels may cause taste issues, reddish staining, and clogging of pipes.

pH

The pH values range from 7.6 (GW-2, GW-3, and GW-9) to 8.4 (GW-7), which falls within the acceptable limit of 6.5–8.5 set by both ECR and WHO. This indicates that the groundwater is slightly alkaline but within safe drinking water standards.

Manganese

Manganese concentrations range from 0.03 to 0.60 mg/L. Several wells, including GW-6, GW-7, GW-8, and GW-10, exceed the WHO guideline of 0.08 mg/L, and in some cases surpass the ECR limit of 0.4 mg/L. High manganese can cause health concerns and affect water acceptability.

Turbidity

Turbidity varies significantly between samples, ranging from 1.1 NTU (GW-9) to 92.3 NTU (GW-5). The ECR standard is 5 NTU, and many wells (such as GW-1, GW-5, and GW-10) exceed this value. High turbidity suggests the presence of suspended particles, which may affect clarity and require filtration before use.

Total Suspended Solid (TSS)

TSS values are generally low, between 1 Mg/L (GW-2, GW-3, GW-8, & GW-9) and 16 mg/L (GW-5). The ECR limit is 10 mg/L, and only a few wells, such as GW-1 and GW-5, exceed this value. Elevated TSS can affect water clarity but is not a major concern compared to other parameters.

Total Dissolved Solid (TDS)

TDS concentrations range from 70mg/L (GW-5) to 1480 mg/L (GW-8). Most samples are within the acceptable limit of 1000 mg/L, but GW-8 shows an elevated value of 1480 mg/L. This indicates mineralization or salinity issues in GW-8, which can affect taste and suitability for drinking.

Copper (Cu)

Copper concentrations are consistently 0.03 mg/L across all wells, well below the ECR guideline of 1.5 mg/L. This suggests that copper contamination is not an issue in the studied groundwater.

Cyanide (Cn)

Cyanide was below detection limit (BDL) in all samples. With a standard limit of 0.05 mg/L, this confirms that there is no cyanide contamination in the groundwater.

Lead (Pb)

Lead levels were consistently <0.01 mg/L across all samples. This is within the ECR permissible limit of 0.01 mg/L, indicating that the groundwater does not pose a risk of lead poisoning.

Cadmium (Cd)

Cadmium levels were mostly below detection, with occasional values between 0.0001 and 0.0022 mg/L. The ECR standard is 0.003 mg/L, so all results are within safe limits, though some are close to the threshold and should be monitored.

Chromium (Cr)

Chromium concentrations were very low, ranging from below detection to 0.018 mg/L. These are well below the ECR standard of 0.05 mg/L, indicating no significant chromium contamination.

Nitrogen (Nitrate)

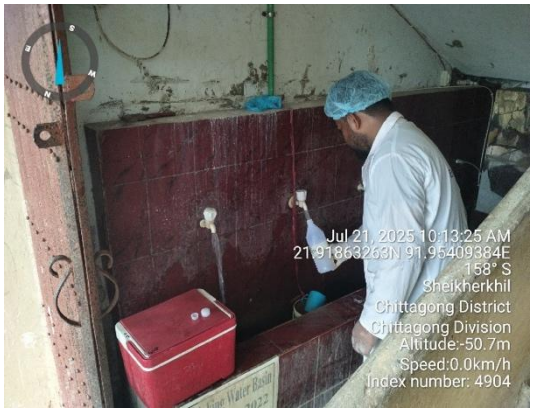
Nitrate concentrations are very low, between 0.82 and 2.1 mg/L, far below the permissible limit of 45 mg/L. This indicates no risk of nitrate-related health issues such as methemoglobinemia (“blue baby syndrome”).

Nitrogen (Nitrite)

Nitrite levels range from 0.18 to 10.8 mg/L. While most samples are low, GW-8 (10.8 mg/L) and GW-9 (1.0 mg/L) exceed the ECR limit of 1.0 mg/L. Elevated nitrite suggests contamination possibly from sewage infiltration or fertilizer leaching, and poses a health concern.

GW-1

GW-2



GW-3

GW-4

GW-5

GW-6

GW-7

GW-8

GW-9 GW-10

Figure 72: Ground water monitoring locations

5.3.4 Surface water Quality

The surface sample was collected by maintaining standard procedures from ten (10) location of the project corridor on 20 to 23 July, 2025. After collected, the samples were placed into appropriate and labeled black bottle and kept in an ice cooler. Then the samples were submitted to DPHE laboratory for analysis of parameters. Groundwater results have been compared with national standard [ECR, 2023-Schedule 2 (B)]. The analysis methods of different parameters of groundwater are given in the following Table.

Table 62: Analysis Methods of surface water quality monitoring

SN	Parameters	Analysis Method	Referred Laboratory	Unit	*Bangladesh Standard ECR 2023, Schedule-2 (A) & (B) Fishing	IFC EHS Guidelines APR 30 2007
1	Arsenic	AAS	DPHE	Mg/L	0.003	NYS
2	Chemical Oxygen Demand (COD)	CRM	DPHE	mg/L	50	125
3	Dissolved Oxygen (DO)	Multimeter	DPHE	mg/L	5 or more	NYS
4	Nitrogen (Nitrate)	UVS	DPHE	Mg/L	7.0	
5	pH	pH Meter	DPHE	-	6-9	6.0-9.0
6	Phosphate	UVS	DPHE	mg/L	0.5	NYS
7	Total Suspended Solid (TSS)	Gravimetric Method	DPHE	mg/L	NYS	NYS
8	Biochemical Oxygen Demand (BOD5)	5 days Incubation with 20° C	BEETLSL	mg/L	6 or less	30
9	Total Coliform (TC)	MFM	BEETLSL	CFU/100ml	≤5,000	400a (MPN[b]/100ml)
10	Fecal Coliform	MFM	BEETLSL	CFU/100ml	200	-
11	Lead (Pb)	AAS	BEETLSL	mg/L	0.1	NYS
12	Mercury (Hg)	AAS	BEETLSL	mg/L	0.004	NYS
13	Total Dissolved Solid (TDS)	Multimeter	DPHE	mg/L	1000	NYS
14	PO_4^{-3}	AAS	BEETLSL	mg/L	0.08	NYS
15	Oil & Grease		BEETLSL	mg/L	0.14	NYS
16	Phenols,		BEETLSL	mg/L	0.05	NYS
17	Cadmium (Cd)	AAS	BEETLSL	mg/L	0.005	NYS
18	CN-	Colorimetry	BEETLSL	mg/L	0.007	NYS
19	Hexavalent Cr	AAS	BEETLSL	mg/L	0.05	NYS

*The Environment Conservation Rules (ECR) 2023, Schedule-2 (A) Standard for Inland Surface Water
Water usable by fisheries * NYS = Not Yet Set

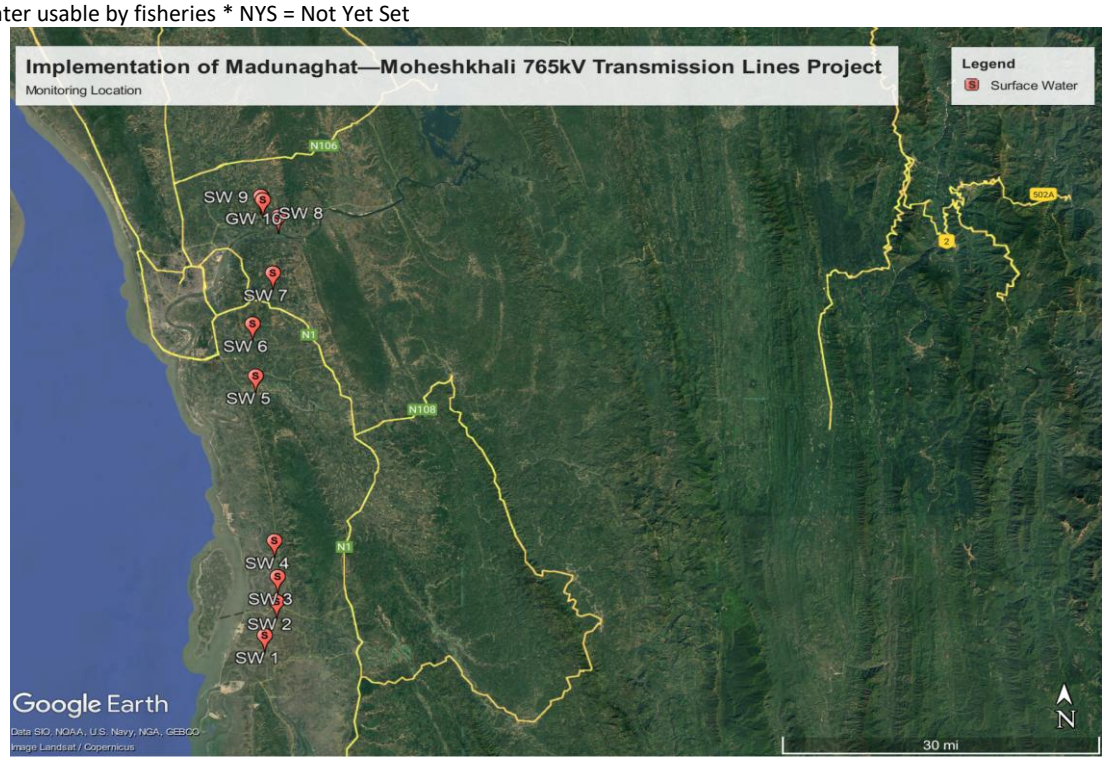


Figure 73: Monitoring Location of Surface (River) Water Quality

Table 63: Surface Water Quality Results of 1st Round during Pre-Monsoon on February 2025

Sl	Test Parameters	Unit	Concentration			*Bangladesh Standard ECR 2023, Schedule-2 (A), (B)
			*Bangladesh Standard ECR 2023, Schedule-2 (A)			
			SW-1	SW-2	SW-3	
1.	Arsenic as (As)	mg/l	<0.003	<0.003	<0.003	0.003
2.	Cadmium (as Cd)	mg/l	<0.005	<0.005	<0.005	0.005
3.	Chemical Oxygen Demand (COD)	mg/l	18	32	<4.0	50
4.	Hexavalent Cr	mg/l	<0.1	<0.1	<0.1	0.05
5.	Cyanide (as CN)	mg/l	<0.001	<0.001	<0.001	0.007
6.	Dissolved Oxygen	mg/l	6.2	6.4	6.1	5 or more
7.	Lead (as Pb)	mg/l	<0.05	<0.05	<0.05	0.1
8.	Mercury (as Hg)	mg/l	<0.0001	<0.0001	<0.0001	0.004
9.	Nitrate (as NO_3)	mg/l	4.3	1.7	3.3	7.0
10.	Oil and grease	mg/l	<5.0	<5.0	<5.0	0.14
11.	Phenolic Compounds	mg/l	<0.05	<0.05	<0.05	0.05
12.	Phosphate (as PO4)	mg/l	0.16	0.17	0.18	0.5
13.	Total Suspended Solid	mg/l	252	110	44.2	NYS
14.	pH value	None	7.71	7.69	7.60	6-9
15.	Faecal coliform	MPN/100ml	17	<1.8	<1.8	200
16.	Total coliform count	MPN/100ml	49	4.5	17	1000

Here, SW-1= Karnaphuli River; SW-2= Matamuhuri River and SW-3= Sangu River

The table presents the surface/river water quality results from the 1st monitoring round conducted during the pre-monsoon period in February 2025 at three sampling locations (SW-1, SW-2, and SW-3). The measured values are compared with the Bangladesh Environmental Conservation Rules (ECR) 2023, Schedule-2 standards.

Overall, the results show that most physicochemical and heavy metal parameters are within the permissible limits. Toxic metals such as arsenic, cadmium, lead, mercury, hexavalent chromium, and cyanide were either below detection limits or well below the standard values, indicating no significant heavy-metal contamination. Chemical Oxygen Demand (COD) values were low to moderate and remained within the allowable limit, suggesting limited organic pollution. Dissolved oxygen levels at all locations were above 6 mg/L, which reflects good oxygen conditions suitable for aquatic life.

Nutrients such as nitrate and phosphate were present at low concentrations and were well within acceptable limits, indicating minimal nutrient pollution. The pH values ranged from 7.60 to 7.71, showing that the water is neutral to slightly alkaline, which is acceptable under ECR standards.

However, Total Suspended Solids (TSS) were relatively high at SW-1 and SW-2, which may indicate sediment runoff or localized disturbance. In terms of microbiological quality, faecal coliform and total coliform counts were detected but remained below the regulatory limits, suggesting low to moderate microbial contamination. In summary, the surface water quality during the 1st round monitoring was generally satisfactory and compliant with Bangladesh ECR 2023 standards, with the main concern being elevated suspended solids at certain locations, which may require further observation or management measures.

Table 64: Surface Water Quality Results of 2nd Round during Monsoon on July 2025

SN	Parameters	Unit	Concentration *Bangladesh Standard ECR 2023, Schedule-2 (A)								*Bangladesh Standard ECR 2023, Schedule-2 (A), (B)	IFC EHS Guidelines APR 30, 2007
			SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	Fishing	
			RW[a]	CW[b]	CW	CW	RW	CW	CW	RW		
1.	Arsenic	mg/L	0.002	0.003	0.001	0.002	0.002	0.002	0.001	0.001	0.003	NYS
2.	Chemical Oxygen Demand (COD)	mg/L	20	12	36	16	32	20	28	28	50	125
3.	Dissolved Oxygen (DO)	mg/L	4.85	5.60	4.90	5.85	5.60	5.70	5.90	5.60	5 or more	NYS
4.	Nitrogen (Nitrate)	Mg/L	0.32	0.70	0.90	0.42	0.43	0.61	0.40	0.50	7.0	10
5.	pH	mg/L	8.0	7.8	7.8	7.6	7.8	7.7	7.8	7.9	6-9	6-9
6.	Phosphate	Mg/L	0.65	0.60	1.0	0.62	0.64	0.48	0.71	0.85	0.5	NYS
7.	Total Suspended Solid (TSS)	mg/L	3	45	16	20	210	15	12	16	NYS	50
8.	Total Coliform (TC)	CFU/100ml	250	243	285	290	257	1600	1350	1090	1000	400 MPN/100 ml
9.	Fecal Coliform	CFU/100ml	115	175	138	159	108	190	235	220	200	NYS
10.	Oil & Grease	mg/L	2.1	2.7	2.3	2.5	2.3	3.4	3.5	3.1	0.14	10
11.	Phenols	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05	NYS
12.	Cadmium (Cd)	mg/L	0.0002	0.0004	0.0001	0.0002	0.0001	0.009	0.008	0.006	0.005	NYS
13.	CN-	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.007	NYS
14.	Hexavalent Cr	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05	NYS
15.	Lead (Pb)	mg/L	<0.1	<0.1	<0.1	<0.1	0.12	0.8	0.19	0.2	0.1	NYS
16.	Mercury (Hg)	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.004	NYS

Primary Data Source: BEETLSL and DPHE-2025

Here, [a]RW= River Water (SW-1= Matamuhuri River; SW-5= Sangu River; SW-8= Karnaphuli River)
[b]CW= Canal Water (SW-2= Fashiakhali Canal; SW-3= Toitong Canal; SW-3= Gobhder Canal; SW-6= Murai Canal; SW-7= Boalkhali Canal)

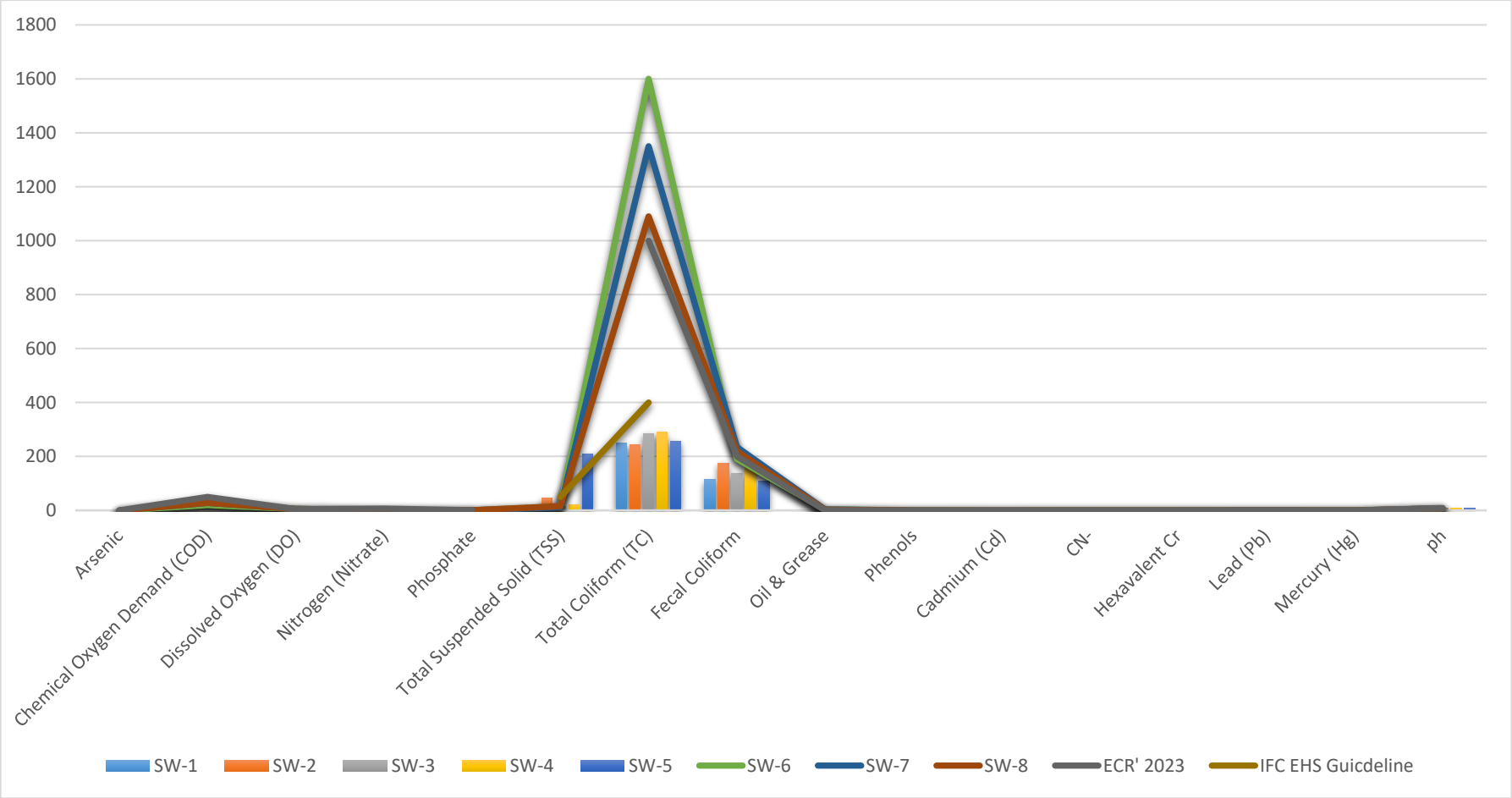


Figure 74: Linear relationship between the surface water of 2nd round (monsoon) with BD Standard and WHO Standard

Interpretation

Total Eight (08) samples were collected from the project corridor. The test result represents those maximum parameters value lies within the standard. All lab test report has been incorporated in annexure.

Arsenic

Arsenic concentrations in all river samples are very low, ranging from 0.001–0.003 mg/L. Since there is no specific ECR 2023 limit for fishing water, these values are negligible and indicate no arsenic pollution.

Chemical Oxygen Demand (COD)

COD values vary between 12–36 mg/L, which is well below both the ECR limit of 50 mg/L for fishing water and the IFC guideline of 125 mg/L. This indicates that organic load in the river is under control.

Dissolved Oxygen (DO)

DO levels are between 4.85–5.90 mg/L. Most samples meet the minimum requirement of 5 mg/L for healthy aquatic life, though SW-1 and SW-3 (4.85 and 4.90 mg/L) are slightly below, suggesting localized oxygen stress.

Nitrate (NO_3^-)

Nitrate concentrations range from 0.32–0.90 mg/L, which are much lower than the ECR limit of 7 mg/L and IFC limit of 10 mg/L. This indicates no risk of eutrophication from nitrate pollution.

pH

pH levels are stable between 7.6–8.0, well within the acceptable range of 6–9 set by both ECR and IFC guidelines. This reflects a neutral to slightly alkaline environment suitable for aquatic life.

Phosphate (PO_4^{3-})

Phosphate levels are 0.48–1.0 mg/L, exceeding the ECR standard of 0.5 mg/L in most samples. This suggests that nutrient enrichment could promote algal growth and eutrophication risks.

Total Suspended Solids (TSS)

TSS levels range from 3–210 mg/L. Although no specific ECR limit is set for fishing water, IFC sets 50 mg/L. SW-5 shows very high TSS (210 mg/L), which can reduce water clarity and affect aquatic organisms.

Total Coliform (TC)

TC levels vary between 243–1600 CFU/100 ml. The ECR standard is 1000 CFU/100 ml, and several samples (SW-6, SW-7, SW-8) exceed this limit, indicating bacterial contamination possibly from sewage discharge.

Fecal Coliform

Values range between 108–235 CFU/100 ml. The ECR guideline is 200 CFU/100 ml, meaning SW-7 and SW-8 exceed the limit, highlighting potential risks of fecal contamination.

Oil & Grease

Concentrations range from 2.1–3.5 mg/L, which far exceed the ECR limit of 0.14 mg/L, though they remain within the IFC guideline of 10 mg/L. This indicates significant hydrocarbon pollution likely from domestic or industrial effluents.

Phenols

Phenols were below detection limit in all samples. The ECR standard is 0.05 mg/L, so no contamination was observed.

Cadmium (Cd)

Cadmium levels are between 0.0001–0.009 mg/L. The ECR limit is 0.005 mg/L, and SW-6 and SW-7 exceed this threshold, suggesting localized cadmium pollution, potentially from industrial discharge.

Cyanide (CN^-)

Cyanide was below detection limit in all samples, which is well within the ECR guideline of 0.007 mg/L.

Hexavalent Chromium (Cr^{6+})

All samples were below detection limit, which is within the ECR standard of 0.05 mg/L. Lead levels vary from <0.1–0.8 mg/L. The ECR limit is 0.1 mg/L, and samples SW-5, SW-6, SW-7, and SW-8 all exceed this, indicating lead contamination, possibly from industrial effluents.

Mercury (Hg)

Mercury was below detection limit in all samples, well within the ECR guideline of 0.004 mg/L.

SW-1

SW-2

SW-3

SW-4

SW-5

SW-6

SW-7

SW-8

SW-9

SW-10

Figure 75: Surface water monitoring locations

Table 65: Pond Water Monitoring Results

SN	Parameters	Analysis Method	Unit	Concentration *Bangladesh Standard ECR 2023, Schedule-2 (A)		*Bangladesh Standard ECR 2023, Schedule-2 (A), (B)	IFC EHS Guidelines APR 30, 2007
				SW-9	SW-10	Fishing	
1.	Arsenic	AAS	mg/L	0.001	0.002	0.003	NYS
2.	Chemical Oxygen Demand (COD)	CRM	mg/L	36	16	50	125
3.	Dissolved Oxygen (DO)	Multimeter	mg/L	5.45	5.90	5 or more	NYS
4.	Nitrogen (Nitrate)	UVS	Mg/L	0.91	0.63	7.0	10
5.	pH	pH Meter	mg/L	7.6	7.8	6-9	6-9
6.	Phosphate	UVS	Mg/L	0.72	0.78	0.5	NYS
7.	Total Suspended Solid (TSS)	Gravimetric Method	mg/L	7	10	NYS	50
8.	Total Coliform (TC)	MFM	CFU/100 ml	215	300	1000	400 MPN/100 ml
9.	Total Cr	AAS	mg/L	BDL	BDL	0.1	NYS
10.	Lead (Pb)	AAS	mg/L	0.05	0.03	0.1	NYS
11.	Mercury (Hg)	AAS	mg/L	BDL	BDL	0.004	NYS
12.	Biochemical Oxygen Demand (BOD5)	5 days Incubation with 20° C	mg/L	5.5	4.7	6 or less	30
13.	NH4-N	colorimetric	mg/L	0.002	0.005	0.3	NYS
14.	Total Dissolved Solid (TDS)	Multimeter	mg/L	700	400	1000	NYS

Primary Data Source: BEETLSL and DPHE-2025.

This pond water cannot be considered as drinkable water. However, contractor will take necessary steps for drinking water during construction activities.

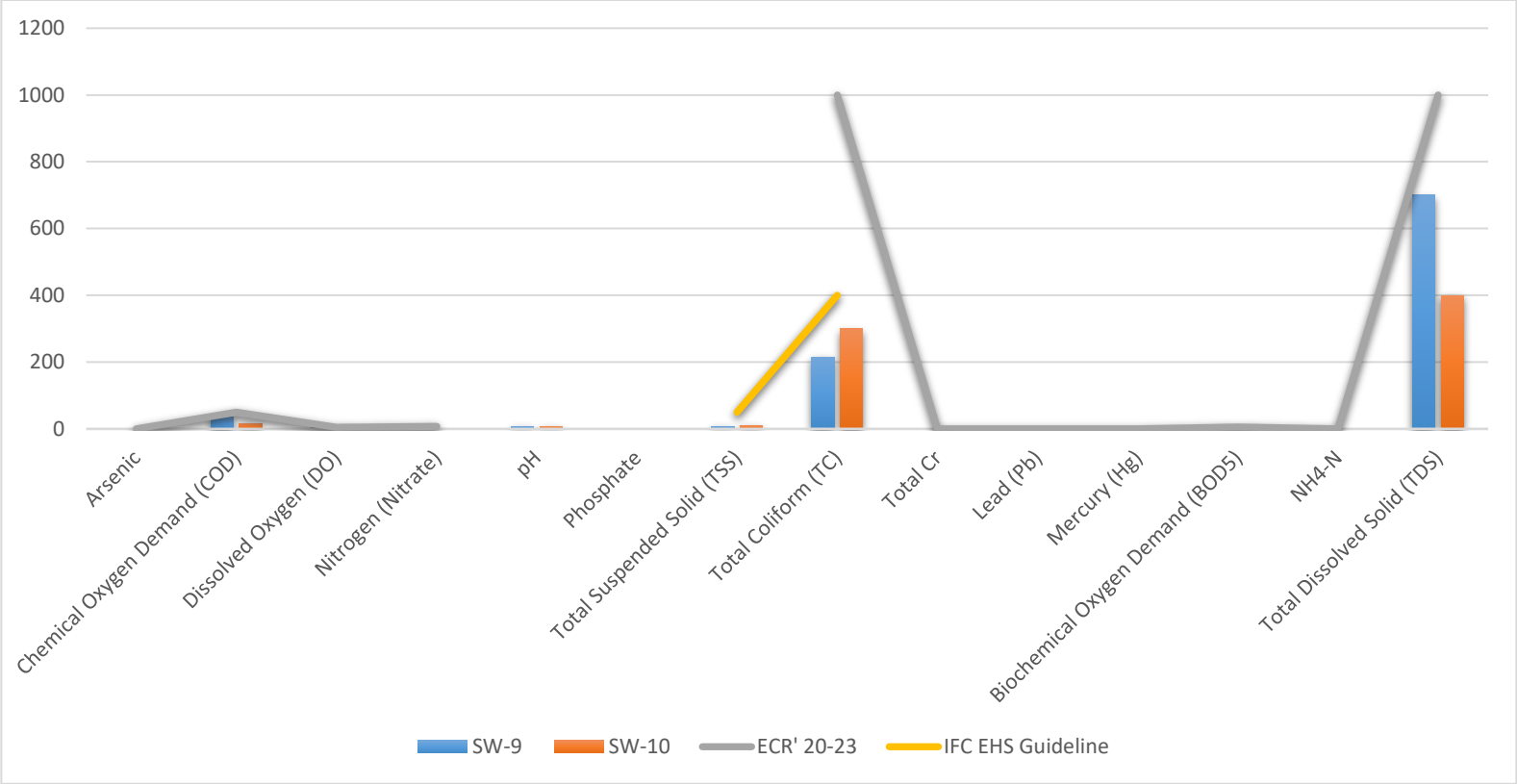


Figure 76: Linear relationship between the surfaced water and BD Standard and WHO Standard

Dissolved Oxygen (DO)

DO levels are 5.45–5.90 mg/L, meeting the minimum requirement of 5 mg/L for aquatic life.

Nitrate (NO_3^-)

Nitrate levels of 0.63–0.91 mg/L are well below both the ECR (7 mg/L) and IFC (10 mg/L) standards, suggesting no nitrate contamination risk.

pH

pH values range between 7.6–7.8, comfortably within the standard range of 6–9, indicating safe water quality.

Phosphate (PO_4^{3-})

Phosphate concentrations of 0.72–0.78 mg/L exceed the ECR limit of 0.5 mg/L, showing risk of nutrient enrichment and potential algal blooms.

Total Suspended Solids (TSS)

TSS values are low, between 7–10 mg/L, within the IFC limit of 50 mg/L. This indicates good clarity of pond water.

Total Coliform (TC)

Values are 215–300 CFU/100 ml, below the ECR limit of 1000 CFU/100 ml, but above the IFC limit of 400 MPN/100 ml. This suggests moderate microbial contamination**.**

Total Chromium (Cr)

Both samples were below detection limit, well within the ECR guideline of 0.1 mg/L.

Lead (Pb)

Lead levels were 0.03–0.05 mg/L, which are within the ECR limit of 0.1 mg/L, showing no lead contamination in pond water.

Mercury (Hg)

Mercury was below detection limit in both pond samples, within the ECR guideline of 0.004 mg/L.

Biochemical Oxygen Demand (BOD_5)

BOD values are 4.7–5.5 mg/L. These meet the ECR limit of 6 mg/L for fishing water and are far below the IFC guideline of 30 mg/L, indicating good oxygen conditions.

Ammonium-Nitrogen (NH_4-N)

Levels are very low (0.002–0.005 mg/L), far below the ECR limit of 0.3 mg/L, showing no contamination from ammonia.

Total Dissolved Solids (TDS)

TDS values range between 400–700 mg/L, within the ECR standard of 1000 mg/L, indicating good salinity and mineral balance.

Interpretation

Total Two (02) samples were collected from pond of the project corridor. The test result represents those maximum parameters value lies within the standard. All lab test report has been incorporated in annexure.

Arsenic

Arsenic levels are very low (0.001–0.002 mg/L), far below the concern level.

Chemical Oxygen Demand (COD)

COD values of 16–36 mg/L are within the ECR limit of 50 mg/L and IFC guideline of 125 mg/L, showing acceptable organic load.

5.3.5 Soil Quality

Soil samples were collection only during monsoon season on July 2025. Soil samples were collected from Ten (10) locations of the project corridor 20 to 23 July, 2025. The samples were collected in a composite sampling method by Auger boring below the surface level. The Hand auger shown in Figure-3 was used for soil sampling. The samples were first placed in zipped lock plastic bags and then transferred to appropriate plastic labeled jars. The collected soil samples were tested from the referred laboratory (BEETSL). The analysis methods of different parameters of soil are given in the following table.

Figure 77: Soil Sampling Equipment (Hand Auger)

Table 66: Methods of Soil Quality Analysis

Sl. No.	Parameter	Unit	Referred Laboratory	Dutch Standard*
1.	Arsenic (As)	PPM	BEETLSL	29
2	Copper (Cu)	PPM	BINA	36
3	Iron (Fe)	PPM	BINA	NYS
4	Mercury (Hg)	PPM	BEETLSL	0.3
5	Nickle (Ni)	PPM	BINA	35
6	Lead (Pb)	PPM	BINA	85
7	Zinc (Zn)	PPM	BINA	140

*Standard: Dutch Target and Intervention Values, 2000; PPM-Parts per Million

A total of ten (10) sample were collected from the project corridor. The test result represents those maximum parameters value lies within the standard (See table: 18). As there is currently no soil standard for Bangladesh or ECR, 2023 guideline, we use Dutch guideline as follow. All lab test report has been incorporated in annexure.

Arsenic (As)

The Arsenic (As) values for the soil samples range from 8.41 (SQ-4) to 15.32 (SQ-2), indicating that all samples are within the Dutch standard threshold of 29 ppm.

Copper (Cu)

Copper (Cu) levels in all ten samples for the soil samples range from 9.62 ppm (SQ-1) to 37.04 ppm (SQ-5), indicating that all samples are within the Dutch standard threshold of 36 ppm except SQ-5. These concentrations suggest that the soils are not contaminated by chromium and reflect either natural geological background or minimal anthropogenic input. Thus, the chromium content poses no environmental or agricultural risk, while SQ-5 slightly exceeds the Dutch limit, suggesting localized copper enrichment, which could be due to industrial activity, agrochemicals, or natural mineralization.

Table 67: Soil quality monitoring results of monsoon on July

Sl. No.	Parameter	Unit	Concentration										Dutch Standard*
			SQ-1	SQ-2	SQ-3	SQ-4	SQ-5	SQ-6	SQ-7	SQ-8	SQ-9	SQ-10	
1.	Arsenic (As)	PPM	8.54	15.32	10.65	8.41	11.15	9.55	17.26	15.17	10.22	12.35	29
2.	Copper (Cu)	PPM	9.62	16.53	25.29	20.57	37.04	24.79	16.01	25.61	30.49	19.47	36
3.	Iron (Fe)	PPM	195.52	125.42	128.18	70.85	385.89	87.86	57.49	182.46	327.41	366.81	NYS
4.	Mercury (Hg)	PPM	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3
5.	Nickle (Ni)	PPM	20.66	26.90	29.78	29.82	47.32	36.32	27.38	42.97	39.14	33.62	35
6.	Lead (Pb)	PPM	10.95	13.16	17.49	16.51	22.95	16.24	14.07	19.24	21.50	13.81	85
7.	Zinc (Zn)	PPM	52.45	41.25	52.00	67.55	134.65	54.70	57.20	60.60	75.00	61.85	140

Primary Data Source: BEETLSL and BINA-2025.

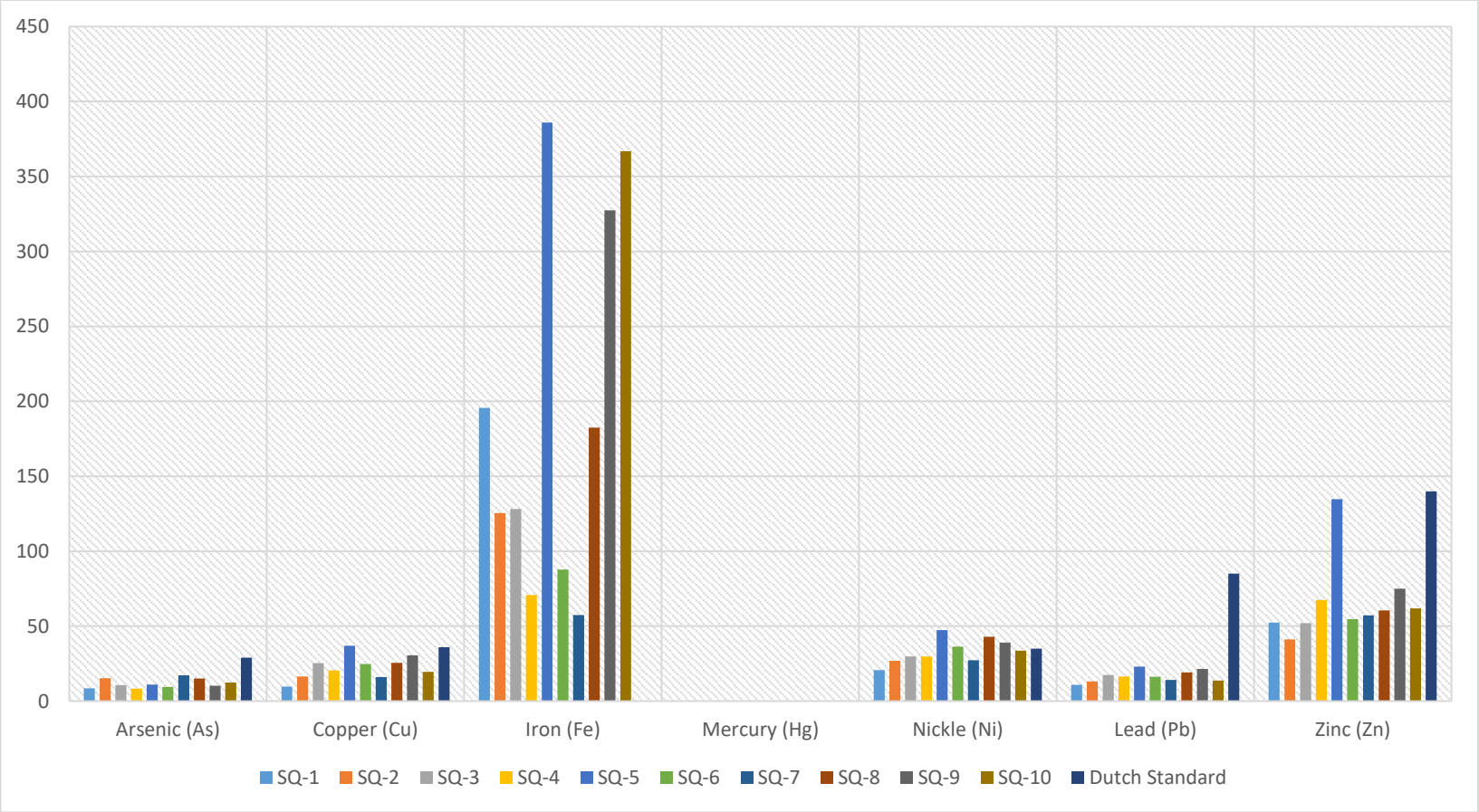


Figure 78: Linear relationship between the soil chemistry and Dutch Standard

Lead (Pb)

Lead concentration ranges from 10.95ppm (SQ-1) to 22.95 ppm (SQ-5), all of which are significantly below the Dutch permissible limit of 85 ppm. All samples are well below the Dutch limit, suggesting no concern for lead contamination at the tested sites.

Iron (Fe)

Iron concentration ranges from SQ-7(57.49 ppm) to SQ-5 (385.89 ppm). The Dutch standard does not specify a target value for iron, so contamination classification is not possible under these guidelines. Nonetheless, the recorded values are generally within normal background levels for soils and are unlikely to pose direct toxicity risks. Iron levels can influence soil chemistry, particularly pH and nutrient availability, so periodic observation could be beneficial.

Mercury (Hg)

The Dutch standard for mercury is 0.3 ppm, but no mercury concentration data were available for the sampled sites. Given mercury's high toxicity and potential for bioaccumulation, especially in aquatic systems, targeted testing is recommended in areas near industrial zones, waste disposal sites, or mining operations to rule out contamination.

Nickle (Ni)

Nickel levels in the samples ranged from 20.66 to 47.32 ppm, with the Dutch standard being 35 ppm. Three sites—SQ-5 (47.32 ppm), SQ-8 (42.97 ppm), and SQ-9 (39.14 ppm)—exceeded this limit. Elevated nickel concentrations may result from industrial discharges, metal processing activities, or natural geological sources. These exceedances pose potential ecological risks and warrant further investigation and management.

Zinc (Zn)

Zinc levels ranged from 41.25 to 134.65 ppm, with the Dutch standard being 140 ppm. All samples fell below the permissible limit, though SQ-5 (134.65 ppm) was close to the threshold. Zinc enrichment can arise from industrial emissions, galvanization processes, or the use of zinc-containing fertilizers. While no immediate concern exists, the proximity to the limit in SQ-5 suggests that periodic monitoring would be prudent.

SQ-1

SQ-2

SQ-3

SQ-4

SQ-5

SQ-6

SQ-7

SQ-8

SQ-9

SQ-10

Figure 79: Monitoring soil sample in the study area

5.4 Land Resources

The proposed project interventions under this study are establishment of overhead power transmission line falls at (a) Chattogram Coastal Floodplain and (b) Northern and Eastern Hills (BARC, 2012). The AEZ of the study area is presented in Figure 80. However, a total of 1650.846 acres of land shall be affected temporarily considering 70m RoW due to the stringing and erection of the transmission line. Majority of the land use comprises agriculture crops, followed by buildup area, water, rangeland, trees and vegetation, etc.

Table 68: Land use in the RoW

Sl	Land Use Category	Area (acre) considering 70-m RoW
1.	Water	148.29
2.	Trees	44.97
3.	Flooded Vegetation	0.766
4.	Crops	1,220.13
5.	Built Up area	225.33
6.	Rangeland	11.36
	Total	**1,650.846**

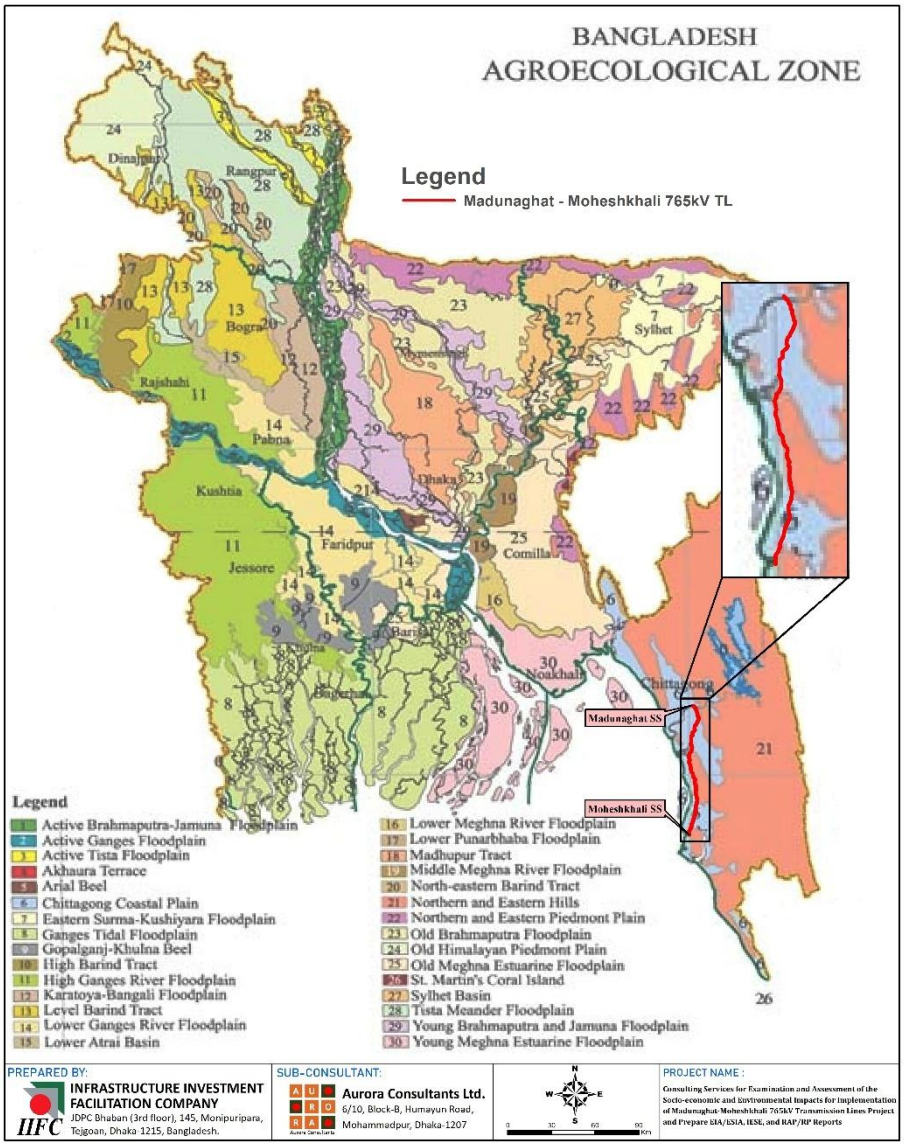


Figure 80: Agro-ecological zones in the study area

The project will affect a total of 43.47 acres of land, comprising mainly agricultural land (31.27 acres), which represents the largest share. Additionally, 7.06 acres of salt fields and 3.27 acres of fallow land will be impacted. Smaller portions include 1.18 acres of homestead gardens and 0.69 acres of pond/water bodies. As per land survey no residential and commercial land will be affected by towers footings.

Table 69: Land use pattern for tower footings

Type of land	Amount of affected land (Acre)
Agriculture Land	31.27
Pond/water body	0.69
Fallow land	3.27
Homestead Garden	1.18
Salt Field	7.06
Total	**43.47**

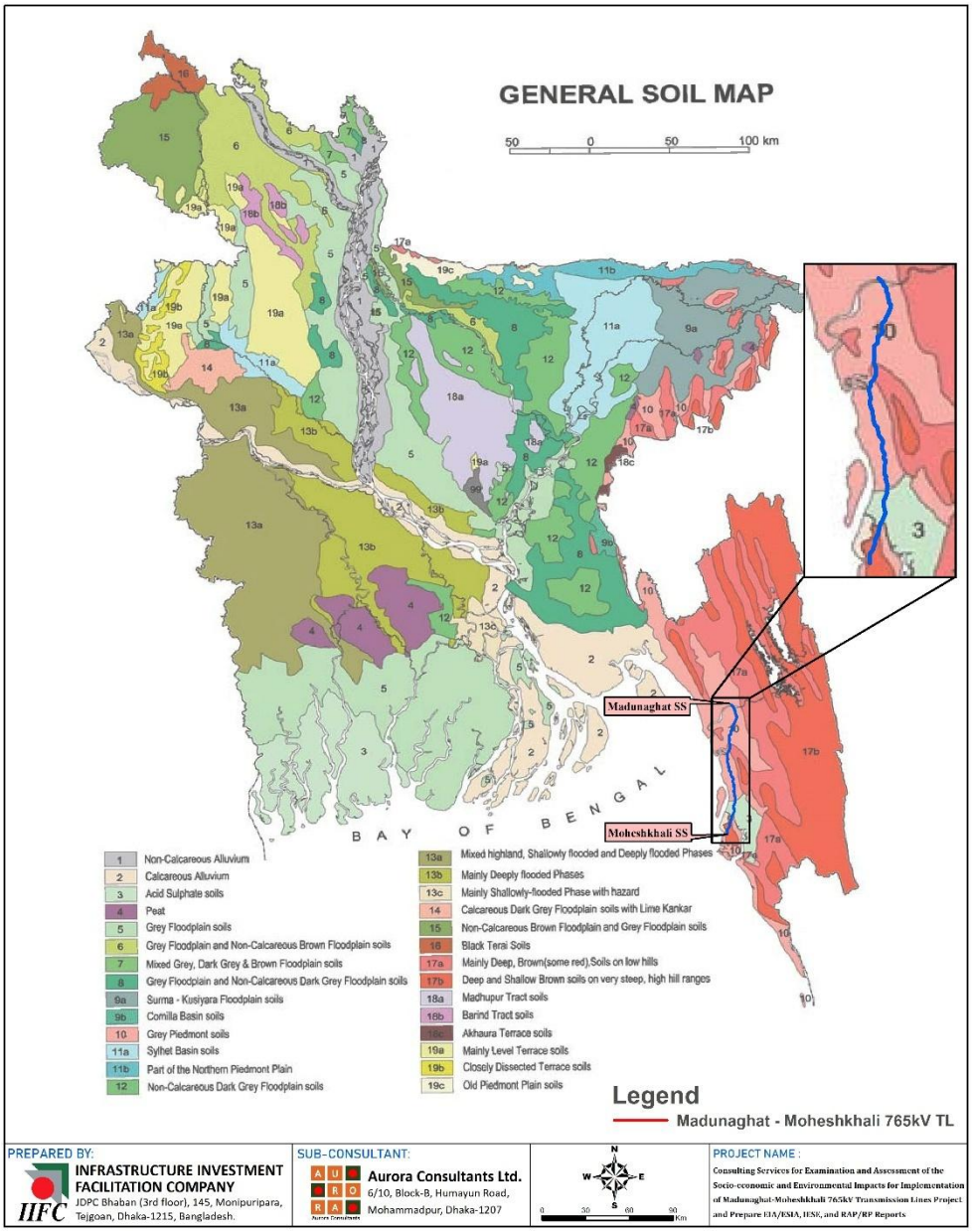


Figure 81: Soil map associated with the project

5.5 Agriculture Resources

Agriculture Land for Tower Footing*:* For construction of new 95.5 km of transmission line, a total of 272 towers will have to construct for the project and 43.47 acres of land will be required for the construction of towers (Table 70). Out of total affected land a total 31.27 acres of agriculture land will be used for transmission towers. The crops compensation will be paid due to loss of agriculture land by the project. The tower footings for laying transmission line require land compensation as per Electricity Act 2018 and Electricity Rules 2020. So, compensation will be paid to the landowners where towers will be constructed. In Addition, the Compensation for standing trees and crops will be provided under RoW which requires felling before laying the transmission line.

Table 70: Status of cultivated land for tower footings

Sl. No.	Name of Transmission Line	Total Number of Tower	Amount of land to be required	Cultivated land
1.	Madunaghat—Moheshkhali 765kV TL	272	43.47 acres	31.27 acres

Agriculture Land Under RoW*:* During construction of transmission line necessitate a certain Right of Way (RoW) which directly impacts agricultural land. To calculate the total land area will be affected by the Right-of-Way (RoW) of transmission line which will pass through agricultural land. As per ToR, considering 70-meter RoW of the transmission line for 765kV, the estimated crop land due to the impact of the project is 1651.84 acres.

Table 71: Status of cultivated land in the RoW of T/L

Transmission Line	Voltage	Total Length (km)	Total Length (m) (c×1000)	RoW width (m)	Total affected area in sqm	Total affected area in (Acre)
1	2	3	4=(3×1000)	5	6= (4×5)	7=(6÷4047) *
Madunaghat – Moheshkhali 765kV TL	765KV	95.5	95500	70	6685000	1651.84

**1 acre=4047 sqm*

5.1.1 Cropping Pattern

Out of the total 38.33 acres of land classified as agricultural, 31.27 acres have been identified as general agricultural land and 7.06 acres as salt-cultivated land. The net cultivated area for the proposed tower footings is estimated at 38.33 acres, while the gross cultivated area is estimated at approximately 85.29 acres. To determine cropping intensity, information on crop types and cropping patterns was collected from the field through public consultations with local farmers and respective offices of Department of Agriculture Extension (DAE). The following formula was applied:

Cropping Intensity (%) = (Gross Cultivated Area / Net Cultivated Area) × 100

Where: – Gross Cultivated Area refers to the total area sown with crops, including repeated use of the same land for different crops within a year.

Table 72: Land Types and cropping pattern

Land Types	Cropping pattern	Affected land (acre)	Gross area (acre)
Agriculture land	Single crops	4.83	4.82
	Double crops	12.98	25.97
	Triple crops	13.46	40.38
Salt land	Double crops	7.06	14.12
	Total	**38.33**	**85.29**
		Cropping intensity	**223**

Net Cultivated Area refers to the actual physical area under cultivation, without duplication for multiple cropping.

Based on this, the cropping intensity of the proposed tower footing land was found to be 223%, which is higher than both the national average of 198% and Chattogram division 217% (Year Book of Agriculture Statistic 2023).

5.6 Fisheries Resources

The Right-of-Way (RoW) of the proposed Transmission Lines possesses river, floodplain, pond and other water bodies. These water bodies function as fish habitat seasonally and perennially and support a wide variety of fresh water fish species. A good number of households depend on these habitats by catching fish as fulltime or part-time fishers. Pulling of transmission lines by erection of tower in low land[4] might have low scale impact on fisheries resources. The contractor will work in such a way that the ecological value can be preserved. There is a provision of compensation if applicable by the project mentioned in RP report.

5.6.1 Fish Habitat Description

Fish habitats have been classified in two categories - i) capture fishery which includes in river and khal, lake, intertidal and floodplain, and ii) culture fishery which have various types of aquaculture pond and seasonal cultured waterbody. The proposed transmission lines crosses over many rivers. The important rivers are the Bongshai, Shitalakshya, Brahmaputra, Meghna, Atrai, Boiran, Dhaleshwari, Buariganga, Ichamati river etc.

The Karnaphuli, Sangu, and Matamuhuri are three distinct major rivers in the Chattogram region of Bangladesh, part of the larger Chattogram River System. The Karnaphuli, though sometimes connected by canal to the Sangu, forms the system's main artery, flowing past the port city of Chattogram and featuring a significant hydroelectric dam at Kaptai. The Sangu and Matamuhuri are smaller, separate rivers originating from the Chattogram Hill Tracts and flowing independently to the Bay of Bengal, each known for unique fish species and significant ecological importance.

Studies have recorded a wide variety of finfish species, including families like Cyprinidae and Danionidae. A total of 95 freshwater finfish species were recorded in the upper Matamuhuri river alone in one study. The study area also has many connecting Khals that function as fish migratory corridors for some indigenous fish species. Most of the Khals are seasonal and get connected with the nearer river in wet season. The intertidal area holds water from June-September in year reported by local people. Water depth varies from 0.5-1.0 meter during high tide and recede water fully for the period of low tide. The area functions as grazing or feeding ground for some fish species such as Guilla (Mystus gulio), Bata (Labeo bata), Baila (Glossogobius giuris), Chiring (Apocryptes bato), Golda (Macrobrachium rosenbergii), Bagda (Penaeus monodon), etc.

The study area has also aquaculture activity in ponds. Most of the ponds are situated with homestead land. Traditional to semi-intensive aquaculture practices are done in these ponds. The culture system depends on pond size, water availability and water quality. Polyculture with Indian major carp, exotic and other fast-growing fish species are practiced in the perennial larger ponds. Usually, the small ponds hold water 36-40 weeks in a year and seasonal aquaculture are practiced by adopting extensive culture method. However, no fish aquaculture will be affected permanently due to laying proposed transmission line. Different types of fish of the study area found in the local market are shown in *Figure 82*.

[4] Here low land is the 'Baid' which means depression between the terraces, where rainfall run-off water is deposited. This low land is cultured with fish seasonally.

Figure 82: Different types of fish found in local market

5.7 Ecological Environment

The proposed power transmission line (95.5-km) are traverse over different landforms as well as different ecosystems such as agricultural land, settlements, saltpans, floodplains, canals, rivers, etc.

5.7.1 Ecological Survey using IBAT Analysis

Ecological Survey has been carried out using The Integrated Biodiversity Assessment Tool (IBAT) which provides key decision-makers with access to critical information on biodiversity priority sites to inform risk management and decision- making processes that address potential biodiversity impacts. Developed through a partnership of BirdLife International, Conservation International, International Union for Conservation of Nature (IUCN) and United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC), the vision of IBAT is that decisions affecting critical natural habitats are informed by the best scientific information and in turn decision makers will support the quest to collect and enhance the underlying datasets and maintain that scientific information.

Proximity: 2-km from the centre line of the proposed transmission lines.

Data Downloads: IBAT data downloads are spatial data in esri formats.

Results:
16 plant species have been reported. In plant species, all species belong to phylum TRACHEOPHYTA. Mostly belobde to class MAGNOLIOPSIDA also known as dicots. Few monocots were also observed. All species are either endangered critical or vulnerable. Such a situation is alarming and needs conservation plan to be enforced without delay. Plants are mostly terrestrial.

174 animal species have been reported mostly aquatic species reported. Many aves and mammals also contribute to the composition. All species fall into the concerned group. This also points immediate conservation strategy for animals. The detailed description is given below are attached in excel sheet attached with this.

Table 73: Status of threatened species within 2-km proximity of the propoed transmission lines

Kingdom	Phylum	Class	Order_	Family	Genus	Scientific_Name	Common_Name	Category
Animalia	Chordata	Reptilia	Testudines	Cheloniidae	Eretmochelys	Eretmochelys imbricata	Hawksbill Turtle	CR
Animalia	Chordata	Reptilia	Testudines	Testudinidae	Indotestudo	Indotestudo elongata	Elongated Tortoise	CR
Animalia	Chordata	Reptilia	Testudines	Geoemydidae	Pangshura	Pangshura sylhetensis	Assam Roofed Turtle	CR
Animalia	Chordata	Mammalia	Pholidota	Manidae	Manis	Manis pentadactyla	Chinese Pangolin	CR
Animalia	Chordata	Reptilia	Testudines	Testudinidae	Manouria	Manouria emys	Asian Giant Tortoise	CR
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Carcharhinus	Carcharhinus longimanus	Oceanic Whitetip Shark	CR
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Sphyrnidae	Sphyrna	Sphyrna lewini	Scalloped Hammerhead	CR
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Sphyrnidae	Sphyrna	Sphyrna mokarran	Great Hammerhead	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Pristidae	Anoxypristis	Anoxypristis cuspidata	Narrow Sawfish	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Pristidae	Pristis	Pristis zijsron	Green Sawfish	CR
Animalia	Chordata	Reptilia	Testudines	Geoemydidae	Heosemys	Heosemys depressa	Arakan Forest Turtle	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Rhinidae	Rhina	Rhina ancylostomus	Bowmouth Guitarfish	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Rhinidae	Rhynchobatus	Rhynchobatus australiae	Bottlenose Wedgefish	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Glaucostegidae	Glaucostegus	Glaucostegus granulatus	Sharpnose Guitarfish	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Glaucostegidae	Glaucostegus	Glaucostegus obtusus	Widenose Guitarfish	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Glaucostegidae	Glaucostegus	Glaucostegus thouin	Clubnose Guitarfish	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Rhinobatidae	Rhinobatos	Rhinobatos annandalei	Bengal Guitarfish	CR
Plantae	Tracheophyta	Magnoliopsida	Myrtales	Lythraceae	Sonneratia	Sonneratia griffithii		CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Pristidae	Pristis	Pristis pristis	Largetooth Sawfish	CR
Animalia	Chordata	Aves	Galliformes	Phasianidae	Perdicula	Perdicula manipurensis	Manipur Bush-quail	CR
Animalia	Chordata	Aves	Anseriformes	Anatidae	Asarcornis	Asarcornis scutulata	White-winged Duck	CR
Animalia	Chordata	Aves	Otidiformes	Otididae	Houbaropsis	Houbaropsis bengalensis	Bengal Florican	CR
Animalia	Chordata	Aves	Charadriiformes	Scolopacidae	Calidris	Calidris pygmaea	Spoon-billed Sandpiper	CR
Animalia	Chordata	Aves	Accipitriformes	Accipitridae	Gyps	Gyps bengalensis	White-rumped Vulture	CR
Animalia	Chordata	Reptilia	Testudines	Geoemydidae	Batagur	Batagur baska	Northern River Terrapin	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Glaucostegidae	Glaucostegus	Glaucostegus typus	Giant Guitarfish	CR
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Maculabatis	Maculabatis bineeshi	Shorttail Whipray	CR
Animalia	Chordata	Reptilia	Testudines	Trionychidae	Pelochelys	Pelochelys cantorii	Asian Giant Softshell Turtle	CR
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Glyphis	Glyphis gangeticus	Ganges Shark	CR
Plantae	Tracheophyta	Magnoliopsida	Laurales	Lauraceae	Dehaasia	Dehaasia rangamattiensis		CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Rhinidae	Rhynchobatus	Rhynchobatus laevis	Smoothnose Wedgefish	CR
Animalia	Chordata	Chondrichthyes	Rhinopristiformes	Rhinobatidae	Rhinobatos	Rhinobatos lionotus	Smoothback Guitarfish	CR
Animalia	Chordata	Reptilia	Testudines	Trionychidae	Nilssonia	Nilssonia nigricans	Black Softshell Turtle	CR
Animalia	Chordata	Mammalia	Artiodactyla	Balaenopteridae	Balaenoptera	Balaenoptera musculus	Blue Whale	EN
Animalia	Chordata	Reptilia	Testudines	Cheloniidae	Chelonia	Chelonia mydas	Green Turtle	EN
Animalia	Chordata	Mammalia	Carnivora	Canidae	Cuon	Cuon alpinus	Dhole	EN
Animalia	Chordata	Mammalia	Proboscidea	Elephantidae	Elephas	Elephas maximus	Asian Elephant	EN
Animalia	Chordata	Reptilia	Testudines	Geoemydidae	Melanochelys	Melanochelys tricarinata	Tricarinate Hill Turtle	EN
Animalia	Chordata	Mammalia	Artiodactyla	Delphinidae	Orcaella	Orcaella brevirostris	Irrawaddy Dolphin	EN
Animalia	Chordata	Mammalia	Carnivora	Felidae	Panthera	Panthera tigris	Tiger	EN
Animalia	Chordata	Chondrichthyes	Orectolobiformes	Rhincodontidae	Rhincodon	Rhincodon typus	Whale Shark	EN

Kingdom	Phylum	Class	Order_	Family	Genus	Scientific_Name	Common_Name	Category
Animalia	Chordata	Chondrichthyes	Lamniformes	Lamnidae	Isurus	Isurus oxyrinchus	Shortfin Mako	EN
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Carcharhinus	Carcharhinus amblyrhynchos	Grey Reef Shark	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Urogymnus	Urogymnus asperrimus	Porcupine Ray	EN
Animalia	Chordata	Reptilia	Testudines	Trionychidae	Nilssonia	Nilssonia hurum	Indian Peacock Softshell Turtle	EN
Animalia	Chordata	Reptilia	Testudines	Trionychidae	Nilssonia	Nilssonia gangetica	Indian Softshell Turtle	EN
Animalia	Chordata	Mammalia	Primates	Lorisidae	Nycticebus	Nycticebus bengalensis	Bengal Slow Loris	EN
Animalia	Chordata	Mammalia	Primates	Hylobatidae	Hoolock	Hoolock hoolock	Western Hoolock Gibbon	EN
Animalia	Chordata	Mammalia	Artiodactyla	Platanistidae	Platanista	Platanista gangetica	Ganges River Dolphin	EN
Animalia	Chordata	Mammalia	Artiodactyla	Cervidae	Axis	Axis porcinus	Hog Deer	EN
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Sphyrnidae	Eusphyra	Eusphyra blochii	Winghead Shark	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Mobulidae	Mobula	Mobula eregoodoo	Longhorned Pygmy Devil Ray	EN
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Negaprion	Negaprion acutidens	Sharptooth Lemon Shark	EN
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Hemigaleidae	Hemipristis	Hemipristis elongata	Snaggletooth Shark	EN
Animalia	Chordata	Chondrichthyes	Orectolobiformes	Stegostomidae	Stegostoma	Stegostoma tigrinum	Indo-Pacific Leopard Shark	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Myliobatidae	Aetomylaeus	Aetomylaeus maculatus	Mottled Eagle Ray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Rhinopteridae	Rhinoptera	Rhinoptera javanica	Javanese Cownose Ray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Mobulidae	Mobula	Mobula tarapacana	Sicklefin Devil Ray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Mobulidae	Mobula	Mobula thurstoni	Bentfin Devil Ray	EN
Animalia	Chordata	Chondrichthyes	Lamniformes	Lamnidae	Isurus	Isurus paucus	Longfin Mako	EN
Animalia	Cnidaria	Anthozoa	Scleractinia	Acroporidae	Acropora	Acropora rudis		EN
Animalia	Cnidaria	Hydrozoa	Anthoathecata	Milleporidae	Millepora	Millepora tenera		EN
Animalia	Cnidaria	Anthozoa	Scleractinia	Acroporidae	Acropora	Acropora glauca		EN
Animalia	Cnidaria	Hydrozoa	Anthoathecata	Milleporidae	Millepora	Millepora platyphylla		EN
Animalia	Chordata	Mammalia	Primates	Cercopithecidae	Trachypithecus	Trachypithecus phayrei ssp. phayrei		EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Pateobatis	Pateobatis uarnacoides	Whitenose Whipray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Maculabatis	Maculabatis gerrardi	Whitespotted Whipray	EN
Animalia	Chordata	Chondrichthyes	Lamniformes	Alopiidae	Alopias	Alopias pelagicus	Pelagic Thresher	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Himantura	Himantura undulata	Honeycomb Whipray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Pateobatis	Pateobatis jenkinsii	Jenkins' Whipray	EN
Animalia	Chordata	Reptilia	Testudines	Geoemydidae	Cuora	Cuora mouhotii	Keeled Box Turtle	EN
Animalia	Chordata	Actinopterygii	Siluriformes	Amblycipitidae	Amblyceps	Amblyceps arunchalensis		EN
Plantae	Tracheophyta	Magnoliopsida	Malvales	Malvaceae	Heritiera	Heritiera fomes		EN
Animalia	Echinodermata	Holothuroidea	Aspidochirotida	Holothuriidae	Holothuria	Holothuria scabra		EN
Animalia	Echinodermata	Holothuroidea	Aspidochirotida	Holothuriidae	Holothuria	Holothuria lessoni		EN
Animalia	Echinodermata	Holothuroidea	Aspidochirotida	Stichopodidae	Thelenota	Thelenota ananas	Pineapple Sea Cucumber	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Urogymnus	Urogymnus polylepis	Giant Freshwater Whipray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Himantura	Himantura leoparda	Leopard Whipray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Rhinopteridae	Rhinoptera	Rhinoptera jayakari	Oman Cownose Ray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Mobulidae	Mobula	Mobula birostris	Oceanic Manta Ray	EN
Animalia	Chordata	Aves	Charadriiformes	Scolopacidae	Tringa	Tringa guttifer	Spotted Greenshank	EN
Animalia	Chordata	Aves	Charadriiformes	Scolopacidae	Calidris	Calidris tenuirostris	Great Knot	EN
Animalia	Chordata	Aves	Charadriiformes	Laridae	Rynchops	Rynchops albicollis	Indian Skimmer	EN

Kingdom	Phylum	Class	Order_	Family	Genus	Scientific_Name	Common_Name	Category
Animalia	Chordata	Aves	Accipitriformes	Accipitridae	Haliaeetus	Haliaeetus leucoryphus	Pallas's Fish-eagle	EN
Animalia	Chordata	Aves	Accipitriformes	Accipitridae	Aquila	Aquila nipalensis	Steppe Eagle	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Aetobatidae	Aetobatus	Aetobatus ocellatus	Spotted Eagle Ray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Telatrygon	Telatrygon crozieri	Indian Sharpnose Ray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Pateobatis	Pateobatis bleekeri	Bleeker's Whipray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Pastinachus	Pastinachus gracilicaudus	Narrow Cowtail Ray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Mobulidae	Mobula	Mobula mobular	Spinetail Devil Ray	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Aetobatidae	Aetobatus	Aetobatus flagellum	Longhead Eagle Ray	EN
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Lamiopsis	Lamiopsis temminckii	Broadfin Shark	EN
Animalia	Chordata	Mammalia	Primates	Cercopithecidae	Trachypithecus	Trachypithecus phayrei	Phayre's Leaf-monkey	EN
Animalia	Chordata	Mammalia	Primates	Cercopithecidae	Trachypithecus	Trachypithecus pileatus ssp. pileatus	Blond-bellied Langur	EN
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Himantura	Himantura uarnak	Coach Whipray	EN
Plantae	Tracheophyta	Magnoliopsida	Sapindales	Anacardiaceae	Semecarpus	Semecarpus subpanduriformis		EN
Animalia	Cnidaria	Anthozoa	Scleractinia	Acroporidae	Acropora	Acropora abrotanoides		EN
Plantae	Tracheophyta	Magnoliopsida	Gentianales	Rubiaceae	Tarenna	Tarenna helferi		EN
Animalia	Chordata	Reptilia	Testudines	Geoemydidae	Cuora	Cuora amboinensis	Southeast Asian Box Turtle	EN
Animalia	Chordata	Reptilia	Testudines	Geoemydidae	Hardella	Hardella thurjii	Crowned River Turtle	EN
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Carcharhinus	Carcharhinus limbatus	Blacktip Shark	VU
Animalia	Chordata	Chondrichthyes	Lamniformes	Lamnidae	Carcharodon	Carcharodon carcharias	White Shark	VU
Animalia	Chordata	Reptilia	Testudines	Cheloniidae	Caretta	Caretta caretta	Loggerhead Turtle	VU
Animalia	Chordata	Mammalia	Carnivora	Felidae	Catopuma	Catopuma temminckii	Asian Golden Cat	VU
Animalia	Chordata	Reptilia	Crocodylia	Crocodylidae	Crocodylus	Crocodylus palustris	Mugger	VU
Animalia	Chordata	Reptilia	Testudines	Dermochelyidae	Dermochelys	Dermochelys coriacea	Leatherback Turtle	VU
Animalia	Chordata	Mammalia	Carnivora	Ursidae	Helarctos	Helarctos malayanus	Sun Bear	VU
Animalia	Chordata	Actinopterygii	Syngnathiformes	Syngnathidae	Hippocampus	Hippocampus histrix	Thorny Seahorse	VU
Animalia	Chordata	Actinopterygii	Syngnathiformes	Syngnathidae	Hippocampus	Hippocampus trimaculatus	Three-spot Seahorse	VU
Animalia	Chordata	Reptilia	Testudines	Cheloniidae	Lepidochelys	Lepidochelys olivacea	Olive Ridley Turtle	VU
Animalia	Chordata	Mammalia	Carnivora	Mustelidae	Lutrogale	Lutrogale perspicillata	Smooth-coated Otter	VU
Animalia	Chordata	Mammalia	Carnivora	Felidae	Neofelis	Neofelis nebulosa	Clouded Leopard	VU
Animalia	Chordata	Mammalia	Carnivora	Felidae	Panthera	Panthera pardus	Leopard	VU
Animalia	Chordata	Mammalia	Carnivora	Felidae	Prionailurus	Prionailurus viverrinus	Fishing Cat	VU
Animalia	Chordata	Mammalia	Primates	Cercopithecidae	Trachypithecus	Trachypithecus pileatus	Capped Langur	VU
Animalia	Chordata	Mammalia	Carnivora	Ursidae	Ursus	Ursus thibetanus	Asiatic Black Bear	VU
Plantae	Tracheophyta	Magnoliopsida	Malvales	Dipterocarpaceae	Dipterocarpus	Dipterocarpus costatus		VU
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Carcharhinus	Carcharhinus amboinensis	Pigeye Shark	VU
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Carcharhinus	Carcharhinus falciformis	Silky Shark	VU
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Carcharhinus	Carcharhinus leucas	Bull Shark	VU
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Carcharhinus	Carcharhinus melanopterus	Blacktip Reef Shark	VU
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Triaenodon	Triaenodon obesus	Whitetip Reef Shark	VU
Animalia	Chordata	Mammalia	Primates	Cercopithecidae	Macaca	Macaca leonina	Northern Pig-tailed Macaque	VU
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Carcharhinus	Carcharhinus amblyrhynchoides	Graceful Shark	VU
Animalia	Chordata	Actinopterygii	Syngnathiformes	Syngnathidae	Hippocampus	Hippocampus kelloggi	Great Seahorse	VU

Kingdom	Phylum	Class	Order_	Family	Genus	Scientific_Name	Common_Name	Category
Animalia	Chordata	Mammalia	Carnivora	Viverridae	Arctictis	Arctictis binturong	Binturong	VU
Animalia	Chordata	Mammalia	Artiodactyla	Physeteridae	Physeter	Physeter macrocephalus	Sperm Whale	VU
Animalia	Chordata	Mammalia	Artiodactyla	Cervidae	Rusa	Rusa unicolor	Sambar	VU
Animalia	Chordata	Chondrichthyes	Orectolobiformes	Hemiscylliidae	Chiloscyllium	Chiloscyllium indicum	Slender Bambooshark	VU
Animalia	Chordata	Chondrichthyes	Orectolobiformes	Hemiscylliidae	Chiloscyllium	Chiloscyllium griseum	Grey Bamboo Shark	VU
Animalia	Chordata	Chondrichthyes	Orectolobiformes	Ginglymostomatidae	Nebrius	Nebrius ferrugineus	Tawny Nurse Shark	VU
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae	Rhizoprionodon	Rhizoprionodon acutus	Milk Shark	VU
Animalia	Chordata	Mammalia	Carnivora	Mustelidae	Aonyx	Aonyx cinereus	Asian Small-clawed Otter	VU
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Gymnuridae	Gymnura	Gymnura poecilura	Longtail Butterfly Ray	VU
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Taeniurops	Taeniurops meyeni	Blotched Fantail Ray	VU
Animalia	Chordata	Chondrichthyes	Torpediniformes	Narcinidae	Narcine	Narcine brevilabiata	Shortlip Numbfish	VU
Animalia	Chordata	Chondrichthyes	Torpediniformes	Narcinidae	Narcine	Narcine timlei	Brown Numbfish	VU
Animalia	Chordata	Chondrichthyes	Torpediniformes	Narcinidae	Narcine	Narcine lingula	Chinese Numbfish	VU
Animalia	Chordata	Chondrichthyes	Torpediniformes	Narcinidae	Narcine	Narcine maculata	Smallspot Numbfish	VU
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Pateobatis	Pateobatis fai	Pink Whipray	VU
Animalia	Chordata	Chondrichthyes	Orectolobiformes	Hemiscylliidae	Chiloscyllium	Chiloscyllium burmensis	Burmese Bambooshark	VU
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Hemigaleidae	Chaenogaleus	Chaenogaleus macrostoma	Hooktooth Shark	VU
Animalia	Chordata	Chondrichthyes	Lamniformes	Alopiidae	Alopias	Alopias superciliosus	Bigeye Thresher	VU
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Brevitrygon	Brevitrygon imbricata	Bengal Whipray	VU
Animalia	Chordata	Actinopterygii	Perciformes	Scombridae	Rastrelliger	Rastrelliger faughni	Island Mackerel	VU
Animalia	Chordata	Actinopterygii	Perciformes	Istiophoridae	Istiophorus	Istiophorus platypterus	Sailfish	VU
Plantae	Tracheophyta	Liliopsida	Alismatales	Hydrocharitaceae	Halophila	Halophila beccarii	Ocean Turf Grass	VU
Animalia	Chordata	Reptilia	Squamata	Elapidae	Ophiophagus	Ophiophagus hannah	King Cobra	VU
Animalia	Echinodermata	Holothuroidea	Aspidochirotida	Stichopodidae	Stichopus	Stichopus herrmanni		VU
Animalia	Chordata	Actinopterygii	Not Assigned	Pomacentridae	Cheiloprion	Cheiloprion labiatus	Biglip Damsel	VU
Animalia	Chordata	Actinopterygii	Tetraodontiformes	Molidae	Mola	Mola mola	Ocean Sunfish	VU
Animalia	Chordata	Reptilia	Squamata	Colubridae	Elaphe	Elaphe taeniura	Cave Racer	VU
Animalia	Chordata	Reptilia	Squamata	Pythonidae	Python	Python bivittatus	Burmese Python	VU
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Mobulidae	Mobula	Mobula alfredi	Reef Manta Ray	VU
Animalia	Chordata	Mammalia	Artiodactyla	Phocoenidae	Neophocaena	Neophocaena phocaenoides	Indo-Pacific Finless Porpoise	VU
Animalia	Echinodermata	Holothuroidea	Aspidochirotida	Holothuriidae	Holothuria	Holothuria fuscogilva		VU
Animalia	Chordata	Aves	Coraciiformes	Alcedinidae	Halcyon	Halcyon pileata	Black-capped Kingfisher	VU
Animalia	Chordata	Aves	Anseriformes	Anatidae	Aythya	Aythya ferina	Common Pochard	VU
Animalia	Chordata	Aves	Piciformes	Picidae	Mulleripicus	Mulleripicus pulverulentus	Great Slaty Woodpecker	VU
Animalia	Chordata	Aves	Bucerotiformes	Bucerotidae	Buceros	Buceros bicornis	Great Hornbill	VU
Animalia	Chordata	Aves	Bucerotiformes	Bucerotidae	Rhyticeros	Rhyticeros undulatus	Wreathed Hornbill	VU
Animalia	Chordata	Aves	Charadriiformes	Scolopacidae	Calidris	Calidris ferruginea	Curlew Sandpiper	VU
Animalia	Chordata	Aves	Charadriiformes	Scolopacidae	Calidris	Calidris falcinellus	Broad-billed Sandpiper	VU
Animalia	Chordata	Aves	Charadriiformes	Charadriidae	Pluvialis	Pluvialis squatarola	Grey Plover	VU
Animalia	Chordata	Aves	Charadriiformes	Laridae	Sterna	Sterna aurantia	River Tern	VU
Animalia	Chordata	Aves	Accipitriformes	Accipitridae	Clanga	Clanga clanga	Greater Spotted Eagle	VU
Animalia	Chordata	Aves	Passeriformes	Turdidae	Turdus	Turdus feae	Grey-sided Thrush	VU

Kingdom	Phylum	Class	Order_	Family	Genus	Scientific_Name	Common_Name	Category
Animalia	Chordata	Actinopterygii	Perciformes	Blenniidae	Omobranchus	Omobranchus smithi		VU
Plantae	Tracheophyta	Magnoliopsida	Malpighiales	Calophyllaceae	Mesua	Mesua ferrea	Churuli	VU
Animalia	Chordata	Mammalia	Carnivora	Mustelidae	Arctonyx	Arctonyx collaris	Greater Hog Badger	VU
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Dasyatidae	Pastinachus	Pastinachus ater	Broad Cowtail Ray	VU
Animalia	Chordata	Mammalia	Artiodactyla	Delphinidae	Sousa	Sousa chinensis	Indo-Pacific Humpback Dolphin	VU
Animalia	Chordata	Chondrichthyes	Myliobatiformes	Myliobatidae	Aetomylaeus	Aetomylaeus nichofii	Banded Eagle Ray	VU
Animalia	Chordata	Reptilia	Squamata	Scincidae	Tropidophorus	Tropidophorus assamensis	North-Eastern Waterskink	VU
Animalia	Chordata	Actinopterygii	Syngnathiformes	Syngnathidae	Hippocampus	Hippocampus spinosissimus	Hedgehog Seahorse	VU
Plantae	Tracheophyta	Liliopsida	Zingiberales	Zingiberaceae	Globba	Globba spathulata	Dancing Girl Flower	VU
Animalia	Chordata	Reptilia	Testudines	Trionychidae	Lissemys	Lissemys punctata	Indian Flapshell Turtle	VU
Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae	Schizothorax	Schizothorax plagiostomus	Snow Trout	VU
Plantae	Tracheophyta	Magnoliopsida	Laurales	Lauraceae	Beilschmiedia	Beilschmiedia assamica		VU
Animalia	Chordata	Mammalia	Artiodactyla	Bovidae	Capricornis	Capricornis sumatraensis	Mainland Serow	VU
Animalia	Chordata	Mammalia	Primates	Hylobatidae	Hoolock	Hoolock hoolock ssp. hoolock	Western Hoolock Gibbon	VU
Plantae	Tracheophyta	Liliopsida	Liliales	Melanthiaceae	Paris	Paris polyphylla	Love Apple	VU
Plantae	Tracheophyta	Magnoliopsida	Magnoliales	Annonaceae	Dasymaschalon	Dasymaschalon longiflorum		VU
Plantae	Tracheophyta	Magnoliopsida	Malvales	Malvaceae	Brownlowia	Brownlowia elata		VU
Plantae	Tracheophyta	Magnoliopsida	Sapindales	Sapindaceae	Allophylus	Allophylus subfalcatus		VU
Plantae	Tracheophyta	Magnoliopsida	Gentianales	Rubiaceae	Ixora	Ixora spectabilis		VU
Plantae	Tracheophyta	Magnoliopsida	Ericales	Sapotaceae	Planchonella	Planchonella longipetiolata		VU
Animalia	Chordata	Actinopterygii	Gobiiformes	Gobiidae	Awaouichthys	Awaouichthys menoni		VU
Animalia	Chordata	Actinopterygii	Siluriformes	Siluridae	Wallago	Wallago attu		VU
Animalia	Chordata	Actinopterygii	Cypriniformes	Danionidae	Devario	Devario anomalus		VU

5.7.2 Bio-ecological Zone

IUCN, the World conservation Union, Bangladesh has divided the whole country into 25 Bio-ecological Zones in context of biological diversity, physical geography and other parameters. The proposed lines and substation locations fall inside two of these Bio-ecological zones. In which, major portion of the transmission line fall over the zone namely (a) Coastal Plains (b) Offshore Islands (c) Chattogram Hills and The CHTs. The Project will require removal of trees of various sizes and species. Tree inventory survey found varieties of trees on both private and Government land. Different species of trees are divided into three categories by height viz., big (> 10 m height), medium (5-10 m height) and small (< 5 m height). Due to the construction of 95.5 km of transmission line and considering a 90-meter Right of Way (RoW), various types of trees will be affected. These include 8,144 fruit-bearing trees, 21,178 timber trees, 86 medicinal plants, and 10,071 bamboo clumps. However, the survey identified that a total of 39,479 trees will be directly affected by the transmission line alignment. The table below shows the aggregated number of trees found on both Government and private land.

Table 74: Total number of affected trees by type and number

Name of trees	Size			Total
	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
(A) Fruits				
Mango	384	674	660	1718
Tetul/Tamarind	0	0	4	4
Jam/Syzygium cumini	0	0	3	3
Jackfruit	127	273	295	695
Banana	79	830	1429	2338
Guava	0	0	101	101
Coconut	457	694	500	1651
Battle leaf	315	458	638	1411
Palm tree	36	50	29	115
Boroi/Ziziphus zizyphus	0	8	4	12
Khejur/Date palm	14	13	69	96
Sub-Total (A)	**1412**	**3000**	**3732**	**8144**
(B) Timber				
Eucalyptus	745	595	589	1929
Raintree	2554	2425	1312	6291
Keora	0	4	10	14
Akashi/Acacia auriculiformis	2263	2941	2836	8040
Mahogany	1322	1376	1048	3746
Segun/Teak Tree	83	375	65	523
Koroi/Lebbeck	39	55	12	106
Babla/Gum arabic tree	20	16	0	36
Belgium Tree	129	222	122	473
Hijol Tree/Barringtonia acutangula	0	0	6	6
Shimul/Cottontrees	11	3	0	14
Sub-Total (B)	**7166**	**8012**	**6000**	**21178**
(C) Medicinial				
Nim/Azadirachta indica	0	0	10	10
Arjun/Terminalia arjuna	21	22	27	70
Ficus/Fig Tree/Dumur	0	6	0	6
Sub-Total (C)	**21**	**28**	**37**	**86**
(D) Bamboo	**4,149**	**4,252**	**1,670**	**10,071**
Grand Total (A+B+C+D)	**12,748**	**15,292**	**11,439**	**39,479**

Source: *Tree Inventory Survey, 2025*

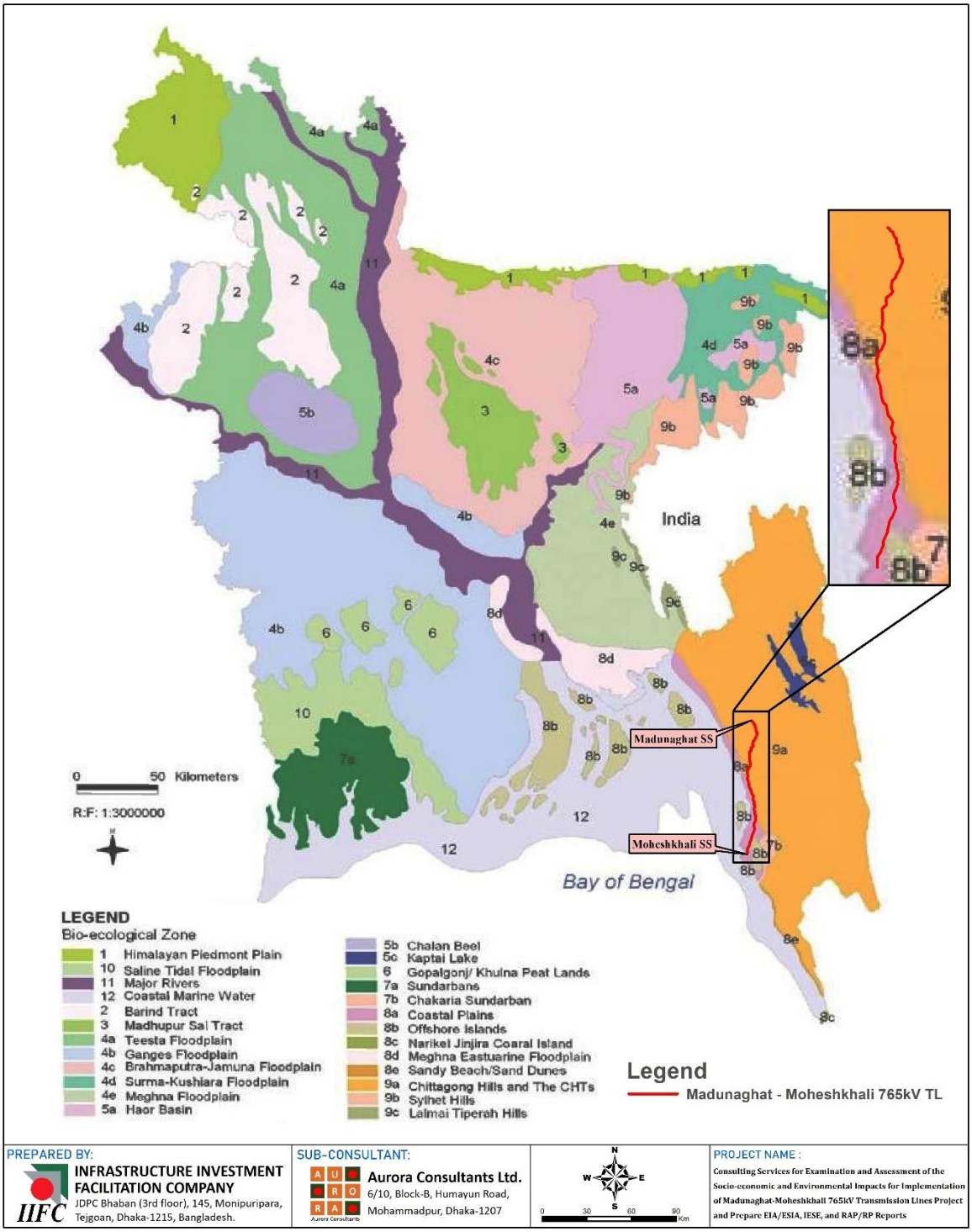


Figure 83: Bio-ecological zones in the study area showing TLs

5.7.3 Ecosystem Diversity

Right-of-Way (RoW) of the proposed transmission lines predominantly comprises of paddy field/floodplains, saltpan, homesteads, forests, rivers, canals in order of significance. Table 75 shows crossing on transmission lines with their ecological diversity and area is presented below:

Table 75 : Ecological diversity with their area and percentage within the transmission lines

Sl	Ecosystem Diversity	Area (acre) considering 70-m RoW	Percent (%)
1.	Water	148.29	8.98
2.	Trees	44.97	2.72
3.	Flooded Vegetation	0.766	0.05
4.	Crops	1,220.13	73.91
5.	Built Up area	225.33	13.65
6.	Rangeland	11.36	0.69
	Total	**1,650.846**	**100.00**

Source: field Survey, 2024-2025

Overall ecosystems diversity of the study area comprises of mostly cultivated economic tall plants with undergrowth wild flora. As homesteads are located comparatively in higher elevation than other landforms except hills area, so settlement/homesteads ground possesses mainly terrestrial ecological components.

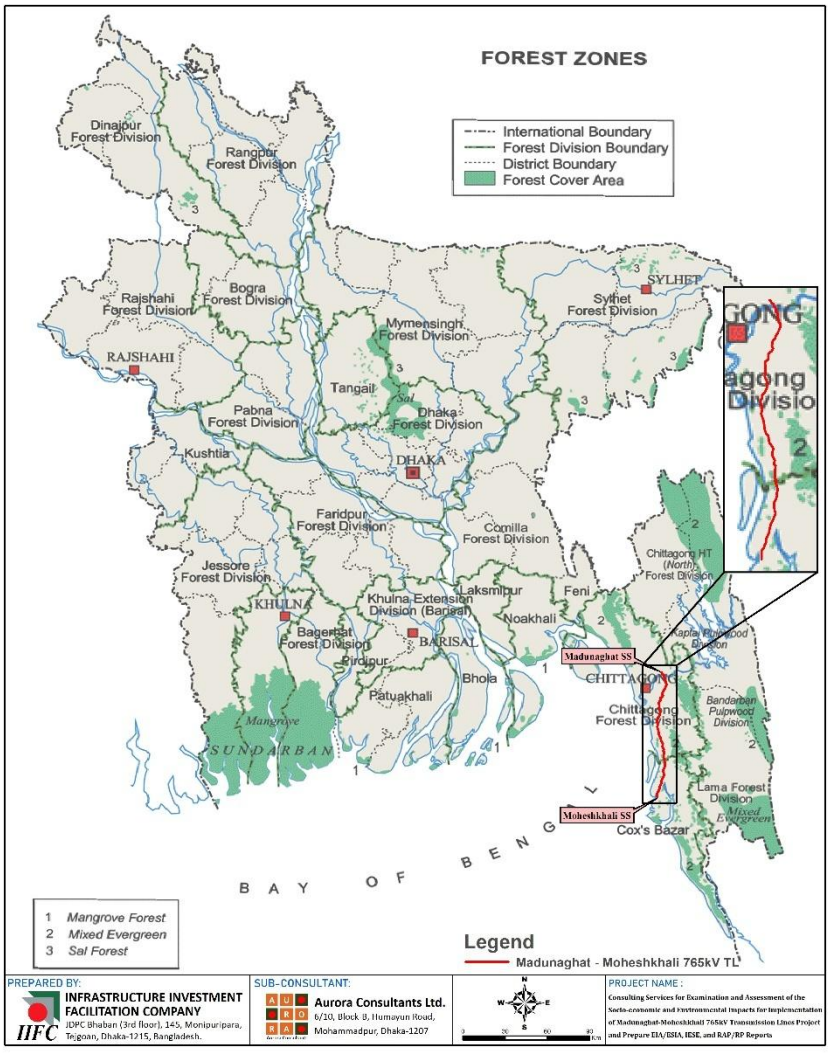


Figure 84: Overlapping the TLs on the Forest Zones Map of Bangladesh

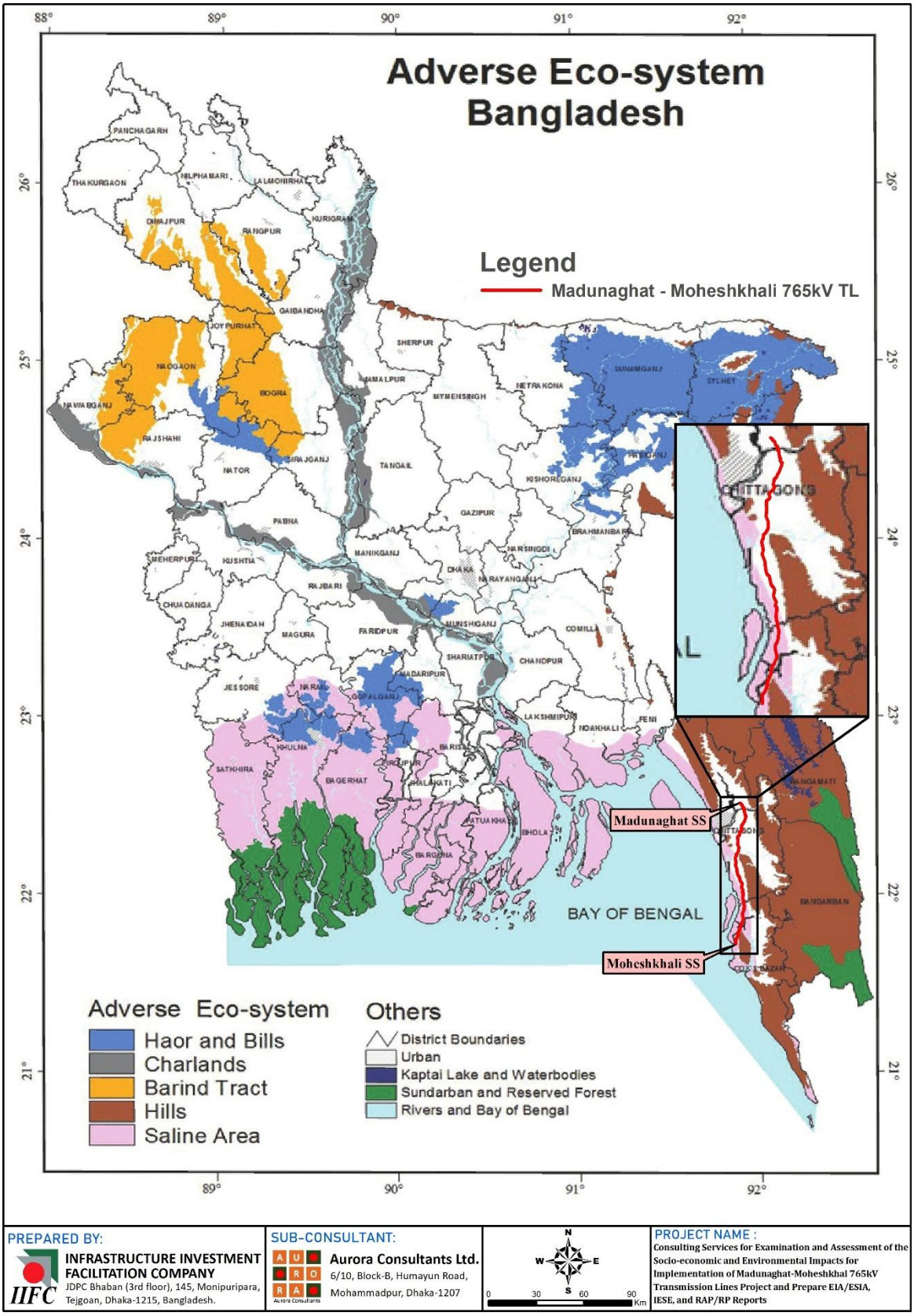


Figure 85: Overlapping the TLs on the Adverse Ecosystem Map of Bangladesh

International Migratory Bird flyways:

Globally, there are more than 30 different international, flyway-based instruments for the conservation of migratory birds. At a global level, 14 % (317) of the included species are currently considered threatened or near-threatened according to the 2010 IUCN Red List. Since 1988, 53 species have deteriorated in status (sufficiently to be up listed to higher categories of extinction risk on the IUCN Red List) while only nine species have improved (sufficiently to be down listed to lower categories). Analysis of the main threats to migratory species evaluated as threatened and near-threatened on the 2010 IUCN Red List shows that important threats include land-use change, illegal hunting and taking, non-native species, diseases, pollution, climate change, natural system modifications, infrastructure development, human disturbance, fishing, energy production and distribution. Some countries (Bangladesh, People's Republic of China, Russian Federation) are covered by the Memorandum of Understanding on the Conservation of Migratory Birds of Prey.

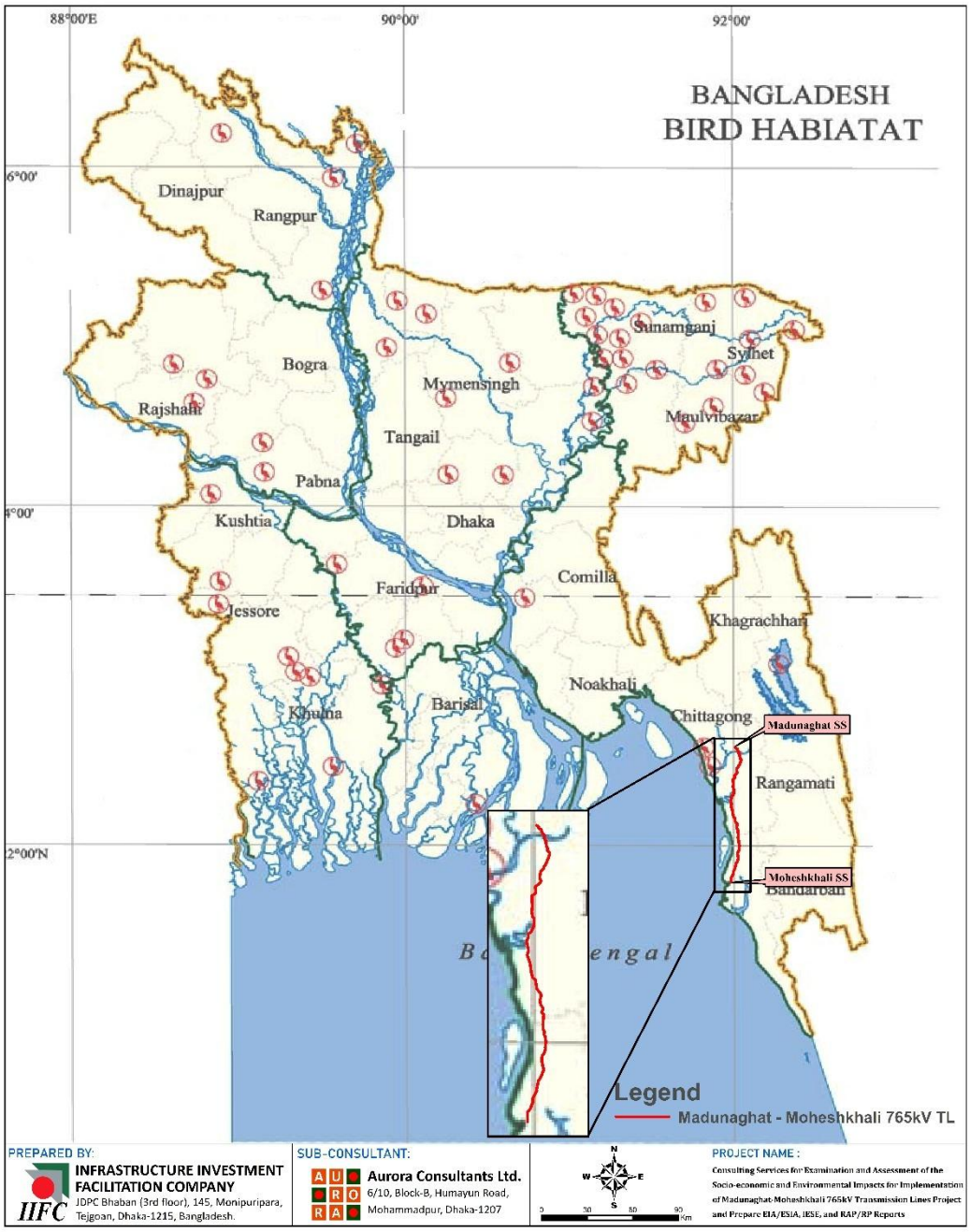


Figure 86: Overlapping the TLs on the Bird Habitat Map of Bangladesh

In Bangladesh, the wetlands are the important habitat of migratory waterbird population. There are about 628 bird species in Bangladesh, out of which 244 are Migratory. The wetlands are the abode of about 70 species of resident waterbirds including ducks, grebe, cormorants, bitterns, herons, egrets, storks, rails, jacanas, finfoot, waders, gulls, turns, skimmers etc. and many other water dependent birds. As mentioned in the IUCN Red Book, about 100 species of migratory birds regularly or occasionally visit the country. "The Asia-Pacific Migratory Waterbird Conservation Strategy" 2001-2005, identified 50 species of migratory waterbirds as threatened, out of which 14 species occur in Bangladesh. In addition to that eleven species of resident waterbirds are also identified as threatened. The major global flyways for migratory shorebirds are presented in below figure. From the above figure (bird habitat of Bangladesh) is can be concluded that the proposed transmission lines shall not make the risk for international bird flyways in East Asian Flyway (Bangladesh).

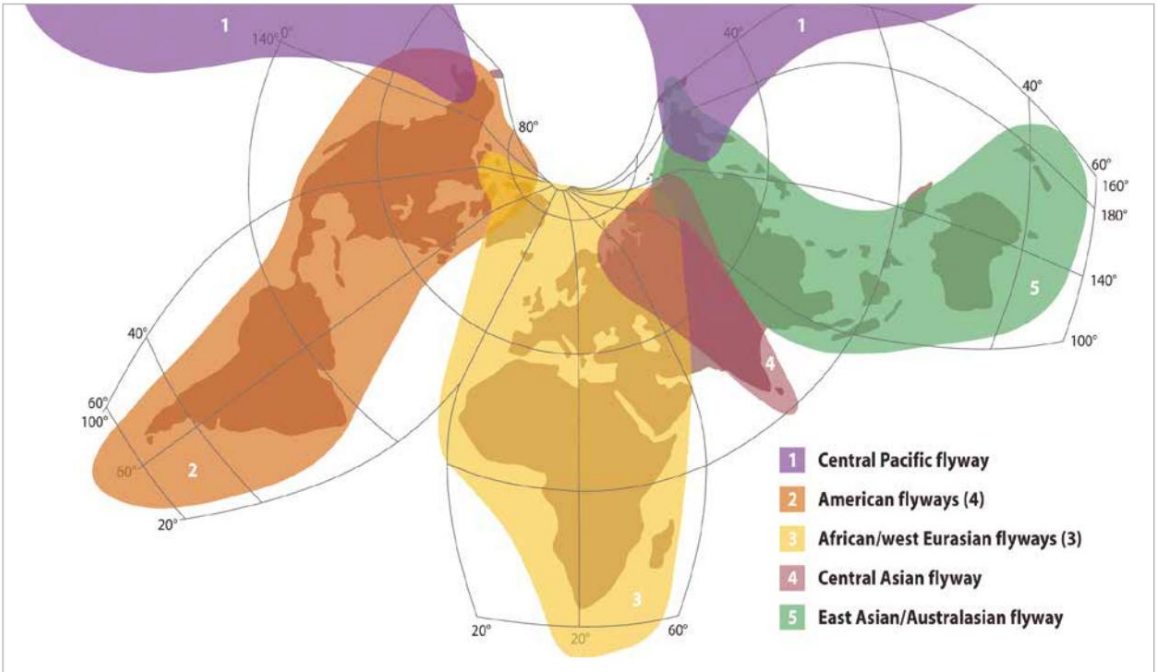


Figure 87: Major global flyways for migratory shorebirds

5.7.4 The Asian Elephant *(Elephas maximus)*

Status and classification- The Asian elephant, a migratory species, is a critically endangered species in the South and SE Asian countries they occur in. It is listed as endangered in IUCN's Red List and as well as in Bangladesh's red list. There are likely less than 300 animals remaining in the country with about 200 resident (i.e., not crossing international borders) and 100-150 having a transboundary range with India and Myanmar, and about 40,000 animals in the world, with the greatest populations found in Myanmar and India. The presence of elephant in an area is an indicator of a healthy ecosystem, and also one of the key drivers in maintaining a diversity of habitat and inhabitants.

General Life History, Habitat and Ecology- Asian elephants are very social animals, living in family groups consisting of related females and their offspring that are led by the oldest female, the 'matriarch'. The social bond between group members is very strong, and cooperative behaviour is common, particularly in the protection and guidance of the young. The average group size is around six or seven. There is no evidence of territoriality, and groups occasionally join to form herds when food is plentiful. "At around 20 years males first come into 'musth', which occurs annually and usually lasts two or three months. During this time males will wander widely in search of receptive females. Females become sexually mature at around 10 years and generally first give birth at around 15-16 years. When habitat conditions are favourable, they are capable of giving birth every 3-4 years. Elephants can live as long as 70 years, although the period of greatest female fecundity is between 25 and 45 years of age. The gestation period lasts 18-22 months, and usually results in the birth of a single calf, weighing an average of 100 kg. The calf may continue nursing for up to 18 months, and can suckle from its mother or from other lactating females in the group".

The elephant's diet consists mostly of grasses, but bark, roots, stems, and the leaves of trees, vines and shrubs are also eaten. Cultivated crops such as bananas, rice and sugarcane planted in their historical territory are also favoured foods, bringing them into conflict with local farmers. Individuals eat an average of 150 kg of food per day and leave about 100kgs of dung, much of it only partially digested. Calves often feed on their mother's dung for extra nutrients. Elephants must drink frequently, as they require 70-90 litres of water each day.

Importance of Species and Key Threats- Elephants play a vital role in the ecosystems they inhabit. They modify their habitat by converting areas of forest to grassland, ecotones, and are important seed dispersers. They can provide water for other species by digging holes in dry riverbeds, and the wide paths they create as they wander through the forests act as firebreaks. Consuming on average 150 kg of plant material per day an adult elephant defecates frequently, producing about 100 kg of dung per day. Dung provided food for a host of other species and helps with seed dispersion and germination.

The three greatest threats to elephant survival are poaching, habitat loss and habitat fragmentation through conversion to agriculture (mostly paddy and production forest plantings such as rubber, and oil palm) and restriction/ blockages of travel routes to food and water.

Status in the Project Influence Area- Population Distribution- In the 1950s, there were more than 500 elephant presents in their natural habitats throughout Bangladesh. Based on a recent survey by IUCN (IUCN 2015) there appear to be around 270 individuals left in the wild, and are severely threatened throughout their range (Figure 90) in Bangladesh. About 85% of these animals now live in the Chattogram Hills and move mostly north-south in this range. Given the high level of habitat destruction and human intrusion into both Chunati WS and Fasiakhali WS, elephant use these areas as feeding, crop raiding and watering areas. The Forest Department is making a significant effort to restore habitat and encourage local communities to coexist with the elephant.

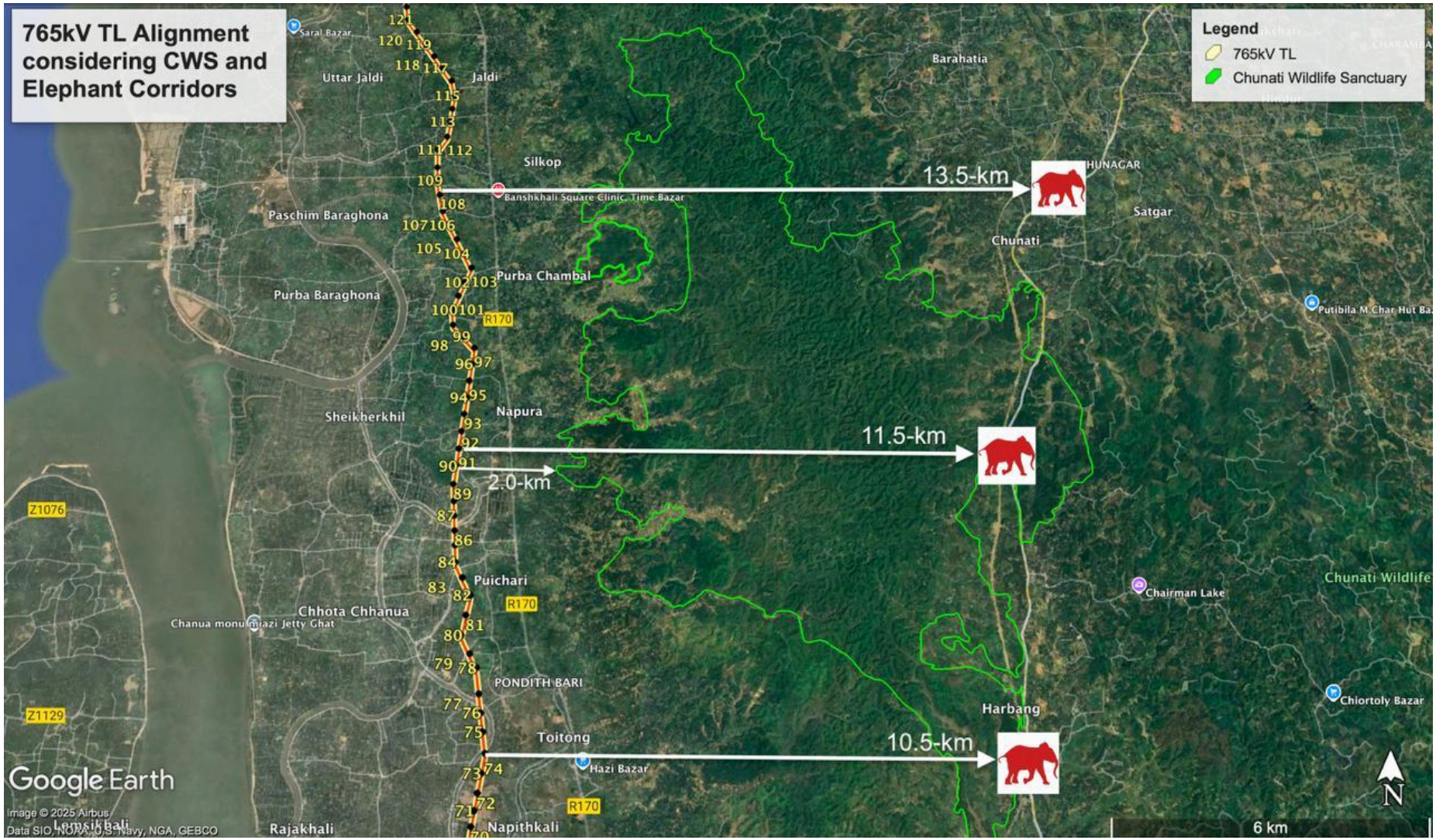


Figure 88: Distance of Chunati WS and Elephant Corridors from proposed Transmission Line

Figure 89: Distributions of Asian Elephants in Bangladesh

Range and Discrete Management Unit- In Bangladesh the population of wild elephants has declined drastically in last two centuries because of habitat fragmentation and destruction caused by the expansion of agriculture and human settlement. The growing pressure on elephant habitats and movement corridors has meant that they are restricted to population pockets in the country, in the Chattogram hills area (Figure 90), Sylhet, Sherpur and migrating animals from Meghalaya State in India.

Diurnal and Seasonal Activities-The species feeds during the dawn and dusk as well as evening periods, sometimes night, and rests in the shade during the heat of the day. Their home range varies greatly, anywhere from 35 to 400 km^2 (Williams, 2002 and Fernando et al, 2005[5] in IUCN red list). Hossen (2013) stated that both FWS and CWS play an essential roll on provided a travel corridor for elephant to move from the large Teknaf Ecological Area through the Himchari National Park (south of Ramu) then north and east, through FWS and exiting to the east across CWS for the Chattogram Hills zone and back again.

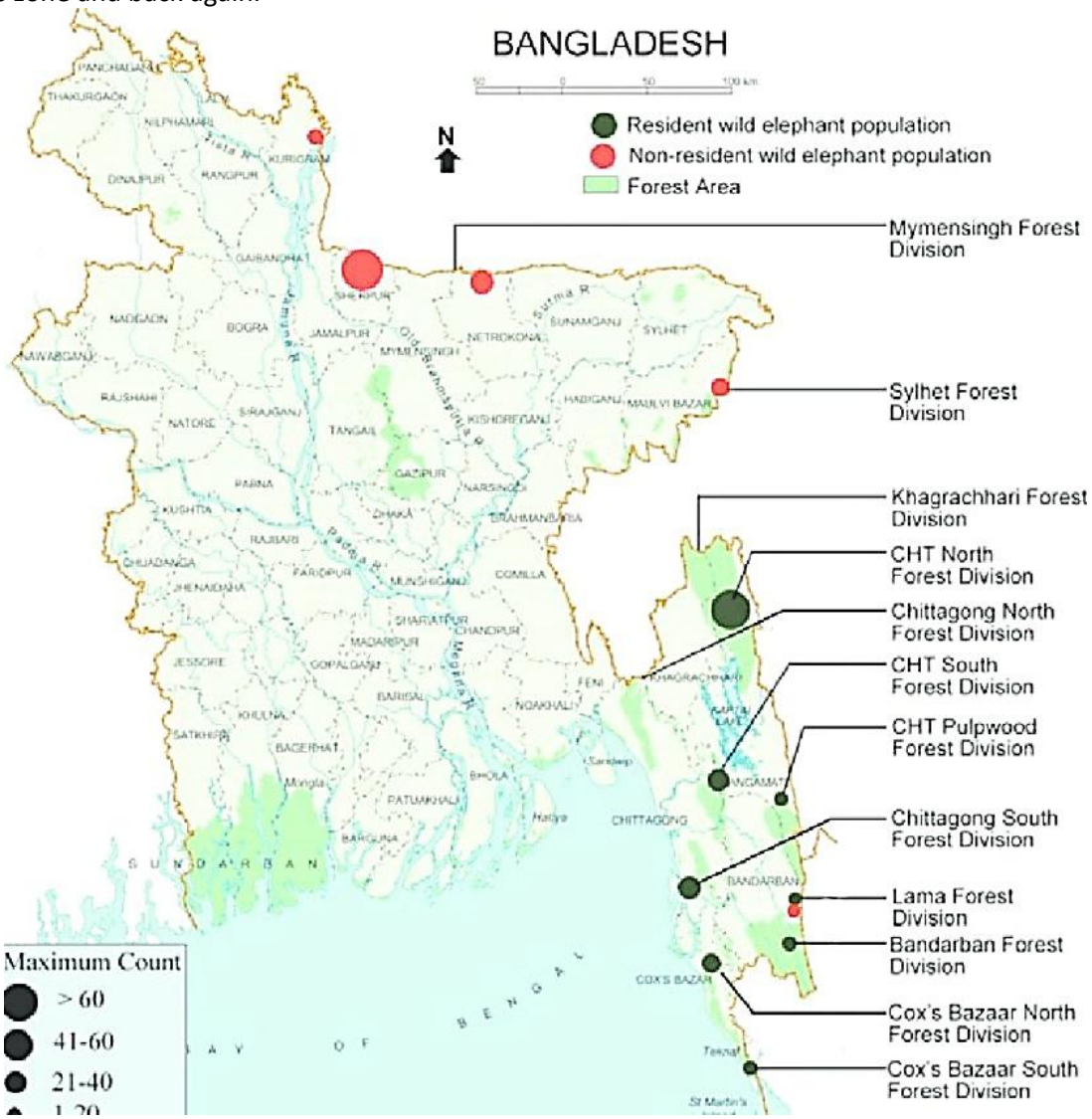


Figure 90: Current distribution of elephant in Bangladesh

[5] Choudhury, A., Lahiri Choudhury, D.K., Desai, A., Duckworth, J.W., Easa, P.S., Johnsingh, A.J.T., Fernando, P., Hedges, S., Gunawardena, M., Kurt, F., Karanth, U., Lister, A., Menon, V., Riddle, H., Rübel, A. & Wikramanayake, E. (IUCN SSC Asian Elephant Specialist Group). 2008. Elephas maximus. The IUCN Red List of Threatened Species 2008: downloaded Dec. 12, 2015

The Asian elephant follows traditional migration routes (varying in width from a few hundred metres to one km) that are determined by the monsoon season and availability of water and food. The eldest elephant of the herd is responsible for remembering the migration route, with the migration generally takes place between the wet and dry seasons, i.e., between November and April. This is also harvesting time and when crops ripen along the elephant's travel route. Since so much of the elephant's traditional territory has been converted to agricultural production there are frequent clashes between travelling herds and farmers. For example, in CWS and FWS well over 60% of the area has been converted to agriculture or commercial plantation lands, and up to 85% has seen extensive tree cutting, mostly for fuelwood.

Undoubtedly the elephant movement corridors are under serious threat and are a large part of why populations continue to decline.

Ongoing Conservation Efforts in relation to the elephant- In Bangladesh the CWS and FWS were established principally to provide habitat for the elephant. However, due to large scale human encroachment and loss of traditional habitat, elephant do not appear to reside in these sanctuaries, but use them as access to food found in the illegal farming operations and water supply flowing from the hills to the east. Unfortunately, the original objectives of the two reserves have largely been lost.

Elephant Corridors of Chunati Wildlife Sanctuary (CWS)
Proposed 765kV high voltage transmission lines located about 2-3 km from CWS. The baseline will focus the elephant corridors of CWS. Chunati was established in 1986 and has about 18.700 ha of land of which 7,760 are in the core zone and rest buffer and 'impact' zone (Figure 91). The buffer and impact zones are highly degraded and make up >33% of the entire area. As of late 2015 hardly any natural forest remains in CWS (CWS Management Plan, 2015). However, Chunati has a new management plan that will not permit new development in the core zone of the sanctuary, while permitting some activity in special cases of national significance, and based on a prime ministerial permit (which Power Grid will obtain from the Forest Department).

The plan calls for the existing roads to be converted to walking trails and encroachers discouraged by conversion of trails used for illegal resource extraction to tourist facilities. Enrichment plantings with indigenous forest trees on 3300 ha of degraded/barren land. Native tree species will be planted in the buffer zone as well as bamboo and bushes. Soil conservation measures such slope stabilization and erosion protection and soil conservation measures training will be provided to local communities.

Encroachers into the CWS will be encouraged to switch to the more sustainable nontimber- forest product extraction, but only in the buffer zone. In other words, a significant effort to bring CWS back to a real sanctuary status is now under way (Chunati Wildlife Sanctuary Management Plan, 2015). The management plan puts forward an ambitious set of tasks to re-establish the natural forest with many of the wild foods preferred by the elephant. First, however, the encroachment and illegal land conversion must be stopped. For example, in the 7,927-ha core zone of the CWS, 7,321 ha have been fully or partially degraded by human activity.

Despite CWS being very heavily degraded it remain as the only movement corridors of the elephant west of the national highway and with the enhancements planned by the Forest Department should begin to recover. The existing Dohazari to Cox's Bazar 132kV transmission line, under constructed new rail line, in addition to a doubling of the size of the national highway, and proposed 230kV transmission line, will mean further obstructions to the elephant movements. However, the construction work of transmission line will create very temporary disturbance on the elephant movement, and in operation there is no such impact on their movement.

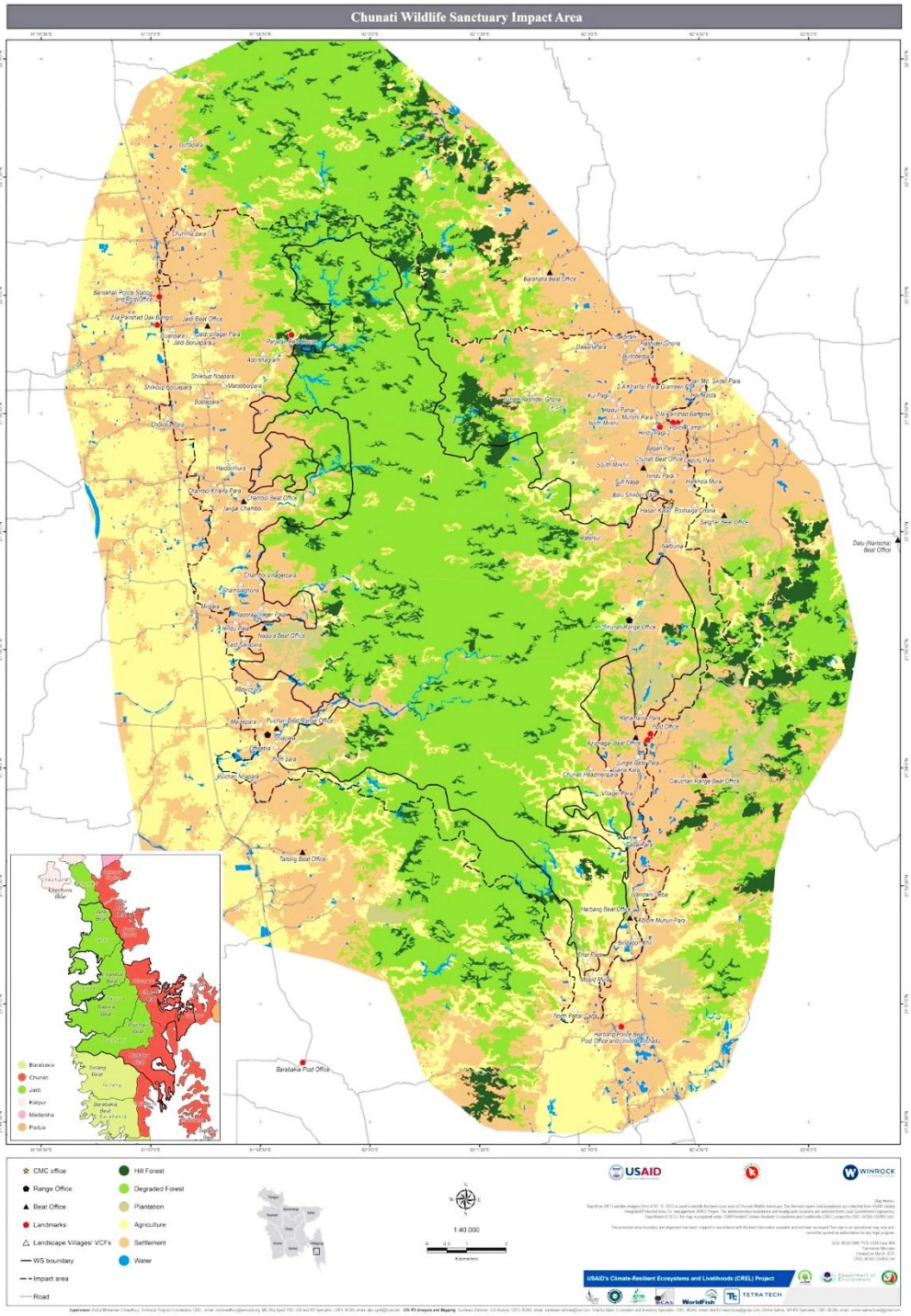


Figure 91: Chunati Wildlife Sanctuary

Asian Elephant Corridor: There are three elephant corridors found along the transmission line during field visit which are demarcated by FD (Forest department) and IUCN (International Union for Conservation of Nature). But, none of the transmission lines cross over the designated corridor areas. Asian Elephant (Elephas maximus) is the critically endangered (Red list of Bangladesh, IUCN, 2015) largest terrestrial animal. The Asian elephant plays a crucial role in its forest ecosystem. The largest number of elephants can be found in Chattogram and Cox's Bazaar Hill Tracts region located in the study area. Local people informed that some corridors have been totally abandoned due to degradation of forest cover, agricultural expansion, settlements extension, road and rail construction, monoculture plantation, change of cultivation practices etc. Table 76 is shown in Asian Elephant corridors and adjacent forests, and wild life sanctuary are presented below:

Table 76: Asian Elephant corridors with location, GPS and adjacent forest name within the transmission line areas

Elephant Corridors	GPS Coordinate	Distance from transmission line
Corridor-1	21°58'35.90"N 92° 4'22.16"E	13.5 km
Corridor-2	21°55'23.75"N 92° 3'30.72"E	11.5 km
Corridor-3	21°52'9.27"N 92° 3'32.36"E	10.5 km

Source: https://portals.iucn.org/library/sites/library/files/documents/2016-072.pdf and IIFC Field Survey, 2025

5.7.5 Ecologically Important Sites

Protected Area (PA)

An area of land and/or ocean especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means is referred to as "Protected Area (PA)". Such an area is predominantly a natural area established and manage (in perpetuity, through legal or customary regimes, primarily to conserve their natural resources. No PA exists at or near the TLs areas.

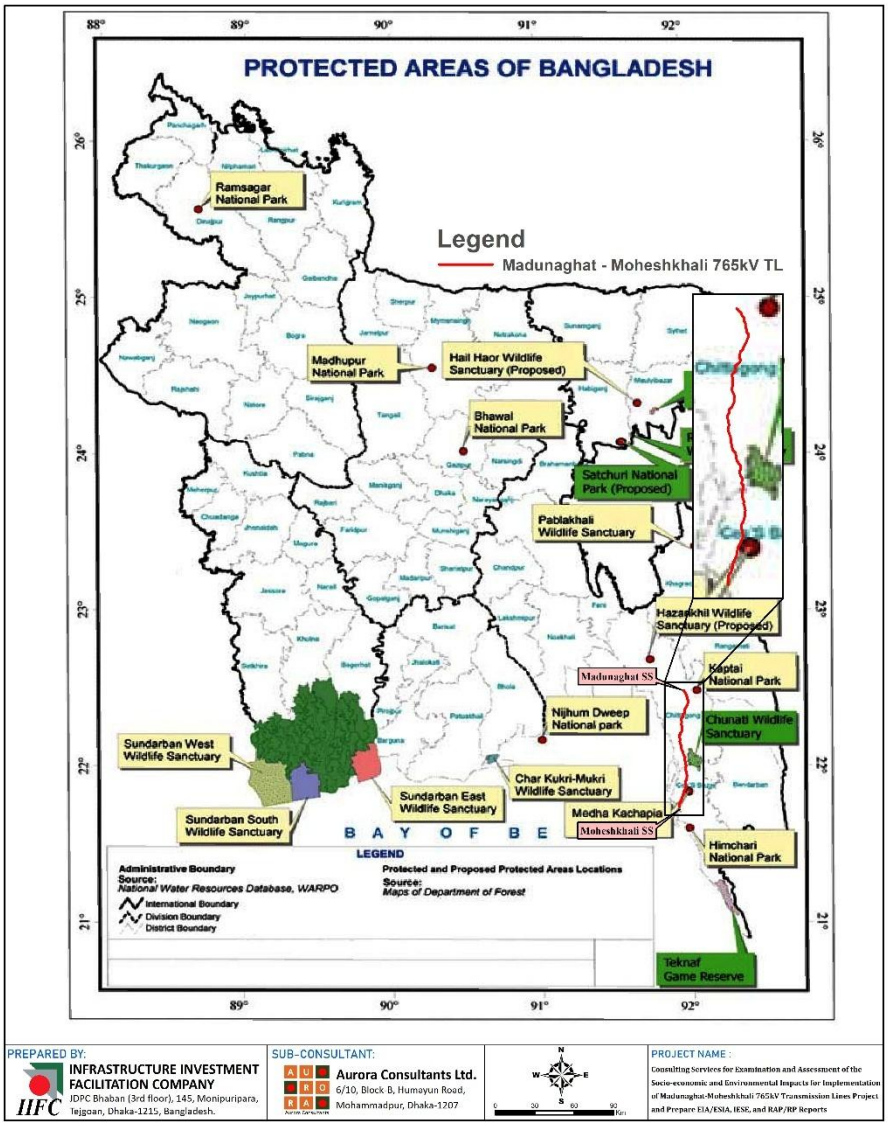


Figure 92: Overlapping TLs in Protected Areas of Bangladesh

National Park (NP)

A National Park (NP) is a reserve land, usually declared and owned by a national government, protected from most human development activities and pollution. No NP exists at or near the TLs areas.

Game Reserve (GR)

A Game Reserve (GR) is an area of land set aside for maintenance of wildlife for tourism or hunting purposes. No GR exists at or near the TLs areas.

Wildlife Sanctuary (WS)

A Wildlife Sanctuary (WS) is an area that assures the natural conditions necessary to protect nationally significant species, groups of species, biotic communities, or physical aspects of the environment where these require specific human manipulation for their perpetuation. Chunati WS about 2-3km from the proposed transmission line. Elephant corridors of CWS is located about 10-12km from the TL.

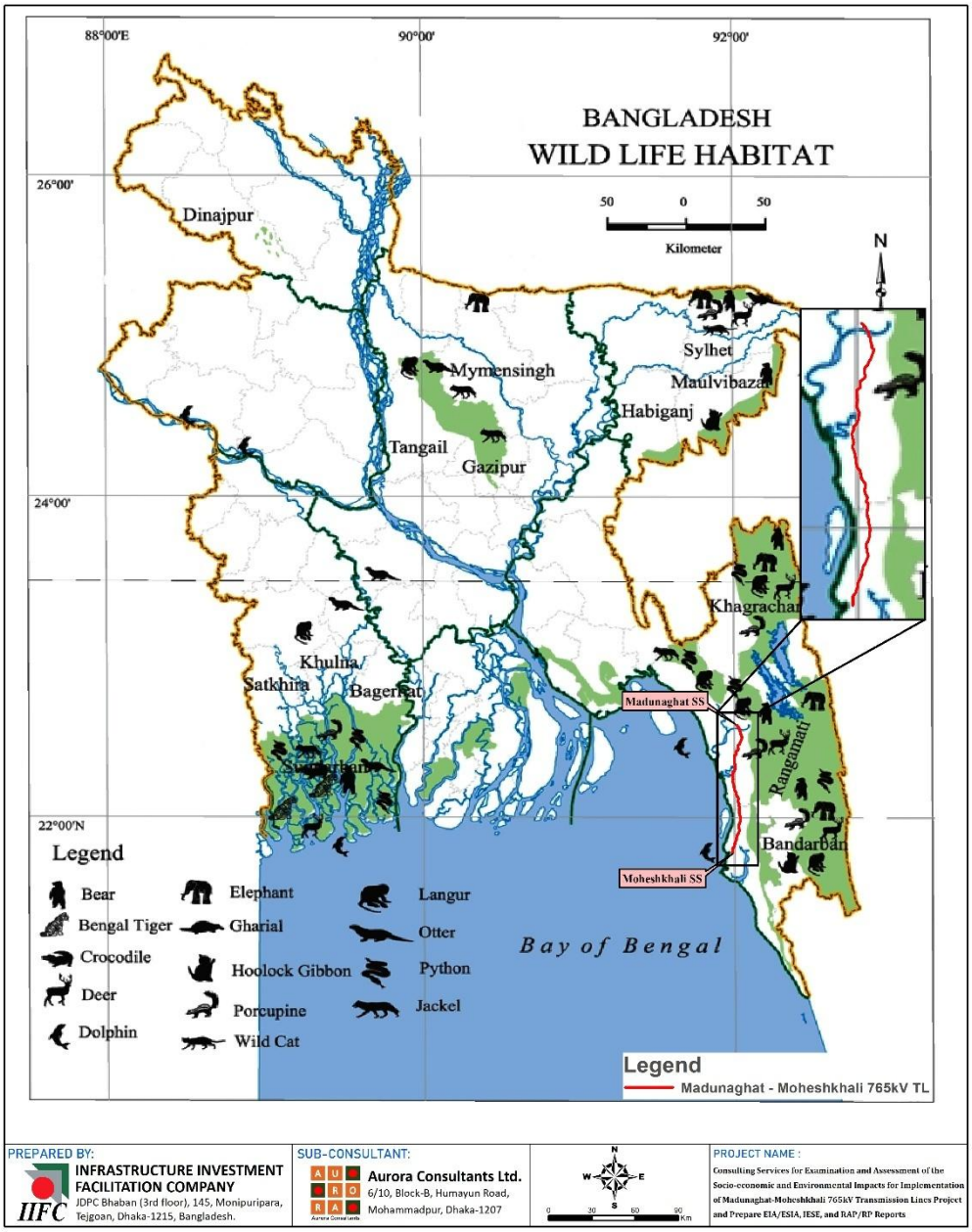


Figure 93: Overlapping TLs in Wildlife Habitat Areas of Bangladesh

Chapter 6
Social Baseline

6.1 Socio-economic Resources

Socio-economic condition refers to social and economic factors accruing to an individual or group and are mainly measured by income, education, occupation and many other variables. In this chapter socio-economic condition of the study area is discussed. Demography, economic condition, working condition and many other indicators are the main components of this chapter. Some data collection tools like Public Consultation Meeting, Focus Group Discussion (FGD), semi structured questionnaire, Key Informant Interview (KII) and were used to collect data from primary source. Relevant secondary information was collected from the Community Report of the Population and Housing Census 2022 published by Bangladesh Bureau of Statistics (BBS).

This chapter presents the socio-economic profile of the affected households in which include demographic characteristics, education status, household amenities, indebtedness, livelihood, employment opportunity, land ownership, income and expenditure status and women and gender issues etc.

6.1.1 Administrative Bounding of Study Area

The project area spans two administrative divisions—Chattogram and Cox's Bazar—covering a total of seven upazilas across two districts. In Chattogram District, the project encompasses the upazilas of Anwara, Banshkhali, Boalkhali, Patiya, and Raozan, which include 29 unions and 57 mouzas. In Cox's Bazar District, the project area covers the upazilas of Pekua and Moheshkhali, comprising 6 unions and 11 mouzas. Overall, the study area includes 35 unions and 68 mouzas.

Table 77: Administrative Bounding of Study Area

Division	District	Upazila	Union	Mouza
Chattogram	Chattogram	Anwara	4	9
		Banshkhali	13	23
		Boalkhali	4	6
		Patiya	5	15
		Raozan	3	4
	Sub-total	**5**	**29**	**57**
	Cox's Bazar	Pekua	5	7
		Moheshkhali	1	4
	Sub-total	**2**	**6**	**11**
Grand Total	**02**	**07**	**35**	**68**

6.1.2 Demographic Characteristic

The project will cover 7 Upazilas of Chattogram and Cox's Bazar districts under Chattogram division. According to Population and Housing Census 2022, the benefited households of the project area are 540950 and the estimated the population of the project area is 2509583 of which 1244139 are males (49.41%) and 1265444 are females (50.59%). The average household six of the project upazilas is 4.57. The average literacy rate of the project area was found 75.87% of which male 77.13% and female 74.68%.

Table 78: Demography information of the study area

SN	Division	District	Upazila	Household	Population Total	Male	Female	HH Size	Literacy Rate Total	Male	Female
1.	Chattogram	Chattogram	Anwara	69082	319482	158444	161038	4.55	75.9	78.63	73.24
2.			Banshkhali	111765	537555	268702	268853	4.75	71.32	72.67	69.99
3.			Boalkhali	58021	258675	126512	132163	4.44	83.45	85.32	81.69
4.			Patiya	87463	397672	198164	199508	4.48	81.1	83.35	78.88
5.			Raozan	88081	396350	189682	206668	4.42	84.87	86.4	83.5
6.		Cox's Bazar	Pekua	45957	214349	106000	108349	4.62	70.62	71.07	70.19
7.			Moheshkhali	80581	385500	196635	188865	4.76	63.85	62.46	65.28
	Total/Average			540950	2509583	1244139	1265444	4.57	75.87	77.13	74.68

Source: Population and Housing Census 2022, BBS

6.1.3 Household Size

The survey findings indicate that most households in the study area consist of four or more members. On average, the household size was found to be 4.57, which is higher than the Chattogram Division average of 4.35 and significantly above the national average of 3.98, as reported in the BBS Population and Housing Census 2022.

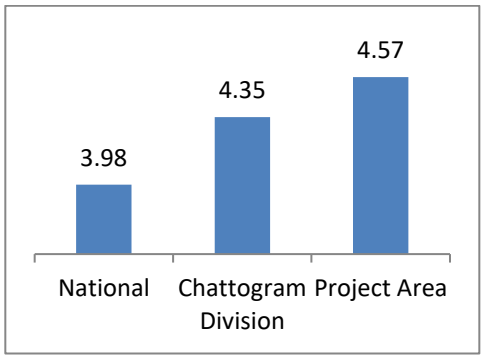


Figure 94: Status of household size

6.1.4 Age Structure

The age structure data indicates notable differences between Cox's Bazar and Chattogram districts. In Cox's Bazar, 35.42% of the population falls within the 0–14 years age group, 61.05% are in the working-age group (15–64 years), and 3.53% are aged 65 years and above. In contrast, Chattogram has a smaller proportion of children at 28.95%, a higher proportion of working-age population at 66.41%, and a slightly higher elderly population at 4.64%. These figures suggest that Chattogram has a relatively larger share of economically active population compared to Cox's Bazar, while Cox's Bazar has a higher proportion of dependents, particularly in the younger age group.

Table 79: Age Structure

District	Age structure (%)		
	0-14 Years	15-64 Years	65 Years and above
Cox's Bazar	35.42	61.05	3.53
Chattogram	28.95	66.41	4.64

6.1.5 Dependency Ratio

According to the data, the dependency ratio in Chattogram district is 50.57, while in Cox's Bazar district it is 63.79. Compared to the Chattogram Division (59.95) and the national average (52.63), the dependency ratio in Cox's Bazar is higher than both divisional and national levels. In contrast, the dependency ratio in Chattogram district is lower than both the divisional and national averages.

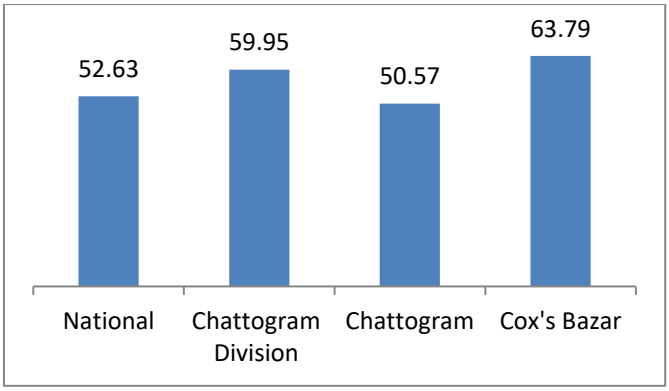


Figure 95: Dependency Ratio

6.1.6 Indigenous Peoples/ Ethnic minorities

According to field survey there is no existence of the indigenous people or the ethnic minority people along the route of transmission lines area. Therefore, no permanent or temporary and direct or indirect impacts on indigenous people's communities are anticipated.

6.1.7 Literacy Rate

The average literacy rate in the project area is 75.87% which is higher than national (74.08%) literacy rate. Below figure shows that the literacy rate of male (74.68%) is also higher than national male literacy rate (76.71%) and the same is the case with female (75.53%) to national level (72.94%). In this regard, it is clearly identified that literacy rate of both male and female are higher than the national level.

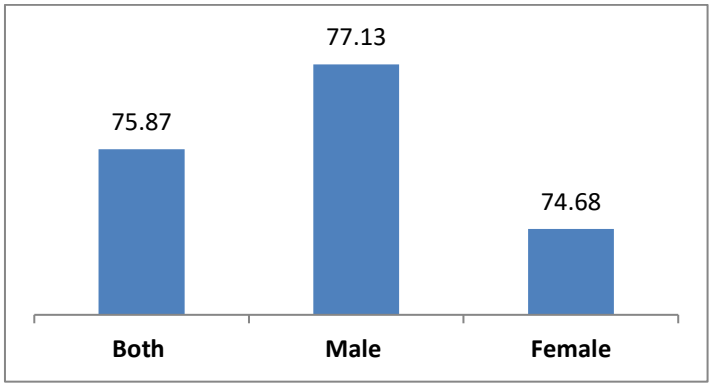


Figure 96: Percentage of Average Literacy Rate in the Project Area (%)

(Source: BBS Population and Housing Census 2022

6.1.8 Access to Health Facilities

People of the project area get health facilities from a variety of institutions, including government hospitals, private hospitals, and community clinics. According to the survey, the majority of households reported receiving medical services from Upazila Government Hospitals (72.67%), followed by District Government Hospitals (56.18%), Union Health Complexes (38.18%), Community Clinics (11.50%), and private hospitals or clinics (11.93%).

Table 80: Medical service status (Multiple Response)

Medical Service point	Number of households	Service received by HH (%)
District Government Hospital	259	56.18
Upazila Government Hospital	335	72.67

Medical Service point	Number of households	Service received by HH (%)
Union Health Complex	176	38.18
Community Clinic	53	11.50
Others private Hospital	55	11.93

Source: Census and survey, February 2025-May 2025

6.1.9 Employment Opportunity and Unemployment

Employment implies that people have engaged in earnings to support livelihood of the household. Of total survey population about 38.55% have engaged in different service sectors. Below figure shows that the highest working population (29.52%) is engaged in business sector followed by service 24.35%, farmer 14.15%, expatriate 11.81%, day labor 4.67%, pensioner 6.89%, driver 2.83%, and others workforce are 1.35%. Among of all workforces in the project area 3.69% are in unemployed which is higher than national unemployment rate 3.51%.

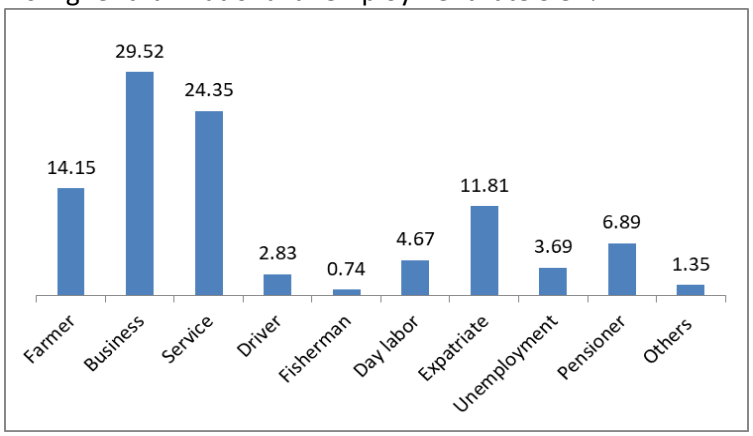


Figure 97: Employment Opportunity and Unemployment Status (%)

6.1.10 Availability of Labor and Wage Rate

Focus group discussion (FGD) findings indicate that a variety of labor categories are available in the project area to support construction activities. Skilled labor is moderately available, with daily wage rates ranging from BDT 1,000 to 1,500. The availability of unskilled labor is also moderate, with wages between BDT 500 and 800 per day. However, the participation of women in construction-related labor is low, and their wage rates range from BDT 500 to 700 per day.

Table 81: Availability of Labor and Wage Rate

Type of labor	Status (High, Low, Moderate)	Wage rate
Skilled labor	Moderate	1000-1500
Unskilled labor	Moderate	500-800
Women labor	low	500-700

6.1.11 Migration

Table presents data on Bangladeshi expatriates who have permanently returned from abroad within the two years preceding the census. During this reference period, a total of 9,261 individuals were reported to have returned permanently to the district. Among the Upazilas, Banshkhali recorded the highest share of returnees at 23.17%, followed by Patia (14.77%), Boalkhali (10.97%), Moheshkhali (10.87%), Anwara (10.85%), and Raozan (7.47%). The lowest proportion of returnees was observed in Pekua, at 9.95%.

Table 82: Migration Status

Upazila	Number	Percent
Anwara	1005	10.85
Banshkhali	2146	23.17
Boalkhali	1016	10.97
Patiya	1368	14.77
Raozan	2075	22.41
Maheshkhali	1007	10.87
Pekua	644	6.95
Total	**9261**	**100.00**

6.1.12 Housing Conditions

The housing conditions in the study area reflect a mix of structural types. Approximately 35% of the houses are pucca (permanent structures), while semi-pucca dwellings account for about 31%. Tin-shed houses 15% of the total, and kancha 19%.

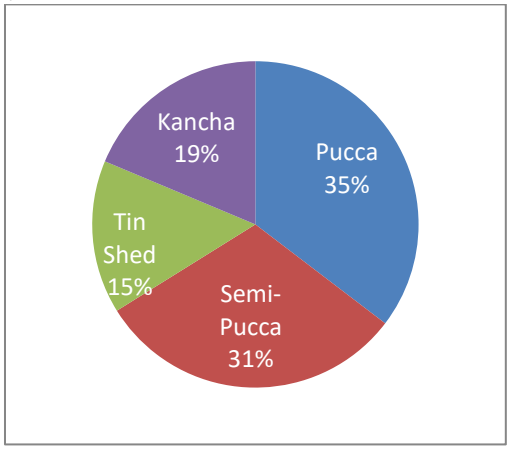


Figure 98: Housing condition of project area
Source: Census and survey, February 2025-May 2025

6.1.13 Drinking Water Facilities

In the project area, 72.02% of general households access drinking water from tube-wells, followed by 33.84% who collect water using electric motors. Additionally, 6.72% of households rely on supplied (piped) water, while 5.21% obtain water from other sources.

Table 83: Source of Water (Multiple Questions)

Source of Water	Frequency	% of household
Tube-well	332	72.02
Electric Motor	156	33.84
Supply Water	31	6.72
Others	24	5.21

6.1.14 Sanitation Facilities

Sanitation Facilities: In the study area, in general 78.1% households use sanitary latrine (with water seal) followed by sanitary (no water seal) 16.3% and non-sanitary latrine 5.6% and Household with no toilet was found zero percent. Below figure shows the sanitation types of the study area.

Table 84: Status of Sanitation Facilities

Type of Sanitary facilities	Frequency	Percent
Sanitary with Water Seal	360	78.1
Sanitary with no water seal	75	16.3
Non-Sanitary	26	5.6
Total	**461**	**100**

6.1.15 Access to Electricity

Access to Electricity: During filed survey and public consultation it was found that Electricity is available for 100% of the households in the project area.

6.1.16 Land Ownership and Price (For tower footing area)

A total of 43.48 acres of land is required for the base area of 272 transmission towers. Of this, 43.43 acres have been identified as private land, while the remaining 0.05 acres are government land currently occupied by the Shekherkhil Union Parishad under Banshkhali Upazila in Chattogram District. The total price of tower footing has been estimated BDT 335.77 million.

Table 85: Land Ownership of Tower Footings

SN	Name of Transmission Line	Land requires for Tower Footing	Landownership (Acre)		Land Price (BDT in million)
			Private	Government Land	
1.	Madunaghat—Moheshkhali 765kV Transmission Line	43.48	43.43	0.05	335.77

6.1.17 Income and Expenditure

Monthly Household Income

The following table presents the income distribution of households in the project area. Approximately 25.16% of households have a monthly income ranging from BDT 5,000 to 24,999, followed by 41.43% in the BDT 25,000 to 44,999 ranges. Additionally, 20.61% earn between BDT 45,000 and 64,999, 5.21% between BDT 65,000 and 84,999, and 2.82% between BDT 85,000 and 99,999. Notably, 4.77% of households report a monthly income exceeding BDT 100,000. The average monthly household income in the project area is BDT 42,169, which is significantly higher than the national average of BDT 32,422.[6]

Table 86: Monthly Household income of survey household

Monthly Income (Tk.)	No. of HH	Percentage
5000-24999	116	25.16
25000-44999	191	41.43
45000-64999	95	20.61
65000-84999	24	5.21
85000-104999	13	2.82
105000-124999	12	2.60
125000-144999	4	0.87
145000-164999	3	0.65
165000-184999	1	0.22

6 BBS Household Income and Expenditure Survey 2022.

Monthly Income (Tk.)	No. of HH	Percentage
345000-364999	2	0.43
Total	**461**	**100**

Source: Socio-economic survey, May 2025

Monthly Household Expenditure

The average monthly household expenditure in the project area is estimated at BDT 30,722, which is slightly lower than the national average of BDT 32,422[7]. The data indicates that the majority of households (42.73%) have monthly expenditures in the range of BDT 20,000 to 34,999—closely aligning with the national average. Additionally, 18.87% of households spend between BDT 5,000 and 19,999, 28.20% between BDT 35,000 and 49,999, and 10.20% of households report monthly expenditures exceeding BDT 50,000.

Table 87: Household Expenditure Status (%)

Monthly Expenditure (Tk.)	No. of HH	Percentage
5000-19999	87	18.87
20000-34999	197	42.73
35000-49999	130	28.20
50000-64999	35	7.59
65000-79999	5	1.08
80000-94999	6	1.30
95000-109999	1	0.22
Total	**461**	**100**

Source: Socio-economic survey, May 2025

6.1.18Self-Assessed Poverty

According to the Household Income and Expenditure Survey (HIES) 2022, the national poverty line is defined as a monthly income of BDT 12,067. Based on this threshold, it is observed that 6 households in the project area fall below the poverty line, indicating their vulnerability due to low-income levels.

6.1.19Indebtedness

According to the household survey, 25.3% of households reported taking loans from various sources over the past 12 months. The sources included banks (7.8%), NGOs (15.8%), and family members or neighbors (1.7%). Among the borrowers, 56.4% reported fully repaying their loans, 29.1% had partially repaid, while 14.5% stated they had been unable to repay their loans within the last 24 months.

Table 88: Source of Loan by household

Source of Loan	Loan Received by HH	Loan Received by HH (%)
Bank	36	7.8
NGO	73	15.8
Family member	8	1.7
Sub Total	**117**	**25.3**
Not borrowed	344	74.7
Grand Total	**461**	**100.0**

Source: Census and survey, February 2025-May 2025

7 *BBS Household Income and Expenditure Survey 2022.*

Table 89: Status of loan repay by household

Household response	Percentage (%)
Yes	56.4
Partially	29.1
No	14.5
Total	**100**

6.1.20Government Assistance

In Bangladesh, the government provides various types of assistance through initiatives such as Vulnerable Group Feeding (VGF), Freedom Fighter Allowance, Disability Allowance, Old Age Allowance, Widow's Allowance, Humanitarian Relief, Food for Work programs, and others. During the survey, the majority of households (90.2%) reported that they had not received any form of government assistance in the past 12 months. In contrast, 9.8% of households indicated that they had received some form of assistance. Among them, the reported types of support included VGF (1.08%), Widow's Allowance (0.65%), Old Age Allowance (4.56%), TCB card support (0.43%), Freedom Fighter Allowance (0.22%), Disability Allowance (1.08%), as well as Pregnancy and Education Allowances (0.43%).

Table 90: Status of Government Assistance

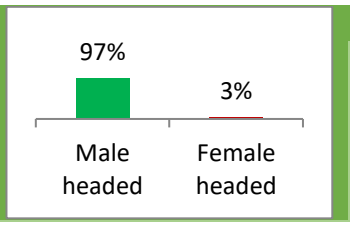
Government Assistance	Valid percentage
VGF	1.08
Widow allowance	0.65
Old age allowance	4.56
TCB Card	0.43
Freedom Fighter allowance	0.22
Disability Allowance	1.08
Pregnancy allowance	0.43
Agriculture subsides	0.00
Education allowance	0.43
No Assistance	90.02
Total	**100**

6.1.21Role of Women and Gender Issues

The role of women, alongside men, is vital to the economic development of any country. In Bangladesh, women are increasingly contributing to key sectors such as education, healthcare, public service, and culture, progressing steadily toward gender equality. Although women make up 50.5% of the country's total population, traditional patriarchal norms still dominate most households, where men typically hold decision-making power. The socio-economic survey identified fourteen female-headed households (3%) within the project area. In Bangladesh, it is more common for men to be the heads of households.

Table 91: Type of household status

Types of households	Frequency
Male headed	447
Female headed	14
Total	461



Source: Socio-economic survey, February 2025 to May 2025

To promote women's empowerment, the 8th Five Year Plan of Bangladesh outlines several initiatives. These include ensuring equal opportunities for women in the job market and setting targets for increasing women's participation in education—at least 70% female teachers at the primary level, 35% at the secondary level, and 30% at the tertiary level.

According to the Population and Housing Census 2022 of the Bangladesh Bureau of Statistics (BBS), women's employment shows notable variation across sectors and regions. In Chattogram, women's participation is highest in agriculture (28.86%), followed by industry (25.42%) and services (10.39%), resulting in an overall women's employment rate of 17.93%. In Cox's Bazar, agriculture also employs the largest share of women (23.27%), while participation in industry (4.03%) and services (7.67%) remains relatively low, with a total employment rate of 13.31%. At the national level, women's employment is more evenly distributed across sectors, with 19.09% in agriculture, 19.83% in industry, and 11.26% in services, leading to an overall national women's employment rate of 15.81%.

Table 92: Sector Wise Women Employment

Employment Sector	Chattogram	Cox's Bazar	National
Agriculture	28.86%	23.27%	19.09%
Industry	25.42%	4.03%	19.83%
Service	10.39%	7.67%	11.26%
Total	17.93%	13.31%	15.81%

Source: Population and Housing Census 2022 (BBS)

During consultations, women across the project area reported that they make significant contributions to the household economy. Despite facing social pressures and family discouragement from seeking formal employment, many women actively participate in various income-generating activities. They take lead roles in livestock rearing, including feeding and caring for cattle, goats, and poultry. Home gardening is also a vital economic activity undertaken by women. Additionally, they are engaged in dressmaking, handicraft production, and employment in the garments industry. Educated women are found working in both government and private sector jobs.

Women's earnings are primarily used to support their children's education and clothing needs, supplement household consumption, and repay debts. Some women also manage to save a portion of their income for emergencies or their children's future needs.

According to the household survey, 19.74% of households reported that women are involved in economic activities. Among them, 6.07% are engaged in jobs or services, 8.03% in livestock rearing, 1.08% in tailoring, and 4.34% in other activities such as small businesses, vegetable gardening, and handicrafts.

Table 93: Status of women involvement in the project area

Types of activities	Respondent frequency	Valid percentage
Not involve	370	80.26
Sub-total	370	80.26
Job/Service	28	6.07
Business	1	0.22
Livestock Rearing	37	8.03
Tailoring	5	1.08
Day/Domestic labor	0	0.00
Vegetable Gardening	2	0.43
Handicrafts	2	0.44

Others	16	3.47
Sub-Total	91	19.74
Grand Total	461	100

Source: Socio-economic survey, February 2025 to May 2025

Household Decision-Making Patterns by Gender on Financial and Welfare Matters: It was found that women role in different household activities was found very poor. Most of the household's decision has been taken by jointly of husband and wife. Below table illustrates who makes decisions regarding the use of household income and savings among the surveyed households. The findings indicate that in the majority of households (56.2%), husbands are the primary decision-makers. Only 1.3% of households reported that the wife solely decides on financial matters. However, in 42.5% of households, both husband and wife make joint decisions. This suggests that although male dominance in financial decision-making remains high, a significant portion of families practices joint decision-making, indicating progress toward shared responsibility and women's involvement in household financial management.

Table 94: Status of Decision-Making on the Use of Household Money Earned and Cash Savings

Decision maker	Frequency	Percent
Husband	259	56.2
Wife	6	1.3
Both jointly	196	42.5
Total	**461**	**100.0**

This table presents decision-making patterns related to spending on children's education and healthcare for family members. The data shows a more balanced picture: in 69.8% of households, decisions are made jointly by both spouses. Husbands alone make such decisions in 28.9% of cases, while only 1.3% of households reported the wife as the sole decision-maker. The high rate of joint decision-making in this domain indicates greater involvement of women in matters that directly impact family welfare, compared to general household financial decisions.

Table 95: Status of Decision-Making on Spending Money on Children's Education and Family Healthcare

Decision maker	Frequency	Percent
Husband	133	28.9
Wife	6	1.3
Both Jointly	322	69.8
Total	**461**	**100.0**

In Bangladesh, particularly in rural areas, women's participation in public affairs is generally limited due to prevailing religious and cultural norms. Within most households, women's roles are typically confined to domestic responsibilities and shared with their husbands, while their involvement in decision-making remains minimal.

Recognizing the limited level of women's empowerment in the project area, the Project Management Unit (PMU), in collaboration with the Implementing NGO (INGO), will actively promote the participation of women in various project-related activities. These activities include public consultations, compensation disbursement, vulnerability assessments, and engagement in the grievance redress mechanism (GRM) process. Ongoing consultation efforts will ensure that woman's voices and concerns are continuously heard and addressed throughout the project lifecycle. This inclusive and targeted approach is intended to foster greater participation, enhance gender equity, and empower women within the project's overall framework.

6.2 Project Related Information

6.2.1 Public Utilities and Cultural Resources

As per tower survey conducted from February to May 2025, no public utility and cultural resources will be affected by the project intervention.

6.2.2 Land required for project Intervention

For the construction of 765kV transmission line a total of 272 transmission towers will be required in which 88 are angle towers and 184 suspension towers. The total extent of land required for the tower footings at ground level of 88 angle towers is approximately 15.86 acre and for 184 suspension towers is 27.72 acre. The number of towers required for the transmission line and the land area required for their installation are shown in below table.

Table 96: Status of Land Required for Tower Footings

SN	Name of Transmission Line	Line Length (km)	No. of Angle Tower	Land Required for angle towers	No. of Suspension Tower	Land Required for Suspension towers	Total Number of Tower	Land Required for all towers
1	2	3	4	5	6	7	8= (4+6)	9= (5+7)
1.	Madunaghat—Moheshkhali T/L	95.5	88	15.86	184	27.62	272	43.48

6.3 Baseline Conditions of Project Affected People

To assess the baseline condition of the affected population, a socio-economic survey was conducted using a sample-based approach. A total of 461 affected households were interviewed to gather information on their socio-economic status, including gender, disability status, education, occupation, housing condition, household assets and income and expenditure patterns.

6.3.1 Status of Sample households

A total of 461 affected households were interviewed, of which 395 were from Chattogram district and 66 from Cox's Bazar district. The survey recorded a total population of 2,109 individuals within these households, comprising 1,179 males and 930 females.

Table 97: Sample Distributions by District

District	Household Frequency (Nos)	Percent	Population		
			Total	Male	Female
Chattogram	395	85.7	1767	993	774
Cox's Bazar	66	14.3	342	186	156
Total	**461**	**100.0**	**2109**	**1179**	**930**

6.3.2 Education

The educational status of the affected population reveals that a majority have attained basic education. Out of a total of 2,109 individuals, 43.76% have passed class 6 to 9, while 23.42% completed primary education (class 1 to 5), indicating that over two-thirds (67.18%) have basic schooling. Secondary-level education shows a moderate presence, with 11.90% having passed SSC and 4.88% HSC. Higher education attainment remains limited—only 3.98% hold an honors degree, 2.94% have completed a master's, and 1.71% possess a diploma. Notably, 4.27% of the population did not attend school, and 3.13% are illiterate.

Table 98: Education Level of Survey Population

Education Level	Population	Percentage (%)
Class 1-5 Pass	494	23.42
Class 6-9 Pass	923	43.76
SSC Pass	251	11.90
HSC Pass	103	4.88
Diploma	36	1.71
Honors	84	3.98
Masters	62	2.94
Not attend school	90	4.27
Illiterate	66	3.13
Total	**2109**	**100**

Source: Socio-economic survey, February 2025-May 2025

6.3.3 Disability status

Of the total surveyed affected population, 13 individuals were identified as persons with disabilities, including 10 from Chattogram district and 3 from Cox's Bazar district.

Table 99: Status disability by population

District	Disability		Total
	Yes	No	
Chattogram	10	1757	1767
Cox's Bazar	3	339	342
Total	**13**	**2096**	**2109**

6.3.4 Housing Condition

The Housing condition in the study area is characterized by 35% Pucca, 31% Semi-Pucca and Tin Shed 15%. And Kancha households was found 19% in the study area.

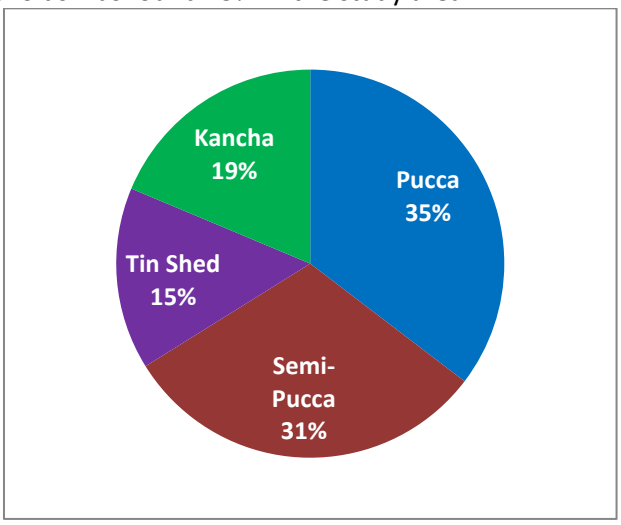


Figure 99: Housing condition of project area

Source: Socio-economic survey, February 2025-May 2025

6.3.5 Household Amenities

Water Facilities: In the project area, 72.02% of general households access drinking water from tube-wells, followed by 33.84% who collect water using electric motors. Additionally, 6.72% of households rely on supplied (piped) water, while 5.21% obtain water from other sources.

Table 100: Source of Water (N=461 (Multiple Questions))

Source of Water	Frequency	% of household
Tube-well	332	72.02
Electric Motor	156	33.84
Supply Water	31	6.72
Others	24	5.21

Sanitation Facilities: In the study area, in general 78.1% households use sanitary latrine (with water seal) followed by sanitary (no water seal) 16.3% and non-sanitary latrine 5.6% and Household with no toilet was found zero percent. Below figure shows the sanitation types of the study area.

Table 101: Sanitation types of the study area (%)

Type of Sanitary facilities	Frequency	Percent
Sanitary with Water Seal	360	78.1
Sanitary with no water seal	75	16.3
Non-Sanitary	26	5.6
Total	**461**	**100**

6.3.6 Household Assets

The table below presents the availability of household assets in the study area. It was found that 100% of households own a mobile phone, indicating universal access to basic communication technology. This is followed by ownership of televisions (76.4%) and refrigerators (69.2%), reflecting a moderate level of access to essential electronic appliances. Ownership of vehicles and other assets is comparatively lower: motorcycles (9.3%), rickshaws/vans (8.7%), computers (3.7%), push cycles (2.2%), cars/microbuses (1.7%), and air conditioners (1.7%). Notably, only 2 households reported owning a bus or truck. Below table show the household assets status of the project area.

Table 102: Household Assets Status of HH (Multiple Answers)

Name of Assets	Number of Households	Percentages
Mobile telephone	461	100.0
Television	352	76.4
Fridge	319	69.2
Motorcycle	43	9.3
Push cycle	10	2.2
Computer/Laptop	17	3.7
Private Car	8	1.7
Bus/Truck	2	0.4
CNG	42	9.1
Rickshaw/Van	40	8.7
Tractor	3	0.7
Air Conditioner	8	1.7

Source: Socio-economic survey, February 2025-May 2025

6.3.7 Monthly Household Income

The following table presents the income distribution of households in the project area. Approximately 25.16% of households have a monthly income ranging from BDT 5,000 to 24,999, followed by 41.43% in the BDT 25,000 to 44,999 range. Additionally, 20.61% earn between BDT 45,000 and 64,999, 5.21% between BDT 65,000 and 84,999, and 2.82% between BDT 85,000 and 99,999. Notably, 4.77% of households report a monthly income exceeding BDT 100,000. The average monthly household income in the project area is BDT 42,169, which is significantly higher than the national average of BDT 32,422.

Table 103: Monthly Household income of survey household

Monthly Household Income (Tk.)	No. of HH	Percentage
5000-24999	116	25.16
25000-44999	191	41.43
45000-64999	95	20.61
65000-84999	24	5.21
85000-104999	13	2.82
105000-124999	12	2.60
125000-144999	4	0.87
145000-164999	3	0.65
165000-184999	1	0.22
345000-364999	2	0.43
Total	**461**	**100**

Source: Census and survey, February 2025-May 2025

6.3.8 Monthly Household Expenditure

The average monthly household expenditure in the project area is estimated at BDT 30,722, which is slightly lower than the national average of BDT 32,422. The data indicates that the majority of households (42.73%) have monthly expenditures in the range of BDT 20,000 to 34,999—closely aligning with the national average. Additionally, 18.87% of households spend between BDT 5,000 and 19,999, 28.20% between BDT 35,000 and 49,999, and 10.20% of households report monthly expenditures exceeding BDT 50,000.

Table 104: Household Expenditure Status (%)

Monthly Household Expenditure (Tk.)	No. of HH	Percentage
5000-19999	87	18.87
20000-34999	197	42.73
35000-49999	130	28.20
50000-64999	35	7.59
65000-79999	5	1.08
80000-94999	6	1.30
95000-109999	1	0.22
Total	**461**	**100**

Source: Census and survey, February 2025-May 2025

6.3.9 Awareness on HIV

The below table illustrates the general awareness of HIV among respondents. It shows that a significant majority (89.6%) of the surveyed population reported having knowledge about HIV, while only 10.4% stated that they had no knowledge. This indicates a relatively high level of awareness in the project area, although a small portion of the population remains uninformed and may be at higher risk due to lack of awareness.

Table 105: Knowledge of HIV

Knowledge of HIV	Frequency	Percent
Yes	413	89.6
No	48	10.4
Total	461	100

Table presents the various sources from which people have received information about HIV. The most common source is television channels, cited by 75.54% of respondents. Educational institutions (42.86%), friends/neighbors/NGOs (40.44%), and social media (32.93%) also play notable roles. Newspapers account for 21.55%, while only 13.80% of respondents mentioned doctors as a source of information. The project can play a crucial role in further educating the population, especially the 10.4% who currently lack knowledge. The project can support awareness efforts by integrating HIV

awareness sessions into public consultations, community meetings, and training programs.

Table 106: Source of Knowledge on HIV (Multiple response) (N=413)

Source of Knowledge of HIV	Frequency	Percent
Newspaper	89	21.55
TV Channels	312	75.54
Social media	136	32.93
Friends/Neighbors/NGO	167	40.44
Education institutions	177	42.86
Doctor	57	13.80

Chapter 7
Stakeholder Engagement, Public Consultation and Disclosure

7.1 Introduction

Community participation always plays a key role for sustainable development. According to the guidelines of the DoE and the development partner (Korea Eximbank-EDCF), people's participation in planning and implementation phases of category A and B Projects (usually red category) is essential to take necessary actions for minimizing any undue socio-cultural, political or any other conflicts and to address environmental issues. People have the right to know about what is going to happen in their surroundings. They must be informed about the positive and negative impacts for obtaining their perceptions, views and feedbacks on the probable changes likely to happen within the study area. Therefore, required numbers of public consultation meetings (PCMs) were undertaken with community stakeholders in accordance with DoE guidelines. A detailed SEP is prepared by Power Grid which will be followed through the project cycle. The prepared SEP will be updated during the detailed design stage (if needed).

7.1.1 Stakeholder Engagement

In order to ensure effective engagement and open, frequent and honest dialogue with local communities and other key stakeholders, a stakeholder engagement plan is designed throughout the life of the Project. This plan is to be developed and implemented in order to identify stakeholder and their issues of concern, establishes the methods for consultation, and provides a specific action plan for stakeholder engagement throughout the life of the Project.

Table 107: Stakeholder Assessment

Key Stakeholders		
Project Proponent	:	Power Grid Bangladesh PLC (Power Grid)
Related organizations/ Local government	:	DOE, DOF, DAE, RHD, BR, BWDB, Department of Fisheries, Ward Commissioner/UP member (male and female)
Local people	:	Businessmen, Service holder, Farmers, Day Labor, Teacher, Transport Worker, Homemaker, Student, Shopkeeper, etc.
Engagement Methods		
IEE phase	:	– Organizing consultation meetings by inviting key stakeholders above at draft scoping report and draft IEE report
Pre-construction/ Construction phase/ Regular operation Phase	:	– Regular communication with local community through personal contact; – Meeting with the representative of village on the quarterly basis; – Participatory meeting with villagers; – Interpersonal Interview with villagers.
Information Disclosure		
ESIA phase: Pre-construction/ Construction phase/ Regular operation Phase	:	– Disclosures of draft scoping report and draft ESIA report.
– Grievance mechanism process and complaints register		
All phase	:	– Receiving complaints and opinions from the public on regular basis through the engagement method; – Meeting with the representative of villagers; – Participatory meeting with villagers.

7.1.2 Tools used in the PCM

The tools most commonly used for the - Stakeholder groups identification and assessments of the local conditions are described in the table below:

Table 108: Tools used in consultations meeting

Sl No.	Tools	Application
1.	Semi-structured interviews and focus group discussions	• Identification and analysis of local criteria, perceptions, priorities, problems and opportunities • Identification and consultation with various social/interest groups, focus groups, key informants
2.	Resource profile	• Analysis of resource problems at individual resource level (e.g., a forest or grassland) • Changes in productivity of resource (for important local products), intensity of resource use, resource degradation
3.	Resource maps at forest, community or other locally defined level	• Analysis of resource problems • Identification of present land-use patterns and practices • Inventory of resources
4.	Social maps	• Explorations of land tenure and land management issues • Identification of different social groups using locally defined criteria • Assessment of the distribution of assets (e.g., land, livestock) across social groups • Identification of potential focus groups and key informants • Identification of local innovators
5.	Trends analysis (using maps and other diagrams)	Baseline analysis of trends and changes in: • Land use patterns and practices (past, present and future use • Agricultural productivity • Income and expenditure, and diversification of livelihoods • Institutional activities and interactions
6.	Venn diagrams	• Identification of key local and external organizations • Understanding local perceptions of the relative importance, and frequency, strength and quality of interactions between local and external groups and agencies • Identification and analysis of sources of conflict and cooperation between local and external stakeholders
7.	Village/towns meetings and exhibitions	• Sharing, analysis and cross-checking of preliminary findings and information • Supporting use-to-user exchanges • Facilitating role reversals • Preparing participatory action plans • Conducting periodic monitoring and activities

In the present study, all the stakeholders have been primarily categorized into two categories that have been identified as:

- Primary Stakeholders: include people, groups, institutions that either have a direct influence on the project or are directly impacted (positively or adversely) by the project and its activities i.e., the grass-root stakeholders, such as project affected persons and general public including women and people with physical disabilities residing in the project area (for the proposed project: people living in the project area particularly the RoW).
- Secondary stakeholders: are those that have a bearing on the project and its activities by the virtue of their being closely linked or associated with the primary stakeholders and due to the influence, they have on the primary stakeholder groups.

- Apart from categorization, the stakeholders have also been classified in accordance with the level of influence they have over the project as well as their priority to the project proponent in terms of importance.

The stakeholders have been classified in accordance with the level of influence they have over the Project as well as their priority to the Project proponent in terms of importance. The influence and priority have both been primarily rates as:

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

Based on the above attributes, the following *Table 109* delineates the stakeholders identified for the Project and their analysis.

Table 109: Stakeholder Mapping for the Project

Stakeholders	Category of stakeholder	Brief profile	Influence status	Basis of Influence Rating
Management				
Project affected persons (PAPs)	Primary	Loss of land for the construction of tower footing. Loss of trees, crops, etc. in the width of RoW of transmission lines	Medium	• No major restrictions around the Project site • Project bring development to the area • Increase in employment opportunities and preference in job during construction phase • Improvement in electrical supply and infrastructure in the area • Minimize impact
Power Grid Bangladesh PLC (Power Grid)	Secondary	Power Grid is the Project proponent own a controlling stake of 100% in the Project	Highest	• Primary Project proponent • Responsible for construction and operation of this Project • Primary financial beneficiaries • Responsible for all the Project related risks and impact liabilities
Regulatory/Administrative Authorities & Agencies				
Department of Environment (DOE)	Secondary	The Department of Environment is the primary government regulatory authority for Environmental protection in Bangladesh.	High	Responsible for environmental clearance, management and monitoring including necessary compliance throughout the Project lifecycle
Department of Forest (DOF)	Secondary	The Department of Forest is the primary government regulatory authority	High	Responsible for forest protection, conservation and management and provide permit for cutting

		for protection of forest in Bangladesh.		trees for width clearing of TL during construction phase
Ministry of Railway	Secondary	Ministry of Railway is the primary government regulatory authority for construction and maintenance of railways in Bangladesh	High	Responsible for the construction of new railway and maintenance of existing. Provides permit while use the right-of-way and/or crossing (overhead and underground) power and gas transmission and distribution lines, etc.
Roads and Highways Department (RHD)	Secondary	Roads and Highways Department is the primary government regulatory authority for the construction and repair of roads and highways in Bangladesh	High	Responsible for the construction of new roads and highways, and maintenance of existing. Provides permit while use the right-of-way and/or crossing (overhead and underground) power and gas transmission and distribution lines, etc.
Other Regulatory & Permitting Authorities	Primary		High	• Agencies required for obtaining permits and licenses for operation of the Project • Primary involvement during operation phases
Political Administration				
Upazila (sub–District Level) Political Administration	Secondary	Elected representatives of people at sub-district level for a fixed tenure	Medium	• Key linkage between the community and the Power Grid
Union/Ward leaders & local representative	Secondary	Elected representatives at Union/Ward level i.e., village level for a fixed tenure	Medium	• Plays important role in providing public opinion and sentiment on the Project • Empowered to provide consent and authorization for establishment of Project on behalf of the community

A stakeholder engagement plan (SEP) prepared for the project given in **Annex-II**.

7.2 Public Consultation

Stakeholder consultations (or public consultation) during the environmental and social assessment process of development projects is increasingly considered an important notion and requirements which increases the authenticity and acceptability of assessment itself but more importantly can possibly enhance the quality of decisions making as well. The dialogues will be inclusive, meaningful and transparent. Special initiatives will be taken to ensure that vulnerable people, women and people with disabilities are consulted. Stakeholder consultation/participation during various stages of developmental projects helps improve the decision making and ultimately leads towards sustainable development.

Stakeholder consultation is a two-way process. For stakeholders, the consultation process is an opportunity to obtain project information, to raise issues and concerns, and ask questions. For the project proponents, the consultation process offers opportunity to understand the stakeholders and their concerns about the project, their needs and aspirations, and also their suggestions that can potentially help shape the project. Listening to stakeholder concerns and feedback can be a valuable

source of information that can improve project design and outcomes and help the project proponent to identify and control external risks. It can also form the basis for future collaboration and partnerships.

The national legislation requires consultations to be carried out particularly with the affected communities as part of the environmental and social assessment process. The consultation carried out during the present ESIA and reported in this Chapter meet these requirements. The primary objective of the PCMs is to incorporate the opinions and suggestions of the public and all other stakeholders at the Project planning stage to ensure wider acceptability of the Project. The key objectives are as follows:

1. Developing and maintaining communication links between the project proponents (Power Grid) and stakeholders
2. To provide information on the economic, environmental, and social benefits as well as potential negative impacts of the Project;
3. To ensure that the potential stakeholders, and local communities are engaged in a meaningful dialogue and are well informed prior to the decision of the Project Proponent as to the nature and extent of social and environmental impacts attributable to the proposed Project with respect to planning;
4. Engaging and assessing the specific needs of vulnerable groups, especially those below the poverty line, the landless, people with disabilities, the elderly, women and children, and those without legal title to land and ensure their participation to in consultations;
5. To engage stakeholders, and local communities and obtain expertise and local, traditional wisdom and knowledge from them in order to plan the mitigation measures; and
6. To facilitate periodic opportunities to the principal stakeholders to offer their inputs on all key components of the Project.

7.3 Approach and Methodology of Public Consultation Meeting

7.3.1 Approach of PCM for ESIA

PCM and disclosure offer an opportunity for people to participate in the decision-making process for design, development, and implementation of the Project. It provides a platform for Project-affected persons and different stakeholders to express their views on possible impacts of the proposed intervention on environmental and social parameters.

Public opinion has been collected through in-depth-interview, focus group discussion and consultation meeting. For better understanding the socio-economic and environmental condition six focus group discussions were held with the local people in the closest settlement area of the proposed sub-stations. In-depth Interview was held with local government representatives, and government officials in the respective field.

In order to assess stakeholder needs, expectations, perceptions, and choices, and to ensure their rights and voices, a two-fold consultation processes was carried out during the survey. Thus, meetings were conducted firstly with both the primary and secondary stakeholders. Later, indirect affected persons of different occupations groups were consulted through FGDs.

PCM and disclosure for Environmental Assessment are planned at two different stages (ESIA scoping stage and draft ESIA report stage) in order to collect opinions and feedback of the public and to disseminate information on the Project and ESIA Study. However, the consultant carried out 8 consultations adjacent to the proposed sub-station area.

a) ESIA Scoping Stage

The first stage of the PCM and disclosure for ESIA is conducted at the time of environmental scoping in the initial stage of the ESIA study. Information on the Project and scope of the ESIA study is disseminated to the public, and then comments and opinions are collected to incorporate into the report. However, the approach undertaken for consultation involved the following key processes.

- Mapping and Identification of key stakeholders such as primary (direct Project influence) and secondary (indirect Project influence) stakeholders;
- Undertaking interviews and focus group discussions (FGD) with the respective stakeholders;
- Assessing the influence and impact of the Project on these stakeholder groups;
- Summarizing of key findings and observations from the consultations.

7.4 Public Consultation Meetings (PCMs)

People have the right to know what will happen in their area, including both the positive and negative impacts. Their opinions, views, and feedback are valuable for understanding and managing the changes a project may bring. For this reason, 13 public consultation meetings (PCMs) were held in different locations around the project area.

Table 110: Consultations Meeting under the project

SN	Tower Location	Address	Date	No. of participants		Total
				Male	Female	
1.	210-216	Baralia Union Parishad, Baralia, Patia, Chattogram	25.06.2025	03	02	5
2.	210-216	Baralia Union Parishad, Baralia, Patia, Chattogram	25.06.2025	0	05	5
3.	267-269	Goschi High School, Raozan, Chattogram	26.05.2025	23	02	25
4.	101-102	Paschim Chambol, Banshkhali, Chattogram	22.05.2025	06	0	6
5.	111-115	Noth Juladhi, Banshkhali, Chattogram	18.05.2025	05	0	5
6.	57	Katakhali, Pekua, Cox's Bazar	28.02.2025	05	0	5
7.	145	Hazigao, Gunaguri, Kalipur, Banshkhali, Chattogram	26.02.2025	08	0	8
8.	207	Pingala, Kashiais, Patia, Chattogram	23.02.2025	09	0	9
9.	227	Mukitline, Dholghat, Patia, Chattogram	22.02.2025	08	0	8
10.	250	Popadia, Boalkhali, Chattogram	20.02.2025	10	0	10
11.	257	Charandip, Boalkhali, Chattogram	20.02.2025	08	0	8
12.	259	Lamburhat, Bagoyan, Raozan, Chattogram	19.02.2025	05	0	5
13.	263	Bagoyan, Bagoyan, Raozan, Chattogram	19.02.2025	07	0	7
			Total	**97**	**9**	**106**

In each of the consultation, participants were encouraged to share their observations, suggestions, and experiences on various environmental and safety issues and suitable mitigation and enhancement measures. Issues discussed were:

- Awareness about the proposed project and responses;
- Protected areas (national park, sanctuaries, reserves forests, religiously sensitive sites, historical or archaeological sites, ecologically critically area, etc.), if any
- Benefits of the Project for the economic and social advancement of the community;
- Status of current environmental conditions in the area – air, dust, noise levels, status of soil in the area;
- Adverse impact of the project on various habitats (natural and man-modified) e.g., home

gardens, paddy fields, agricultural crops, plantations, natural forest, fish ponds) or soil resource in the locality;
- Type of trees found in the home gardens, natural forests (if any): fruit trees, timber, medicinal trees/forest trees;
- Threatened and endemic flora and fauna in the project area;
- Impact of the project on Elephant Corridor/route under the proposed transmission lines;
- Labor availability in the Project area or requirement of outside labor involvement;
- Gender and/or women violence in the project area.

The details and/or summary of consultations for different areas held with issues raised or discussed and suggestions provided by the respective primary stakeholders are presented in *Table 111*. Public Consultations minutes are attached in the end of this section.

Table 111: Details of Consultations Held for the Project

Major Issues	Issues and concerns raised	Response from the project
Awareness about the proposed project	• During public consultations, consultant informed about the proposed project to the affected persons; • Most of the participants expressed concerns about the proposed project, emphasizing that the project authority should avoid installing transmission lines over existing housing structures. They pointed out that if transmission lines pass above residential buildings, it would create difficulties in constructing multi-storied buildings in the future; • Md. Shafiqul Alam, President of Guschi High School in Raozan, Chattogram, stated that the project authority should avoid routing the proposed transmission line over educational institutions, as there are future plans to expand the school into a multi-storied building. He further mentioned that they would have no objections if the transmission line were installed across agricultural land. Most of the participants also expressed their willingness to support the project, on condition that that no structural damage occurs during the construction works; • Mr. Subrato Kumar, Assistant Upazila Primary Education Officer, Raozan, Chattogram said that, before the construction work started, Power Grid will conduct revision of the propose route avoiding any educational institution;	• The consultant informed participants that the revised proposed route of the transmission line has already been adjusted to avoid important structures such as educational institutions, religious establishments, and residential buildings along the route. • Representatives from the Power Grid and the consultants stated that, before the commencement of the project, the Power Grid will conduct a detailed check survey through the EPC contractor, as well as carry out a socio-economic impact assessment survey to identify any potential losses. The project will consider public concerns and make every effort to avoid damage to structures. If avoiding damage is not possible, compensation will be provided in accordance with the Electricity Act 2018. • The Power Grid will give top priority to preventing impacts on any educational institutions before starting construction. • Land compensation for the areas required for tower footings will be provided to the affected people by the DC office as per the Electricity Rules 2020 (Amendment 2022). •

Major Issues	Issues and concerns raised	Response from the project
	• Most participants from Moheshkhali, Patia, Boalkhali, and Raozan emphasized that the Power Grid should ensure payment of compensation for any loss of land, crops, salt, and trees before commencing construction work.	
Benefits of the Project	• Participants asked about the expected benefits of the project; • They expressed hope that uninterrupted power supply in the Chattogram Division would encourage the establishment of medium and large industries; • They anticipated that the new transmission lines would enhance power supply capacity and help reduce load shedding in the area; • Some unskilled laborers from the project area are expected to gain income opportunities during the construction phase; • Overall, participants expected the project to ensure a continuous electricity supply at full voltage within the project area.	• The consultant informed participants that the project would bring numerous positive benefits, not only to the project area but also by enhancing the power capacity of the national grid; • Economic and social development is expected to accelerate, with new industries being established due to the availability of reliable power supply. Local people will have increased job opportunities in these industries, thereby improving their economic conditions. As a stable power supply is essential for any development activities; • The project will ensure uninterrupted electricity supply at full voltage in the project area; • The Power Grid will coordinate with the EPC contractors to give priority to hiring local labor during civil construction works.
Loss of land, livelihoods and incomes and compensation	• Most participants stated that they would lose crops during the construction of the transmission line and demanded proper compensation; • Participants from Moheshkhali Upazila mentioned that the transmission line would cross salt-cultivated areas, leading to a loss of salt production during construction, for which they also demanded compensation; • Many participants from Anwara, Banshkhali, Boalkhali, and Raozan reported that they would lose homestead trees due to the construction of the transmission line and expected appropriate compensation for the loss of trees.	• In accordance with the Electricity Act 2018 and the Electricity Rules 2020 (Amendment 2022), compensation for the loss of land, crops, salt, and trees will be provided to the affected persons; • Land compensation will be disbursed to affected persons through the DC office, while compensation for crops and trees will be paid either by the EPC contractor or through the Resettlement Plan (RP) implementing INGO. •
Agriculture Impact	• Majority of participants stated that they will loss crops due to use of land for tower foundation. It was estimated that 31.27 acre of agriculture land will be affected by the project. They demanded proper compensation due to loss	• Power Grid will provide compensation due to loss of crops.

Major Issues	Issues and concerns raised	Response from the project
	of crops during construction period of transmission line.	
Impact on Salt Production	• Majority of participants from Moheshkhali and Pekua stated that due to construction of tower footing, they will loss salt production, they demand proper compensation.	• Power Grid will provide compensation due to loss of salt field.
Impact on Fisheries	• The impact on fish will be very minimal by intervention of the project in the area.	• Power Grid will provide compensation due to loss of fishes.
Environmental Impact	• As per inventory of loss survey, approximately 39,479 trees will need to be cut due to installation of 765kV transmission line. Participants from these areas have strongly emphasized the need for fair and adequate compensation for the loss of trees. Additionally, they have called for a tree plantation program to be implemented in the affected areas to replace the lost vegetation and mitigate environmental impacts.	• To mitigate environmental impact due to cut of trees, Power grid will provide tree compensation as well as will effectively take initiative to plant tree sapling as of 1:3 basis that mean three tree will be planted by replace of one tree cut.
Traffic congestion and road impact	• Transportation of construction materials may lead to traffic congestion, as well as dust and noise emissions. Additionally, stringing works for the transmission line—particularly at road crossings—can further disrupt traffic flow. Local communities have requested that effective measures be implemented to minimize traffic jams in these areas.	• Contractors will be obliged to avoid traffic congestion and follow health and safety guidelines to control dust emissions and noise generation. Power Grid officers and monitoring consultant will monitor the performance of the contractors and compliance with safeguards requirements;
Avoidance and safeguards	• Locals stated that during the stringing works of the transmission line, the contractor must ensure appropriate safety measures to prevent any accidents involving community members. The EPC contractor will install adequate safety signs, conduct safety awareness activities, and hold public consultations to alert people in the affected areas along the transmission line route.	• Power Grid will ensure that all required safety measures are followed by contractors during construction of TL. Power Grid and monitoring consultant will strongly monitor the community safety during its operations; • Power Grid will establish a code of conduct with EPC to take effective measures related to safety concern.
Risks and hazards	• Locals said that sound and air pollution will increase during construction of TL; • Civil works of the project will lead to influx of migrant labor teams; their possible misconduct and engagement in sexual harassment	• Necessary safety measures such as erecting bamboo sheds over the built structures and fencing off the construction sites will be adopted by the contractors during conductor stringing. Civil works will be scheduled to avoid cultivation seasons, and peak periods for

Major Issues	Issues and concerns raised	Response from the project
	of women; • Compensation payments should not be delayed. Middlemen interfering with compensation process and seeking bribes should be avoided. It should be a trouble-free process for APs; • Locals expected that they seek help from power grid in preparing proper documentation for land compensation from DC office.	other livelihood activities; • The final engineering designs will study the drainage systems and necessary measures would be incorporated to avoid environmental hazards; • Power Grid and the contractors will endeavor to minimize labor influx and place priority in local labor. Awareness raising programs will be conducted for labor teams. It will be a mandatory requirement for the contractors to enforce a code of conduct for the labor teams. Power Grid will establish a grievance redress mechanism (GRM) to facilitate any affected/aggrieved parties to report their grievances/complaints and seek resolution within a reasonable time frame; • Power Grid together with DC will ensure that compensation is paid on due time and before taking possession of land. Compensation will be paid directly to the landowner/ claimant through banking channel. Implanting INGO and EPC contractor will assist affected landowners to prepare proper documents for land compensation from DC office.
Job Opportunity	• During construction period some local workers may have been required such as civil helper, earth workers, security guards etc. Local people said project authority should engage local workers as priority basis.	• Power Grid will hire local people as civil helpers, earth workers and security guards during construction work.
Opinion	• Local people expected uninterrupted electric supply in the area by implementation of the project. They think project will reduce load shedding in the area resulted people will be benefited by the project. • Most of the local expected proper compensation due to loss of land, crops, trees etc.	• As per Electricity Act 2018 and Electricity Rules 2020 (Amendment 2022) DC will provide compensation due to use of land for tower footings; additionally, Power Grid through EPC contractor will provide compensation due to loss of crops, salt production, trees etc.

Women Consultation

A consultation meeting with women was held on 25 June 2025 at Borolia Union Parishad, Patia Upazila, Chattogram district, within the proposed transmission line area. Participants stated that most women are primarily engaged in household activities, although some also assist in agricultural tasks such as crop threshing alongside men. They noted that women's involvement in construction work in the area is currently rare; however, poor women are sometimes engaged in activities such as earth cutting, brick breaking, and cooking. It was also mentioned that many working women from the project area are employed in garment factories in Chattogram and Dhaka districts.

During the consultation, women participants expressed several expectations: proper compensation for the loss of crops and trees, adequate community safety measures during construction works, and, where possible, opportunities for women to be engaged in construction activities. They also requested income-generating training programs—such as tailoring, poultry farming, and goat rearing—for vulnerable households.

In response, the consultants informed participants that the project would compensate for all economic losses and encourage women's participation in livelihood restoration activities, including tree planting programs, skills training, and social development initiatives. Female-headed households would receive additional cash allowances as vulnerable households. Power Grid would instruct the EPC contractor to engage interested women in suitable construction-related activities such as cooking, earth cutting, and brick/rock breaking. Consultations will continue throughout the project lifecycle to ensure women's concerns are addressed.

Inference

Participants given their positive attitude after hearing about the project will be implement to develop power supply in this area. The community perception about the project is that after completion of transmission line uninterrupted power supply will improve their business and daily life. Local's commitment to be contribute in project planning and implementation process including construction work, land acquisition and requisition stage appreciated. Due to construction of tower agriculture land will be acquired, the labor depend on this agriculture land will be jobless, the authority should create alternative income opportunity of locals and should be given priority of local's skill and unskilled labor during construction phase. The affected persons for losing land, crops, trees or any other assets will get compensation. DC will take all responsibility for final assessment and disbursement of compensation to tiled holders on behalf of the project. Power Grid Bangladesh PLC (Power Grid) is responsible to pay compensation through DC office to the affected titled holders. Additional compensation and other resettlement benefits as per policy of the RP will be paid through NGO or Consultant firm. Compensation will be assessed as per current market price following Bangladesh Government law.

7.5 Future Consultation Plan for Power Grid and Contractor

The stakeholder consultation and engagement are an ongoing process and will continue throughout the project's construction as well as operation and maintenance phases. The ongoing consultation process could be scheduled on monthly or quarterly basis with the stakeholders including but not limited to the concerned government departments, local administration and the community representatives from the proposed project area. The overarching goal of consultations and community engagement is to support and facilitate the project's design and implementation, to reduce conflicts and project opposition, and to increase project's acceptability. Stakeholder consultations and participation will take place during implementation through the following means:

- Grievance Redress Mechanism (GRM) at the community level and project level;
- Awareness campaign for all stakeholders;
- Identify all the non-traceable 2461 land owners and conduct detailed consultation and safeguard due-diligence
- Formal interactions through periodic workshops, consultation sessions with wider stakeholders especially institutional ones such as other Government Department relevant NGOs;
- Informal interactions during the construction phase and also during the maintenance activities;

Periodically, the Project may also hold formal workshops to consult a wide range of stakeholders on project activities. These workshops will involve PAPs from communities, DoE, Power Grid, and representatives of other relevant departments/entities to share the progress and elicit the views of

all the stakeholders for the improvement. Tentative future consultations plan of the project is presented in Table 112.

A future consultation plan should focus on proactive engagement, risk management, and collaborative problem-solving. This includes establishing clear communication channels, conducting regular progress reviews, and addressing potential conflicts proactively. The plan should also incorporate feedback mechanisms for continuous improvement and ensure alignment with relevant policies and regulations. Key elements of a future consultation plan:

(1) Regular Progress Reviews:

Conduct periodic meetings between the power grid (Power Grid) and contractors to discuss project progress, address challenges, and identify potential issues early on.

(2) Open Communication Channels:

Establish clear and accessible communication channels for both the Power Grid and contractors to share information, raise concerns, and seek clarification.

(3) Proactive Risk Management:

Identify potential risks related to project implementation, such as land acquisition, material procurement, or environmental impacts, and develop mitigation strategies in advance.

(4) Stakeholder Engagement:

Involve relevant stakeholders, including local communities and government agencies, throughout the project lifecycle to ensure transparency and address potential concerns.

(5) Feedback Mechanisms:

Implement systems for collecting feedback from contractors and other stakeholders on project processes, and use this feedback to improve future consultations.

(6) Contractual Clarity:

Ensure that all contracts are clear, unambiguous, and include provisions for addressing disputes and changes in project scope.

(7) Training and Capacity Building:

Provide training and support to contractors on relevant safety regulations, environmental standards, and project management best practices.

(8) Compliance with Regulations:

Ensure that all project activities comply with relevant government regulations and environmental standards.

(9) Dispute Resolution:

Establish clear procedures for resolving disputes between the Power Grid and contractors, such as mediation or arbitration.

(10)Post-Project Evaluation:

Conduct a post-project evaluation to assess the effectiveness of the consultation plan and identify areas for improvement in future projects.

By implementing these key elements, the Power Grid and its contractors can foster a collaborative and productive working relationship, leading to successful project implementation and long-term benefits for the energy sector.

Table 112: Future consultations plan of the project

Stage	Target stakeholders	Topic(s) of Engagement	Method(s) used	Location/ Frequency	Responsibilities
STAGE 1: Project preparation (Project design, Scoping, Resettlement Planning, ESIA, LMP, GBV Plan and SEP preparation and Disclosure)	Project Affected People: People potentially affected by land due to construction of Tower Footing, when triggered People residing in project area Vulnerable households including women	• ESIA, LMP, Gender and GBV prevention plan, SEP, RP disclosures; • Land compensation process; • Assistance in gathering official documents for authorized land use; • Compensation rates and methodology; • Compensation packages; • Project scope and rationale; • Project E&S principles; • Resettlement and livelihood restoration options; • Grievance mechanism process;	• Public meetings, separate meetings for women and vulnerable • Face-to-face meetings • Mass/social media communication (as needed) • Disclosure of written information: brochures, posters, flyers, websites • Information boards or desks • Grievance mechanism • Local news paper The following modes to be adopted specifically for the vulnerable groups: • Robust engagement with local community-based organizations. • The project would arrange separate consultation sessions for different target groups • Resources allocation towards local administration representatives and councilors. • Provision of transportation or transportation cost particularly for the disabled, marginalized and the elderly ones including women • Engagement of local NGO's and CBO's who work with vulnerable people at the community level to help disseminate information and organize consultations • Separate consultation with men and women to be arranged • Manageable and gendered FGD to be arranged so that women can speak freely • The project must have adequate	• During preparation and detailed design stage- that would affect the area. • Continuous communication through mass/social media and routine interactions throughout RP development as needed.	power grid staff responsible for land acquisition or its consultant

Stage	Target stakeholders	Topic(s) of Engagement	Method(s) used	Location/ Frequency	Responsibilities
			means to reach the disabled ones in the community. If need be, teams must visit the disabled ones in their habitat • Information may be printed in Braille to allow the blind ones to have access to the project details		
	• Other Interested Parties (Internal) • Press and media • NGOs • Businesses and business organizations • Workers' organizations • Academic institutions • National Government Ministries • Different Government Departments • General public, jobseekers • Women's groups or organizations	ESIA, RP, LMP, SEP disclosures Grievance mechanism Project scope, rationale and E&S principles	• Public meetings, • Mass/social media communication • Disclosure of written information: Brochures, posters, flyers, website • Information boards • Grievance mechanism • Notice board for employment recruitment	• Throughout RP/ESIA/LMP/SEP and GBV prevention plan development as needed; • Project launch meetings at local Power Grid office and Power Grid head quarter; • Quarterly meetings in affected villages and affected communities • Disclosure meetings in local, national level	Power Grid responsible for land acquisition or its consultant
	• Other Interested Parties (External) • Other Government Departments from which permissions/clearances are required; • Other project developers, donors	• Legal compliance issues • Project information scope and rationale and E&S principles • Coordination activities • Land acquisition process • Grievance mechanism process • Disclosures of E&S documents	• Face-to-face meetings • Invitations to public/community meetings • Submission of required reports	Disclosure meetings Reports as required	Power Grid and PIU
STAGE 2: Construction and mobilization activities	• Project Affected People • People potentially affected by land acquisition • People residing in project area • Vulnerable households	• Grievance mechanism • Health and safety impacts (ESMP, community H&S, community concerns) • Employment opportunities • Project status	• Public meetings, open houses, trainings/workshops; • Separate meetings as needed for women and vulnerable; • Individual outreach to PAPs as needed; • Disclosure of written information: brochures, posters, flyers, website Information boards in Power Grid	• Quarterly meetings during construction seasons • Communication through mass/social media as needed • Notice boards updated weekly • Routine interactions	• Power Grid, PIU, ESU, or its consultants' contractors, • RP implementing NGO

Stage	Target stakeholders	Topic(s) of Engagement	Method(s) used	Location/ Frequency	Responsibilities
			• Notice board(s) at construction sites, • Grievance mechanism and as guided with ESF documents mainly RP and ESIA.	• Brochures in local offices	
	Vulnerable communities and project affected people	• Vulnerable group has to be identified considering the households which are (i) living below the official poverty line; (ii) women headed households living below the official poverty line; and (iii) headed by elderly persons or disabled persons. • Announcement of vacancies (skilled/unskilled) at proposed site; • Announcement of contract work for small scale work associated with the proposed Project;	Face to face, consultation, FGD etc.	Before the construction starts and during the construction period	• Power Grid, PIU, ESU or its consultants, contractors, • RP implementing NGO
	• Other Interested Parties (External) • Governmental committees for land use and compensation • representatives in villages	• Project scope, rationale and E&S principles • Grievance mechanism • Project status • Bank compensation requirements	• Face-to-face meetings • Joint public/community meetings with PAPs	As needed (monthly during construction season)	Power Grid, PIU, ESU or its consultant, contractors
	• Other Interested Parties (External) • Press and media • NGOs • Businesses and business organizations • Workers' organizations • Academic institutions • National Government Ministries • Various Government Departments • General public, tourists, jobseekers	• Project information - scope and rationale and E&S principles • Project status • Health and safety impacts • Employment opportunities • Environmental concerns • Grievance mechanism process	• Public meetings, open houses, trainings/workshops • Disclosure of written information: brochures, posters, flyers, website, Information boards Notice board(s) at construction sites • Grievance mechanism	Same as for PAPs	Same as above

Stage	Target stakeholders	Topic(s) of Engagement	Method(s) used	Location/ Frequency	Responsibilities
	• Other Interested Parties (External) • Press and media • NGOs • Workers' organizations • Academic institutions • Local Government Departments • General public, tourists	• Grievance mechanism process • Issues of concern • Status and compliance reports	• Grievance mechanism • Power Grid website • Face-to-face meetings • Submission of reports as required	As and when required	Power Grid Staff, PIU, ESU or its consultant

Tower Location: 210-216, Baralia Union Parishad, Baralia, Patia, Chattogram, Date: 25.06.2025

Tower Location: 210-216, Baralia Union Parishad, Baralia, Patia, Chattogram, Date: 25.06.2025

Tower Location: 267-269, Goschi High School, Raozan, Chattogram, Date: 26.05.2025

Tower no: 111-115, North Julodhi, Banshkhali, Chattogram. Date: 18.05.2025

Tower no: 101-102, Paschim Chambol, Banshkhali, Chattogram, Date: 22.05.2025

Tower Location: 57, Katakhali, Pekua, Cox's Bazar, Date: 28.02.2025

Tower Location: 145, Hazigao, Gunaguri, Kalipur, Banshkhali, Chattogram, Date: 26.02.2025

Tower Location: 207, Pingala, Kashiais, Patia, Chattogram, Date: 23.02.2025

Tower no: 257, Charandip, Boalkhali, Chattogram, Date: 20.02.2025

Tower no: 260, Popadia, Boalkhali, Chattogram, Date: 20.02.2025

Tower no: 227, Mukitline, Dholghat, Patia, Chattogram, Date: 22.02.2025

Tower no: 263, Bagoyan, Bagoyan, Raozan, Chattogram, Date: 19.02.2025

Tower no: 259, Lamburhat, Bagoyan, Raozan, Chattogram, Date: 19.02.2025

Figure 100: Picture of public consultation meeting

Chapter 8
Environmental Impact Assessment

This chapter discusses potential impacts of the proposed project on various aspects of environment including air, water soil, flora, and fauna. Also discussed in this chapter are the mitigation and control measures to avoid, minimize, or mitigate these impacts. The potential impacts of the project on people and socio-economic resources are discussed in the next Chapter.

8.1 Summary of Potential Impacts

The project's potential impacts and their significance have been assessed using the methodology described in Section 1.7. A summary of these impacts and their significance along with the mitigation measures are presented in Table 113 the environmental impacts are discussed in the subsequent sections while the social impacts are discussed in the next Chapter as stated earlier.

Table 113: Summary of potential environmental impacts, their significance and mitigation measures

Potential Impact	Sensitivity	Magnitude	Significance before Mitigation	Mitigation and Enhancement Measure	Significance of Residual Impact
Impacts from Siting					
Enhanced grid connectivity ensuring that additional power generation reaches the end users.	Severe	Major	Critical (positive)	Adequate maintenance of the facilities in accordance with the standard operating practices of Power Grid	-
Impact on natural vegetation and wildlife due to permanent clearing of land for siting of substations and towers and temporary clearing along RoW	Severe	Moderate	Medium	Minimizing clearance of natural vegetation particularly of WS and RF; near river banks and khals; selecting barren lands	Low-Medium
Greenhouse gas emissions (SF6) from site clearing, materials life cycle and power leakage	Mild	Moderate	Medium	Minimizing using GIS, grounded metal enclosures, favorable insulation for the phase to phase and phase to ground moderation	Medium
Impacts from Construction					
Land use (substations)	Severe	Moderate	High	Barren and uncultivated land will be preferred to establish substations	Medium
Land use (transmission lines)	Mild	Moderate	Medium	Transmission lines will be aligned to minimize impacts on cultivated land and natural forests	Medium
Risk of soil contamination and soil erosion	Mild	Moderate	Medium	Pollution prevention plan and implementation of environmental code of	Negligible

Potential Impact	Sensitivity	Magnitude	Significance before Mitigation	Mitigation and Enhancement Measure	Significance of Residual Impact
				practice (ESCPs) (ESCPs are discussed later in the document). Excavated top soil in the cultivated areas will be stored separately, to be used as the top most layer during backfilling. Backfilled soil will be compacted to avoid soil erosion.	
Risk of water contamination	Mild	Moderate	Medium	Implementation of pollution prevention plan and of ESCPs	Negligible
Damage to canals (water courses) and tube-wells	Severe	Moderate	High	Works close to khals and tube-wells will be avoided to the extent possible; No excavated material or debris will be released in khals or wells; Any damage caused by the construction activities will be immediately repaired	Low
Dust and air pollution from construction activities	Mild	Moderate	Medium	Maintenance of construction equipment and vehicles; noise control measures as specified in ESCPs.	Negligible
Noise and vibration from construction activities	Mild	Moderate	Medium	Maintenance of construction equipment and vehicles; noise control measures as specified in ESCP.	Negligible
Generation of spoils	Severe	Moderate	High	To be used as filling material where needed; disposal at approved locations; implementation of ESCP.	Negligible
Generation of solid waste and hazardous waste	Mild	Moderate	Medium	Minimize generation of waste. Proper collection and disposal of wastes in approved sites or to vendors; implementation of Waste Management Plan and ESCPs.	Negligible
Impact on wildlife	Severe	Minor	Medium	Minimize vegetation clearance; control of noise and artificial lighting, ban on hunting, and checks for breeding birds during vegetation clearance implementation of ESCPs.	Low-Medium

Potential Impact	Sensitivity	Magnitude	Significance before Mitigation	Mitigation and Enhancement Measure	Significance of Residual Impact
Impact on biodiversity	Severe	Moderate	High	As much as possible, damage will be minimized during the construction work	Medium
Site clearance and Restoration	Severe	Minor	Medium	Cleaning of the construction sites; implementation of ESCPs	Negligible
Community health and safety from construction traffic and activities	Severe	Moderate	Medium	Traffic, noise and dust control measures in accordance with ESCPs; Public safety and occupational health and safety (OHS) management plan to be implemented.	Low
Workers health and safety	Severe	Major	High	OHS plan to be implemented; Implementation of ESCPs.	Medium
Traffic congestion	Severe	Moderate	High	Contractor to prepare and implement traffic management plan; Construction activities to be scheduled to minimize traffic disruption; coordination to be maintained with relevant authorities (e.g., Traffic Police).	Minor
Additional load on local resources	Mild	Moderate	Medium	Contractor to obtain water in a manner not to affect the local communities; liaison with local communities to be maintained; GRM to be established.	Negligible
Impacts from O&M Activities					
Public Health Impacts from Electro Magnetic Fields (EMF)	Mild	Moderate	Moderate	GIS set up along with grounded metal enclosure containing the conductors, current and voltage transformers, circuit breaker interrupters, switches, and lightning arrestors	Negligible
Audible noise and radio interference from the transmission lines	Severe	Minimal	Negligible	Design considerations to comply with the standards	Negligible
Diminution of Land Value in the RoW Corridor and Administrative Issue Management RoW Corridor					

Potential Impact	Sensitivity	Magnitude	Significance before Mitigation	Mitigation and Enhancement Measure	Significance of Residual Impact
Tree Cutting during Maintenance Activities					
Risk of bird collision and electrocution	Severe	Moderate	High	Placing of bird markers on the transmission line cables/conductors where necessary (e.g., reserve forest, at river crossing, etc.). Design parameters (distance between live parts) to minimize bird electrocution	Negligible
Occupational Health and Safety during Operation and Maintenance	Severe	Major	Low	Implementation of Standard Operating Procedures (SOPs) of Power Grid.	Low

8.2 Environmental Impacts from Project Siting

The environmental impacts associated with the project siting are discussed below.

8.2.1 Improvement of Electricity in Surrounding Area

As stated in Section 1.3, the construction of the 765kV transmission line project is expected to significantly improve electricity supply in the Chattogram and Cox's Bazar areas by increasing power transmission capacity and strengthening the grid, leading to more reliable, efficient, and stable power, which in turn supports economic growth and job creation. The project includes establishing a robust network to accommodate new power plants, enhancing the reliability of power transmission in the Chattogram region, and bolstering the grid in areas like Cox's Bazar. Key Improvements in Electricity are as follows:

(a) Increased Power Transmission:

The 765kV line will have a higher capacity to transmit electricity, allowing more power to reach major load centers in Chattogram and support industrial and economic development.

(b) Grid Stability and Reliability:

The project aims to strengthen the overall power system, making the electricity supply more stable and reliable in the Chattogram division and surrounding areas like Cox's Bazar.

(c) Support for New Power Plants:

The transmission line is designed to carry power from new power generation facilities, such as the United power plants in Anowara, to the city and other areas.

(d) Economic Growth and Livelihood Opportunities:

A more dependable and increased supply of electricity is a catalyst for economic development. It can create more livelihood opportunities and jobs, contributing to social stability by providing employment for the local youth and improving living standards.

(e) Chattogram and Cox's Bazar Focus:

The project specifically targets the southern part of the Chattogram division and areas like Cox's Bazar to improve their power infrastructure.

(f) Integration with New Power Generation:

The project aligns with the development of new, large-capacity power plants and the broader plan to meet the growing demand for electricity in Bangladesh.

(g) Infrastructure Development:

The project involves constructing a high-voltage transmission line and supporting infrastructure to ensure efficient and secure delivery of power. This project will also assist Power Grid to introduce reactive, predictive and proactive O&M approaches.

8.2.2 Impact on Natural Vegetation and Wildlife

The laying of overhead transmission line will also similar impacts; in particular the natural vegetation and trees under the overhead transmission line will permanently be affected. However as discussed in Chapter 5, most of the affected area is under cultivation. The natural vegetation and habitats in the area are mostly homestead and roadside trees, river and khals, small ponds, and on the periphery of cultivation fields, etc. In view of the altered nature of the habitat, the vegetation found in the project area mostly belongs to homestead forests, i.e., village forest, bushy land cultivable/plantation forest, roadside forest; and homestead/settlement vegetation, crop-field vegetation. Therefore, the project will have a significant impact on the natural vegetation of the area; the significance of this impact has been assessed as High, as shown in Table 113.

With respect to the faunal resources, no designated important bird area (IBA) and Ecologically Critical Area (ECA) is existed along the RoW of the proposed transmission line and tower footing areas. Therefore, the project will have significant impact on the faunal species of the area; the significance of this impact has been assed as High, as shown in Table 113.

Mitigation

The following measures will further reduce the negative impacts of the proposed project on natural vegetation and habitat of wildlife of the area:

- Clearing and removing of natural vegetation will be minimized
- Tree cutting will be minimized
- Selecting barren/fallow land for aligning transmission line
- Compensatory tree plantation will be carried out (e.g., along the periphery of substations).
- Environmental Code of Practice (ESCP) (discussed later in the document) will be implemented

Residual Impacts

After implementing the above listed mitigation measures, whatever small impacts the proposed project might have on the natural vegetation and wildlife of the area, will be further reduced. The residual impacts have therefore been assessed as Mild to Medium, and significance of impact would be Negligible as shown in Table 113.

8.2.3 Greenhouse Gas (GHG) Emissions

Net greenhouse gas (GHG) emissions from implementation of T/L are estimated using the World Bank " Guidance Manual: Greenhouse Gas Accounting for Energy Investment Operations, Version 2.0 January 2013 (hereinafter "Guidance Note") and IPCC 2006 guidelines. The emissions from the Project and baseline emission of the nearest least-cost alternative estimated over 30 years. Three sources of emissions are considered for accounting GHG from the Project. The following sources are considered in the estimates:

- Direct generation emissions associated with losses

- Emissions generated due to Land Clearing for Civil Works
- Sulfur hexafluoride leakage as fugitive emissions generated from oil base transformers and circuit breakers

Direct Generation Emissions Associated with Losses

Impacts relevant to this source result from technical loss reductions in the transmission line facilities being supported by the project. Losses can be reduced by upgrading overloaded or not properly sized transformers, increasing conductor capacity, installing reactive power equipment, and undertaking other types of maintenance interventions. The losses in the transmission lines in Bangladesh are generally estimated as 3.13 percent[8]. The direct generation emissions associated with these losses (emission factor: 0.6545 tCO_2/MWh) is estimated to be 0.2 million tCO_2e per year and 6.03 million tCO_2e for the entire life of the project, assuming that the life of the project is 30 years.

To calculate CO_2 from a 765kV transmission line, you need to first find the annual transmission loss for the line and then multiply it by the CO_2 emission factor of the grid (in kg CO_2 per kWh) from which the lost energy is supplied.

Annual CO_2 Emissions (kg CO_2) = Annual Transmission Loss (kWh) × Grid Emission Factor (kg CO_2/kWh). If your 765kV line loses 50 million kWh of energy annually and the grid's emission factor is 0.85 kg CO_2/kWh, then the CO_2 emissions from the line would be:

50,000,000 kWh × 0.85 kg CO_2/kWh = 42,500,000 kg CO_2 = 46,848.231 tons CO_2=0.0468 million tons of CO_2 equivalent.

Emissions from Land Clearing for Civil Works

Construction of towers, transmission line RoW, and some other project facilities such as grid stations require land clearing. The total land to be cleared for RoW is 668.5 ha (6.685 km^2). The clearing may affect the carbon stored in biomass and soil. Emissions from land clearing can be calculated as a one-time emission of CO_2 based on the available dry biomass carbon for the total cleared areas for construction. According to IPCC guidelines, temperate climate has 100 tons/ha of dry biomass, of which average carbon content is 47 percent. The conversion factor for carbon weight to CO_2 weight is 44/12. Total land clearing emissions for 6.685 km^2 are 0.115 million tCO_2e. (6.685 x 100 x 100 x 0.47 x 44/12 = 115204.8333 t tCO_2e = 0.115 million tCO_2e.)

Sulfur-hexafluoride Fugitive Emissions

Sulfur-hexafluoride (SF_6) is used in insulation and current interruption applications in transmission and distribution systems. SF_6 is used in gas-insulated switch-gear and substations, gas circuit breakers, and (less frequently) in high-voltage, gas-insulated lines. SF_6 may escape as fugitive emissions during the manufacturing, installation, use, maintenance, and disposal of this equipment. Sealed distribution equipment may not emit any SF_6 during use, but transmission equipment often requires periodic refilling and hence has higher rates of fugitive emissions during use. The amount of SF_6 emitted during operation and decommissioning is related to the number and type of equipment used, as well as the maintenance and recycling procedures. SF6 emissions could occur in all transmission and distribution projects, depending on the type of equipment installed, refurbished, or maintained. Countries report SF_6 emissions from the power sector in their national emissions inventories, and emissions factors from these inventories provide one way to estimate their magnitude (emission factor is 0.119 gSF_6/MWh). Circuit breakers containing SF_6 will be used in the grid station and the SF_6 emissions are estimated as 0.026 million tCO_2e per year and 0.78 million

[8] Source: https://www.Power Grid.org.bd/Power Grid/upload/Reports/MIS-March'2014.pdf.

tCO_2e for the entire life of the project (30 years). (1.8 kg of SF_6 = 40 tCO_2e); 0.119 g x 50000 MWh = 5.95 g or 5950 kg SF_6; 5950 kg of SF_6 x 40/1.8 = 132.22 tCO_2e or 0.00013 million tCO_2e per year; 0.00013 x 30 = 0.00396 million tCO_2e for 30 years).

Total Emissions from Proposed Project

The total Project emissions from above three sources are estimated to be 0.165 million tCO_2e for the entire life of the project (30 years). Significance of these emissions has been assessed as Medium, as shown in Table 113. No mitigation measures are proposed to address these emissions. Moreover, this is an energy efficiency enhancement project, hence compare to the scenario of current outdated old lines, the emissions shall be reduced.

8.3 Impacts during Construction Phase

8.3.1 Soil Contamination and Erosion

During construction phase, there is a high risk of accidental spills and leakages; minor maintenance chemicals (paints, lubricants, gases); waste oil; that may occur from fuel and oil tanks, vehicles and machinery and storage of chemicals used in tower construction areas, yards, batching plants, worker camps, and residential areas and from storage sites. These spills can pollute soils and contaminate surface water and groundwater in the area. Waste effluents from temporary facilities such as camps and offices can also contaminate soil and surface run off.

Disturbance of soils during construction including (and particularly) from movement of vehicles, may lead to destruction of the integrity of upper soil layers. Damaged soil is more readily eroded and washed into water courses during rainfall events and can also form dust during dry periods. This effect will be significant due to the need of access roads construction which will further damage the integrity of soil apart from vehicle movement.

Excavation for construction of transmission line towers particularly near the rivers and khals can cause soil erosion which can adversely affect the water quality of the rivers/water bodies and land sliding respectively. High rainfall events can also potentially cause accelerated erosion particularly in excavated areas. The significance of impact on soil pollution and soil erosion is characterized as Medium, as given in Table 113.

Mitigation

The following mitigation measures will be implemented:

- Contractor will prepare and implement a Pollution Prevention Plan prior to the start of the work. Proper baseline data will be collected.
- Contractor will be required to implement the measures prescribed in the Environmental and Social Code of Practices (ESCP), which will be included in the contracts. Detailed ESCPs are included in the **Annex I**.
- Contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the soil
- Contractor will confine the contaminants immediately after such accidental spillage
- Contractor will collect contaminated soils, treat and dispose them in environment friendly manner
- All areas intended for storage of hazardous materials to be quarantined and provided with adequate facilities to combat emergency situations complying all the applicable statutory stipulation
- Top soil to be stripped and stockpiled where practical.
- Temporary stockpiles to be protected from erosion.

- For sewage waste, appropriate treatment arrangement such as septic tanks and soakage pits will be installed on site. Water will percolate into the ground so there will be no discharge. Alternatively, sewage from construction camps and other facilities will be collected and transported to nearby municipal sewage treatments plans.
- The monsoon season will be avoided to carry out construction activities particularly excavation to the extent possible to minimize soil erosion.

Residual Impacts

After implementation of the above mitigation measures, the impacts of the project on the soil contamination and soil erosion will be adequately mitigated. Hence the significance of residual impacts is expected to be Negligible, as shown in Table 113.

8.3.2 Water Contamination

The proposed transmission route crosses three major river (Karnaphuli, Sangu and Matamuhuri) and several canals, as mentioned in Section 5.2.1 and shown in Table 50. During construction, there is a high risk of contamination of these water bodies from the following activities:

- Run-off from excavation, crushed and ground rock material from drilling
- Run off from earthmoving and spoil handling, open excavations, concrete batching for new tower construction
- Run-off from dampening systems to control dust emissions; dumping of spoil material
- Sanitary effluents from construction workers' camp
- Oil and chemical spills; washing of vehicles and other machinery

All other activities causing soil contamination discussed earlier can also cause water contamination. The significance of impact on soil pollution and soil erosion is characterized as Medium, as given in Table 113.

Mitigation

The following mitigation measures will be implemented to address the water contamination caused by the project:

- Contractor will prepare and implement a Pollution Prevention Plan prior to the start of the work. Proper baseline data will be collected.
- Contractor will be required to implement the measures prescribed in ESCP, which will be included in the contracts.
- Contractor will be required to comply with the national and WBG EHS Guidelines for waste water discharges in to the rivers.
- Contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the water
- All areas intended for storage of hazardous materials to be quarantined and provided with adequate facilities to combat emergency situations complying all the applicable statutory stipulation
- For the treatment of effluent to be discharged, sedimentation ponds will be provided to allow sediment to settle for periodic removal for disposal in designated site spoil areas. Water being discharged from these ponds will be regulated to ensure they are within turbidity limits.
- Oil and water separators and settling ponds will be installed where appropriate to minimize the risk of contaminated construction water entering the river or groundwater and degrading water quality

- Construction works near river and khals will be carried out ensuring that no debris or excavated soil fells in water

Residual Impacts

After implementation of the above mitigation measures, the impacts of the project on the water pollution will be adequately mitigated. Hence the significance of residual impacts will be Negligible, as shown in Table 113.

8.3.3 Damage to River/Canals and Tube-wells

The proposed transmission lines will cross several river/khals (water courses), as described in Section 5.2.1. A total of 10-15 shallow tube-wells falls under the RoW of transmission lines but no deep tube-wells exist in the project area which provide irrigation water to the crops of the area. Notwithstanding, the construction activities can potentially cause damage to these khals and tube-wells, which can in turn affect the irrigation system of the area and ultimately affecting the crops of the area. Significance of these impacts is High, as shown in Table 113, in view of the importance of these structures for the agriculture production of the area.

Mitigation

Tube well will be decommissioned to prevent the contamination of groundwater. Proper well decommissioning consists of removing pump, fittings, pipes and debris from tube well casing. The tube well is then filled from the bottom up with sealant materials. Sealing materials are used to prevent water from migrating into or between aquifers. They are commonly less permeable to water than the soil or rock on site. Bentonite chips or pellets, neat cement, concrete grout, and high solids bentonite slurry are approved for tube well decommissioning. A new tube well within a 500 m radius from the existing tube well will be constructed. The same volume of water will be provided as this area consists of the same aquifer. No additional impacts will be expected due to the tube well relocation. Following measures will be implemented to avoid/minimize impacts on khals and tube-wells of the area:

- During river crossings, the sags to be considered to ensure sufficient vertical clearance.
- Any excavation and other construction work near khals and tube-wells will be planned and implemented in a manner to avoid any damage to these structures.
- The vehicle movement near khals and tube-wells will be minimized. If unavoidable, it will be closely monitored to avoid any damage to these structures.
- No excavated material or debris will be released into the khals.
- The contractor will repair and restore any damage the construction activities may cause to khals and tube-wells. It will be ensured that the construction activities do not affect the water flow/availability in the khals or from the tube-wells.

Residual Impacts

After implementation of the above mitigation measures, the impacts of the project on khals and tube-wells will be mostly mitigated. Hence the significance of residual impacts will be Low, as shown in Table 113.

8.3.4 Dust and Air Pollution

Air quality will be affected and dust will be generated during construction activities. Major sources of air quality pollution are drilling activities, excavations, emissions from construction related traffic and equipment. The construction activities will also generate airborne dust and particulate matter. Dust raised from the above activities will have impacts on crops, animals and public health. These impacts will be most severe for the sensitive receptors in the area. No sensitive receptors found within the periphery of RoW of transmission lines sites. But adjacent community can be affected by

the impact of dust and air pollution due the construction activities of the transmission lines. Therefore, the significance of the impact has been assessed as Medium, as shown in Table 113.

Mitigation

To mitigate deterioration of air quality and generation of dust, the following measures will be taken:

- The equipment and vehicles used during the construction process will comply with the national as well as WBG EHS Guidelines on exhaust emissions.
- Concrete batching and asphalt plants will be located minimum 500 m away from residential areas and will have appropriate dust/emission suppression mechanisms such as wet scrubbers.
- Contractor will implement dust prevention measures such as watering of roads near the residential areas and spraying of water on loose material where required and appropriate.
- Loose material such as sand will be covered with tarpaulin when being transported on trucks.
- Regular air monitoring will be carried out near the sensitive receptors to ensure ambient air quality remains within the limits defined by national standards and WBG EHS Guidelines.
- Measures will be taken to protect the workers from excessive dust (i.e., usage of personal protective equipment).
- A GRM (discussed later in the document) will be put in place to receive complaints from public on various aspects of environmental issues, including air pollution. These grievances will be addressed by the contractor by adopting necessary pollution control measures. Continued consultations with the affected communities will be carried out during construction phase.
- In addition, the measures in ESCP on air quality management will be implemented

Residual impacts

With the help of the above mitigation measures, the potential impacts associated with air quality deterioration are likely to be adequately addressed and hence the residual impact is likely to be Negligible in significance, as shown in Table 113.

8.3.5 Noise and Vibration

The construction of the Project has the potential to generate significant noise and vibrations from blasting and piling activities. Off-site movement of construction related traffic also has the potential for significant noise generation. Potential noise levels have been estimated from various stages of construction activities and are presented in Table 114. In general, the noise levels are within the standards at a distance of 400m from the construction activities.

Table 114: Estimated Noise Levels during Construction

Stage of work	Description of works	Key Activities	Activity LAeq, 10m, dB	Predicted noise at 400m, dB	Predicted noise at 800m, dB
Site preparation	Excavation and moving soil and fill	Earthmoving	90	59	47
	Site compounds and set-up	Excavation works	90	49	37
		Transport and handling of soil/materials	70	29	30
		Storage of soil/ materials	88	47	48
		Preparation of materials (cutting, grinding)	86	45	46
	Ground preparation	Earthworks	90	51	51

Stage of work	Description of works	Key Activities	Activity LAeq, 10m, dB	Predicted noise at 400m, dB	Predicted noise at 800m, dB
Tower foundation construction	Tower foundation construction	Transport and handling of soil / materials	70	30	30
	New access road	Concrete batching	95	56	42

Vibration from drilling and excavation activities is a major source of concern if any structures and trees are located within close proximity to the blasting locations. The vibrations may cause damages to the structures and trees. The impacts of noise and vibration from construction activities has been estimated as Medium, as shown in Table 113.

Mitigation

To mitigate impacts associated with noise generation, the following measures will be taken:

- The equipment and vehicles used during the construction process will comply with the national standards as well as WBG EHS Guidelines on noise.
- Contractors will adopt appropriate noise attenuation measures to reduce the noise generation from construction activities. The noise attenuation measures will include, (i) fitting of high efficiency mufflers to the noise generating equipment; and (ii) keeping acoustic enclosures around drilling equipment.
- Regular noise monitoring will be carried out near the sensitive receptors listed in Table 114.
- A GRM will be put in place to receive complaints from public on various aspects of environmental issues, including noise pollution. These grievances will be addressed by the contractor by adopting necessary pollution control measures. Continued consultations with the affected communities will be carried out during construction phase.
- In addition, the measures in ESCP on noise quality management will be implemented.

Residual impacts

With the help of the above mitigation measures, the potential impacts associated with noise generation are likely to be adequately addressed and hence the residual impact is likely to be Negligible in significance, as given in Table 113.

8.3.6 Spoil Generation

Spoils will be generated due to the blasting and excavations for the tower foundation at a depth of 3-6 m. In the mountains with steep slope, management of these spoils will be extremely difficult, due to the absence of spaces that can be used as a potential disposal site for these materials. Improper disposal of spoils along the valley slopes may eventually deposited in to the cultivated lands or in to the rivers thus causing rockfall, landslides, soil and water pollution. The spoils will also act source of dust. The significance of the impact has been assessed as High, as shown in Table 113.

Mitigation

The first step towards addressing the impacts of spoil is to minimize the generation of spoils by recycling the excavated soil to the maximum extent possible by using it as filling material in the substations. The excess spoils should be stored in the lands provided by local communities or in the areas approved by the project management/local authorities.

Residual Impacts

With the help of the above mitigation measures, the potential impacts associated with spoil generation are likely to be adequately addressed and hence the residual impact is likely to be Negligible in significance, as shown in Table 113.

8.3.7 Solid Waste Management

The construction works generate excess materials from construction sites (concrete, steel cuttings, discarded material, vegetation), demolition wastes (dismantled transformers and other facilities), and wastes from field camps and construction yards, including garbage, recyclable waste, food waste, and other debris. A large part of this waste is biodegradable or recyclable. In addition, small quantities of hazardous waste will also be generated mainly from the vehicle maintenance activities (liquid fuels; lubricants, hydraulic oils; chemicals, such as anti-freeze; contaminated soil; spillage control materials used to absorb oil and chemical spillages; machine/engine filter cartridges; oily rags, spent filters, contaminated soil, and others). If this waste is not responsibly disposed, it can cause adverse environmental, human health and aesthetic impacts. Significance of this impacts has been assessed as Medium, as shown in Table 113.

Mitigation

The following mitigation measures will be implemented:

- Contractor will prepare and implement pollution prevention plan and waste management plan.
- The contractor will identify suitable sites for temporary storage of wastes from construction sites and demolished wastes in consultation with communities and government authorities. The wastes shall be transported for disposal in a timely manner.
- Protocols and measures will be prescribed in the ESCPs to be included in the contracts with the contractors.

Residual Impacts

With the help of the above mitigation measures, the potential impacts associated with waste generation are likely to be adequately addressed and hence the residual impact is likely to be Negligible in significance, as shown in Table 113.

8.3.8 Impacts on Wildlife/ Collision of Birds during Stringing Operation

As discussed in Section 5.4, most of the affected area is under cultivation (overhead transmission line). Therefore, the wildlife species found in the area are the ones that have adapted to human presence. These wildlife species, including mammals, reptiles and birds, are likely to be affected by construction through habitat loss/degradation, disturbance (presence of people, artificial lighting and noise), injury or death owing to construction works (including trapping in deep excavations) and increased traffic, and temporary habitat fragmentation. The natural vegetation and habitats in the area are mostly homestead forest, river and canals, small ponds, and on the periphery of cultivation fields, etc. In view of the altered nature of the habitat, the vegetation found in the project area mostly belongs to village forests, bushy land cultivable/plantation forest, roadside forest; and homestead/settlement vegetation, crop-field vegetation, as discussed in Section 5.7.3 and shown in Table 75. The significance of the impact has been assessed as Medium, as shown in Table 113. primarily because of low conservation value of these species and partly because these species already survive in the modified habitat, as specified above.

The proposed TL alignment obstructs the seasonal fly-way of migratory and local birds. Large flocks of migrating birds follow the Central Asia Fly-way with south ward migration starting from September to November and northward migration starting from February to March. During stringing of conductors, potential collisions might occur mostly with cables hanging perpendicular to the flight direction particularly with the top earth-wire because of its small diameter and poor visibility.

Mitigation

Reduction and control of artificial lighting

Artificial lighting used on construction sites and camps at night will be shaded and directed downwards to avoid light spillage and disturbance to nocturnal birds, bats and other wildlife.

Ban on hunting and poaching

A ban on hunting and poaching by construction and operation staff will be implemented to reduce pressure on threatened and protected species in the Project areas and surroundings. All construction and operation staff will be required to follow company rules and code of conduct. Signage will be installed illustrating the hunting ban on any species throughout the Project areas.

Checks for breeding birds

To minimize the potential impact to all breeding bird species, vegetation clearance will be undertaken outside of the main bird breeding period if possible. Where this is not possible, the areas to be cleared will be checked for breeding birds prior to the clearance and if nesting birds are found, appropriate mitigation measures will be implemented. This may involve avoiding construction within 50m of the active nest until the chicks have fledged.

Vegetation clearance will be carried out in a methodical manner so that any fauna present in these areas can disperse. Where clearance of dense scrub is required, it will be preceded by a hand search for mammal and/or reptile species which may be present in the sward. The dense vegetation will only be cleared once it has been established that any individuals present have fled. The incidental creation of pockets of habitat or islands will be avoided. Before and during vegetation clearance or tree felling, any animals found will be removed and released to safe refugium. There should be no burning of natural vegetation.

Stringing the T/L

The identified 39 high risk spans for flyway of migratory birds, with a length of 13793.13m. The overhead earth wire/ shield wire or ground wire of the transmission line will be installed with the bird diverters such as colored balls, when the transmission line crosses these spans. Towers on both sides of the river should have light beams focused on the balls on the power lines, at night, during ‘mid-February to end March’ and again from ‘mid-September to mid-November’. Each tower on the flyway will have blinking light on its top. Bird collision and electrocution data will also be collected during early March and October.

Residual Impacts

With the help of the above mitigation measures, the potential impacts on wild life are likely to be adequately addressed and hence the residual impact is likely to be Negligible in significance, as shown in Table 113.

8.3.9 Community Health and Safety

Community health and safety impacts during the construction and decommissioning of transmission lines are common to those of most large industrial facilities. These impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labor. Construction of the substation may cause road traffic and impact on occupation health and safety.

For transmission line projects, Community Health and Safety (CHS) considering Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) requires a comprehensive Environmental and Social Management Plan (ESMP) with specific provisions for this risk. This plan must include risk

assessments and mitigation measures to address the potential increase in SEA/SH incidents due to worker influx, and a grievance mechanism sensitive to these issues. Additionally, strategies should encompass worker awareness programs, Codes of Conduct, community consultations, and referral pathways for victims. Significance of these impacts has been assessed as High as shown in Table 113.

Mitigation

The mitigation measures to address the project impacts on communities' health and safety are listed below.

- Conduct a thorough risk assessment to understand the potential for SEA/SH, especially in relation to worker influx and community vulnerabilities.
- Develop a specific action plan to prevent and respond to SEA/SH issues, integrated into the broader Environmental and Social Management Plan (ESMP).
- The contractor will follow the Environmental Health and Safety Guidelines of Electric Power Transmission and Distribution of IFC as mentioned in Section 2.5.3;
- The contractor will follow the pandemic guidelines of WHO during the construction of the project;
- Construction camps will be located at least 500 m away from the communities. Entry of the site personnel in the local communities will be minimized to the extent possible/appropriate.
- The contractor will prepare and implement an Occupational Health and Safety (OHS) Plan that will also cover communities' health and safety aspects.
- A Code of Conduct and Guidance on GBV is to be implemented in all construction camps. Training and orientation on the Code of Conduct and Guidance on GBV is to be carried out periodically.
- The contractor will prepare and implement a Traffic Management Plan that will also address traffic safety for communities.
- The community will be informed about the nature of construction activities and the associated health and safety risks; awareness raising of the communities will be carried out for this purpose with the help of training sessions, posters, signage, and other similar means.
- Awareness raising of communities will be carried out, in a culturally-sensitive manner, about the communicable diseases including sexually transmitted infections.
- The construction sites will be fenced as appropriate to minimize entry of the local communities particularly children in the work areas.
- Construction camps and other site facilities will be fenced.
- Liaison with the community will be maintained.
- GRM will be established to address community grievances related to health and safety aspects.

Residual Impacts

Even after implementing the above-listed mitigation measures, the health and safety impacts on local communities cannot be fully mitigated. Hence the significance of residual impacts will be Medium, as shown in Table 113. Strict monitoring will be required to ensure that mitigation measures are effectively and strictly enforced.

8.3.10 Occupational Health and Safety

If not managed appropriately, activities such as site preparation, construction activities, operation of construction machinery and equipment, vehicular traffic, and the use of temporary workers' accommodation pose potential risks to the health, safety, security and therefore wellbeing of construction workers. Health and safety issues associated with the use of temporary accommodation sites include those relating to sanitation, disease, fire, cultural alienation, sleeping

space, quality and quantity of food, personal safety and security, temperature control and recreation, amongst others.

Some of the Occupational Health and Safety risks which are likely to arise during the construction phase of the Project, and are typical to many construction sites, include: exposure to physical hazards from working on heights, use of heavy equipment including cranes; trip and fall hazards; exposure to dust, noise and vibrations; falling objects; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery.

Workers on the Project, particularly sub-contracted construction workers, are vulnerable to risks to their wellbeing, health and safety on a daily basis. Appropriate health and safety management planning and execution in line with good international industry practice will be undertaken by the Project team to reduce the risks as far as possible. Significance of the above impacts has been assessed as High, as shown in Table 113.

Mitigation

The mitigation measures to address the project impacts on workers' health and safety are listed below.

- The contractor will follow the Environmental Health and Safety Guidelines of Electric Power Transmission and Distribution of IFC as mentioned in Section 2.5.3.
- The contractor will follow the COVID 19 guidelines of WHO during the construction of the project;
- The contractor will prepare and implement an Occupational Health and Safety (OHS) Plan
- Contractors will have dedicated and qualified staff for ensuring compliance with the OHS Plan
- Regular trainings will be provided to the workers on OHS aspects.
- Awareness raising material will be used including posters, signage, booklets, and others
- All site personnel will be screened for communicable diseases including sexually transmitted infections.
- Use of appropriate personal protective equipment (PPE) will be mandatory. No worker (or even visitor) will be allowed on the site without the required PPE (such as hard hat, safety shoes).
- Firefighting equipment will be made available as required at construction sites, camp sites, and particularly near the fuel storage.
- The project drivers will be trained in defensive driving. They will maintain low speed while driving through / near the communities.
- Complete record of accidents and near-misses will be maintained.
- First aid facilities will be made available at the work sites and in the camps. The contractors will engage qualified first aider(s).
- Location and telephone numbers of the nearest hospital will be displayed at appropriate places at work sites and in construction camps. If necessary, the contractor will have an ambulance available at the site.

Residual Impacts

Even after implementing the above-listed mitigation measures, the health and safety impacts on site personnel cannot be fully mitigated. Hence the significance of residual impacts will be Medium, as shown in Table 113. Strict monitoring will be required to ensure that mitigation measures are effectively and strictly enforced.

8.3.11 Traffic Congestion

The construction activities particularly laying of overhead transmission lines in rural and partly in semi-urban areas, and along the existing roads may cause traffic disruption and congestion. Significance of these impacts has been assessed as High, as shown in Table 113.

Mitigation

The following mitigation measures will be implemented to address the traffic congestion caused by the project:

- The contractor will prepare and implement a traffic management plan that will include plans for traffic control, signage, diverting or bypass.
- Construction activities will be scheduled in a manner to avoid peak traffic hours.
- Liaison and coordination will be maintained with relevant authorities such as City Corporation/Municipality and Traffic Police.
- Traffic signage will be placed where necessary and appropriate to warn the drivers and pedestrians about the construction activities.
- ESCP to be implemented.
- GRM will address the traffic congestion elated issues.

Residual Impacts

With the help of the above mitigation measures, the potential impacts associated with traffic congestion are likely to be mostly address.

8.3.12 Additional Load on Local Resources

The construction work and camp operation will require supplies such as water, fuel, and camp supplies. Obtaining these supplies from the local sources can exert additional pressure on these sources which may already be over-exploited and therefore adversely affect the local communities. Any such impact on the local community can increase their hardship and even result in disruption of the construction works. Significance of this impact has been assessed as Medium, as shown in Table 113.

Mitigation

The mitigation measures to address impacts associated with the availability of local resources and supplies are listed below.

- The contractor will prepare and implement a plan to obtain key supplies such as water and fuel, in consultation and coordination with the local community,
- The plan will ensure that there is no significant impact on the local community and local resources.
- Liaison with the community will be maintained.
- The GRM described earlier will also address community grievances related to usage of local resources.

Residual Impacts

After implementing the above-listed mitigation measures, the impacts of the project associated with usage of local resources will be adequately mitigated. Hence the significance of residual impacts will be Negligible, as shown in Table 113.

8.3.13 Site Clearance and Restoration

After the completion of the construction activities, the left-over construction material, debris, spoils, scraps and other wastes from workshops, and camp sites can potentially create hindrance and encumbrance for the local communities in addition to blocking natural drainage and or irrigation channels. Significance of these impacts has been determined as Medium, as shown in Table 113.

Mitigation

The contractors will be required to remove all left-over construction material, debris, spoils, and other wastes from the construction sites in a timely manner. The camps sites will be completely cleaned and restored in original condition to the extent possible. No waste disposal will be carried out in the streams and rivers.

Residual impacts

With the help of the above mitigation measures, the potential impacts associated with site clearance are likely to be adequately addressed and hence the residual impact is likely to be Negligible in significance, as shown in Table 113.

8.3.14Climate Change

Climate change is impacted by 765kV transmission line construction primarily through increased greenhouse gas (GHG) emissions from construction activities and disruption to natural carbon sinks, while the transmission lines themselves aim to mitigate climate change by enabling renewable energy transfer. Impacts during construction include soil erosion, habitat fragmentation, and water pollution from heavy machinery and infrastructure development. Following impacts of Climate Change are expected during construction of proposed transmission lines.

(a) Increased GHG Emissions: Construction machinery and activities, such as earthmoving and material transport, contribute to GHG emissions, which accelerate climate change.

(b) Deforestation and Land Use Changes: Clearing land for tower foundations and access roads can lead to deforestation, which diminishes the capacity of natural carbon sinks and exacerbates climate change.

(c) Soil Erosion: Disturbed soil can lead to erosion, which can affect the surrounding ecosystems and contribute to land degradation.

(d) Water Pollution: Runoff from construction sites can carry sediment and other pollutants into waterways, impacting water quality.

(e) Habitat Fragmentation and Loss: The physical footprint of the transmission line can fragment and reduce the available habitat for wildlife, disrupting ecosystems

Mitigation

(a) Environmental Impact Assessment (ESIA): This study is conducted to identify and assess the potential environmental and social impacts of the project, guiding the development of mitigation strategies.

(b) Biodiversity Impact Assessments: Studies are performed to understand the impact on local biodiversity and to develop plans to protect sensitive ecosystems.

(c) Site Selection and Planning: Projects aim to avoid or minimize impacts by selecting routes that are as far as possible from sensitive areas, like forests and wildlife sanctuaries.

(d) Restoration and Reforestation: Companies often implement plans for restoring disturbed areas, replanting topsoil, and undertaking tree plantations to buffer the visual impact and enhance the environment.

(e) Stakeholder Consultation: Including local communities, wildlife authorities, and other stakeholders in the planning process helps ensure potential impacts are identified and addressed.

8.3.15Transboundary/Global Risks

Transboundary risks for Bangladesh's 765kV transmission line project primarily concern regional energy security and diplomatic relations, particularly with India, regarding potential future power flows and the use of Bangladesh's territory for a wider grid expansion. While the primary project in Bangladesh is an internal transmission corridor, the possibility of integrating it into a future transboundary infrastructure presents risks related to differing national interests, energy security, and the legal framework for such integration. Potential transboundary, regional and global risk are:

(a) Regional Energy Security: India's proposal for a 765kV cross-border line through Bangladesh indicates a potential need for seamless electricity links that could influence regional energy dynamics and potentially lead to dependencies or security concerns for Bangladesh.
(b) Diplomatic & Legal Framework: Building a transboundary line requires extensive due diligence and agreement on legal, operational, and financial aspects. Bangladesh's concerns about using its territory for Indian hydropower evacuation highlight potential disputes over energy source and flow management.
(c) Geopolitical Factors: Complex regional geopolitics, such as China's influence in the region, add complexity to the discussion of cross-border power corridors, as seen in India's proposal for a route through Bangladesh to enhance overall security, notes New Age BD.
(d) Climate Change Impacts: The construction and operation of large-scale infrastructure like transmission lines are vulnerable to global climate change effects. Bangladesh, being a low-lying delta, faces increased risks from extreme weather events and sea-level rise, which can affect project implementation and long-term stability.
(e) Supply Chain Vulnerabilities: Reliance on imported specialized equipment for 765kV lines can expose the project to global supply chain disruptions, affecting timely completion and potentially increasing costs.
(f) Financial Stability of Funding Partners: While the Korean Eximbank is involved, the global economic climate and the financial stability of such institutions can indirectly impact the project's funding and its long-term viability.

Mitigation

Consultants are engaged to prepare in-depth feasibility study reports, which include technical, financial, economic, environmental, social, and institutional analyses to ensure the project's viability and align with international requirements. The project aims to build climate-resilient and technology-enabled infrastructure, with EDCF's involvement helping to embed climate adaptation components and meet international ES management standards. Collaboration with various government agencies, such as the Department of Environment (DOE), is essential for obtaining clearances and ensuring proper infrastructure planning.

8.3.16 Hydrological Distributaries

During the construction of the 765kV transmission line, the primary impacts on hydrological distributaries were associated with potential waterlogging, soil erosion, and altered water flow from the disturbance of riverbanks, construction of infrastructure, and changes to drainage patterns in flood-prone areas. As mentioned above, a total of three major rivers and many canals are closely related with the crossing proposed transmission line. Major direct impact is:

(a) Alteration of Riverbanks and Landforms: Construction of tower foundations and access roads could disturb the natural configuration of riverbanks and low-lying agricultural land, which are crucial parts of the hydrological system.
(b) Soil Erosion: The disturbance of soil during construction can lead to increased soil erosion, especially in areas with high rainfall or tidal influences, which can then silt up downstream river channels and distributaries.
(c) Increased Waterlogging and Drainage Disruption: Construction activities, such as the placement of transmission line towers, could block natural water flow paths, leading to temporary or permanent changes in water levels and increased risk of waterlogging in agricultural fields and populated areas.
(d) Impacts on Agriculture: Hydrological changes, like increased waterlogging, can damage crops, particularly the dominant rice crops (Boro and Aman), which are sensitive to excess water and drought conditions.
(e) Sedimentation: Runoff from disturbed construction sites carries soil into the distributaries, reducing their depth and affecting water quality, impacting aquatic ecosystems.

Mitigation

(a) Environmental Management Plan (EMP): The project included a specific EMP and RP, which guided construction activities and required contractors to manage environmental and social issues at tower locations and substation sites.
(b) Environmental Safeguards: The project aimed to implement safeguard policies from the Asian Development Bank (ADB) and the Government of Bangladesh, requiring detailed Environmental Impact Assessments (EIAs) to understand and mitigate impacts on water bodies.
(c) Measures Against Erosion: Practices like maintaining vegetated buffer zones along riverbanks and using appropriate erosion control methods during construction help prevent soil runoff into water bodies.
(d) Drainage Management: The project planned to minimize impacts on natural drainage by designing infrastructure in a way that preserves natural water flows, preventing blockage and waterlogging.
(e) Coordination with Local Authorities: The project involved coordination with the Deputy Commissioner's office and local communities to ensure compliance with Land Acquisition Rules and compensation for any losses of agricultural land or crops.

8.4 Significant Impacts during O&M Phase

8.4.1 Public Health Impacts from Electro Magnetic Fields (EMF)

Now a days, the land resources in developing countries, particularly in transmission corridors, have become increasingly dense with construction of large transmission lines. It is not economical to build new transmission line corridors. On the contrary, ever increasing in power demand posing a challenge to mandatorily examine the possibilities of increasing power handling capabilities of existing transmission lines or construct a new line with different design criteria. This economical requirement made the power utilities to utilize the existing transmission line corridors with higher voltages, viz. Ultra-High Voltage (UHV) or Extra High Voltage (EHV) transmission level. In this UHV/EHV voltage level, emission of electric and magnetic fields in their vicinity is likely to have hazardous effects on human beings, plants and animals when their exposure level exceeds specified limits. Based on the guidelines set by International Commission on Non-Ionizing Radiation Protection (ICNIRP), countries have their own limits for exposure to electric and magnetic Fields.

In case of AC power lines, electric field at ground levels is mainly due to capacitive coupling between the conductors and the living beings at ground level. Strength of electric field depends upon voltage associated with electric charges. Higher the voltage and stronger the electric field. UHV lines

produces stronger electric field than that of low voltage lines. Magnetic fields are created by moving charges. A stream of charges moving in the same direction constitutes an electric current. Same as that of electric strength, greater the current, the stronger the magnetic field.

The possibility of biological effects due to AC electric and magnetic fields generated by transmission lines have been a source of public concern. Results of research on effect of electric and magnetic fields on a human being health is inconclusive; the public opinion is remains in opposition to increase the transmission voltage level. Although, the results of numerous scientific studies performed in many countries around the world have so far failed to prove that they are hazardous to health, doubts still persist in this regard. To solve this important public concern regarding health issue, it is mandatory to measure the electric and magnetic fields in transmission line vicinity.

International Commission on Non-Ionizing Radiation Protection (ICNIRP) has published guidelines for limiting the exposure to time varying electric and magnetic fields (1 Hz to 100 kHz). As per ICNIRP guidelines 2010, the reference levels for general public exposure to time varying electric and magnetic fields are 5 kV/m and 200 µT respectively and for occupational exposure to time varying electric and magnetic fields are 10 kV/m and 1000 µT respectively. Hence, to create awareness to general public, on interest of power utilities, Central Power Research Institute has performed measurement of electric and magnetic fields on 765 kV single circuit transmission line in Bangladesh. As per IEEE Std. 644, the measurement is to be carried out in flat surface. However, in developing countries like India, where the agriculture is the backbone of economy, getting such measurement sites without any vegetation and irregularities is challenging

The electric and magnetic field are believed to cause cancer and affect nervous system. Today, among scientists there is still a considerable difference of opinion as to the degree of possible detrimental health influence caused by these fields. There are several investigations and publications reporting a severe influence of electromagnetic fields, but the discussion about biological and health effects is still going on. The International Council on Large High Voltage Electric Systems (CIGRE), a permanent non-governmental and non-profit-making international association based in France, publishes from time-to-time summaries of latest researches on bio and health effects of electric and magnetic fields.

International Standards and Guidelines

Overhead lines produce both electric and magnetic fields. Electric fields are created by differences in voltage. The strength of the electric field is measured in kilovolts per meter (kV/m). Any electrical wire that is charged will produce an associated electric field. Such fields exist even when there is no current flowing. The higher the voltage, the stronger the electric field at a given distance from the wire. Magnetic fields are created when electric current flows; the greater the current, the stronger the magnetic field. Electric fields are strongest close to a charge or charged conductor, and their strength rapidly diminishes with distance from it. Magnetic fields arise from the motion of electric charges. The strength of the magnetic field is measured in micro tesla (µT). Health concerns over exposure to EMF are often raised when a new transmission line or substation is proposed. However, in spite of all the studies that have been carried out over the past 30 years, there is still no persuasive evidence that the fields pose any significant health risks. New lines may induce new EMF and will traverse some populated areas. The IFC EHS Guidelines (June 2007) recommend using exposure guidelines published by the International Commission on NonIonizing Radiation Protection (ICNIRP). The ICNIRP (2010) has set the limits for public exposure at 50 hertz as: (i) electric field strength (kV per meter) below 5 kV/m; and (ii) magnetic field strength (micro tesla) below 200 µT (equivalent to 160 A/m); while for the occupational exposure (i) maximum allowed electric field, strength is 10 kV/m; and (ii) maximum allowed magnetic field strength is 1000 µT for high voltage overhead line.

The exposure limits for EMF fields developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) - a non-governmental organization formally recognized by WHO[9], are given in table below. WHO, also, concluded that EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on human health. The EMF field of the proposed transmission line is within the ICNIRP Standards.

Table 115: Electrical and Magnetic Field from Transmission Line

Distance from Centre of transmission Alignment (m)	Electric Field (kV/m)	Magnetic Field (μT)
40 (edge of RoW)	1.34	104.81
50	0.59	68.33
60	0.17	46.17
70	0.03	32.30
80	0.03	23.31
90	0.03	17.3
100	0.03	13.14
ICNIRP Standards	Public Exposure: 5; Occupational Exposure: 10	Public Exposure: 200; Occupational Exposure: 1000

The possibility of human exposure to electric & magnetic field is increasing with the use of HV, EHVAC & UHVAC voltage level for power transmission, which has raised concerns on their possible health effects. General guidelines for electric and magnetic field exposure have been established for occupational and public exposure by national and international organizations. These guidelines are intended to limit electric and magnetic field exposure that can results in shocks or might cause health effects.

In 1974, the "International Radiation Protection Association" (IRPA) formed a working group on non-ionizing radiation (NIR), to examine the problems arising in the field of protection against the various types of NIR. At the IRPA congress in Paris in 1977, this working group became the "International Non-Ionizing Radiation Committee" (INIRC). In cooperation with the Environmental Health division of the World Health Organization (WHO), the IRPA/INIRC developed a number of health criteria documents on NIR as part of WHO's environmental health criteria programme, sponsored by the United Nations Environment Programme (UNEP).

At the 8th international congress of the IRPA, a new, independent scientific organization "International Commission on Non-Ionizing Radiation Protection" (ICNIRP) was established as a successor to the IRPA/INIRC. The functions of the commission are to investigate the hazards that may be associated with the different forms of NIR, develop international guidelines on NIR exposure limits, and deal with all aspects of NIR protection.

The International Committee on Electromagnetic Safety (ICES) is a committee under the sponsorship of the Institution of Electrical and Electronic Engineers, a USA-based organization (it is also known as IEEE Standards Coordinating Committee 28). It develops different standards for different frequency ranges which are published as IEEE standards. IEEE C95.6 covers 0 to 3 kHz and therefore includes power frequencies. Guidelines of CEA Urban RoW and ICNIRP are generally being followed for limiting the exposure of electric and magnetic field from transmission lines. The limits for electric field are 5kV/m for general exposure at the edge of RoW and 10kV/m for exposure within the Right of Way. The limits for magnetic field are 200uT for general exposure at the edge of RoW and 1000uT

[9]. EMF Fields, WHO Webpage http://www.who.int/peh-emf/standards/en/

for exposure within the Right of Way. The occupational and public exposure limits recommended by ICNIRP & IEEE guidelines are mentioned in below table:

Table 116: Reference levels for electric and magnetic field exposure

Sl	Organization	Type of Exposure	E-field (kV/m)	B-field(μT)
1.	ICNIRP	Occupational	10	1000
		General Public	5	200
2.	IEEE	Occupational	20	2710
		General Public	5	904

Note:
a) Within power line right of way, the guideline is 10kV/m
b) Sources: ICNIRP, 2010 & IEEE, 2002, CEA Urban RoW guidelines
c) Occupational Exposure: All exposure to EMF experienced by individuals in the course of performing their work
d) Public Exposure: All exposure to EMF experienced by members of the general public.

Simulation Results of 765kV Transmission Lines

All the measurements were carried out at 1-meter height from the ground level as per IEEE standard 644-1994 guidelines and also, at 1.8 meter from the ground (i.e., at normal human height) to study the effective field intensity levels on human beings. Distance between the sensor and operator was ensured to be more than 2.5m.

a) Longitudinal Profile

The longitudinal profile of electric and magnetic field strengths was measured along the line at 1 m and 1.8m above the ground level. The longitudinal profile measurements were carried out at generally 10 no. of points (refer below Figure) under all the three phases of the single circuit line and both circuits of double circuit line starting from the one tower to the adjacent tower.

(b) Lateral Profile

The lateral profile of electric field strengths along a span were measured at 1 m and 1.8 m above the ground level in a direction normal to the line at maximum sag point. The lateral profile measurements were made between two outer phase of single and double circuit line and up to a lateral distance of corresponding RoW from the outer phase of transmission line or to a distance of insignificant field at generally 8 no. of points (refer below Figure) spread across the RoW.

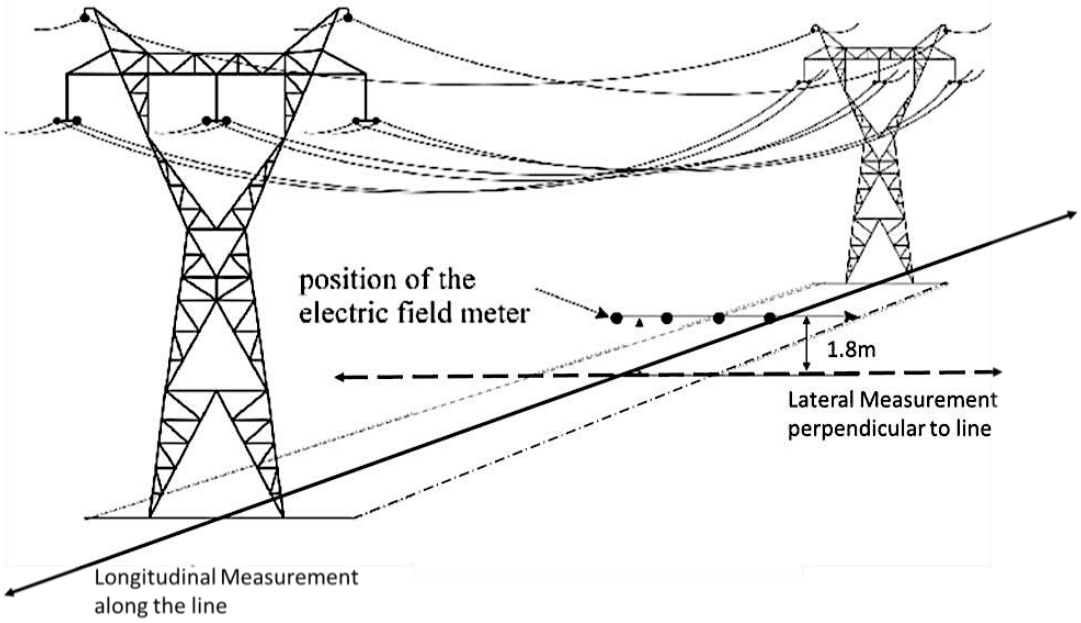


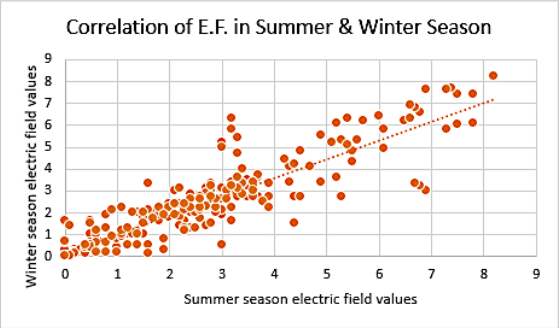
Figure 101: Lateral and Longitudinal measurements

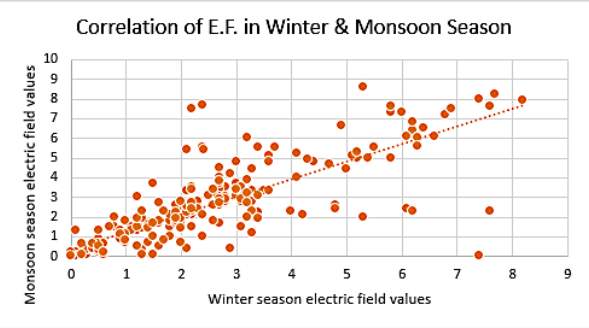
The results discussed in the report are based on the measurements carried out under actual site conditions and system load conditions prevailing at the time of measurement. The electric and magnetic field measurements were carried out under selected 132kV, 400kV and 765kV transmission lines of Power Grid in summer, winter and monsoon seasons to study the impact of environmental factors on the field values however, measurement at some of the points couldn't be performed in certain seasons due to presence of crops/rain/water-logging. The measurement was performed at 1-meter height from the ground level as per IEEE: 644-1994 guidelines and also, at 1.8 meter from the ground (i.e., at normal human height) to study the effective field intensity levels on human beings.

It is observed that the longitudinal profile of electric and magnetic fields reaches maximum value at the maximum sag point and they reduce from the maximum sag point towards the towers. The lateral profile of electric field reaches maximum under each of the three phases and reduces as we move away from the phase conductors in direction transverse to the line. Also, the electric field under the middle phase is generally less than the electric field under the outer phases. The lateral profile of magnetic field reaches maximum value under the middle phase and then reduces as we move further away from the middle phase in direction transverse to the line. Also, the magnetic field under the middle phase is generally more than the magnetic field under the outer phases.

The presence of tree/bush at ground potential has a significant effect in electric field distribution in its vicinity. The effect of bush/tree is clearly visible in few of the cases above where the electric field value reduces drastically below the bush/tree. In general, the presence of tree/bush shifts the effective ground plane near to the top of vegetation resulting in increase in electric field on the tip of bush and simultaneously shielding the area below the bush. The effect of wet land can also be seen in few of the cases where the electric field increased significantly. However, the presence of the bush/tree/wet lands doesn't have any significant effect on the magnetic field distribution.

For correlation study, only those points were considered where measurements were carried in all three seasons. The Electric and Magnetic field values for these points were sorted as per temperature and humidity to analyze whether the field values are following any specific trend w.r.t. temperature and humidity. No general trend was observed between field values and environmental parameters; however, the field values of all seasons were found to be highly co-related. The co-relation between field values of different seasons is shown in figure below:





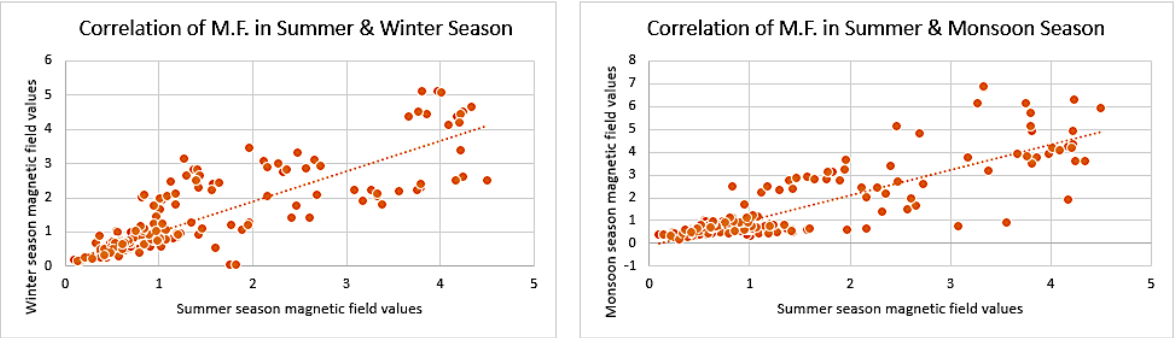


Figure 102: Correlation profile of Electric and Magnetic field values of all 3 seasons

The electric and magnetic fields obtained under all the transmission lines in all the seasons were found to be normal and well within the acceptable limits w.r.t to the occupational as well as public exposure limits of IEEE and ICNIRP guidelines.

Mitigation

Exposure to EMF has already been considered during the design of the transmission line conductors and RoW to ensure compliance with the internationally recognized standards. Hence, no additional mitigation measures are proposed. Considering siting new facilities so as to avoid or minimize exposure to the public. Installation of transmission lines or other high voltage equipment above or adjacent to residential properties or other locations intended for highly frequent human occupancy, (e.g., schools or offices), should be avoided. If EMF levels are confirmed or expected to be above the recommended exposure limits, application of engineering techniques should be considered to reduce the EMF produced by power lines, substations, or transformers. Examples of these techniques include:

- Shielding with specific metal alloys
- Burying transmission lines
- Increasing height of transmission towers
- Modifications to size, spacing, and configuration of conductors

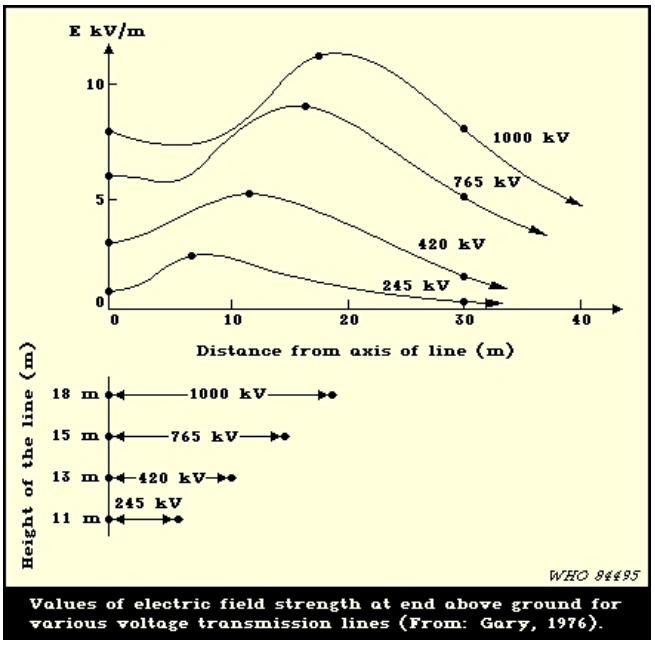


Figure 103: Electric fields of different voltages regarding height and distance

Residual Impacts

The electromagnetic fields will be regularly monitored during O&M phase to ensure compliance with the ICNIRP standards and if required additional mitigation measures will be proposed during O&M phase. The following figure demonstrates the EF impacts for 765kV lines are negligible.

8.4.2 Audible Noise and Radio Interference from Transmission Lines

Audible Noise from Transmission Line occurs primarily in foul weather. In Dry Weather conditions, the conductor usually operates below corona inception level and generates few corona sources for audible noise. However, in wet conditions, water drops impinging or collecting on conductor produce a large number of corona discharges and thereby creating bursts of noise. Therefore, the audible noise increases to such an extent that sometimes it represents one of the limitations for the design of transmission line conductor. The audible noise for the proposed transmission lines has been estimated and presented in table below. The noise levels during fair weather are generally within the national standards. However, during rainy periods, the noise levels will exceed the night time standards up to 100m from the center of TL alignment.

Radio interference also called radio influence is a noise type that occurs in the Amplitude Modulation Radio reception including the standard broadcast band from 0.5 to 1.6 MHz. It does not take place in Frequency Modulation bands. Power line interference tends to be roughly in inverse proportion to the frequency. Radio interference can be predicted by applying Empirical or Comparative formula as a result of regression analysis performed on experimental data of Radio Interference of various variables such as conductor diameter, surface gradient, lateral distance from the line etc.

Instead of using absolute noise level, as a criterion for rating interference level, it is more logical to use a relative measure as signal to noise ratio. This parameter is generally employed to affect the effect of transmission noise on AM Radio broadcast. The radio interference is calculated and presented in table below.

No standard limit exists for Radio Interference but Canadian Standard Association has developed the recommended limits for Electromagnetic Noise based on the line voltage. For high voltage level of 765 kV, the acceptable limit is 60dBA in fair weather measured at the distance 40 meter from center of tower. The estimated radio interference levels from Dasu TL will be within these standards.

Table 117: Electrical and Magnetic Fields from Transmission Line

Distance from Centre of transmission lines Alignment (m)	Audible Noise (dBA)		Radio Interference (dBuV/m)	
	Rain Weather	Fair Weather	Rain Weather	Fair Weather
40 (edge of RoW)	51.5	26.5	59.6	42.6
50	50.8	25.8	57.4	40.4
60	50.1	25.3	55.2	38.2
70	49.4	24.4	53.5	36.5
80	48.9	23.9	52.1	35.1
90	48.4	23.4	50.9	33.9
100	47.9	22.9	49.7	32.7
National Standard	Residential Area: Day: 55; Night: 45		Canadian Standard Association: 60	

Mitigation

Exposure to noise and radio interference from transmission lines has already been considered during the design of the transmission line conductors and RoW to ensure compliance with the national and

international standards. In addition, Power Grid will conduct noise monitoring at the operation stage to ensure the compliance with ECR, 2023. Hence, no additional mitigation measures are proposed.

Residual Impacts

The significance of residual impact would be Negligible

8.4.3 Diminution of Land Value in the RoW Corridor and Administrative Issue Management RoW Corridor

There is no doubt that the value of land in the width of RoW of transmission lines will be decreased as people cannot expand their structures vertically. The presence of transmission lines and towers will significantly reduce the market value and real estate potential of the land under corridor of transmission line RoW. This impact would be major though loss of valuable agricultural land under the transmission line towers would also be significant. Table below shows the land use in RoW areas of transmission lines. The major land use was found for agriculture (668.05 ha) considering 70m RoW corridor. When the land owners intend to build structure on new land/agriculture land which fall under the RoW of this project, cannot build vertically. Moreover, it will be risk and health hazard issue for them to stay there for long time. Significance of this impact has been assessed as High, as shown in Table 113.

Mitigation

According to Electricity Rules 2020, there is no scope to provide compensation towards diminution of land value in the width of RoW corridor due to laying of transmission line. Government can explore possibility of enlarging scope of survey to include land scheduling for complete RoW width including name of land owners to facilitate payment of diminution of land value compensation to all eligible persons.

Residual Impact

Since the reduced value of the land within the transmission line RoW cannot be fully mitigated, the residual impact will remain High, as shown in Table 113.

8.4.4 Tree Cutting during Maintenance Activities

The trees under the overhead transmission line need to be trimmed to a certain height so as to maintain a safe distance from the top of the trees to the transmission line conductor. Depending upon the type of these trees, this trimming can cause loss of production (in case of fruit trees) or reduction in its value (in case of timber tree). Significance of these impacts has been assessed as Medium, as shown in Table 113.

Mitigation

Compensatory tree plantation should be carried out where necessary. In case of private trees, compensation will be paid to the owners for the loss of production or loss of its value.

Residual Impacts

Even after implementing the above mitigation measures, the impact of the project on the trees under the proposed transmission lines will not be fully mitigated. Hence the significance of residual impacts will remain Medium, as shown in Table 113.

8.4.5 Risk of Bird Collision and Electrocution

The overhead transmission lines can potentially cause bird collision and electrocution. Fatal collisions occur mostly with cables hanging perpendicular to the flight direction particularly with the top neutral conductor because of its poor visibility. The bird collision may occur in river and forest crossing areas of the project.

ESIA team collected migratory or bird species data of Chunati Wildlife Sanctuary (CWS) located about 2-3-km east from proposed transmission line. While specific numbers aren't available, Chunati Wildlife Sanctuary is part of a national system that includes migratory birds. A baseline study in 2018, covering five sites including Chunati, recorded 200 species, with 30 (15%) being migratory and 170 (85%) resident species. These data may be used to develop a Collision Management Plan. A relative risk category was identified for each line-span based on the numerical ranking or linear scoring system. The 39 highest-risk spans with a total length of 13793.13m (i.e., relative risk 9 through 12) are sections of line that are perpendicular to migration corridors and/or are near sensitive species of CWS. The list of the spans is presented below.

Table 118: List of towers and span length

Tower Nos.		Span Length	
From	To	m	km
82	83	388.9982	0.3889982
83	84	341.1791	0.3411791
84	85	338.9921	0.3389921
85	86	294.5569	0.2945569
86	87	301.799	0.301799
87	88	296.9711	0.2969711
88	89	346.986	0.346986
89	90	376.601	0.376601
90	91	362.492	0.362492
91	92	365.781	0.365781
92	93	363.97	0.36397
93	94	353.2371	0.3532371
94	95	358.538	0.358538
95	96	365.0439	0.3650439
96	97	351.3674	0.3513674
97	98	349.2499	0.3492499
98	99	341.3518	0.3413518
99	100	333.3024	0.3333024
100	101	334.0676	0.3340676
101	102	323.5289	0.3235289
102	103	348.0157	0.3480157
103	104	367.0544	0.3670544
104	105	368.27	0.36827
105	106	371.198	0.371198
106	107	360.7846	0.3607846
107	108	388.9923	0.3889923
108	109	352.3999	0.3523999
109	110	302.3032	0.3023032
110	111	427.9451	0.4279451
111	112	361.6434	0.3616434
112	113	367.9441	0.3679441
113	114	312.2471	0.3122471
114	115	324.5456	0.3245456
115	116	378.1257	0.3781257
116	117	382.2809	0.3822809
117	118	359.5316	0.3595316
118	119	358.8155	0.3588155
119	120	385.5365	0.3855365
120	121	387.485	0.387485
Total Distance		**13793.13**	**13.79**

Power line structures (towers) provide perching, roosting, and nesting substrates for some avian species especially for birds of prey (raptors). Due to their large wingspans, the raptors may simultaneously come in contact with two energized parts or one energized and one neutral/grounded part of the transmission lines/their towers, potentially resulting in electrocution. Although raptors are most often considered when addressing electrocution risk, other birds such as crows, ravens, magpies, small flocking birds and wading birds can also be electrocuted. Closely-spaced exposed equipment, such as jumper wires on transformers, poses an electrocution risk to small birds.

Figure 104: Bird Diverters on power lines

The electrical design factor most crucial to avian electrocutions is the physical separation between energized and/or grounded structures, conductors, hardware, or equipment that can be bridged by birds to complete a circuit. As a general rule, electrocution can occur on structures with the following characteristics:

- Phase conductors separated by less than the wrist-to-wrist or head-to-toe (flesh-to-flesh) dimensions of a bird. The wrist is the joint toward the middle of the leading edge of a bird's wing. The skin covering the wrist is the outermost fleshy part on the wing.
- Distance between grounded hardware (e.g., grounded wires, metal braces) and any energized phase conductor that is less than the wrist-to-wrist or head-to-toe (flesh-to-flesh) distance of a bird.

Mitigation

The maximum length and wingspan of the birds are generally within 1.5m and 3m respectively. Hence, mitigation to prevent or reduce the bird electrocution is possible by maintaining a minimum

vertical distance of 1.5m and horizontal distance of 3m between the energized parts of the transmission line. The phase to phase and phase to ground separations of 400kV and 765kV towers are larger.

The identified 39 high risk spans for flyway of migratory birds, with a length of 13793.13m. The overhead earth wire/ shield wire or ground wire of the transmission line will be installed with the bird diverters such as colored balls (Figure 95), when the transmission line crosses these spans. Towers on both sides of the river should have light beams focused on the balls on the power lines, at night, during 'mid-February to end March' and again from 'mid-September to mid-November'. Each tower on the flyway will have blinking light on its top. Bird collision and electrocution data will also be collected during early March and October.

Residual Impacts

After installation of bird diverters and colored bills, risks of bird collision and electrocution will be adequately mitigated. Hence the significance of residual impacts will be Negligible, as shown in Table 113.

8.4.6 Occupational Health and Safety during Operation and Maintenance

Workers may be exposed to occupational hazards from contact with live power lines during, maintenance, and operation activities. They are also exposed to occupational hazards when working at elevation and live wires, and exposure to electric and magnetic fields, and to fuels during maintenance, and operation activities. Significance of these impacts is High, as shown in Table 113.

Mitigation

Power Grid has Standard Operating Procedures (SOPs) on Workers' Health and Safety and these will be implemented during the operation. Regular training will be provided to the staff on the SOPs and risk registers (reporting and recording of accidents and near misses) will be maintained. The SPOs are explained below.

General Principles: Accident prevention can be accomplished only through possessing and applying safety know-how and wholehearted cooperation of all members of the organization. Learn and understand the following five basic principles in job safety to deal with the hazards:

- Identify the hazards.
- Eliminate the hazards wherever practical.
- Control the hazards when they cannot be eliminated.
- Protect against injuries in case a hazard gets out of control.
- Minimize the severity of an injury, if an accident occurs.

Neither management and supervision, nor the Safety Code can prevent accident without the help of each employee. Unsafe workers are a danger to themselves, their fellow workers, the public property and the equipment with which they work. Due care and attention to all safety rules and devices is essential not only to prevent injury to the workers but also to protect equipment. Capable and mentally alert employees will avoid accidents by learning all they can about their work, using proper safeguards and protective equipment and avoiding shortcuts and make shift work methods. Good operation is safe operation. This is true for both employees and equipment. A job done safely is job done efficiently. Accidents do not "just happen". Accidents are the natural result of unsafe condition or unsafe acts, usually a combination of both. Machinery and equipment generally are manufactured to perform safely within limits of design. In fact, statistics show that more than 90 percent of accidents are due to the human element, such as failure to use safety devices and observe safety rules and procedures.

Residual Impacts

Even after the implementation of above measures, the safety risks will not be fully mitigated and therefore the significance of the residual impact will remain Low, as shown in Table 113.

Chapter 9
Social Impact Assessment

This chapter predicts, access and summarizes the likely positive and negative direct and indirect impacts due to loss of land, tree, structures, etc. The chapter also describes the mitigation measures in terms of its predicted impact associated with the intervention of the project.

9.1 Project Impacts

The project's potential impacts and their significance have been assessed using the methodology described in Section 1.7. A summary of these impacts and their significance along with the mitigation measures are presented in *Table 119*.

Table 119: Summary of potential social impacts, their significance and mitigation measures

Potential Impact	Sensitivity	Magnitude	Significance before Mitigation	Mitigation and Enhancement Measure	Significance of Residual Impact
Impacts from Siting					
Impacts due to land acquisition for Substations	Severe	Major	High	Cash compensation as provided in the RP.	Low
Impact on income and livelihood sources of affected households including vulnerable households	Severe	Major	High	Additional cash compensation and livelihood assistance and as provided in the RP	Low
Impacts during Construction/Implementation					
Construction induced impacts	Severe	Major	High	Construction of substations, transmission lines tower, etc. compensation as provided in the RP	Low
Impacts due to construction of towers	Severe	Major	High	Cash compensation for land of tower footings	Low
Employment opportunities for local communities	Mild	Moderate	Medium (positive)	Preference to the local communities in the construction works; Employment Policy to be announce	-
Impact on land use	Severe	Moderate	Low	Agricultural land will be converted into infrastructure facility	Moderate
Crop damage	Severe	Minor	High	Crop damage will be minimized through astute construction and site management and scheduling of construction works; Compensation will be paid to the growers/landowners	Low

Potential Impact	Sensitivity	Magnitude	Significance before Mitigation	Mitigation and Enhancement Measure	Significance of Residual Impact
Impacts from access roads and damages to local infrastructure and public utilities	Severe	Major	Low	Minimize damages to infrastructure and public utilities; compensation as per RP, and relocation of utilities; Coordination with relevant entities	Medium
Blocked access due to construction activities	Mild	Moderate	Medium	Traffic management plan to be implemented; alternate routes to be identified in consultation with communities and relevant authorities; GRM to be established.	Negligible
Social conflict and influx of workers	Mild	Moderate	Medium	Camps to be established at least 500 m away from communities (preferably inside the substations); contractor to enforce code of conduct to respect local norms and culture; movement of outside workers will be restricted to work sites and workers' camps; liaison with local communities to be maintained; GRM to be established.	Negligible
Damage to cultural Resources	Major	Moderate	High	Such sites to be demarcated and avoided during construction activities; liaison with local communities to be maintained; GRM to be established.	Negligible
Impact of COVID 19	Major	Major	High	Guidelines of WHO will strictly be maintained	Low
Gender issues	Major	Major	High	The contractor will prepare and implement Gender Based Violence (GBV) Prevention Plan (as part of the construction environmental and social management plans – discussed later in the document); code of conduct for workers will include gender aspects (such as GBV and SE); trainings, awareness raising and orientation to be provided to workers will include gender aspects; GRM will also address gender aspects (e.g., GBV and SE).	Low
Impacts from O&M Activities					

Potential Impact	Sensitivity	Magnitude	Significance before Mitigation	Mitigation and Enhancement Measure	Significance of Residual Impact
Diminution of land value in the width of RoW Corridor	Severe	Major	High	There is no mitigation for this impact.	High

9.1.1 Employment Opportunities

As described in Section 3.11, the construction contractor(s) will have a sizeable work force. A large proportion of this workforce will be skilled and semi-skilled laborers including drivers, machinery operators, steel fixers, technicians, electricians, fitters, welders, watchmen, camp staff, warehouse staff, and manual laborers. The local communities during the stakeholder consultations have shown great desire to be included in the project's workforce (see Section 6.4). In line with the aspirations of local communities, the contractors will be contractually bound to maximize employing the locals as appropriate. In addition to maintaining good relations with the local communities, maximizing local employment may also be cost effective since engaging workforce from other parts of the Country could be costlier.

Mitigation

This is a beneficial impact of the project and hence does not need any mitigation as such. The contractors will be required to formulate an employment policy to ensure equitable availability of employment opportunities to all communities within the project area particularly the project affected persons (PAPs). It will also be ensured that no child labor is engaged by the project or its contractors/suppliers.

Residual Impacts

Power transmission projects can have significant, lasting positive impacts on employment, both directly and indirectly. While construction creates temporary jobs, the enhanced power infrastructure leads to long-term employment gains by enabling businesses to operate more efficiently and expand, particularly in sectors reliant on electricity. Power transmission projects can be a catalyst for both short-term and long-term job creation, contributing to overall economic growth and development, especially in regions with limited access to reliable electricity

9.1.2 Access Restrictions

9.1.2.1 Blockage of Access Routes

The construction activities can potentially block local roads and routes particularly because transmission line laying is a linear activity. This can adversely affect the local communities particularly in urban areas and also in areas where accessibility is already an issue. About 33-km of transmission line passes adjacent to the town area. So, any such disturbance to the local community can also result in disruption of the construction works. Significance of this impact has been assessed as Low, as shown in *Table 119*.

Mitigation

The mitigation measures to address impacts associated with the blockage of local routes are listed below.

- The contractor will prepare and implement a traffic management plan (TMP), in consultation and coordination with the local community

- The community will be informed about the nature of construction activities and possibility of any blocked route; alternate routes will be identified with the help of local/affected community. Duration of such blockage will be minimized to the extent possible.
- Liaison and coordination will be maintained with relevant authorities such as City Corporation and Traffic Police.
- Liaison with the community will be maintained.
- The GRM described earlier will also address community grievances related to any blockage of local routes.

Residual Impacts

After implementing the above-listed mitigation measures, the impacts of the project associated with blockage of routes will be adequately mitigated. Hence the significance of residual impacts will be Negligible, as shown in *Table 119*.

9.1.2.2 Impacts from Access Roads and Damages to Local Infrastructure

The construction activities will require using/establishing tracks to access the RoW from the existing road network. It has been estimated that on average about 200 m long access track will be used for each tower location. Though exact locations and hence ownership of the land under these access tracks is not known at this stage, it can however be estimated that crops will be damaged over about 70.8 ha of cultivated land (200m long x 15 m wide x 236 towers). It is also estimated that salt production will be hampered of about 10.8 ha (200m long x 15 m wide x 36 towers).

In addition to the crop and salt damage, the construction activities including establishing and using access tracks may also damage the local infrastructure such as existing roads/tracks, tube-wells, water courses, and drainage channels.

Significance of these impacts has been assessed as High, as shown in *Table 119* primarily because of the importance of agriculture and salt production as the main livelihood of the communities in the area.

Mitigation

These damages caused by the establishing and or using access tracks will be compensated by paying cash compensation equivalent to value of crops and salt for two seasons. For any inadvertent damage to the existing infrastructure, the contractor will be contractually liable to repair and or replace the damaged infrastructure to original or better condition. The GRM established at the site will also address any community grievances related to the damaged infrastructure.

Residual Impacts

After payment of the compensation for crop and salt damage, the impacts of the project on livelihood of the affected households will be mostly mitigated. Hence, the significance of residual impacts will be Medium, as shown in *Table 119*. The impacts associated with the damaged infrastructure will be completely mitigated and hence the significance of residual impacts will be quite negligible.

9.1.3 Impacts on Livelihoods

Transmission tower construction in Bangladesh can have both positive and negative impacts on livelihoods. While the project can lead to increased access to electricity and potential industrialization, it can also cause short-term income loss and disruptions to livelihoods due to land acquisition and construction activities. Due to the construction of the proposed transmission line towers, it will have temporary effect on the income and livelihood of the landowners/sharecroppers.

About 72% (31.27 acres) of total land is agriculture followed by 16% (7.06 acres) salt production land and others 12% (5.14 acres). Compensation is provided for lost assets (land, crops, structures) and for income loss due to land use by Power Grid.

Mitigation

Act 12 of the Electricity Act, 2018 (of Bangladesh, Act No. Vll of 2018) deals with the compensation and right of way for the licensee during civil works and the establishment of aerial lines. As per this act, Power Grid shall pay compensation for any damage or inconvenience caused and obtain the right of way over land and airspace for the purpose of laying power lines. According to Electricity Rules 2022, affected individuals shall get compensation due to the construction of transmission line tower footings on his/her land. This means that landowners impacted by the construction of transmission line towers are entitled to get financial compensation for the land occupied by the tower bases. So, the affected land owners for tower footings will get the land compensation as per the Current Market Price (CMP) and during the construction period the affected landowners, sharecroppers will also get 3-4 times compensation for crops. For households under the RoW of transmission lines, civil works can be scheduled to avoid cultivation seasons, and peak periods for other livelihood activities. In addition, related training on income restoration and livelihood assistance by INGO can be another mitigation measure though loss of livelihoods is temporary.

Residual Impacts

After implementing the above-listed mitigation measures, the impacts of the project associated with income and livelihoods will be minimized, hence the significance of the impacts will be Low as shown in Table 119.

9.1.4 Impacts on Land Use

9.1.4.1 Agricultural Land

For construction of proposed 95.5km of transmission line, a total of 272 towers will have to construct for the project and 43.47 acres of land will be required for the construction of towers. Out of total affected land a total 31.27 acres of agriculture land will be used for transmission towers. Considering 70-meter RoW, the estimated crop land due to the impact of the project is 1651.84 acres.

Mitigation

The crops compensation will be paid due to loss of agriculture land by the project. The tower footings for laying transmission line require land compensation as per Electricity Act 2018 and Electricity Rules 2022. So, compensation will be paid to the landowners where towers will be constructed. In Addition, the compensation for standing trees and crops will be provided under RoW which requires felling before laying the transmission line.

Residual Impacts

After implementing the above-listed mitigation measures, the impacts of the project associated with loss of agricultural land and temporary production will be minimized, hence the significance of the impacts will be Low as shown in Table 119.

9.1.4.2 Residential and Commercial Land

Additionally, 7.06 acres of salt fields and 3.27 acres of fallow land will be impacted. Smaller portions include 1.18 acres of homestead gardens and 0.69 acres of pond/water bodies. As per land survey no residential and commercial land will be affected by towers footings.

Mitigation Measures

The following mitigation measures will address the potential impacts discussed above to some extent:

- Transmission lines will be aligned to minimize impacts on cultivation fields and other important areas.
- Compensation will be paid to the land owners for the land permanently acquired for the project. Similarly, assistance will be paid to the persons/households losing their livelihoods (resettlement impacts are discussed in the next Chapter, and a resettlement plan has been prepared for this project).

Residual Impacts

Even after implementing the above listed measures, the impacts of the project on the land use of the area cannot be completely mitigated. Therefore, the significance of the residual impacts is likely to remain Medium, as shown in Table 119.

9.1.5 Affected Residential and Commercial Structure in the RoW

According to the Inventory of Loss (IoL) survey, no building structures will be directly affected by the construction of transmission towers. However, within the 70-meter Right of Way (RoW) of the transmission line, a total of 970 structures were identified. These include 232 pucca, 239 semi-pucca, 374 tin-shed structures, and 13 classified as 'others'. Out of these, 824 are residential structure, 78 commercials, and 68 are common property structures. Since all of these are structures and located outside the tower footing areas, no relocation, damage, or physical displacement will be required. Nevertheless, restrictions will apply to the construction of high-rise or multi-storied buildings within the RoW of the transmission line.

Mitigation

As per Electricity Act 2018 and Electricity Rules, 2020 (amended February 2022), there is no provision of relocation/displacement and in fact, no any scope of compensation. During the construction phase, transmission lines can be laid to save the auxiliary structures. Laying the lines over the residential structures should perform carefully by the contractor. However, before the implementation of the project, RP should be updated by INGO.

9.1.6 Temporary Loss of Crops in the RoW

During construction of transmission lines necessitate a certain Right of Way (RoW) which directly impacts agricultural land. To calculate the total land area will be affected by the Right-of-Way (RoW) of transmission lines which will pass through agricultural land. As per ToR, considering 70 m RoW of the transmission line for 765kV, the estimated crop land due to the impact of the project is 668.05 ha.

9.1.7 Loss of Trees in the RoW

The Project will also require felling of trees of different sizes and species. Due to the construction of 95.5 km of transmission line, there are different types of trees will be affected like fruit bearing (8,144), Timber (21,178), Medical (86) and Bamboo (10,071). The survey found that a total of 39,479 number of trees will be affected by the transmission line.

Mitigation

Compensation for trees will be paid to the affected households as per the Entitlement Matrix of resettlement plan of the project. In addition, a replantation ratio of 1:3 will be considered under the project during implementation period aim to conserve the ecological balance of the environment.

For plantation, sapling will be given to the persons who will loss the tree. The sapling would be mixed of fruit, timber and medicinal species. They will plant the tree at their convenient space.

Residual Impacts

After the replantation at 1:3 basis (i.e., 1,18,437) as mentioned in mitigation measures, the impacts of the project associated with loss of trees, ecology and biodiversity will be minimized if proper management and nursing can be done by Power Grid for at least two years, hence the significance of the impacts will be Medium as shown in *Table 119*.

9.1.8 Impacts due to Land Requisition

There is no substation under the project, hence, no land acquisition would be needed. Moreover, as per Electricity Rules 2020 (amendment 2022), no land acquisition would be required for the construction of transmission towers. A total of 43.47-acres of land would be required for construction of transmission towers.

Mitigation

All affected households/landowners will get compensation against land requisition for proposed towers will be given to follow the Section-4 of Electricity Rules 2020 (amended 2022). According to this rule, compensation for affected individuals due to transmission line tower footings. This means that landowners impacted by the construction of transmission line towers are entitled to get financial compensation for the land occupied by the tower bases. So, the affected land owners for tower footings will get the land compensation as per the Current Market Price (CMP) and during the construction period the affected landowners, sharecroppers will also get 3-4 times compensation for crops. The Deputy Commissioners will disburse the compensation amount as per the Electricity Rules 2020 (amended 2022). ESCMC would assist PMU to estimate the compensation.

Residual Impacts

After payment of the compensation for land requisition and resettlement benefits to sharecroppers and wage earners, the impacts of the project on land requisition of the affected households will be mitigated. Hence, the significance of the residual impacts will be Low, as shown in *Table 119*. The extent of this impact will stay only on pre-construction phase of the project. So, the actual impact would be Negligible.

9.1.9 Impacts due to construction of Towers

As per transmission route plan, a total of 272 towers will have to construct for the project of which 88 are angel towers and 184 are suspension towers. Due to construction of towers, some crops of agricultural land will be damaged.

Mitigation

As per recently gazette Electricity Rules of Bangladesh (2020) and its amendment, if land is affected due to construction of towers, compensation has to pay in consultation with land owners. INGO will review, verify and provide the compensation to the land owners according to this Rules.

Residual Impacts

After paying the compensation properly according to the abovementioned law, the impacts due to tower footings will be mitigated, hence the significance of the impacts will be Medium as shown in *Table 119*.

9.1.10Construction Induced Impacts

Since there is no land acquisition required for transmission lines, people can still retain their ownership of the land, and use it for residential and cultivation purposes provided the vertical and horizontal clearance requirement is maintained after construction. Power Grid will consider increasing the vertical clearance to 8000mm (8 m) or extending the height of transmission towers or use of additional angle towers to avoid any direct impacts on built structures, and physical displacements of the populations living within the corridor. Some roadside shopkeepers will be affected temporary and permanently during the construction of underground transmission line. Additionally, Power Grid will also adopt enough safety measures such as erecting bamboo sheds above the built structures during conductor stringing to avoid any damages to structures and risks of their falling and causing accidents. Also, construction work will avoid peak periods of agricultural and other livelihood activities, and seasons that are abundantly occupied for educational, religious and cultural activities. As such, neither permanent nor temporary physical displacements are anticipated due to construction of the transmission lines. During construction period of angel towers of transmission lines, vehicles movements will require to carry equipment. As there is no access road, vehicle has to move damaging crops. Moreover, temporary stake yard/construction yard will have to require for the safety of the construction equipment. For this purpose, temporary land use will be required which will also affect agricultural lands as maximum angel towers will be constructed in agricultural land.

Mitigation

The construction of transmission line including tower footings in such a way, so as to occur minimum damage of adjacent public and private properties as well as social common property resources. The work schedule of contractor should prepare based on the cropping seasons including harvesting period, sub-projects social and environmental context related to the project's interventions.

9.1.11 Vulnerable Households

For this project, vulnerable households have been identified based on several criteria: (i) households headed by a single woman or a woman with dependents and low income; (ii) households headed by elderly or disabled persons without means of support; (iii) households living at or below the poverty line10; and (iv) households belonging to indigenous populations or ethnic minorities. Based on these criteria, it was observed that 6 households in the project area fall below the poverty line, making them vulnerable due to their low-income levels.

9.1.12 Damage to Cultural Resources

Bangladesh is a country where civilization has existed for thousands of years and encountering physical and cultural monuments in construction related excavations is a distinct possibility. During construction, with many small construction sites along the line alignment, there is potential to unearth or discover objects of a cultural nature that will need to be protected. While there is no evidence of such sites within the study area, hence, no impact has been considered in this case. But there are various tombs, temples and other sites in the country. It is, therefore, important to have a procedure in place to ensure that there is a mechanism in place to handle any material culture finds.

Mitigation

To protect cultural resources from accidental damage from construction, existing cultural property will be treated as sensitive receptors. They will be avoided where possible and subject to the control

[10] *According to the Household Income and Expenditure Survey (HIES) 2022, the national poverty line is defined as a monthly income of BDT 12,067*

on air pollution and noise. Implement Chance Find Protocols as soon as historical/cultural monuments are encountered during construction activities. Stop work and inform the relevant authorities including the Ministry of Cultural Affairs, Bangladesh. The Ministry would implement measures to avoid damage to monuments and valuable features which the contractor is bound to follow. Chance Find Procedures for Protection of Cultural Property is given in Annex-V.

9.1.13 Social Conflict and Influx of Workers

The influx of a large number of workers from other parts of the country can potentially cause conflict between the project personnel and the local community. This could be because of differences in culture, religion, social norms, acceptable social behavior, and even dress code. In addition, the construction activities can potentially affect the women activities and movement. Any such impact can be detrimental to the project since it can potentially cause tension between the project and local communities and even disruption of construction works.

The mitigation measures to address impacts associated with the social conflict are listed below.

- The World Bank Guidance Note[11] will be used to address potential impacts caused by temporary project induced labor influx.
- The contractor will prepare and implement a Labor Management Plan (LMP) which includes a Code of Conduct for all site personnel, in consultation and coordination with the local community.
- All site personnel will be provided orientation and training on Code of Conduct. Awareness raising materials such as posters and signage will be used as appropriate.
- All site personnel will be provided awareness and training to prevent communicable diseases, sexually transmitted infections, Human immunodeficiency virus (HIV) infections / Acquired Immune Deficiency Syndrome (AIDS).
- Privacy of women will be respected; routes and places used by them will be avoided as far as possible.
- Entry of the site personnel in the local communities will be minimized to the extent possible/appropriate.
- The GRM described earlier will also address community grievances related to social conflict.
- No child labor will be engaged by the project or its contractors.
- Liaison with the community will be maintained.

9.1.14 Gender Issues and Potential GBV Issues

Primarily because of the influx of construction worker, the proposed project can potentially create a number of gender issues particularly gender-based violence (GBV) and child sex exploitation (SE). These issues can cause serious harm to women and children living in the project area. These issues can be detrimental to the project since they can potentially cause tension between the project and local communities and even disruption of construction works. A detailed GBV prevention plan is prepared which will be followed as guiding note during the project implementation. A code of conduct is provided in the LMP and GBV Plan which may be updated as needed. The following specific measures need to be taken to address the gender issues:

[11] Thttp://pubdocs.worldbank.org/en/497851495202591233/Managing-Risk-of-Adverse-impact-from-project-labor-influx.pdf

GBV and SE Risk Assessment

- Assess the risk of GBV and SE for the proposed project. This assessment should incorporate a variety of contextual and project-specific risk factors for GBV and SE, and analyze risks to women and children separately.
- Assess risks related to labor influx for the proposed project. The risk assessment should take into account "the size and scale of a project; the scale of labor influx; the extent to which a community has capacity to absorb labor influx or requires separate camp facilities; the inflow of income to workers, which can exacerbate already existing inequities between workers and community members; and the geographic location of project activities."

GBV and SE Risk Mitigation

- Develop a plan to prevent and mitigate identified risks. A GBV Action Plan should be put into place for all projects with a substantial or higher level of risk of GBV, and a Labor Management Plan/Workers' Camp Management Plan should be put into place for projects with high risks related to labor influx. The GBV action plan should include an awareness-raising strategy, an identification of GBV services providers, and procedures for handling GBV allegations. Labor influx mitigation measures should include prioritizing the hiring of local workers (as opposed to migrant workers from other parts of the client country or from another country).
- Raise awareness among affected stakeholders on GBV risks, with a focus on women, adolescents, and children. Project staff and workers should also be trained.
- Assess the capacity of project implementing agencies and units on GBV-related issues and identify capacity-building measures needed.
- Ensure that grievance redress systems have the capacity to address GBV complaints.
- "Project-level grievance mechanism should have "multiple channels through which complaints can be registered in a safe and confidential manner," including at least one channel that is accessible to children. "The GRM should not ask for, or record, information on more than three aspects related to the GBV incident: The nature of the complaint (what the complainant says in her/his own words without direct questioning); if, to the best of their knowledge, the perpetrator was associated with the project; and, if possible, the age and sex of the survivor. For GBV, the GRM should primarily serve to: (i) refer complainants to the GBV Services Provider; and (ii) record resolution of the complaint."
- For higher-risk projects, a local organization with the capacity to serve as a GBV services provider can also operate a GBV-specific grievance redress system.

Ensure that contractors put into place GBV-prevention measures:

- Civil works contracts should incorporate GBV-prevention measures.
- Contractors should put into place zero tolerance policies for cases of GBV and SE perpetrated by project workers, and codes of conduct that prohibit these activities, including sexual harassment. Workers should be trained on these requirements.
- If needed, the contractor should be required to institute additional prevention measures, including "separate, safe and easily accessible facilities for women and men working on the site, locker rooms and/or latrines that are "located in separate areas, well-lit and include the ability to be locked from the inside," visible signs "around the project site (if applicable) that signal to workers and the community that the project site is an area where GBV is prohibited," and well-lit "public spaces around the project grounds."
- The World Bank's good practice note on addressing GBV should be followed[12].

[12] http://pubdocs.worldbank.org/en/158041571230608289/Good-Practice-Note-Gender.pdf

- The contractor will prepare the above-mentioned plans as part of its site-specific environmental and social management plans (further discussed later in the document).

9.1.15 Impact of COVID 19

COVID-19 situation in Bangladesh is getting worse and if the COVID safety protocols are not maintained adequately, it may spread among the labors and adjacent communities. As there will be 50% migrant labors with the project and local people may believe that COVID is being spread to the adjacent community through the migrant labors.

Mitigation

Contractor should maintain and follow the health and safety guidelines of WHO for development project during construction phase. In addition, Contractor shall close contact with nearest hospitals, and community clinic for any emergency.

9.1.16 Security Risk

Site security risks in Bangladesh's transmission line construction include theft of construction materials like anti-theft fasteners and tower accessories, unauthorized access by locals to construction sites, and potential social unrest from land acquisition and the influx of temporary workers, which can lead to issues like gender-based violence and other crimes. The high population density makes land acquisition difficult and can cause frustration among locals, especially if compensation is inadequate.

Mitigation

Employing security personnel, such as accident prevention officers, can help monitor sites, prevent theft, and manage access. Proactive community engagement and comprehensive communication about project benefits and land compensation can help build local support and reduce potential opposition. Adhering to land acquisition laws and having effective Grievance Redress Committees helps ensure fair compensation for land and crops, mitigating social unrest. Strict adherence to safety plans and reporting procedures for any accidents or security breaches helps ensure timely response and resolution.

9.2 Mitigations

For mitigation, compensation and assistance under the project, a Resettlement Plan (RP) has been prepared following- EDCF Safeguard Policy 2020, Electricity Act 2018 and Electricity Rules 2020 (amended 2022). Act 12 of the Electricity Act, 2018 (of Bangladesh, Act No. Vll of 2018) deals with the compensation and right of way for the licensee during civil works and the establishment of aerial lines. As per this act, Power Grid shall pay compensation for any damage or inconvenience caused and obtain the RoW over land and airspace for the purpose of laying power lines. All affected households/landowners will get compensation against land requisition for proposed towers will be given to follow the Section-4 of Electricity Rules 2020 (amended 2022). According to this rule, compensation for affected individuals due to transmission line tower footings. This means that landowners impacted by the construction of transmission line towers are entitled to get financial compensation for the land occupied by the tower bases. So, the affected land owners for tower footings will get the land compensation as per the Current Market Price (CMP) and during the construction period the affected landowners, sharecroppers will also get 3-4 times compensation for crops. After the completion of tower construction work, landowners shall use the land as like before without damaging the tower base. The Deputy Commissioners will disburse the compensation amount as per the Electricity Rules 2020 (amended 2022). ESCMC would assist PMU to estimate the compensation.

A two-tier Grievance Redress Mechanism (GRM) has been proposed in the RP. The fundamental objectives of the GRM, are to resolve any resettlement-related grievances locally in consultation with the aggrieved party to facilitate smooth implementation of the social and environmental action plans. The GRM will be implemented through the formation of Grievance Redress Committees (GRC). The GRCs will be established through a gazette notification from the Ministry of Power, Energy and Mineral Resources (MoPEMR); therefore, the GRC will be a legally constituted body. A two-tier bottom up GRC system – (i) Local GRC at the UP Level and (ii) Project-Level GRC – will be established in this Project.

In the case of land compensation payment, IA (Implementing Agency) (along with the selected representatives of DC Offices, Forest Department, INGO and affected communities including women and members of affected person will carry out joint verifications of affected persons (APs) and their assets (i.e., land, crops, trees) to be used and compensated by the Project. During construction phase of the project, INGO will be engaged by the IA for implementing the RP. In addition, an individual Consultant will be deployed for external monitoring of the RP implementation.

The total estimated budget for RP implementation is 814.23 million (USD 6.70 million). This includes BDT 335.72 million for tower footings, BDT 120.05 million for crop compensation, and BDT 226.10 million for tree compensation. The budget covers land compensation for tower footings, crops, and trees, as well as other resettlement benefits. One-time Cash Compensation under Law (CCL) value of land as well as with the present mauza rate of land and CMP has been considered for the compensation of crops and trees. A major portion of the budget, approximately 44.75%, is allocated for land compensation for tower footings. In addition, the budget includes BDT 30 million for RP implementation and BDT 2.06 million for other resettlement benefits, such as vulnerable allowances, livelihood support, and training programs. The budget also includes RP implementation and its external monitoring costs. A 10% contingency provision has also been incorporated to cover unforeseen costs. The budget will be updated and adjusted if there are variations in land size or market prices.

The RP implementation schedule is prepared which requires 4 years (*i.e.,* 48 months) excluding a margin of 6 months to redress any unforeseen situations or circumstances. The schedule will be finalized considering possible changes of events of the project.

ESCMC and Contractor will assist the IA to take remedial measures of any implementation problems to ensure the achievement of targets within scheduled time. Besides, an evaluation process will also enable IA to identify lapses, procedural weaknesses, policy inadequacies and institutional problem, and take remedial measures to achieve the desired goals and objectives of RP. Monitoring will be carried out both internally and externally. Internal monitoring will be carried out by the Environmental and Social Unit (ESU). The services of an External Monitoring Consultant are required to carry out the evaluation of the RP implementation. The Consultant will submit (i) half-yearly resettlement reports (every six months after the beginning of the resettlement processes) and (ii) Resettlement Completion report (submitted within 30 days of the end of resettlement process). Details of mitigation, compensation and assistance have been included in Resettlement Plan (RP) of this project.

9.3 Alternative Traffic Plan

An alternative traffic management plan for transmission line construction in Bangladesh would involve a detailed site-specific assessment to identify and address traffic impacts, especially considering the presence of non-motorized vehicles (NMV) and pedestrians. Key elements would include developing phased construction schedules that minimize disruption to main traffic flows, establishing designated construction zones away from active roadways, implementing a robust

stakeholder engagement plan for community awareness and input, using alternative routes where possible, and preparing comprehensive road traffic management plans in coordination with authorities like the Road Transport Authority (BRTA) and Bangladesh Railways (BR). Proposed route of transmission line planned to cross over 4-times National Highways and 2-times railway track.

Mitigation

Ensure that all construction vehicles, including heavy machinery, are managed effectively to prevent damage to roads and disruption to traffic. In some instances, it might be more efficient to use smaller vehicles and transport equipment in stages rather than attempting to move large components on busy roads. Schedule heavy material transport and tower erection during off-peak hours to reduce impact on main roads. Work closely with the BRTA and Bangladesh Railway to develop and approve comprehensive Road Traffic Management Plans, ensuring compliance with regulations. Disseminate information about the project and its potential traffic impacts to affected communities and stakeholders. Establish a clear process for the public to raise concerns and provide feedback on traffic-related issues. Where feasible, construct temporary bypass routes to divert local and long-distance traffic around the active construction areas.

Chapter 10
Environmental and Social Management Plan

This chapter describes the Environmental and Social Management Plan (ESMP) of the Project. It describes institutional arrangements for the environmental and social management of the project, provides mitigation and monitoring plans, presents monitoring and reporting requirements, and recommends environmental and social trainings to be conducted by various project entities.

10.1 Objectives of ESMP

The basic objective of the ESMP is to manage adverse impacts of proposed project interventions in a way that minimizes the adverse impact on the environment and people in the project area. The specific objectives of the ESMP are to:

- Facilitate the implementation of the mitigation measures discussed earlier in the document;
- Maximize potential project benefits and control negative impacts;
- Draw responsibilities for Power Grid, contractors, consultants, and other members of the project team for the environmental and social management of the Project;
- Define a monitoring mechanism and identify monitoring parameters in order to:
  - Ensure the complete implementation of all mitigation measures;
  - Ensure the effectiveness of the mitigation measures;
- Assess environmental training requirements for different stakeholders at various levels.

10.2 Contractors Certifications

It is recommended all contractors procured under the Project be compliant of ISO 9001 Quality Management, ISO 14001 Environmental Management and OHSAS 18001 Occupational Health and Safety Management. These will be done by the client giving preference to the contractors having ISO and OHSAS certifications during prequalification or technical evaluation.

10.3 Inclusion of Relevant Components of ESMP in Contract Documents

The ESMP of the Project along with the ESCPs (discussed later in the Chapter) will be included in the construction bid documents and also reflected in the construction contracts. The technical specifications of the bid documents will clearly state that contractor will need to comply with the mitigation measures provided in ESMP and ESCPs; EDCF Safeguard Policy 2020 and Environmental and Social Standards described in Section 2.4, and national regulatory requirements described in Section 2.2 and 2.3.

10.3.1 BOQs in Bid Documents

The following items will be included in the bill of quantities (BOQs) of construction bid documents:

- Preparation and implementation of Contractor's Environmental Action Plan in compliance with ESMP, EDCF Safeguard Policy 2020 and Environmental and Social Standards, and national standards on air, noise, water quality, and others;
- Update and implementation of RP, TPP, BMP, LMP, SEP, GBV prevention Plan with the support of ESU;
- Provision of an Environmental and Social Officer and an Occupational Health and Safety Officer by Contractor (during construction phase);
- Provision of using diverters while working in Wildlife Sanctuary/Reserve Forest by contractor;

- Providing and maintenance of Vibration Meters and Dust Measurement Meters for spot measurements;
- Air quality monitoring (PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO_2, CO) and noise monitoring at locations specified by the Power Grid.
- Water quality monitoring where project locations within 500m of waterbodies specified by Power Grid.

After award of the contract and before mobilization, the Contractor will need to prepare Construction ESMP (CESMP) with site specific mitigation measures for approval by Power Grid. Power Grid will ensure that contractors and their subcontractors carry out their responsibility of implementing the mitigation measures, monitoring plan as well as other environmental and safety measures provided in the ESMP.

10.3.2 Payment Milestones

Payments to contractors would be linked to environmental and social performance, measured by completion of the prescribed environmental and social mitigation measures. Contractors would be required to join forces with the executing agency, project management unit, supervising consultants, Forest Department, and local population for the mitigation of adverse impacts of the project. For effective implementation of the proposed mitigation and monitoring measures they will be required to employ trained and experienced environmental management staff. In addition, for any non-compliance causing damages or material harm to the natural environment, public or private property or resources, the contractor will be required to either remediate / rectify any such damages in a timeframe specified by and agreed with the engineer, or pay Power Grid for the cost (as assessed by Power Grid) of contracting a third party to carry out the remediation work.

10.4 Environmental and Social Management Plan

The environmental and social management of the project will be achieved through implementation of a number of plans, which are discussed below.

10.4.1 Environmental Code of Practices for Construction

The environmental and Social Code of Practices (ESCPs) are generic, non-site-specific guidelines for the construction phase. The ESCPs consist of environmental and social management guidelines and practices to be followed by the contractors for sustainable management of all environmental issues. The contractor will be required to follow them and also use them to prepare site-specific management plans (discussed later in the Section). The ESCPs are listed below and attached in Annex I.

- ESCP 1: Waste Management
- ESCP 2: Fuels and Hazardous Substances Management
- ESCP 3: Water Resources Management
- ESCP 4: Drainage Management
- ESCP 5: Soil Quality Management
- ESCP 6: Erosion and Sediment Control
- ESCP 7: Top Soil Management
- ESCP 8: Topography and Landscaping
- ESCP 9: Borrow Areas Management
- ESCP 10: Air Quality Management
- ESCP 11: Noise and Vibration Management
- ESCP 12: Protection of Flora
- ESCP 13: Protection of Fauna
- ESCP 14: Road Transport and Road Traffic Management

- ESCP 15: Construction Camp Management
- ESCP 16: Cultural and Religious Issues
- ESCP 17: Workers Health and Safety
- ESCP 18: Construction and Operation Phase Security
- ESCP 19: Operation of Heavy Equipment Management
- ESCP 20: Excavation
- ESCP 21: Transportation of Oversized Equipment
- ESCP 22: Lifting and Materials Handling
- ESCP 23: Stringing conductors at road, river, and existing transmission line crossings

10.4.2 Construction Stage Site Specific Management Plans

As stated earlier, construction contractor(s) will be required to prepare and implement CESMP. The contractors will need to obtain ESCMC's approval of the CESMP. The key elements of CESMP will include the following:

- **Pollution Prevention Plan** will be prepared and implemented by the contractor on the basis of the mitigation measures given in this ESIA and ESCPs. Under this plan, Contractors shall focus air, noise, water and soil pollution by the construction activities. ECR 2023 and IFC guidelines should followed by the Contractors in this case.
- **Waste Disposal and Effluent Management Plan** will be prepared and implemented by the Contractor on the basis of the ESMP and ESCP. Under this plan, construction solid wastes like stone, cement, sands and bricks shall be removed the tower footing areas, and management of human fecal wastes shall be generated from labor sheds.
- **Drinking Water Supply and Sanitation Plan:** Separate water supply and sanitation provisions will be needed for the temporary facilities including offices, labor camps and workshops in order not to cause shortages and/or contamination of existing drinking water sources.
- **Occupational Health and Safety (OHS) Plan** will be prepared and implemented by the contractor on the basis of the present ESMP, ESCPs, and other relevant standards.
- **Traffic Management Plan** will be prepared by the contractor after discussion with Power Grid and authorities responsible for roads and traffic. The Plan will be submitted to the ESCMC for their review and approval before contractor mobilization. The Plan will identify the routes to be used by the contractors, procedures for the safety of the local community particularly pedestrians, and monitoring mechanism to avoid traffic congestion.
- **Construction Camp Management Plan** will be prepared by the contractor. The Plan will include the camp layout, details of various facilities including supplies, storage, and disposal.
- **Fuel and Hazardous Substances Management Plan** will be prepared by the contractor in accordance with the present ESMP, standard operating procedures and other relevant guidelines, and where applicable, material safety data sheets (MSDS). The Plan will include the procedures for handling the oils and chemical spills.
- **Spoil Management Plan** will be prepared by the contractor on the management of excess spoils from various excavation activities.
- **Emergency Preparedness Plan** will be prepared by the contractor after assessing potential risks and hazards that could be encountered during construction. Under this plan, fire safety shall focus special attention including unanticipated accidents or incidental issues.
- **Communication Plan** to deal with the interaction of the community, complaints management, workers recruitment, notice of works and workers conduct with locals.
- **Wildlife/Biodiversity Management Plan** aim to prepare for the management of flora and fauna under the RoW of transmission lines during tower footing, erection and stringing.
- **Physical Cultural Resources Management Plan** will be prepared by contractor site development, trenching, excavation and foundation of tower footing, etc. as per WB.

- **Tree Plantation Plan** aim to prepare for combating soil erosion, enhancing biodiversity, improving air quality, providing climate resilience (especially coastal protection), offering livelihood support through social forestry, and offsetting the project's footprint by creating green buffers, ensuring sustainable energy transmission in a sensitive coastal zone.

10.4.3 Mitigations and Compliance Monitoring Plan

The mitigation and compliance monitoring plans (compliance monitoring is discussed Section 9.5.1) are the key element of ESMP to be prepared on the basis of impact assessment and mitigation measures described in Chapter 7 and 8. The plan describes the potentially negative impacts of each subproject activity, lists mitigation and control measures to address the negative impacts, and assigns responsibilities for implementation and monitoring of these measures. For instance, all the site-specific pre-construction plans to be prepared by contractor shall be provided with guidance per IFC/WB EHS general and sectoral guidelines in the ESMP chapter, to ensure that the guidelines standards and measures are followed and reflected in ESCP and ESMP measures and monitoring requirements. All testing of parameters must be carried out by the contractor on a quarterly basis until the end of the defect liability period. The ESMP is given in Table 120.

Table 120: ESMP Mitigation Plan

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
A. PRE-CONSTRUCTION PHASE					
1. Various issues of related with pre-construction activities					
1.1. Permits and Plan	• Collection of NOCs from different agencies (e.g., UP, CPA, BIWTA, BWDB, FD, DAE, etc.) • Preparation of CSEMP by EPC (e.g., air & noise management plan, tree management plan, GBV, BMP, LMP, Stakeholder Engagement Plan, etc. • Prepare Baseline E&S monitoring report by EPC as per ECR 23 and other associated rules and regulations.	Contractor	PIU and ESU	NOCs from authorities, E&S data, Approved CESMP, etc.	After Appointment of EPC
1.2. Change of land use, and compensation for tower locations	Location of towers will be selected in uncultivated areas, to the extent possible. Transmission lines will be aligned to minimize impacts on cultivation fields and other important areas. Compensation will be paid to the land owners as per Electricity Rules 2020 (amended 2022). Similarly, assistance will be paid to the persons/households losing their livelihoods. However, a RP has been prepared in this case.	Power Grid and DC Offices	ESCMC	Documentary evidence of payment of compensation and assistance; Number of complaints related to land use change and compensation received; Number of complaints resolved.	Before construction
1.3. Loss of crops, trees, buildings	Compensation and assistance will be paid to the PAPs. Types of compensation are loss of crops, trees and structures. Types of assistance are- vulnerability allowance, livelihood training, distribution of trees, etc. A RP has been prepared in this case.	PIU/ESCMC	ESCMC	Documentary evidence of payment of compensation and assistance Income levels of affected households; Number of public grievances re resettlement and compensation received; Number of complaints resolved	Before construction

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	Contractors will lease the land for construction facilities on temporary basis. Proper documentation will be carried out for this leasing. Site selection will be carried out in consultation with the community and local officials; approval from ESCMC will also be required for the selected sites.	Contractor	ESCMC	Documentary evidence of land leasing for temporary facilities ESCMC approval for the selected site(s). Absence of grievances regarding temporary facilities	Before contractor mobilization
1.4. Soil, water, and noise pollution	A pollution prevention plan will be prepared in accordance with ESCPs, national and IFC standards	Contractor and Consultant	ESCMC	Approved plan; Plan itself will outline appropriate KPIs for its implementation	Before construction
1.5. Disposal of excavated material	Identification of re-use of excavated material on site, to reduce off site effects Maximization of use excavated material in construction.	Contractor	ESCMC	Availability of plan to dispose excavated material	Before construction
1.6. Water quality	Drainage system will be designed so that all spills will be drained and collected in a sump for further appropriate disposal; and Oil and chemical storage and vehicle wash and oil change facilities will be established on impermeable surfaces to avoid percolation	Contractor	ESCMC	Monitoring in accordance with Drinking Water and Sanitation Plan. No breaches of Material Safety Data Sheet (MSDS) for hazardous substances.	Before construction
1.7. Traffic Management	A Traffic Management Plan (TMP) will be prepared in accordance with ESCP	Contractors	ESCMC	Approved TMP; Plan itself will outline appropriate KPIs for its implementation.	Before mobilization of contractor
1.8. Construction camp (and other temporary facilities) site selection	Site for construction camp will be selected with approval from the Environmental Social Construction Monitoring Consultants (ESCMC). Areas having thick/dense vegetation will be avoided as far as possible. No beels (water ponds) or canals (water channels) will be affected. The areas where construction camps and construction staging areas are not allowed should be made clear to the contractors.	Contractor	ESCMC	Approval from ESCMC Plan itself will outline appropriate KPIs for its implementation	Before mobilization of contractor

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
1.9. Construction camp management	Construction Camp Management Plan will be prepared per ESCP and approval obtained from ESCMC.	Contractor	ESCMC	Approved Plan; Plan itself will outline appropriate KPIs for its implementation	Before mobilization of contractor
1.10. Waste management	A Waste Management Plan will be prepared per ESCP and approval obtained from ESCMC.	Contractor	ESCMC	Approved Plan; Plan itself will outline appropriate KPIs for its implementation	Before mobilization of contractor
1.11. Fuels and hazardous substances management	A fuels and hazardous substances management plan will be prepared per ESCP and approval obtained from ESCMC.	Contractor	ESCMC	Approved Plan; Plan itself will outline appropriate KPIs for its implementation	Before mobilization of contractor
1.12. Water resource management	A Drinking Water Supply and Sanitation Plan will be prepared per ESCP and approval obtained from ESCMC.	Contractor	ESCMC	Approved Plan; Plan itself will outline appropriate KPIs for its implementation	Before mobilization of contractor
1.13. Occupational Health and Safety (OHS) management	An OHS management plan will be prepared per ESCP, and approval obtained from ESCMC.	Contractor	ESCMC	Approved Plan; Plan itself will outline appropriate KPIs for its implementation	Before mobilization of contractor
1.14. Drinking water and sanitation	A drinking water and sanitation plan will be prepared per ESCP and approval obtained from ESCMC	Contractor	ESCMC	Approved Plan; Plan itself will outline appropriate KPIs for its implementation	Before mobilization of contractor
1.15. Emergency Preparedness	An emergency preparedness plan will be prepared and approval obtained from ESCMC	Contractor	ESCMC	Approved Plan; Plan itself will outline appropriate KPIs for its implementation	Before mobilization of contractor
1.16. Communication and community liaison	A stakeholder engagement plan will be prepared	PIU	-	Approved Plan; Plan itself will outline appropriate KPIs for its implementation	Before site activities.
1.17. Biodiversity Conservation	A biodiversity conservation plan will be prepared. Biodiversity management plan (BMP) will focus trees, avifauna, elephant, fish and any other species with ecological conservation value.	Contractor	ESCMC	Approved Plan; Plan itself will outline appropriate management and mitigation plan for the conservation of natural resources	Before site activities

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
1.18. Employment Opportunities	Priority shall be given to local skilled and unskilled labors	Contractor	PIU	Approved Plan; Plan itself will outline appropriate management and mitigation plan for the conservation of natural resources	During site activities
B. CONSTRUCTION PHASE					
2. Contractor Mobilization and Demobilization; Transportation of Materials and Supplies					
2.1. Traffic management	• The contractor will implement the traffic management plan. • Construction activities will be scheduled in a manner to avoid peak traffic hours. • Liaison and coordination will be maintained with relevant authorities such as City Corporation and Traffic Police. • Traffic signage will be placed where necessary and appropriate to warn the drivers and pedestrians about the construction activities. • ESCP to be implemented • GRM will address the traffic congestion elated issues.	Contractor (with PIU's assistance)	ESCMC	Number of any non-compliance reports Number of complaints/grievances. Number of traffic accidents/incidents involving project vehicles and lorries bringing materials and supply to project	During mobilization and de-mobilization
2.2. Soil Erosion and Contamination	• Contractor will implement the Pollution Prevention Plan prior to the start of the work. Proper baseline data will be collected. • Contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the soil • Contractor will confine the contaminants immediately after such accidental spillage	Contractor	ESCMC	Number of any non-compliance reports Number of complaints	Throughout contractor mobilization and de-mobilization

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Contractor will collect contaminated soils, treat and dispose them in environment friendly manner • All areas intended for storage of hazardous materials to be quarantined and provided with adequate facilities to combat emergency situations complying all the applicable statutory stipulation • Top soil to be stripped and stockpiled where practical. • Temporary stockpiles to be protected from erosion. For sewage waste, appropriate treatment arrangement such as septic tanks and soakage pits will be installed on site. Water will percolate into the ground so there will be no discharge. Alternatively, sewage from construction camps and other facilities will be collected and transported to nearby municipal sewage treatments plans. • ESCPs will be implemented.				
2.3. Air Quality	• The equipment and vehicles used during the construction process will comply with the national as well as IFC Guidelines on exhaust emissions. • Concrete batching and asphalt plants will be located minimum 500 m away from residential areas and will have appropriate dust/emission suppression mechanisms such as wet scrubbers. • Contractor will implement dust prevention measures such as watering	Contractor	ESCMC	Number of non-compliance reports. Number of community complaints. Ambient air quality found beyond the national and WBG EHS Guidelines	Throughout contractor mobilization and de-mobilization

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	of roads near the residential areas and spraying of water on loose material where required and appropriate. • Regula air monitoring will be carried out near the sensitive receptors to ensure ambient air quality remains within the limits defined by national standards and IFC Guidelines. • Measures will be taken to protect the workers from excessive dust (i.e., usage of personal protective equipment). • A GRM will be put in place to receive complaints from public on various aspects of environmental issues, including air pollution. These grievances will be addressed by the contractor by adopting necessary pollution control measures. Continued consultations with the affected communities will be carried out during construction phase. • ESCP on air quality management will be implemented.				
2.4. Noise	• The equipment and vehicles used during the construction process will comply with the national standards as well as IFC Guidelines on noise. • Contractors will adopt appropriate noise attenuation measures to reduce the noise generation from construction activities. The noise attenuation measures will include, (i) fitting of high efficiency mufflers to the noise generating equipment; and (ii) keeping	Contractor	ESCMC	Number of non-compliance reports; Noise measurement data Number of community complaints	Throughout contractor mobilization and de-mobilization

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	acoustic enclosures around drilling equipment. • The construction activities near the settlements will not be carried out during night time. • Regular noise monitoring will be carried out near the sensitive receptors • A GRM will be put in place to receive complaints from public on various aspects of environmental issues, including noise pollution. These grievances will be addressed by the contractor by adopting necessary pollution control measures. Continued consultations with the affected communities will be carried out during construction phase. • ESCP on noise quality management will be implemented				
2.5. Safety hazards	• Occupational health and safety procedures and OHS Plan will be enforced. Public safety will be included in the Plan. • Implement fuels and hazardous substances management plan • Fencing would be provided around construction sites as appropriate to minimize public safety risks. • A Traffic Management Plan will be implemented that will aim at ensuring access to residential areas, and preventing of unsafe situations, especially near schools, housing areas, construction areas, camps and offices.	Contractor	ESCMC	Number of any non-compliance reports; Number of any related public complaints Number of accidents, incidents and near-misses.	Throughout contractor mobilization and de-mobilization

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Special attention should be focused on safety training for workers to prevent and restrict accidents and on the knowledge how to deal with emergencies. • Road signage will be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic. • Liaison with traffic police and communities will be maintained • Project drivers will be trained on defensive driving. • Vehicle speeds near/within the communities will be kept low, to avoid safety hazards. • Awareness raising of communities will be carried out about the construction activities and associated safety hazards. • ESCPs will be implemented				
2.6. Damage to Infrastructure	All damaged infrastructure will be restored to original or better condition.	Contractor	ESCMC	Number of any non-compliance reports; Number of any public complaints	Throughout contractor mobilization and demobilization
2.7. Blocked routes	• Contractor will prepare and implement a traffic management plan, in consultation and coordination with the local community • The community will be informed about the nature of construction activities and possibility of any blocked route; alternate routes will be identified with the help of local/affected community.	Contractor	ESCMC	Number of any non-compliance reports Number of complaints	Before and during construction

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	Duration of such blockage will be minimized to the extent possible. • Liaison and coordination will be maintained with relevant authorities such as City Corporation and Traffic Police. • Liaison with the community will be maintained. • The GRM described earlier will also address community grievances related to any blockage of local routes.				
3. Construction workers camp establishment and operation					
3.1. Soil erosion; soil and water contamination; solid waste, waste water, sanitary facilities, PPE, drinking water	• Camp management plan will be implemented • Location of camp will be selected after obtaining ESCMC's approval and in consultation with local community • Photographs will be taken to record the site conditions prior to the establishment of the camp. • Land clearing, leveling and grading will be minimized, and carried out in a manner to minimize soil erosion. • Camp will have rainwater drainage arrangements • Camps will have protection arrangements against soil erosion • Contractors will implement the Waste Management Plan and Pollution Prevention Plan. • For the domestic sewage, appropriate treatment and disposal system (e.g., septic tank and soaking pits) will be constructed having adequate capacity	Contractor	ESCMC	Compliance to the Camp Management Plan, Waste Management Plan Number of any non-compliance reports Results of soil and water quality analysis	Before and throughout the construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Waste oils will be collected in drums and sold to the recycling contractors. • The inert recyclable waste from the site (such as cardboard, drums, and broken/used parts) will be sold to recycling contractors. The hazardous waste will be kept separate and handled according to the nature of the waste. • Domestic solid waste from the camp site will be disposed of in a manner that does not cause soil contamination. • The contractor will identify suitable sites for disposal of hazardous and non-hazardous waste. The selection will be done in consultation with the PIU and the local municipal authorities. No waste disposal will be carried out in canals, and rivers. • Contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the soil • Contractor will confine the contaminants immediately after such accidental spillage • Contractor will collect contaminated soils, treat and dispose them in environment friendly manner • All areas intended for storage of hazardous materials to be quarantined and provided with adequate facilities to combat emergency situations complying all the applicable statutory stipulation				

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• The camp site area will be completely restored after completion of construction works. All temporary structures will be demolished, • All camps will have a temporary store of keeping necessary PPEs • Labor camps will use LPG bottle for cooking as their primary sources • ESCPs will be implemented				
4. Construction Site Pollution Management					
4.1. Air Quality	• All testing of parameters must be carried out by the contractor on a quarterly basis until the end of the defect liability period. • Pollution prevention plan will be implemented • Implement dust prevention measures such as watering of roads near the residential areas and regular water sprinkling on loose material where required • The equipment and vehicles used during the construction process will comply with the national as well as IFC Guidelines on exhaust emissions. • Measures will be taken to protect the workers from excessive dust (i.e., usage of personal protective equipment). • A GRM will be put in place to receive complaints from public on various aspects of environmental issues, including air pollution. These grievances will be addressed by the contractor by adopting necessary pollution control	Contractor	ESCMC	Number of any non-compliance reports Air quality monitoring data Number of related grievances	Throughout the construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	measures. Continued consultations with the affected communities will be carried out during construction phase. • ESCP on air quality management will be implemented.				
4.2. Vegetation loss; threat to wildlife	• Clearing natural vegetation will be avoided as far as possible. • The camp will be established in a natural clearing, to the extent possible. • Complete record will be maintained for any tree cutting. • The camp staff will not indulge in any animal shooting, trapping, catching, or killing activities. • Include information on wildlife protection in all tool-box orientation briefings for camp staff • Contractors shall use lower wattage flat lens fixtures that direct light down and reduce glare, and shall avoid use of flood lights. • Contractors will also raise awareness about the protection of birds and other wildlife species among the work force to reduce impacts such as disturbance and poaching • ESCPs will be implemented.	Contractor	ESCMC	Number of any non-compliance reports Number of trees felled Number of sighting of key wildlife species	Before and throughout the construction phase
4.3. Noise and vibration	• Pollution prevention plan will be implemented. • Generators and vehicles will have exhaust mufflers (silencers) to minimize noise generation. • Liaison with the communities will be maintained.	Contractor	ESCMC	Number of any non-compliance reports Noise monitoring data Number of grievances regarding noise	Throughout the construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Noise monitoring will be carried out. • Compliance will be ensured with national and WBG EHS Guidelines. • GRM will be put in place • ESCP will be implemented				
4.4. Health and Safety	• Construction camps will be located at least 500 m away from the communities. Entry of the site personnel in the local communities will be minimized to the extent possible / appropriate. • OHS plan will be prepared and implemented • Implement fuels and hazardous substances management plan • Drinking water management plan will be implemented • Pandemic management plan will be prepared as per WHO guidelines • Protective fencing to be installed around the Camp to avoid any accidents. • Contain all fuel tanks in a fully bunded area with a storage capacity of at least 110 percent of the potential storage volume. • Spill control arrangements to • Firefighting equipment will be made available at the camps. Regular inspection of fire extinguishers and timely refilling/replacement before the expiry date. • The camp staff will be provided OHS training twice a month.	Contractor	ESCMC	Number of any non-compliance reports Number of trainings conducted Number of accidents, incidents, and near misses. Number of complaints	Before and throughout the construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel. Construction camps will have first aid kits • Camp crew will be provided with awareness for transmissible diseases (e.g., HIV, hepatitis B and C). • ESCPs will be implemented.				
4.5. Social and Gender Issues	• Labor Management Plan including a Code of conduct will be implemented per international best practice provided in the WB Guidance Note on labor influx. • Local norms and customs will be respected • Camp crew will avoid entering the villages • No child labor will be employed in the camps. • A GBV prevention plan will be followed on social and gender issues per international best practice provided in the WB Good Practice Note on GBV/SEA/SH. • Camp staff will be provided training on code of conduct, gender issues, GBV and SE • Liaison with the community will be maintained. • GRM will be put in place • ESCP will be implemented	Contractor	ESCMC	Number of non-compliance reports; Number of related complaints	Throughout the Construction Phase
4.6 Chance finds	In case any artifacts or sites of archeological, cultural, historical, or religious significance are discovered during camp clearance, the	Contractor	ESCMC	Number of non-compliance reports Number of reports of any PCR discovery	Throughout the Construction Phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	works will be stopped, and the Archeological Department will be informed. During excavation of tower footings refer to the chance find procedures per Annex V				
4.7. Increased Load on Local Services and Supplies	• The contractors to procure their supplies in a manner not significantly affecting the availability of essential commodities in the area for the residents. • Community liaison will be maintained • GRM will be established to address community complaints and grievances.	Contractor	ESCMC	Number of related public grievances	Construction phase
4.8. Access roads and damages to local infrastructure and public utilities	• Minimize damages to infrastructure and public utilities; • Compensation as per RAP, • Relocation of utilities; • Coordination with relevant entities	Contractor	ESCMC	Number of related public grievances	Construction phase
5. Construction Activities (Towers Foundations; Tower Erection; and Conductor Stringing)					
5.1. Soil erosion	• Works will be carried out in a manner not to cause soil erosion • Vehicular traffic near the bank line will be minimized • Protective measures such as mulching will be undertaken to stop erosion • Vehicular traffic on unpaved roads will be minimized • ESCP will be implemented.	Contractor	ESCMC	Number of non-compliances observed. Number of complaints	Throughout the construction phase
5.2. Soil and water contamination	• Contractor will prepare and implement a Pollution Prevention Plan prior to the start of the work. Proper baseline data will be collected. • Contractor will be required to take appropriate measures to avoid and	Contractor	ESCMC	Number of non-compliances observed or reported Monthly auditing of management of hazardous materials against Material Safety Data Sheet Soil and water quality monitoring data Number of any non-	Throughout the construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities Execution	Monitoring	Key Performance Indicator	Timeline
	contain any spillage and pollution of the soil • Contractor will confine the contaminants immediately after such accidental spillage • Contractor will collect contaminated soils, treat and dispose them in environment friendly manner • All areas intended for storage of hazardous materials to be quarantined and provided with adequate facilities to combat emergency situations complying all the applicable statutory stipulation • Top soil to be stripped and stockpiled where practical. • Temporary stockpiles to be protected from erosion. For sewage waste, appropriate treatment arrangement such as septic tanks and soakage pits will be installed on site. Water will percolate into the ground so there will be no discharge. Alternatively, sewage from construction camps and other facilities will be collected and transported to nearby municipal sewage treatments plans. • ESCPs will be implemented.			compliance Number of related complaints	
5.3. Air Quality	• The equipment and vehicles used during the construction process will comply with the national as well as WBG EHS Guidelines on exhaust emissions. • Concrete batching and asphalt plants will be located minimum 500 m away	Contractor	ESCMC	Number of non-compliances observed or reported Number of dust-related complaints. Number of air quality-related complaints, Air quality monitoring data	Throughout Construction Phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	from residential areas and will have appropriate dust/emission suppression mechanisms such as wet scrubbers. • Contractor will implement dust prevention measures such as watering of roads near the residential areas and spraying of water on loose material where required and appropriate. • While transporting loose material such as sand, it will be covered with tarpaulin. • Regular air monitoring will be carried out near the sensitive receptors to ensure ambient air quality remains within the limits defined by national standards and IFC Guidelines. • Measures will be taken to protect the workers from excessive dust (i.e., usage of personal protective equipment). • A GRM (discussed later in the document) will be put in place to receive complaints from public on various aspects of environmental issues, including air pollution. These grievances will be addressed by the contractor by adopting necessary pollution control measures. • Continued consultations with the affected communities will be carried out during construction phase. • ESCP on air quality management will be implemented				
5.4. Workers Health and Safety	• The contractor will implement the OHS Plan for workers that will also cover communities' health and safety aspects	Contractor	ESCMC	Number of non-compliances observed or reported Number of respiratory protective devices	Throughout construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• The community will be informed about the nature of construction activities and the associated health and safety risks; awareness raising of the communities will be carried out for this purpose with the help of training sessions, posters, signage, and other similar means. • Awareness raising of communities will be carried out, in a culturally-sensitive manner, about the communicable diseases including sexually transmitted infections. • Regular safety monitoring will be carried out at the sensitive receptors. • The construction sites will be fenced as appropriate to minimize entry of the local communities particularly children in the work areas. • Liaison with the community will be maintained. • GRM will be established to address community grievances related to health and safety aspects. • Contractors will have dedicated and qualified staff for ensuring compliance with the OHS Plan • Regular trainings will be provided to the workers on OHS aspects twice a month. • Awareness raising material will be used including posters, signage, booklets, and others • All site personnel will be screened for communicable diseases including sexually transmitted infections.			and other PPEs issues to workers. Monitoring of compliance with Health and Safety standards (including monthly reporting of accidents). Number of accidents, incidents and near misses. Number of trainings provided. Number of complaints received. Regular inspection on availability of PPE and report accordingly.	

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Use of appropriate personal protective equipment (PPE) will be mandatory. No worker (or even visitor) will be allowed on the site without the required PPE (such as hard hat, safety shoes). Consultant would do regular inspection on availability of PPE and report accordingly. • Firefighting equipment will be made available as required at construction sites, camp sites, and particularly near the fuel storage. Regular inspection of expiry date of fire extinguisher will be performed by EPC and Consultant. • The project drivers will be trained in defensive driving. They will maintain low speed while driving through / near the communities. • Complete record of accidents and near-misses will be maintained. • First aid facilities will be made available at the work sites and in the camps. The contractors will engage qualified first aider(s). • Location and telephone numbers of the nearest hospital will be displayed at appropriate places at work sites and in construction camps. If necessary, the contractor will have an ambulance available at the site. • ESCP will be implemented.				
5.5. Community Health and Safety	• Conduct a thorough risk assessment to understand the potential for SEA/SH,				

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	especially in relation to worker influx and community vulnerabilities. • The contractor will follow the Environmental Health and Safety Guidelines of Electric Power Transmission and Distribution of IFC as mentioned in Section 2.5.3; • The contractor will follow the pandemic guidelines of WHO during the construction of the project; • Construction camps will be located at least 500 m away from the communities. Entry of the site personnel in the local communities will be minimized to the extent possible/appropriate. • The contractor will prepare and implement an Occupational Health and Safety (OHS) Plan that will also cover communities' health and safety aspects. • A Code of Conduct and Guidance on GBV is to be implemented in all construction camps. Training and orientation on the Code of Conduct and Guidance on GBV is to be carried out periodically. • The contractor will prepare and implement a Traffic Management Plan that will also address traffic safety for communities. • The community will be informed about the nature of construction activities and the associated health and safety risks; awareness raising of the communities				

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	will be carried out for this purpose with the help of training sessions, posters, signage, and other similar means. • Awareness raising of communities will be carried out, in a culturally-sensitive manner, about the communicable diseases including sexually transmitted infections. • The construction sites will be fenced as appropriate to minimize entry of the local communities particularly children in the work areas. • Construction camps and other site facilities will be fenced. • Liaison with the community will be maintained. • GRM will be established to address community grievances related to health and safety aspects.				
5.6. Noise and Vibration	• The equipment and vehicles used during the construction process will comply with the national standards as well as WBG EHS Guidelines on noise. • Contractors will adopt appropriate noise attenuation measures to reduce the noise generation from construction activities. The noise attenuation measures will include, (i) fitting of high efficiency mufflers to the noise generating equipment; and (ii) keeping acoustic enclosures around drilling equipment.	Contractor	ESCMC	Number of non-compliances observed or reported Record of equipment used on site capable of producing over 85dB and whether equipment has been fitted with mufflers Number of related community complaints Noise monitoring data	Throughout construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• The construction activities near the settlements will not be carried out during night time. • Regular noise monitoring will be carried out near the sensitive receptors. • A GRM will be put in place to receive complaints from public on various aspects of environmental issues, including noise pollution. These grievances will be addressed by the contractor by adopting necessary pollution control measures. • Continued consultations with the affected communities will be carried out during construction phase. • ESCP on noise quality management will be implemented				
5.7. Vegetation loss; damage to crops	• Clearing and removing of natural vegetation and crops will be minimized • Tree cutting will be minimized • Selecting barren/fallow land for establishing substations and aligning transmission lines. • Compensatory tree plantation will be carried out (e.g., along the periphery of substations). • Compensation will be paid for any crop damage. • Replantation will be done at 1:3 ratio; • Maintenance of the planted trees have to be done by contractor until defect liability period. • ESCP will be implemented	Contractor	ESCMC	Area of vegetation lost/disturbed Number of trees felled Number of complaints received.	Throughout construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
5.8. Biodiversity Management Plan	• Contractor would follow BMP before construction starts in environmentally sensitive areas as provided in Annex-XIX • Contractor would follow Tree Plantation Plan (TMP) as provided in Annex-XVI	Contractor	ESCMC	Number of any non-compliance reports. Tree Plantation and Management	Before and throughout the construction phase
5.9. Threat to wildlife	• Complete record will be maintained for any tree cutting. • The site staff will not indulge in any animal shooting, trapping, catching, or killing activities. • Include information on wildlife protection in all tool-box orientation briefings for camp staff • Contractors shall use lower wattage flat lens fixtures that direct light down and reduce glare, and shall avoid use of flood lights. • Contractors will also raise awareness about the protection of birds and other wildlife species among the work force to reduce impacts such as disturbance and poaching • ESCPs will be implemented.	Contractor	ESCMC	Number of any non-compliance reports Number of sighting of key wildlife species	Before and throughout the construction phase
5.10. Wildlife Corridors	• Three (03) Elephant corridors are >10km from TL. However, use non-lethal deterrents such as trip alarms, sirens, and specialized torches to prevent elephants from entering dangerous construction perimeters. • Creation of artificial salt licks, waterholes, and fodder plantations (e.g., banana and bamboo) within the sanctuary to keep elephants away from active construction sites.	Contractor	ESCMC	Number of any non-compliance reports. Number of sighting of elephants.	Before and throughout the construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Use of heavy-duty fencing, often made from welded train tracks, is used to funnel elephants toward these safe passages and away from high-risk construction zones.				
5.11. Climate and Seasonal Variability	• Focus on foundation/tower erection during dry, stable weather. • Towers and foundations must exceed standard requirements for cyclone resilience (wind load, uplift). • Corrosion-resistant coatings and components are essential. • Real-time forecasting to anticipate severe weather events.	Contractor	ESCMC	Number of any non-compliance reports.	Before and throughout the construction phase
5.12. Damage to infrastructure	• Any damaged infrastructure such as roads, or culverts will be repaired	Contractor	ESCMC	Number of any non-compliance reports Number of related complaints	Construction Phase
5.13. Damage to Sites/Places of Religious / Cultural Significance	• The contractor will identify and demarcate any sites and places of religious and or cultural significance, in consultation with the local community. Such sites will be 'no-go-areas' and will be avoided as far as possible. If unavoidable, then the contractor will prepare a plan to move/restore such places in consultation with local community and (related authorities if relevant and required). Such a plan will be implemented after obtaining complete consensus of the related community. • Liaison with the community will be maintained.	Contractor	ESCMC	Number of any non-compliance reports Number of complaints received. Number of reports of any new PCR discovered/reported	Construction Phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Chance Find Procedures will be put in place. • Chance Find Procedure: In the event of discovery of any site or artefact of archeological, historical, cultural, or religious significance, the contractor shall immediately cease all works in that area and report the find to Power Grid. Works may not recommence until approval is given by the Power Grid. Upon receiving a report of a chance find, the Archeological Department will be notified and their site visit will be facilitated. Further works will be carried out on such sites only after obtaining clearance from the Archeological Department / DoE. • The GRM described earlier will also address community grievances related to any damage to sites of religious and or cultural importance.				
5.14. Loss of Access to Villages	• Contractor will prepare and implement a traffic management plan, in consultation and coordination with the local community • The community will be informed about the nature of construction activities and possibility of any blocked route; alternate routes will be identified with the help of local/affected community. Duration of such blockage will be minimized to the extent possible. • Liaison and coordination will be maintained with relevant authorities	Contractor	ESCMC	Number of related community complaints	Construction Phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	such as City Corporation and Traffic Police. • Liaison with the community will be maintained. • The GRM will be established				
5.15. Social conflict due to the Influx of Workers; gender issues	• Labor Management Plan including Code of conduct will be implemented as per international best practice provided in the WB Guidance Note on labor influx • Local norms and customs will be respected • Camp crew will avoid entering the villages • No child labor will be employed in the camps. • Camp staff will be provided training on code of conduct, gender issues, GBV and SE • WB's guidance note on GBV will be followed • Liaison with the community will be maintained. • GRM will be put in place • Notifying the community before the construction work start and inform them about the GRM issue. • ESCP will be implemented.	Contractor	ESCMC	Number of public grievances relating to in-migrants Number of trainings provided	Construction Phase
5.16. Traffic congestion	• The contractor will implement the traffic management plan. • Construction activities will be scheduled in a manner to avoid peak traffic hours. • Liaison and coordination will be maintained with relevant authorities	Contractor (with PIU's assistance)	ESCMC	Number of any non-compliance reports Number of complaints / grievances. Number of traffic accidents/incidents involving project vehicles and lorries bringing materials and supply to project	During construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	such as City Corporation and Traffic Police. • Traffic signage will be placed where necessary and appropriate to warn the drivers and pedestrians about the construction activities. • ESCP to be implemented • GRM will address the traffic congestion elated issues.				
5.17. Damaged rivers/canals and tube-wells	• Any excavation and other construction work near rivers/canals and tube-wells will be planned and implemented in a manner to avoid any damage to these structures. • The vehicle movement near rivers/canals and tube-wells will be minimized. If unavoidable, it will be closely monitored to avoid any damage to these structures. • No excavated material or debris will be released into the rivers/canals. • The contractor will repair and restore any damage the construction activities may cause to rivers/canals and tube-wells. • GRM will be established.	Contractor	ESCMC	Number of non-compliances Number of complaints received	During construction phase
5.18. Spoil generation	• Recycle excavated material and use it in construction • Surplus spoil to be disposed in consultation of communities and relevant authorities	Contractor	ESCMC	Number of non-compliances Number of complaints received	During construction phase
5.19. Impacts of lightning	• Strengthen the insulation level of transmission line	PIU	Power Grid	During the rainy season	Construction and operation phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Installing controllable discharge lightning rod • Reduce the tower grounding resistance • Add ground coupling • The proper use of transmission line lightning arrester				
6. Waste management					
6.1. Soil and water contamination	• Contractors will implement the Waste Management Plan. • Appropriate hazardous, industrial and domestic waste disposal facilities must be established • For the domestic sewage, appropriate treatment and disposal system (e.g., septic tanks and soaking pits) will be constructed having adequate capacity • Waste oils will be collected in drums and sold to the recycling contractors. • The inert recyclable waste from the site (such as cardboard, drums, and broken/used parts) will be sold to recycling contractors. • The hazardous waste will be kept separate and handled according to the nature of the waste. • Domestic solid waste will be disposed of in a manner that does not cause soil contamination. • Awareness raising for minimizing use of non-biodegradable substances • Regular maintenance of waste management facilities will be undertaken	Contractor	ESCMC	Monthly auditing of management of hazardous materials against Material Safety Data Sheet	construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• No waste dumping/release will be carried out in environmental sensitive areas and rivers • Implement ESCPs.				
6.2. Odor	• Waste disposal sites will be located away from the communities. • Regular maintenance of waste management facilities will be undertaken.	Contractor	ESCMC	Number of related complaints	construction phase
6.3. Waste generated during piling and foundation	• Provide clearly labeled, color-coded bins/skips for different waste types (e.g., metal, wood, general waste, hazardous) to prevent contamination and facilitate recycling. • Reusable clean soil should be stockpiled on-site for backfilling or landscaping. • Use mud cleaners/shakers to separate drill cuttings for reuse of the mud within a closed-loop system, or dispose of the waste at an authorized facility. • Store new materials properly to prevent damage, contamination, or exposure to the elements, thereby reducing spoilage and waste. • Keep detailed records of all waste transfers, quantities, and characterization data for regulatory compliance and performance monitoring. • Regularly train all site workers and subcontractors on the waste management procedures and the importance of correct segregation.	Contractor	ESCMC	Monthly auditing of management of hazardous materials against Material Safety Data Sheet	construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
6.4 Management of excess cement mixture during construction phase	• Utilize small amounts of leftover concrete for non-structural elements around the site, such as paving paths, creating small retaining walls, or as general backfill material. • Pour surplus concrete into designated molds to create precast blocks (e.g., for temporary barriers, foundation support, or future landscaping uses). • Establish dedicated, contained washout areas on-site for cleaning mixer trucks, pumps, and tools.	Contractor	ESCMC	Monthly auditing of management of hazardous materials against Material Safety Data Sheet	construction phase
6.5 Management of water mixed with cement.	• Establish clearly marked, designated washout areas on site, located at least 50 feet away from storm drains, open ditches, and water bodies. • The designated area must be impermeable (lined with a barrier like plastic sheeting or a geomembrane) and securely bunded (e.g., using sandbags, earth, or a purpose-built container) to prevent any leakage into the soil or surrounding environment. A freeboard (at least 10% capacity) should be maintained to prevent overflow, especially during rainfall. • Scrape off as much excess concrete from equipment and tools into a receptacle before washing to minimize the volume of washout water generated. Use high-pressure, low-volume water spray nozzles for cleaning.	Contractor	ESCMC	Monthly auditing of management of hazardous materials against Material Safety Data Sheet	construction phase
7. Site Restoration					

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
7.1. Site restoration	• Demolition of temporary structures • Removal of all debris, excess construction material, scraps, spoils, other wastes • No khoa, cement or sand in surroundings land area. • Landscaping will be carried out • Restoration of sites for camps and office buildings. • ESCPs will be implemented.	Contractor	ESCMC	Photographic record Clearance from ESCMC	construction phase
7.2 Restoration of top soil	• It involves stripping, stockpiling, protecting, and reinstating the soil to its original grade using specific best practices to preserve its fertility and structure. • The depth of removal will depend on the soil type but generally ranges from 20-30 cm in normal earth. • Stockpile heights should generally not exceed 2 to 2.5 meters (approximately 6.5 to 8 feet) to maintain soil biota and ensure adequate air and moisture exchange, with side slopes no steeper than 2:1 (H:V). • After construction, the subsoil should be de-compacted (ripped or chiseled) to a depth of 12 to 18 inches, especially in agricultural or pasture areas.	Contractor	ESCMC	Photographic record from ESCMC	construction phase
7.3 Restoration of land surroundings the tower area	• Removing and preserving the topsoil for later use in restoration. • Using techniques like bamboo palisading or applying specific vegetation to anchor the soil and prevent landslides.	Contractor	ESCMC	Photographic record from ESCMC	construction phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Ensuring proper drainage of water from the tower base to prevent water accumulation and erosion. • Performing sufficient planting on eroded or vulnerable sides to retain soil and restore vegetation cover. • In agricultural areas, the land can often be returned to crop production after proper restoration.				
8. Social Management Plans (RP/GBV/LMP/SEP)					
8.1. Resettlement Plan	• Land requisition for 272 towers (43.47 acres) footing • Compensation of standing crops, trees, etc. • Any other allowances as mentioned in RP • Updating the RP report before providing the compensation	PIU/ESU	External RP Monitor, INGO	As per RP report	construction phase
8.2. GBV, LMP and SEP	• Updating, implementation and monitoring of GBV, LMP and SEP	PIU/ESU	INGO	As per Plans prepared for this project	construction phase
C. O&M PHASE					
9.1. Transmission Line Operation	• Placing of bird markers on the transmission line cables	Contractor	Power Grid	- 39 high risk spans are identified with a length of 13793.13m for bird collision and electrocution. - Dynamic, suspended devices with warning discs (minimum 150mm diameter) that swing, sway, and rotate are preferred. - They should have contrasting colors (e.g., black and white, or red/yellow/orange/white) and reflective or glow-in-the-dark features for visibility in varying light conditions.	Operation phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
				- Diverters are placed in the middle portions of the span, leaving a buffer of about 50 meters from either side of the tower. Standard Spacing Intervals: - Earth Wire/OPGW: One diverter at every 10 meters. - Phase Conductors: One diverter at every 15 meters in a staggered layout. - Overall Effective Spacing: The staggered placement on all wires means there is effectively one diverter every 5 to 6 meters across the power line. - So, considering max. 6 meters, at total of 2299 nos. of diverters will be installed by the Contractor. - PIU, ESU and ESCMC will ensure the installation of bird diverters after actual assessment during construction work.	
9.2. Audible noise and radio interference from the transmission lines	• Design considerations to comply with the standards. In addition, Power Grid will conduct noise monitoring at the operation stage to ensure the compliance with Bangladesh Noise Pollution Control Rules 2006.	Consultant/ESU	Power Grid	As per Noise Testing Report and Photographic evidence	Operation phase
9.3. T/L RoW Maintenance	• Bird nests will be preserved by minimizing trimming of trees during the bird breeding season. Trim the hollow bearing trees in a manner which reduces	Contractor	Power Grid	Impacts from tree cutting during maintenance activities	Operation phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	the potential for fauna mortality. Follow the ESCP 13.				
9.4. Working near exposed energized overhead lines or grid stations; working on wet locations	Conduct a job hazard analysis to identify the hazard risks. Follow Power Grid's standard operating procedure for repair and maintenance. Only, qualified persons using proper test equipment and personal protective equipment must adhere to limited approach boundary with a distance of 7.25 m for 765 kV voltage. Must comply with the working space requirement for the equipment. Receptacles and cord connectors used in damp or wet locations must be designed for use in wet or damp locations and, unless approved for submersion, must not be allowed to lie in water.	Power Grid	Power Grid	Electrocution from overhead power lines, damaged tools and equipment, inadequate wiring and overloaded circuits, exposed electrical parts, improper grounding, damaged insulation, and wet conditions	Operation phase
9.5 Public exposure to electromagnetic fields	Exposure to EMF has already been considered during the design of the transmission line conductors and right of way to ensure compliance with the internationally recognized standards. The 765 kV transmission line has an electric field generated with the 70 m RoW in the amount of 0.03 kV/m, which is way lower than the ICNIRP standards of 5 kV/m for public exposure and 10 kV/m for Occupational Exposure. On the other hand, Magnetic Field for the T/L will be 23.31 µT, which is again significantly lower than the public exposure limit of 200 µT and Occupational Exposure limit of 1,000 µT. The electric and magnetic fields will be regularly monitored during O&M phase to ensure compliance with the	Power Grid	Power Grid	Hazards from electric and magnetic fields from transmission lines on community health and safety	Operation phase

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	ICNIRP standards and if required additional mitigation measures will be proposed during O&M phase. Power Grid will maintain and clear entire RoW from the establishment of permanent structures. Awareness will be created along the TL alignment to avoid long exposures under the line.				

Considering the environmental sensitivity, total length of the proposed route has been classified into— (1) Saline or salt production land (30.5-km) (2) Along the forest land (13.8-km) and (3) Plain land (51.2-km). However, a site specific ESMP based these sensitive areas has been presented in the below table.

Table 121: ESMP based on environmental sensitive areas considering site specific scenario

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
A. PRE-CONSTRUCTION PHASE					
1. TL PASSING SALINE OR SALT PRODUCTION LAND (30.5-km)					
1.1. Site Selection and Route Planning	Optimize the transmission line route to avoid, or at least minimize, passing through highly sensitive salt production areas, critical habitats, or areas prone to salinization.	Power Grid and Contractor	-	Revisit, Data Collection, Re-routing, and Stakeholder Engagement, etc.	During pre-construction
1.2 Soil and Drainage Management Plan	Develop specific Environmental Codes of Practice (ECPs) for soil quality and drainage management to prevent water stagnation, control erosion, and minimize the spread of existing saline conditions.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
1.3 Hazardous Substances Management Plan	Create a plan for the management, storage, and disposal of fuels, oils, and other hazardous materials to prevent contamination of the saline environment.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
1.4 Waste Management Plan	Establish a comprehensive waste management plan for the proper collection, storage, and disposal of all project-	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	generated waste, ensuring no contamination of the local environment.				
1.5 Permitting and Legal Compliance	Obtain all necessary environmental permits and approvals from relevant regulatory bodies, ensuring the project adheres to national environmental protection laws and guidelines	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
1.6 Stakeholder Consultation and Information Disclosure	Hold public consultation meetings with local communities, salt farm owners, employees, and relevant government agencies to inform them about project details, potential risks, and mitigation measures, and to gather their input and concerns.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
1.7 Compensation for Land of Towers	Follow Electricity Act 2018 and Rules 2020 (amended 2022) to ensure fair compensation	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
1.8 Grievance Redress Mechanism (GRM)	Establish a clear and accessible GRM to address community complaints and concerns during all project phases, particularly regarding impacts on salt production activities or land access.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
1.9 Community Health and Safety Plan	Incorporate health and safety measures to protect local communities from construction-related hazards, such as increased traffic or potential exposure to hazardous materials.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
1.10 Pre-Construction Audit	Document the existing social and environmental conditions through a pre-construction audit report, including photographs, to serve as a baseline for future comparisons and rehabilitation efforts.	Power Grid	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
2. TL PASSING ALONG THE FOREST LAND (13.8-km)					

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
2.1. Tower Placement Optimization	Adjust specific tower locations to avoid archaeological sites, minimize soil erosion, and use higher terrain at crossings to reduce the required tower height and footprint.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
2.2 Vegetation Management Planning	Develop protocols for "lopping" trees instead of full felling and ensure that no new access roads are cut in steep areas to prevent erosion.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
2.3 Invasive Species Protocol	Create a management plan to mark and avoid existing invasive species and schedule construction when the ground is frozen or vegetation is dormant to reduce soil and habitat disturbance.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
2.4 Public Consultation & Disclosure	Engage with local communities, environmentalists, and indigenous groups early to integrate local ecological knowledge and cultural wisdom into the design.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
2.5 Institutional Coordination	Conduct joint inspections with Forest Department officials and obtain necessary approvals from irrigation or other relevant authorities before using local resources.	Power Grid and Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
2.6 Safety & Awareness Planning	Develop worker awareness programs for vector-borne diseases and safety rules, ensuring a safety officer is planned for every site.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
2.7 Topographical & Soil Surveys	Complete detailed surveys and ground investigations to design stable tower foundations that prevent future soil erosion or slope failure.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
3. TL PASSING PLAIN LAND (51.2-km)					
3.1. Route Selection and Walkover Survey	Review the route to select the optimal transmission line, avoiding sensitive areas such as national parks, significant ecological	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	habitats, wetlands, and heavily populated zones.				
3.2 Mitigation Plan Development	EPC should develop a detailed CESMP that outlines specific mitigation measures for identified impacts. This includes plans for erosion control, waste management, and minimizing disruption to local flora and fauna.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
3.3 Permitting and Approvals	Secure all necessary permits and approvals from relevant environmental protection agencies and local authorities, ensuring compliance with national and local environmental regulations.	Power Grid and Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
3.4 Identification and Management of Sensitive Areas	• Identify and mark critical habitats, rare species locations, and water bodies to ensure they are avoided or appropriately managed during all project phases. • Develop specific protocols for controlling the introduction and spread of invasive species, including cleaning equipment before moving between sites	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
3.5 Water Resource Planning	Plan the water usage for construction activities and the domestic needs of the labor force, identifying water sources and potential impacts on local water bodies	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
3.6 Compensation for Tower Footing and RoW Planning	• Identify the land required for tower foundations and the necessary RoW. • Plan for the fair and legal compensation as per Electricity Rules 2022 for any affected properties or crops, ensuring all land use restrictions are clearly communicated to landholders	Contractor	ESCMC	Preparation of CESMP, Approval of CESMP	After appointment of EPC

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
3.7 Labor Management Plan	Develop a plan that outlines working conditions, health and safety (H&S) protocols, and guidelines for the workforce, including the establishment of living quarters (campsites) and sanitary facilities.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
3.8 Cultural and Archaeological Site Protection	Conduct surveys to identify any sites of cultural, historical, or archaeological significance within the project area and develop a plan for their protection or management.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
3.9 Traffic Management Plan	Plan for the movement of construction vehicles and materials to and from the site, minimizing disruption to local traffic and ensuring temporary signage is installed where necessary.	Contractor	-	Preparation of CESMP, Approval of CESMP	After appointment of EPC
B. CONSTRUCTION PHASE					
1. TL PASSING SALINE OR SALT PRODUCTION LAND (30.5-km)					
1.1 Corrosion Protection	Use anti-corrosion techniques for reinforced concrete and steel components, such as specialized coatings, waterproofing, and material innovations, to combat the high chloride and sulfate content in saline soil.	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
1.2 Site Selection and Layout	Carefully select tower locations and access road routes to avoid the most sensitive or "wetter" portions of the salt production area, minimizing the physical footprint of construction activities.	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
1.3 Soil and Drainage Management	• Implement erosion and sediment control measures to prevent the spread of saline soil or construction runoff into active salt pans or nearby water bodies. • Manage drainage to avoid water ponding at construction sites, which	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities Execution	Monitoring	Key Performance Indicator	Timeline
	can exacerbate salinization and create health hazards. • Build new or rehabilitate existing drainage lines with appropriate silt collectors and oil interceptors.				
1.4 Waste and Hazardous Substances Management	• Minimize waste generation and store all waste types in appropriate facilities before disposal by qualified agencies. • Prevent spills of fuels, oils, and other hazardous materials by using impermeable flooring in storage areas and implementing robust management procedures.	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
1.5 Water Resource Management	Ensure all construction and domestic wastewater quality conforms to national and international guidelines before discharge.	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
1.6 Biodiversity Protection	Implement measures to protect local flora and fauna, including potential "substitute habitats" like rights-of-way that can be managed for specific species if planned correctly.	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
1.7 Stakeholder Engagement and Consultation	Conduct comprehensive public consultations with salt farmers, landowners, and local communities to understand their concerns and integrate their feedback into the Environmental and Social Management Plan (ESMP).	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
1.8 Livelihood Restoration and Compensation	• Assess the project's impact on salt production activities and the livelihoods of farmers and workers. • Provide fair and timely compensation for any loss of land, economic trees, or	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities Execution	Monitoring	Key Performance Indicator	Timeline
	disruption to ongoing salt production processes. • Coordinate actions with local authorities to ensure support for vulnerable groups affected by the project.				
1.9 Employment and Local Benefits	Prioritize the employment of local labor and source materials locally to foster economic growth within the community.	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
1.10 Health and Safety	Implement strict worker health and safety protocols, including the management of potential health risks associated with the saline environment and general construction hazards.	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
1.11 Access Management	Use existing roads as much as possible for access to minimize disturbance to active salt production areas and ensure local communities can continue their operations.	Contractor	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
1.12 Grievance Redress Mechanism	Establish a transparent and accessible mechanism for local communities and workers to report grievances and have them addressed promptly.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
2. TL PASSING ALONG THE FOREST LAND (13.8-km)					
2.1 Biodiversity Protection	• Implementing approved Biodiversity Management Plan (BMP) that includes measures for protecting critical habitats and species, particularly known elephant corridors. • Minimizing the project footprint (e.g., tower locations) to avoid significant adverse impacts on the sanctuary's ecosystem.				

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities Execution	Monitoring	Key Performance Indicator	Timeline
	• Avoiding construction activities during sensitive periods for wildlife, such as breeding seasons.				
2.2 Bird Protection	Install bird diverters on the lines in areas with high bird traffic especially the route passing along the Chunati WS to reduce the risk of collisions as per indication mentioned in ESMP Mitigation Plan	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
2.3 Vegetation and Topsoil Management	• Proper Clearing: Implement a plan for the proper disposal or use of cleared woody material (e.g., chipping for mulch or creating wildlife habitats). • Topsoil Preservation: Scrape and store topsoil for later use in site rehabilitation and landscaping. • Re-Plantation: Plant cleared areas and slopes as soon as possible after construction using native, non-invasive species to stabilize the soil and restore habitat as per 1:3 ratio	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
2.4 Wildlife and Habitat Protection	Schedule construction activities to avoid sensitive periods like breeding seasons. Mark sensitive areas for avoidance to protect local flora and fauna.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
2.5 Cultural Heritage Protection	Implement procedures for "chance finds" (e.g., archeological relics) and inform relevant authorities immediately upon discovery.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
2.6 Noise and Light Management	Minimize noise and light pollution from construction activities and equipment, especially during night hours, to lessen disturbance to wildlife and nearby communities.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
2.7 Waste Management	• Managing and disposing of all wastes (solid, liquid, hazardous) generated during construction according to national regulations and the ESMP. • Controlling air emissions (dust, vehicle exhaust) and noise levels to stay within acceptable limits, especially near sensitive areas. • Preventing soil and water contamination by managing effluents and using proper storage for materials and chemicals.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
2.8 Habitat Restoration and Resource Efficiency	• Restoring temporary construction areas (e.g., fly camps, material laydown areas) to their original or a better state after construction is complete. • Minimizing the clearing of natural vegetation and trees, particularly within the right-of-way (ROW). • Implementing a program of maximum recycling of materials where possible.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
2.9 Gender and Social Issues	• Implementing approved Gender-based Violence (GBV) prevention plan and addressing other social concerns identified during the social impact assessment.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
3. TL PASSING PLAIN LAND (51.2-km)					
3.1 Soil and Land Management	• Minimize Disturbance: Confine the movement of equipment and materials to a single travel path or existing roads to limit soil compaction and damage to topsoil. • Erosion Control: Install and maintain proper erosion controls (e.g., leveling	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities Execution	Monitoring	Key Performance Indicator	Timeline
	and stabilization of tower construction sites after completion) to minimize surface runoff, especially during the rainy season. • Topsoil Preservation: Store excavated topsoil separately within the right-of-way to be reused later for site rehabilitation. • Invasive Species Prevention: Clean construction equipment thoroughly before moving between sites to prevent the spread of invasive species, and monitor for new infestations post-construction.				
3.2 Waste Management	• Debris Disposal: Ensure daily and proper disposal of construction waste, surplus backfill, and debris at controlled landfill sites. • Hazardous Materials: Provide secure, waterproof storage areas for construction materials and hazardous products (e.g., fuels, lubricants) with a peripheral drainage system to contain potential spills. Contaminated soil, in the event of a leak, must be stored in containers and handled by authorized companies.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
3.3 Water Management	• Prevent Contamination: Install temporary sanitary units connected to waterproof septic tanks that can be emptied by authorized companies. • Dust Control: Water traffic routes and work platforms during dry periods to	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities Execution	Monitoring	Key Performance Indicator	Timeline
	suppress dust generated by vehicle traffic and excavation activities.				
3.4 Flora and Fauna Protection	• Limit vegetation clearing to the necessary right-of-way (RoW) and dispose of woody material appropriately, potentially by piling brush to provide wildlife habitat • Re-Plantation: Plant cleared areas as soon as possible after construction using native, non-invasive species to stabilize the soil and restore habitat as per 1:3 ratio	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
3.5 Consultation and Compensation	• Consultation: Engage with stakeholders, including landowners and local communities, early and often to address concerns and build support. • Compensation: Assess land requirements and provide fair and timely compensation as per Electricity Rules 2022 for permanent or temporary loss of agricultural land, crops, and any property within the RoW during tower footing, erection, and stringing works.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work
3.6 Health and Safety	• Worker Safety: Prioritize safety by providing comprehensive safety training and appropriate personal protective equipment (PPE) for all workers. • Public Safety: Install temporary road signage to warn of ongoing works and secure construction sites with barriers and security guards.	Contractor and Power Grid	ESCMC and External Monitor	Approved CESMP, EMR, SMR, etc.	During Construction Work

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• GRM: Establish a functional Grievance Redress Mechanism (GRM) and committee to record and follow up on complaints from the community and workers. • Community Safety: Aware community and engage them regarding their health and safety issues.				
C. O&M PHASE					
1. TL PASSING SALINE OR SALT PRODUCTION LAND (30.5-km)					
1.1 Corrosion Protection	• Implement rigorous monitoring and maintenance programs to prevent corrosion of structural elements (towers, conductors, hardware) caused by salt contamination • Regularly inspecting and cleaning insulators and metal parts to remove salt deposits.	Power Grid	-	Monitoring Checklist, Report and Auditing	After Construction Work
1.2 Vegetation Management	• Manage the right-of-way (RoW) vegetation for safety and access, potentially encouraging salt-tolerant native species to thrive, which can also act as substitute habitats for some species. • Avoid the use of non-native invasive species for revegetation efforts.	Power Grid	-	Monitoring Checklist, Report and Auditing	After Construction Work
1.3 Sustaining Livelihoods	• Coordinate O&M activities with local salt producers and farmers to minimize disruption to their operations (e.g., salt production cycles, harvesting schedules)	Power Grid	-	Monitoring Checklist, Report and Auditing	After Construction Work
2. TL PASSING ALONG THE FOREST LAND (13.8-km)					

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
2.1 Avian Protection	• Collision Avoidance: Install and maintain visual markers, such as large, colored spheres or spirals, on the ground wires and conductors to increase visibility and reduce bird collisions, particularly for migratory species. • Electrocution Prevention: Ensure all power poles/towers, especially at junctions and terminal points, are designed with adequate separation (over 1.5 meters) between energized parts and grounded elements to prevent electrocution of large perching birds (e.g., raptors, storks, vultures). Retrofit existing dangerous poles with insulated covers where necessary. • Perch Management: Provide alternative, safe artificial perches and nesting platforms at a safe distance from energized components to discourage	Power Grid	-	Monitoring Checklist, Report and Auditing	After Construction Work
2.2 Habitat and Biodiversity Protection	• Right-of-Way (RoW) Management: Maintain the RoW using manual clearing methods rather than chemical herbicides to prevent pollution and allow specific low-growing, early-succession vegetation to act as a potential substitute habitat for certain species • Minimizing Disturbance: Schedule O&M activities (e.g., vegetation clearing, repairs) to avoid sensitive periods such	Power Grid	-	Monitoring Checklist, Report and Auditing	After Construction Work

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	as peak migration, breeding, or nesting seasons. • Access Control: Strictly control vehicle and personnel access to the RoW using predefined routes to minimize soil compaction, vegetation damage, and disturbance to wildlife.				
3. TL PASSING PLAIN LAND (51.2-km)					
3.1 Vegetation Management	• Regularly clear or lop trees and other tall vegetation within the ROW to maintain safe ground clearance and prevent electrical hazards. • Utilize selective clearing methods and avoid the extensive use of herbicides to prevent the spread of invasive species and promote native, low-growing plant communities that can serve as substitute habitats for some wildlife.	Power Grid	-	Monitoring Checklist, Report and Auditing	After Construction Work
3.2 Wildlife and Biodiversity Protection	• Maintain bird flight diverters or other markings on conductors in areas known for high bird traffic, especially for large or migratory species, to reduce collision risks. • Minimize noise and human activity during sensitive periods (e.g., breeding seasons) if the line passes near protected natural areas.	Power Grid	-	Monitoring Checklist, Report and Auditing	After Construction Work
3.3 Monitoring	• Conduct periodic inspections (e.g., line patrols, drone surveys) to check for environmental compliance, identify new potential impacts (like illegal structures or land use changes), and monitor the effectiveness of mitigation measures.	Power Grid	-	Monitoring Checklist, Report and Auditing	After Construction Work

Impacts/ Issue	Actions/Mitigations	Institutional Responsibilities		Key Performance Indicator	Timeline
		Execution	Monitoring		
	• Monitor electromagnetic fields (EMF) periodically, if required by local regulations, to address any potential health concerns, although scientific evidence is generally inconclusive on human health impacts.				

10.1 Institutional Arrangements

The main purpose of this environmental assessment is to delineate the correct measures to enhance the environmental sustainability of the proposed project through providing suggestion on design considerations, implementation, management and operation as suggested in the ESMP. The effective implementation and operation of ESMP depends on regular monitoring.

The overall responsibility of environmental and social performance of the project and effective ESMP implementation will rest with Power Grid. Power Grid will establish the Project Implementation Unit (PIU) to lead the Project implementation. The PIU will be headed by the Project Director (PD). Existing Environment and Social Unit (ESU), comprising qualified environmental and social development staff, will be work under the PIU. The ESU will assist the PIU on issues related to environmental and social management and oversee the Environmental Social and Construction Monitoring Consultant (ESCMC) and contractors. The ESU will compile quarterly regular progress reports on ESMP compliance, to be sent to the Project Director and also shared with the Lender, throughout the construction period. The ESU will also provide trainings to the Power Grid field personnel responsible for monitoring of environmental compliance during both construction and O&M phases of the project.

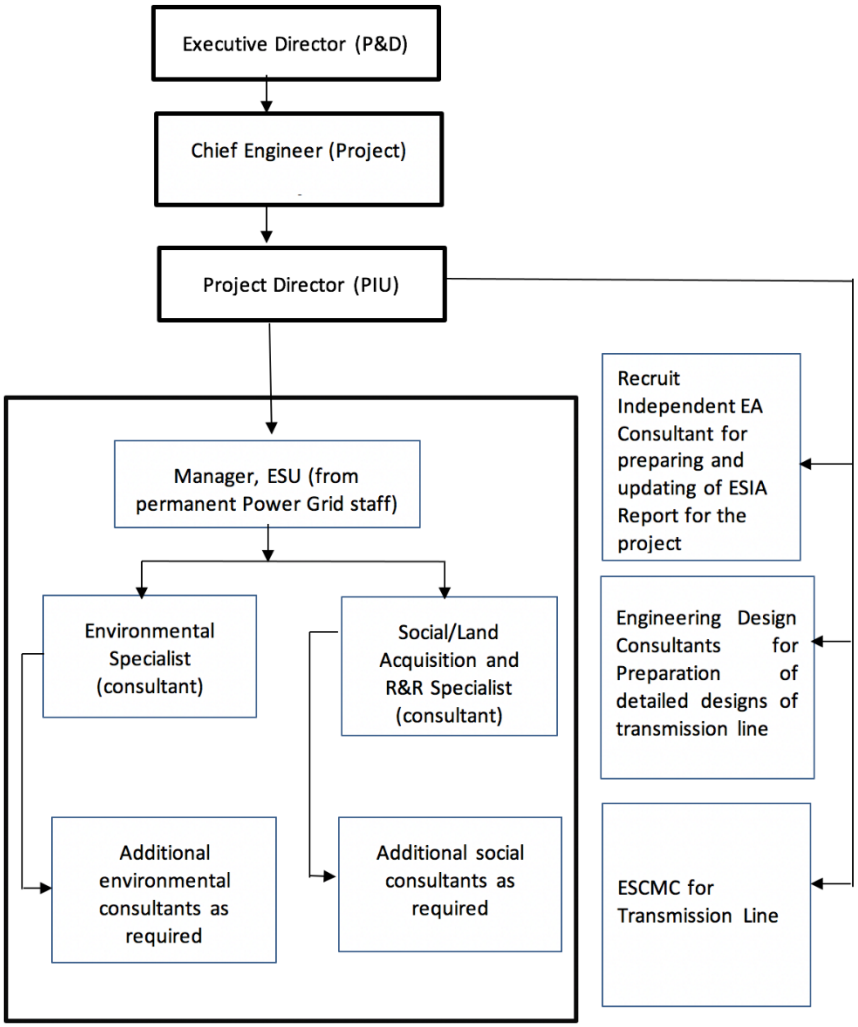


Figure 105: Organogram for Environmental and Social Management of Project

The PIU will engage Environmental Social and Construction Monitoring Consultant (ESCMC) to supervise the construction contractors in order to ensure design compliance and quality assurance of the construction activities. The ESCMC will also supervise the contractors for ESMP

implementation. For this purpose, ESCMC will engage environmental and social development specialists.

The contractors in turn will also have environmental, (occupational) health and safety (EHS) supervisors who will be tasked to first develop CESMP in accordance with the present ESMP and then responsible for its implementation during construction activities.

The organogram of PIU is shown in Figure 105; *Table 122* presents the responsibilities of PIU, its consultants, and construction contractor(s). The roles and responsibilities of the PIU, ESU, ESCMC and contractor for the implementation and monitoring of ESMP have been outlined in Table 122.

Table 122: Roles and Responsibilities for ESMP Implementation

Organizations	Responsibilities
PIU	• Ensure effective implementation of the project in accordance with the plans • Ensure that all project activities are well-managed and coordinated. • Establishing ESU and engaging environmental and social development specialist in it. • Recruitment of consultants for ESIA and engineering designs; and obtain approval of ESIA from the DoE • Procurement of works and goods. • Payment of compensation to the project affecters • Recruitment and supervision of Environmental Social and Construction Monitoring Consultants (ESCMC) in timely manner.
ESU within PIU	• Responsible for screening and determining scope of EA work required for subprojects and studies, assisting PD with developing ToRs and hiring of consultants to carry out any required environmental assessment work, reviewing consultant's deliverables related to environmental assessment, reviewing bid documents for inclusion of ESMP measures, supervising construction activities, producing periodic monitoring reports, • Ensuring inclusion of ESMP in bidding documents. • Providing training on ESMP principles and requirements to Power Grid field staffs, and others as needed to ensure effective implementation of ESMP. • Supervising ESCMC for the implementation of ESMP. • Closely coordinate with other concerned agencies, local governments and communities to support implementation of ESMP • Preparation of progress reports on implementation of ESMP. • Ensure effective implementation of ESMP components not directly tasked to the contractor including components dealing with indirect, induced and cumulative effects, as well as plans and measures for O&M phase. • Commissioning and oversight/review of consultant reports for ESIAs/ESMPs to be developed for the subcomponents of the Project. • ESU will review the report quarterly and bi-annually and submit to PIU.
ESCMC	• Supervise civil works, ensuring compliance with all design parameters including quality requirements • Supervising and monitoring contractors for ESMP implementation • ESCMC would widely implement the RP of the project • Prepare monthly reports and submit to PIU • ESCMC will have dedicated environmental, occupational health and safety, and social and RP Manager staff. • ESCMC should have an ornithologist (bird specialist) and Ecologist cum Wildlife Specialist for biodiversity management and monitoring during construction works and will closely guide Contractor. • ESCMC will prepare the report on quarterly and bi-annually basis and will submit to ESU • CESMP submitted by Contractor will be reviewed and cleared by ESCMC and then submit to ESU before the mobilization of Contractor

Organizations	Responsibilities
	• ESCMC will update the ESIA report if variation come during on, before or during construction works of the project
Contractor	• Responsible for implementation of mitigation measures and monitoring proposed in the ESMP • Preparation and implementation of CESMP • Each contractor will recruit Environmental, Health, and Safety Manager, who will be responsible for implementing the contractors' environmental, health and safety responsibilities, and liaising with government agencies. S/he will have adequate number of staffs to support him/her for these tasks. • Contractor will prepare the report on monthly basis and will submit to ESCMS

10.1.1 Monitoring Program

As one of the key elements of the ESMP, a two-tier monitoring program has been proposed comprising compliance monitoring and effects monitoring. The main purpose of this monitoring program is to ensure that the various tasks detailed in the ESMP particularly the mitigation measures are implemented in an effective manner, and also to evaluate program impacts on the key environment and social parameters. Both these types of ESMP monitoring are discussed below.

10.1.2 Compliance Monitoring

The purpose of the compliance monitoring is to ensure that the contractor implements the mitigation measures given in the ESMP are effectively and timely implemented. This monitoring will generally be carried out by the ESCMC with the help of checklists prepared on the basis of the mitigation measures given in Table 120.

10.1.3 Effects Monitoring and Follow up Plan

Effects monitoring and follow up plan is a very important aspect of ESMP and aims to ensure environmental protection. The effects monitoring plan proposed for the project is presented in Table 123. The monitoring will comprise surveillance to check whether the contractor is meeting the provisions of the contract during construction and operation of the project including the responsible agencies for implementation and supervision. Compliance indicators or threshold limits for the monitoring are also given in Table 123. Actual monitoring time and location will be decided by ESCMC and PIU.

Table 123: Effects Monitoring and Follow up Plan

Parameter/ Activity	Location	Means of Monitoring	Compliance indicator/ threshold limits	Frequency	Responsible Agency	
					Implementation	Supervision
Pre-Construction Phase						
Air (all parameters as APCR 2022)	At sensitive sites identified by ESCMC	24-hour continuous monitoring with appropriate equipment	Compliance with national and WBG EHS Guidelines	Monthly	Contractor	ESCMC
Water quality (as per ECR 2023)	At sensitive sites	Testing of ground and surface water	National and WBG EHS	Monthly	Contractor	ESCMC

Parameter/ Activity	Location	Means of Monitoring	Compliance indicator/ threshold limits	Frequency	Responsible Agency	
					Implementation	Supervision
	identified by ESCMC	quality of standard parameters	Guidelines for drinking water			
Land Requisition	TLs Towers	APs receive compensation by DC	Compliance with Electricity Rules 2022	Monthly	Contractor and PIU	ESCMC
Noise (as per Noise Pollution Control Rules 2006)	At sensitive sites identified by ESCMC	Noise measurement using potable noise meter;	Compliance with national and IFC standards	Monthly	Contractor	ESCMC
During Construction Phase						
Change of Land Use	Substations and TLs Towers	Visual inspection	Design standard of Power Grid	Quarterly	Contractor and PIU	ESCMC
Loss crops, trees and structures	Substations and TLs Towers, RoW of TLs	Visual inspection	Compliance with ARIPA 2017 and WB Involuntary Resettlement	Quarterly	Contractor and PIU	ESCMC
Disposal of Excavated Materials	Construction camps and construction sites	Visual inspection that solid waste collection facilities are in place and waste is disposed at designated site	Facilities are clean and waste collection and disposal facilities are in place	Monthly	Contractor	ESCMC
Construction of Camp Issues	Labor Camp	Visual inspection that solid waste collection facilities are in place and waste is disposed at designated site	Facilities are clean and waste collection and disposal facilities are in place	Monthly	Contractor	ESCMC
Hydrocarbon and chemical storage and handling	Construction camps and yards	Visual Inspection of storage facilities	No leakages from the containers in the storage. Handling follows procedures to avoid spillages.	Monthly	Contractor	ESCMC
Spoils	At substations and tower locations	Visual inspections	Disposal in approved locations	Monthly	Contractor	ESCMC

Parameter/ Activity	Location	Means of Monitoring	Compliance indicator/ threshold limits	Frequency	Responsible Agency	
					Implementation	Supervision
Traffic Safety	Access Roads; other roads in project area (particularly along the underground transmission line route	Visual inspection to see whether proper traffic signs are placed and flag-persons for traffic management are engaged	Smooth flowing of traffic; and placement of traffic signs and flag-person	Monthly	Contractor	ESCMC
Dust	Construction sites	Visual inspection to ensure good standard equipment is in use and dust suppression measures (e.g., spraying of waters) are in place.	No dust generation from the construction activities	Weekly	Contractor	ESCMC
	Construction Sites	Spot measurements with potable meters	Compliance with national and WBG EHS Guidelines	Monthly	Contractor	ESCMC
Noise (as per Noise Pollution Control Rules 2006)	Construction sites; camp site	Noise measurement using potable noise meter;	Compliance with national and IFC standards	Monthly	Contractor	ESCMC
Water quality (as per ECR 2023)	At sensitive sites identified by ESCMC	Testing of ground and surface water quality of standard parameters	National and WBG EHS Guidelines for drinking water	Monthly	Contractor	ESCMC
Waste Management	Construction camps and construction sites	Visual inspection that solid waste collection facilities are in place and waste is disposed at designated site	Facilities are clean and waste collection and disposal facilities are in place	Monthly	Contractor	ESCMC
Biodiversity Conservation	WS/RF areas	Continuous monitoring by standard methods as per management plan	As per management plan principles	Regularly	ESCMC	ESCMC
Drinking water quality	Camps, offices	Testing of water quality of workers camp	National and WBG EHS	Monthly	Contractor	ESCMC

Parameter/ Activity	Location	Means of Monitoring	Compliance indicator/ threshold limits	Frequency	Responsible Agency	
					Implementation	Supervision
		water supply for drinking water standards	Guidelines for drinking water			
Air Quality (all parameters as APCR 2022)	At sensitive sites identified by ESCMC	24-hour continuous monitoring with appropriate equipment	Compliance with national and WBG EHS Guidelines	Half yearly	Contractor	ESCMC, PIU
Cultural and archeological Sites	At all work sties	Visual observation for chance finds	Indication of chance finds	Daily	Contractor	ESCMC, PIU
Restoration of Work Sites	All Work Sites	Visual Inspection	The facilities are clean with no waste at the works sites	After completion of all works	Contractor	ESCMC, PIU
Safety of workers Monitoring and reporting of accidents	At work sites	Usage of PPE and implementation of contractor OHS plan	All workers should be provided with, and use necessary PPEs	Monthly	Contractor	ESCMC, PIU
Grievances	In the project area	Number of grievances registered and addressed	Minutes of grievance redress meetings; number of grievances received; number of grievances resolved.	Monthly	ESCMC	PIU
During Operation and Maintenance (OM) Phase						
Tree Plantation	Near the vacant areas of the project	Visual Inspection (mortality and natality rate)	Inventory	Monthly	ESCMC	PIU
Inspection as per Standard Operating Procedures	Tower locations	Visual Inspection of environmental related issues	Comply with Power Grid SOPs	Monthly	PIU	Power Grid
Bird collision and electrocution data	At locations crossed by major rivers	Walk over surveys and interviews	Zero mortality	Six monthly – in March and October	PIU	Power Grid
Electro-magnetic fields	Near the residential areas along the	Measurement through appropriate equipment	WHO recognized standards	Yearly	PIU	Power Grid

Parameter/ Activity	Location	Means of Monitoring	Compliance indicator/ threshold limits	Frequency	Responsible Agency	
					Implementation	Supervision
	transmission line alignment					

10.1.4 Performance Indicators

For evaluating the performance of the environmental management and monitoring plan, performance indicators are identified for efficient and timely implementation of measures/actions proposed in ESMP. The indicators are defined both for implementation phase and for operation phase. ESCMC will be responsible for compiling the information on these indicators and report to Power Grid. To measure the overall environmental performance of the project, a list of performance indicators is given below:

- Number of inspections carried out by ESCMC per month.
- Number of non-compliances observed by ESCMC or PIU.
- Availability of environmental specialists in ESCMC.
- Availability of EHS specialists with contractors.
- Timely reporting of documents (as defined in ESMP and monitoring plan).
- Number of trainings imparted to stakeholders/other capacity building initiatives
- Timely disbursement of compensation/ timely resettlement of project affectees
- Timely implementation of resettlement schedule.
- Number of grievances received.
- Number of grievances resolved.
- Number of construction-related accidents.

10.1.5 Capacity Building

Capacity building for effective implementation of the environmental and social requirements is a key element of the ESMP. Capacity building for environmental and social management will need to be carried out at all tiers of the project, including Power Grid, PIU, ESCMC, and contractors. At the construction site, ESCMC will take the lead in implementing the capacity building plan, though the contractors will also be responsible to conduct trainings for their own staff and workers. The various aspects that are covered under the capacity building will include general environmental and social awareness, key environmental and social sensitivities of the area, key environmental and social impacts of the project, ESMP requirements, OHS aspects, and waste disposal. Table 124 provides a summary of various aspects of the environmental and social trainings to be conducted at the construction site. ESIC may revise the plan during the project implementation as required. During the O&M phase of the project, these trainings will continue to be conducted by Power Grid staff for all relevant O&M personnel.

Table 124: Environmental and Social Trainings

Contents	Participants	Responsibility	Schedule
General environmental and socio-economic awareness; Environmental and social sensitivity of the project influence area; Mitigation measures; Community issues and workers' code of conduct; Grievance Mechanism; ESMP;	PIU; ESCMC; selected contractors' crew	ESCMC	Prior to the start of the field activities. (To be repeated as needed.)

Contents	Participants	Responsibility	Schedule
Awareness of transmissible diseases; Workers' Code of Conduct; Social and cultural values; Gender issues including GBV and SE.			
Biodiversity management and monitoring; Bird collision and monitoring, etc.	PIU; ESCMC; selected contractors' crew	ESCMC	Prior to the start of the field activities. (To be repeated as needed.)
ESMP; Waste disposal; OHS; Code of Conduct; Social and cultural values; Gender issues including GBV and SE.	Construction crew	Contractors	Prior to the start of the construction activities. (To be repeated as needed.)
Road safety; Defensive driving/; Waste disposal; Cultural values and social sensitivity; Gender issues including GBV and SE; Code of Conduct.	Drivers	Contractors	Before and during the field operations. (To be repeated as needed.)
Camp operation; Waste disposal; OHS Natural resource conservation; Code of Conduct; Gender issues including GBV and SE; Housekeeping	Camp staff	Contractors	Before and during the field operations. (To be repeated as needed.)
Restoration requirements; Waste disposal.	Restoration teams	Contractors	Before the start of the restoration activities.

10.1.6 Documentation and Reporting

Both Contractors and ESCMC will prepare two separate monthly reports, one for Environmental and Social Management and the second one for OHS Management. The PIU with assistance from ESCMC and contractors will produce the following environmental and social reporting documentation:

Monthly Report on Environment, Health, and Safety: the contractor will prepare a monthly report covering environmental monitoring, OHS compliance, OHS incidents and accidents, trainings conducted, and any other salient activities carried out during the reporting period. The report will be submitted to ESCMC.

Quarterly/Bi-annually Progress Reports on Environment: The environmental monitoring reports will include environmental mitigation measures undertaken, environmental monitoring activities undertaken, details of monitoring data collected, analysis of monitoring results particularly the non-compliances, recommended mitigation and corrective measures, environmental training conducted, and environmental regulatory violations observed. The environmental monitoring reports will be submitted quarterly during the construction period and annually for two and half years after completion of construction. ESCMC will prepare the report on quarterly and bi-annually basis and will submit to ESU. CESMP submitted by Contractor will be reviewed and cleared by ESCMC and then submit to ESU before the mobilization of Contractor on quarterly and bi-annually.

Quarterly Progress Reports on Social and Resettlement: The quarterly social progress reports will cover the progress on implementation of social mitigation measures including payment of compensation and assistance by ESCMC.

Project Completion Environmental Monitoring Report: One year after completion of construction, the PIU will submit a Project Completion Environmental Monitoring Report which will summarize the overall environmental impacts from the project by ESCMC and Contractor.

10.1.7 Budget for ESMP Implementation

For implementing the present ESMP, a total of Tk. 940,709,640.00 has been estimated where (a) about Tk. 48,20,000 for the implementation of environmental management and monitoring, (b) Tk. 81,02,97,400 for the implementation of social management and monitoring plan and (c) Tk. 12,55,92,240 for the expense of carry out institutional arrangement. The contractor must provide valid supporting documents/proof for the cost of each item, which must be reviewed and approved by the relevant authority.

Table 125: Budget for Implementation of ESMP

SN	Environmental Component	Item	Unit	Frequency (No)	No. of Sample per Frequency	Km of interval	Quantity	Rate (Tk)	Total BDT
1	2	3	4	5	6	7	8=(5x6)	9	10
A		Environmental Management and Monitoring Plan							
1	Ambient Air Quality	CO, Pb, NO_2, PM_{10}, $PM_{2.5}$, O_3, SO_2, NH_3	km	19	4	5	76	20,000	15,20,000

SN	Environmental Component	Item	Unit	Frequency (No/Year	Time (Project Year	Quantity	Rate (Tk)	Total BDT
A	Environmental Management and Monitoring Plan							
2	Ambient Noise	Ambient noise level (Day & Night) level (LAeq)	Nos	4	5	20	5,000	1,00,000
3	Surface Water Quality (River/Canal Water)	pH, SS, DO, COD, Total Coliform, Fecal Coliform, NO_3-N, PO_4-3, Oil & Grease, Phenols, As, Cd, CN-, Hexavalent Cr, Pb, Hg	Nos	4	5	20	25,000	5,00,000
4	Surface Water Quality (Pond Water)	pH, DO, BOD, NO_3-N, NH_4-N, PO_4-P, Total Cr, Pb, Hg, Total Coliform, TDS, COD	Nos	4	5	20	25,000	5,00,000
5	Ground Water Quality	pH, SS, TDS, Chloride, Turbidity, As, Cu, CN, Pb, Mn, Cd, Cr, NO_3, NO_2, Fe, Total Coliform, Fecal Coliform	Nos	4	5	20	25,000	5,00,000
6	Soil Quality	Arsenic (As), Copper (Cu), Iron (Fe), Mercury (Hg), Nickle (Ni), Lead (Pb), Zinc (Zn)	Nos	4	5	20	25,000	5,00,000

SN	Environmental Component	Item	Unit	Frequency (No/Year	Time (Project Year	Quantity	Rate (Tk)	Total BDT
7	Waste Management	Handling, storage and disposal in the designated area of the construction camp	LS	-	-	-	2,00,000	2,00,000
		Removal of Construction Waste from Tower Site						
		Collection and management of domestic wastes from Labor Camp						
8	Dust Management	Dust generates from heavy vehicle and management through water sprayer/watering	LS	-	-	-	2,00,000	2,00,000
9	Implementation of OHS Plan	H&S measures for workers (such as PPEs for workers, safety equipment and Safety (H&S) such as barriers, posters, banners etc.)	LS	-	-	-	1,00,000	1,00,000
10	Top Soil Stripping, Storage and Reuse	Collection, Management and Reuse of Top Soil from Tower Sites Footing Works	LS	-	-	-	5,00,000	5,00,000
11	H & S Training	Contractor's workforce with special attention to mitigating COVID-19 related threat, STI, STD and HIV AIDS alleviation programme	LS	-	-	-	2,00,000	2,00,000
							Subtotal (A)	**48,20,000**
B	Social Management and Monitoring Plan							
12	Tree Plantation Programme (1:3 basis)	Replantation of trees with nursing and fence at the end of construction or starting of operation (preferably during monsoon period)	Nos	-	-	1,18,437	200	2,36,87,400
13	E & S Services	Environmental and Social Services (Consultations, Awareness, Communications with communities, etc.)	LS	-	-	-	3,00,000	3,00,000
14	Resettlement Plan (RP)	Implementation of RP as per Electricity Rules 2022					78,43,10,000	78,43,10,000
15	Grievance Redress Management (GRM)	Implementation of GRM as mentioned in the Report and formation of GRC approved by PIU and ESU					20,00,000	20,00,000

SN	Environmental Component	Item	Unit	Frequency (No/Year	Time (Project Year	Quantity	Rate (Tk)	Total BDT
							Subtotal (B)	**81,02,97,400**
C	Institutional Arrangement							
16	ESMP and RP Implementation INGO	As per ToR approved by PIU and ESU					3,00,00,000	3,00,00,000
17	Independent Consultant (for monitoring)	E&S Review Consultant for PIU	Month		5	60	1,00,000	60,00,000
18	Transport (for monitoring team)		Month		5	15	20,000	3,00,000
19	Yearly Renew Fee for ECC	As per Schedule 7 of ECR 2023	Year		5		5,75,000	28,75,000
20	Reporting and Documentation		Month		5	60	10,00,000	10,00,000
21	Contingency (10%)							8,54,17,240
							Subtotal (C)	**12,55,92,240**
							Total	**940,709,640.00**

In Words: Taka Ninety -Four Crore Seven-Five Lac Nine Thousand Six Hundred Forty

Chapter 11
Grievance Redress Mechanism

11.1 Introduction

Grievance (in the context of a development Project) is an issue, concern, problem, or claim (perceived or actual) that an individual or community group wants to be addressed and resolved by the Power Grid. The grievance mechanism is a local based, project-specific extra-legal way to deal with and resolve complaints and grievances faster and thus enhance project performance in terms of environment, social and resettlement management.

Power Grid will establish a grievance redress mechanism (GRM) as a means to ensure social accountability and to answer to queries and address complaints and grievances about any irregularities in application of the guidelines adopted in this ESIA for assessment and mitigation of social and environmental impacts. Based on consensus, the procedure will help to resolve issues/conflicts amicably and quickly, saving the aggrieved persons from having to resort to expensive, time-consuming legal actions. The procedure will however not pre-empt or deny a person's right to go to the courts of law.

11.2 Purpose

The fundamental objectives of the GRM, implemented through the Grievance Redress Committees (GRCs) serving as a para-legal body, are to resolve any environment, social or resettlement-related grievances locally in consultation with the aggrieved party to facilitate smooth implementation of the project and present ESMP. Another important objective is to democratize the development process at the local level and to establish accountability to the affected people. The mechanism tends to meet the requirements of stakeholder engagement process, prevent and address community concerns, reduce risk, and assist the processes that create positive social change. A well-functioning grievance mechanism contains the following elements:

- Provides a predictable, transparent, and credible process to all stakeholders, resulting in outcomes that are seen as fair, effective, and lasting;
- Builds trust as an integral component of broader community relations activities and between employees;
- Enables more systematic identification of emerging issues and trends, facilitating corrective action and community engagement.

Managing community grievances is equally important, especially in the cases pertaining to land acquisition where often the likelihood of land owners not being satisfied with the compensation is observed. The land compensation for proposed towers will be given to follow the Section-4 of Electricity Rules 2020 (amended 2022). According to this rule, compensation for affected individuals due to transmission line tower footings. This means that landowners impacted by the construction of transmission line towers are entitled to financial compensation for the land occupied by the tower bases. So, the affected land owners for Tower footings will get the land compensation as per the Current Market Price (CMP) & during the construction period the affected Land owners, sharecroppers have also got 3-4 times compensation for crops. The Deputy Commissioners will disburse the compensation amount as per the Electricity Rules 2020 (amended 2022).

So, there is no reason of dissatisfaction. Effective GRCs are required for providing the compensation properly to the affected persons.

11.3 Scope

The Grievance Redressal Mechanism (GRM) has been developed with an intention of it being an effective tool for early identification, assessment and resolution of complaints during Project implementation. It is a means through which acceptance, assessment and resolution of community complaints concerning the performance or behaviour of the Power Grid are ascertained and addressed. The GRM prepared should be implemented to the entire life cycle of the proposed transmission lines and substations project prior to the construction phase. Consultations, communication and disclosure of this plan are mandated by EDCF as per its Safeguard Policy 2020 to Grievance Redress in Project (Dispute Resolution and Prevention).

EDCF requires the Power Grid to establish, in accordance with the Safeguard Policy, a suitable grievance mechanism to receive and facilitate resolution of the concerns or complaints of people who believe they have been adversely affected by the Project's environmental or social impacts, and to inform Project affected people (PAP) of its availability. Survey revealed that a total of 2462 nos. APs (as per BS Khatian and RP Report) shall be affected by the project. The grievance mechanism is scaled to the risks and impacts of the Project. The grievance mechanism may utilize existing formal or informal grievance mechanisms, provided that they are properly designed and implemented, and deemed by the Korea Eximbank to be suitable for the Project; these may be supplemented, as needed, with Project specific arrangements. The mechanism is designed to address affected people's concerns and complaints promptly, using an understandable and transparent process that is gender sensitive, culturally appropriate and readily accessible to all affected people. The grievance mechanism includes provisions to protect complainants from retaliation and to remain anonymous, if requested. The mechanism provides for maintenance of a publicly accessible case register, and reports on grievance redress and outcomes, which are disclosed in accordance with the Safeguard Policy.

However, people who believe they have been or are likely to be adversely affected by a failure of the Bank to implement the Safeguard Policy may also submit complaints to the Bank's Project-affected People's Mechanism in accordance with the Policy on the Project-affected People's Mechanism.

11.4 Grievance Redress Mechanism

Power Grid would establish a procedure to deal with and resolve any queries as well as address complaints and grievances about any irregularities. In this regard, a policy and/or guideline will be prepared and adopted for assessing and mitigating potential social and environmental complaints/impacts through Grievance Redress Mechanism (GRM). The GRM will deal with complaints and grievances related to both social/resettlement and environmental issues of the Project. The mechanism, process or procedure will not prevent access to judicial or administrative remedies.

The Project-affected People's Mechanism (PPM) has been established by the Lender to provide an opportunity for an independent and impartial review of submissions from Project-affected people who believe they have been or are likely to be adversely affected by Lender's failure to implement its ESF in situations when their concerns cannot be addressed satisfactorily through Project-level GRM or Lender Management's processes. It has been advised that a multi-tier GRM will be constituted for the Project in line with the prescriptions of the PPM Policy of the Bank, building on the existing complaint mechanisms. GRM also will deals the any issues raise in the case of gender-based violence (GBV).

Local and Project-level Grievances Redress Committees (GRC) will be formed to receive and resolve complaints as well as grievances from aggrieved persons from the local stakeholders including the Project-affected persons. Based on consensus, the procedure will help resolving issues/conflicts amicably and quickly, saving the aggrieved persons from having to resort to expensive, time-consuming legal actions. The procedure will, however, not prevent a person's right to go to the courts of law. The GRCs will be established through a gazette notification from the Ministry of Power, Energy and Mineral Resources (MPEMR); therefore, the GRC will be a legally constituted body.

11.5Grievance Mechanism Principles

Grievance Mechanisms will respond to the Project needs if they are developed early in the Project cycle as a measure to anticipate rather than respond to the rise of apprehension with surrounding communities. As per IFC's Good Practice Note on Addressing Grievances from Project-Affected Communities, September 2009, five principles have been recommended to ensure that the mechanism becomes acceptable to the communities. The five principles relate to:

- *Proportionality:* Scaled to risk and adverse impact on affected communities
- *Cultural Appropriateness:* Designed taking into account culturally appropriate ways of handling community concerns
- Accessibility: Clear and understandable mechanism that is accessible to all segments of the affected communities at no cost
- Transparency and Accountability: To all stakeholders
- Appropriate Protection: A mechanism that prevents retribution and does not impede access to other remedies.

11.6 Approach to Grievance Redress

IFC in its "Approach to Grievance Redress in Projects" has proposed three interlinked steps of Grievance Redress. The steps are provided in the following:

- A risk-based assessment of potential grievances, disputes or conflicts that may arise during Project preparation and implementation;
- Identification of the client's existing capacity for grievance redress;
- An Action Plan that identified priority area for strengthening grievance capacity, or if necessary, establishing new mechanisms at the Project level.

11.7 Process Involved in an Effective Grievance Management

An effective grievance management encompasses a step-by-step process which is necessary along with competent personnel for proper completion of grievances handled. IFC's Good Practice Note on Addressing Grievances from Project Affected Communities highlights five steps which should be considered in implementing an effective grievance mechanism. The five process steps have been detailed in the following,

- **Publicizing Grievance Management Procedures:** An effective grievance mechanism can be determined by how popular and accessible it is to the stakeholders. By publicizing the grievance mechanism in line with the cultural characteristics and accessibility factor, the success of its acceptability can be determined among the stakeholders.
- **Receiving and Keeping Track of Grievances:** Once publicizing of the grievance's mechanism is undertaken the Power Grid should have the capacity of collecting grievances, recording, registering and tracking them throughout the processing cycle to reflect their status and important details.
- **Reviewing and Investigating Grievances:** A successful grievance mechanism reflects the transparency and speed by which it records, registers and addresses the grievances.

- **Developing Resolution Options and Preparing a Response:** Once acknowledgment and understanding of the grievances is done, resolution options to commensurate with the nature of grievances by considering community preferences, Project policy, past experiences, current issues and potential outcomes is to be developed.
- **Monitoring, Reporting and Evaluating a Grievance Mechanism:** The tools of monitoring and reporting are important components for measuring the effectiveness of the grievance mechanism. Monitoring helps identify common or recurrent claims that may require structural solutions or a policy change, and it enables the Power Grid to capture any lessons learned in the resolution of grievances.

11.8 Mechanism of GRC

The GRCs will be established locally at Project sites and centrally at the Project level to receive as well as settle grievances from the affected persons and other local stakeholders. The two-tier GRM will be-composed of local GRCs at the union/municipal level (LGRC), the first tier, and Project GRC at the central level (PGRC), the second-tier. Most of the grievances will be resolved at the local-level GRC, but those cases that cannot be resolved at the local level will be forwarded to PGRC. The LGRC will be constituted with representation of the local Union Parishad Chairman and affected people ensuring women's representation. The PGRC will be constituted with representation from the PIU, Implementing NGO and one independent person from the civil society having knowledge about land acquisition/ requisition law of Bangladesh and involuntary resettlement. A total of three GRCs will be created consists of above-mentioned bodies.

Local Level GRC (LGRC)

The following composition is proposed for the local level GRC (LGRC) with representations from Project Proponent, INGO, local public representatives, representatives of affected people including women in the Project area to ensure a participatory process and to allow voices of the affected communities in the grievance procedures.

1.	Executive Engineer, Power Grid	Convener
2.	Representative of INGO (non-voting)	Member-Secretary
3.	Chairman of Union Parishad (UP) concerned	Member
4.	Female Member of ward of the UP concerned	Member
5.	Retired teacher from the union concerned	Member
6.	Representative of PAPs	Member

A representative of PAPs (based on the recommendation of INGO and approved by the Convener) will be a member of the LGRC. The Member-Secretary of LGRC will be available and accessible to PAPs to address concerns and grievances. Unresolved cases will be forwarded to the PGRC. The LGRC is empowered to take a decision, which is bound upon the Project Proponent. But it requires the approval of the Project Director for implementation of the decisions.

Terms of Reference for Local GRC (LGRC)

The scopes of work and the Terms of Reference (ToR) for LGRC are:

- The LGRC shall review, consider and resolve grievances related to social/resettlement and environmental mitigations during implementation of the Project.
- Any grievances presented to the LGRC, should ideally be resolved on the first day of hearing or within a period of four weeks except complicated issues requiring additional investigations. Grievances of indirectly affected persons and/or persons affected during project implementation due to social or environmental problems will also be reviewed by LGRC.

- The LGRC will not engage in any review of the legal standing of an "awardee" other than in the distribution of shares of acquired property among the legal owners and associated compensation or entitlement issues.
- LGRC decisions should ideally be arrived at through consensus, failing which resolution will be based on majority vote. Any decision made by the LGRC must be within the purview of RP policy framework and entitlements.
- The LGRC will not deal with any matters pending in the court of law.
- A minimum three members (in addition to the Member Secretary) shall form the quorum for the meeting of the LGRC to proceed.

The INGO will assist the PAPs in lodging their resettlement complaints in a proper format acceptable to the LGRC after they get ID Cards from the Power Grid (EA) or are informed about their entitlements and losses. LGRC meetings will be held in the convener's office in the Project area or other location(s) as agreed by the aggrieved persons. If needed, LGRC members may undertake field visits to verify and review the issues at dispute, including titles/shares, left-out cases during Joint Verification Survey (JVS) or other relevant matters.

Other than disputes relating to ownership right under the court of law, LGRC will review grievances involving all resettlement benefits, relocation and other assistance. However, the major grievances that might require mitigations include:

- PAPs not enlisted;
- Losses not identified correctly;
- Compensation/assistance not as per entitlement matrix;
- Dispute about ownership;
- Delay in disbursement of compensation/assistance;
- Improper distribution of compensation/assistance in case of joint ownership;
- Incorrect name in the award book of DC.

Project-level GRC (PGRC)

The Project-level GRC will review all unresolved cases involving social and environmental issues of the project. The Project Director will head the PGRC. The composition of the PGRC will be as follows:

Project Director, PIU, Power Grid	Chairperson
Team Leader of INGO	Member Secretary
Representative of Civil Society	Member

The Member-Secretary in the PGR will provide necessary knowledge and information regarding relevant standard policies and international protocols. He/she will also set examples of resolving such grievances from other development projects in Bangladesh. The PGRC should establish fairness and transparency in the resolution of grievances by project-affected persons. In case of technical or environmental issues as well as any legal matters, the Team Leader of the INGO will advise the PGRC. In specific cases, environmental and social development specialists of ESU or external legal advisors may be consulted, if required.

ToR for Project Level GRC (PGRC)

The scope of work and the Terms of Reference (ToR) for PGRC are:

- Review, consider and settle unresolved grievances forwarded by LGRCs related to social/resettlement and environmental issues.
- Any grievances presented to the PGRC should ideally be resolved within two weeks from the date of receiving the complaints from LGRC.
- In case of complicated cases, the PGRC Members can request additional information or carry out field level verifications.
- Resolutions should be based on consensus among Members, where all the decisions may be taken on majority vote.

- Any decision made by the PGRC must be within the purview of RP policy and entitlements.
- The PGRC will not deal with any matters pending in the court of law.
- All three members are required to form the quorum for the meeting of the PGRC.

11.9 Processes for Filing GRC Cases and Role of GRC

The procedural steps of resolving grievances and the grievance redress processes are presented in below figure which explains the GRM in detail in a flow chart. GRC procedures and operational rules will be publicized widely through community meetings and pamphlets in the local Bangla language so that PAPs are aware of their rights and obligations, and procedure of grievance redress. All local GRC documents will be maintained, review and verification by INGO, Co-financier and any external reviewers. The Power Grid Field Office(s) will act as the Secretariat to the local GRCs. As a result, the records will be up-to-date and easily accessible on-site.

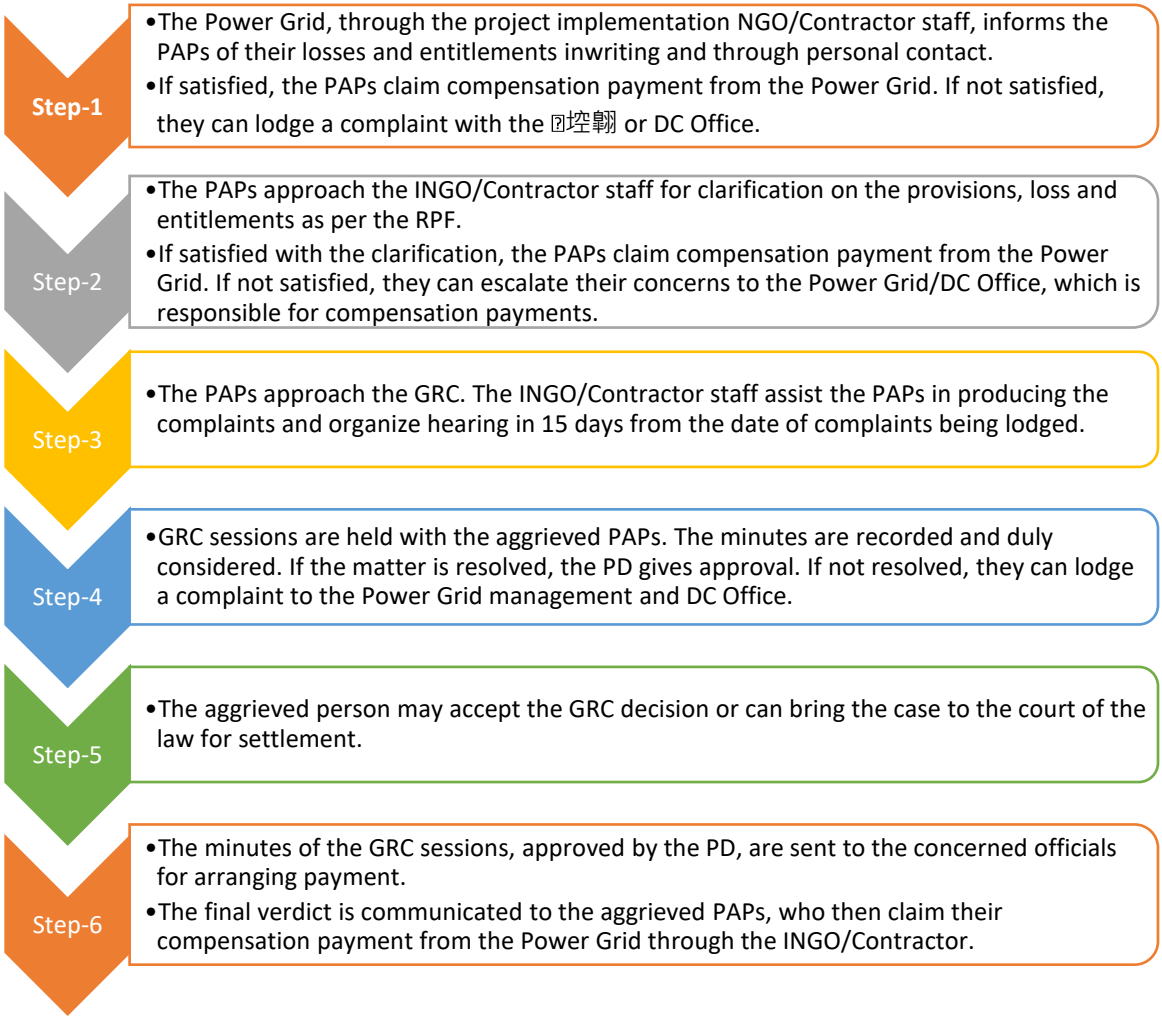


Figure 106: Grievance Redress Processes

11.10 Monitoring and Reporting

Monitoring and reporting are requisite tools of measuring the effectiveness of the grievance mechanism, the efficient use of resources, determining broad trends and acknowledging recurring problems so that they can be resolved before they reach a higher level of contention. They also create a base level of information that can be used by the Power Grid to report back to the stakeholders.

11.10.1 Monitoring

Depending on the extent of Project impacts and the volume of grievances, monitoring measures like internal and external audits every six-monthly based on the complexity of the nature of grievances can be adopted by Power Grid. Grievance records maintained should provide the background information for these regular monitoring exercises. Through the review of each grievance and analysis of its effectiveness and efficiency, Power Grid can draw on the complaints to evaluate systematic deficiencies. In addition, monitoring of the grievance mechanism helps to ensure that the design and implementation of the mechanism is adequately responding to stakeholder's comments in a cost-effective manner.

11.10.2 Reporting

All grievances registered have to be recorded and regularly updated. Power Grid and Contractor or INGO is responsible to discharging this responsibility and should be able to produce this document whenever any audits take place. In addition, a monthly reporting system should be introduced to submit a Grievance Report to the Power Grid /Korea Eximbank even if 'nil' grievances are recorded at the site level. All minutes of meetings with stakeholders, complainants and Grievance Committee are to be recorded and documented regularly for reference purposes. In addition, through the process of monitoring and the reports produced thereafter, assurance of continual improvement of the company's operations is guaranteed. The company can also use these monitoring reports to report back to the community on its implementation of the mechanism and the modification/ changes proposed to make it more user friendly. A sample Grievance Form has been provided in the below table which can assist to accelerate the process.

Table 126: Sample Grievance Form

Reference No. Date Full Name Address Contact No. Date, Time and Venue of GRC Meeting Description of Incident or Grievance (What happened? Where did it happen? Who did it happen to? What is the result of the problem? Date if Incident or grievance (provide details, such as:) One-time incident/grievance (date _____) Happened more than once (how many times? _____) On-going (currently experiencing problem) _____) What would you like to see happen to resolve the problem? Signature of complainant /thump impression of complainant **Signature of person filling the form (Power Grid Representative)**

Chapter 12
Conclusion and Recommendations

12.1 Conclusion

An Environmental Impact Assessment (ESIA) study, for the construction of double circuit line 765kV power transmission line comprise of 272 towers in a length of about 95.5 km from Moheshkhali to Madunaghat has been carried out which included development of an Environmental and Social Management Plan (ESMP) covering both the planning/design, construction and operational phases of the Project. The current ESIA study for the Project is largely based on the Project specific details as provided by Power Grid, discussions with community and observations from the site visits and surveys conducted. Comprehensive social and ecological surveys were undertaken to assess these aspects.

As per Department of Environment (DOE) rules, the Project has been categorized as Red based on adverse impact anticipated specially during construction phase of the Project. The detailed ESIA of this Project was conducted following the national guideline (ECR, 2023) Department of Environment (DoE).

This ESIA study has examined the Project's potential negative and positive environmental impacts, alternative analysis (including the "without Project" situation), and recommended measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and to improve environmental performance. As to the results of the ESIA study for the proposed transmission line project, the following items are found:

a) In terms of living environment, most of the impacts are controlled and limited in and around the Project area. The key negative impacts such as emission of GHG gas (CO_2 and Sulfur-hexafluoride), dust and generation of noise are expected. However, implementation of appropriate mitigation and management plan, such as to spray water to bare areas for dust prevention and to avoid the incentive operation of the construction machinery for prevention of emission gas, and noise during construction phase will minimize these impacts.

b) In terms of natural environment, some terrestrial herbs, shrubs and trees would be damaged by laying transmission line during construction phase of the Project which impact would be medium to high in nature. Generation of spoils would pollute the local water sources like rivers, khals, etc. In addition, there is no reserve forest falls under the RoW of transmission lines. There is no important bird Protected Area (IBA), and Environmentally Critical Area (ECA) exists at or near the Project Site. However, implementation of appropriate mitigation measures suggested Chapter 7 and 9 will minimize the impact on both terrestrial and aquatic ecosystem.

c) In terms of social environment, there is no land acquisition of the project, rather land requisition and compensation provision for the construction of tower; there is no economic displacement for the project interventions. Detail resettlement plan (RP) has been prepared as per guidelines of EDCF Safeguard Policy 2020 and Electricity Rules 2020 (amended 2022). There are no sites of archaeological or cultural significance within or near the Project Site and/or study area. There are no indigenous people at or near the project area. On the other hand, some positive impacts of the Project such as increase in job opportunity and improvement of social infrastructure are also expected.

d) In terms of health and safety, some impacts on occupational/community health and safety including COVID-19; and increase in number of accidents are expected. However, implementation of appropriate mitigation, grievance and management plan, such as to manage working conditions during the construction work and to provide security and maintain safety prevention measures during construction phase will minimize these impacts.

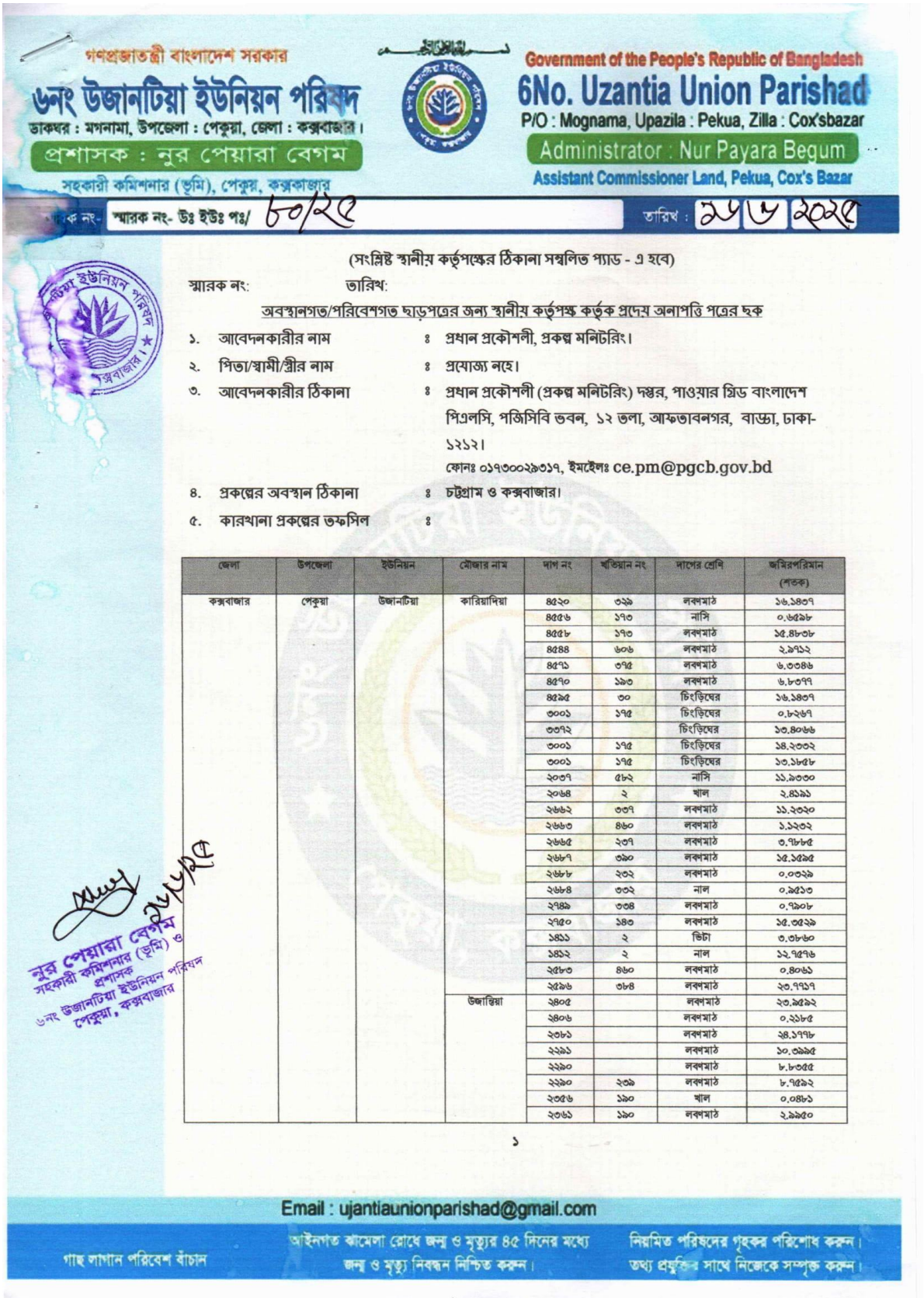
Power Grid will establish an environmental and social management system by its PIU for the project based on a project-specific ESMP. This will be overseen, monitored, and audited by Power Grid, ESCMC and DoE, and implemented by a dedicated team. The Project will make its best effort to minimize the environmental and social impacts unavoidably associated with the Project during its entire life cycle by implementing suggested mitigation measures and management plans with the required management system in place as described in this ESIA to ensure compliance with the requirement of ESCPs. Power Grid will ensure that the Project conforms to all the legal, regulatory and policy objectives and also ensure that all the necessary permits are obtained and renewed from time to time.

12.2Recommendations

a) PIU and Contractor should comply with the Terms and Conditions given by Department of Environment (DoE) in the Environmental Clearance Certificate (ECC);
b) Power Grid and Contractor should strictly maintain environmental and social monitoring compliance mentioned in Chapter 9;
c) Resettlement Plan (RP) should implement properly, and updating the RP before paying the compensation after the appoint of ESCMC;
d) Contractor should carry out the construction work to follow the ESCPs; and prepare site-specific CESMP;
e) Proper training regarding EHS/OHS should be provided to Project Management Unit (PMU) as well as work forces during construction phase;
f) Detailed hydro-morphology study should be carried out for crossing Karnaphuli, Sangu and Matamuhuri Rivers. Location of anchor should be selected based on the recommendation of hydro-morphology study. However, Contractor will assess or distance of anchor tower from shoreline or river bank before footing;
g) Contractor should implement Tree Plantation Programme in consultation with PIU, ESU and ESCMC with similar felled species at or near the suitable places of T/L during monsoon season;
h) Diverters (i.e., colored balls) should be installed for 39 towers beside the Chunati WS to avoid bird collision and electrocution on the power lines. Towers on both sides of the river should have light beams focused on the balls on the power lines, at night, during 'mid-February to end March' and again from 'mid-September to mid-November'. Each tower on the flyway will have blinking light on its top.
i) Eligible local people should be considered at least during construction phase as skill or non-skilled labor on priority basis that will be helpful for minimizing the socio-economic disruption;
j) Carry out detail hydro-morphological study for Karnaphuli, Sangu and Matamuhuri Rivers before construction of river crossing towers;
k) Eventually, Power Grid can introduce the concept of 'Corporate Environmental and Social Responsibility (CESR)' for the management of local environmental, their employees, adjacent communities, stakeholders, etc.

ANNEXURES

Annex-I: No Objection Certificate (NOC)



গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
৬নং উজানটিয়া ইউনিয়ন পরিষদ
ডাকঘর : মগনামা, উপজেলা : পেকুয়া, জেলা : কক্সবাজার।
প্রশাসক : নুর পেয়ারা বেগম
সহকারী কমিশনার (ভূমি), পেকুয়া, কক্সবাজার

Government of the People's Republic of Bangladesh
6No. Uzantia Union Parishad
P/O : Mognama, Upazila : Pekua, Zilla : Cox'sbazar
Administrator : Nur Payara Begum
Assistant Commissioner Land, Pekua, Cox's Bazar

স্মারক নং- উঃ ইউঃ পঃ/ ৮০/২৫ তারিখ : ২৮/৮/২০২৫

(সংশ্লিষ্ট স্থানীয় কর্তৃপক্ষের ঠিকানা সম্বলিত প্যাড - এ হবে)

স্মারক নং: তারিখ:

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।
২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।
৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd
৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।
৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমিরপরিমান (শতক)
কক্সবাজার	পেকুয়া	উজানটিয়া	কারিয়াদিয়া	৪৫২০	৩২৯	লবণমাঠ	১৬.১৪৩৭
				৪৫৫৬	১৭৩	নাসি	০.৬৫৯৮
				৪৫৫৮	১৭৩	লবণমাঠ	১৫.৪৮৩৮
				৪৫৪৪	৬০৬	লবণমাঠ	২.৯৭১২
				৪৫৭১	৩৭৫	লবণমাঠ	৬.৩৩৪৬
				৪৫৭০	১৯৩	লবণমাঠ	৬.৮৩৭৭
				৪৫৯৫	৩০	চিংড়িঘের	১৬.১৪৩৭
				৩০০১	১৭৫	চিংড়িঘের	০.৮২৬৭
				৩৩৭২		চিংড়িঘের	১৩.৪০৬৬
				৩০০১	১৭৫	চিংড়িঘের	১৪.২৩৩২
				৩০০১	১৭৫	চিংড়িঘের	১৩.১৮৫৮
				২০৩৭	৫৮২	নাসি	১১.৯৩৩০
				২০৬৪	২	খাল	২.৪১৯১
				২৬৬২	৩৩৭	লবণমাঠ	১১.২৩২০
				২৬৬৩	৪৬০	লবণমাঠ	১.১২৩২
				২৬৬৫	২৩৭	লবণমাঠ	৩.৭৮৮৫
				২৬৮৭	৩৯০	লবণমাঠ	১৫.১৫৯৫
				২৬৮৮	২৩২	লবণমাঠ	০.০৩২৯
				২৬৮৪	৩৩২	নাল	০.৯৫১৩
				২৭৪৯	৩৩৪	লবণমাঠ	০.৭৯০৮
				২৭৫০	১৪৩	লবণমাঠ	১৫.৩৫২৯
				১৪১১	২	ভিটা	৩.৩৮৬০
				১৪১২	২	নাল	১২.৭৫৭৬
				২৫৮৩	৪৬০	লবণমাঠ	০.৪০৬১
				২৫৯৬	৩৮৪	লবণমাঠ	২৩.৭৭১৭
			উজাড়িয়া	২৪০৫		লবণমাঠ	২৩.৯৫৯২
				২৪০৬		লবণমাঠ	০.২১৮৫
				২৩৮১		লবণমাঠ	২৪.১৭৭৮
				২২৯১		লবণমাঠ	১০.৩৯৯৫
				২২৯০		লবণমাঠ	৮.৮৩৫৫
				২২৯০	২৩৯	লবণমাঠ	৮.৭৫৯২
				২৩৫৬	১৯০	খাল	০.০৪৮১
				২৩৬১	১৯০	লবণমাঠ	২.৯৯৫০

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নুর পেয়ারা বেগম ২৮/৮/২৫
সহকারী কমিশনার (ভূমি) ও
প্রশাসক
৬নং উজানটিয়া ইউনিয়ন পরিষদ
পেকুয়া, কক্সবাজার

Email : ujantiaunionparishad@gmail.com

গাছ লাগান পরিবেশ বাঁচান
আইনগত ঝামেলা এড়াতে জন্ম ও মৃত্যুর ৪৫ দিনের মধ্যে জন্ম ও মৃত্যু নিবন্ধন নিশ্চিত করুন।
নিয়মিত পরিষদের গৃহকর পরিশোধ করুন। তথ্য প্রযুক্তির সাথে নিজেকে সম্পৃক্ত করুন।

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

৬নং উজানটিয়া ইউনিয়ন পরিষদ

ডাকঘর : মগনামা, উপজেলা : পেকুয়া, জেলা : কক্সবাজার।

প্রশাসক : নুর পেয়ারা বেগম

সহকারী কমিশনার (ভূমি), পেকুয়া, কক্সবাজার

Government of the People's Republic of Bangladesh

6No. Uzantia Union Parishad

P/O : Mognama, Upazila : Pekua, Zilla : Cox'sbazar

Administrator : Nur Payara Begum

Assistant Commissioner Land, Pekua, Cox's Bazar

স্মারক নং- স্মারক নং- উঃ ইউঃ পঃ/ তারিখ :

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমিরপরিমান (শতক)
				২৩৬২		লবণমাঠ	১৩.৭৬৪৩
				৩৪৮৯	৪৯২	নাল	১.৭০৬৪
				৩৬৫১	৮২৫	নাল	১২.১০৬২
				৩৬৪৮	৬৫৪	বাড়ী	০.৪২০৬
				৩৪৭৭	১৯৯	নাল	১৮.৯৬০২
				৪৮০৩	৮৩৯	নাল	১৬.৮০৭৩
				৪৮০৩	৮৩৯	নাল	১৪.২৩৩২
				৪৮০২	১২২৬	নাল	১৪.২৩৩৩
				৪৮০১	৮৩৯	বাড়ী	১৪.২৩৩৩
				৪২০৪	৩৮৮	লবণমাঠ	০.৯২৯১
				৪২০৩	৫১০	বাড়ী	১৩.৩০৪১
				৪১৯০	৩৮৮	লবণমাঠ	৯.৩৮৭৫
				৪১৯২	৭১৫	লবণমাঠ	৩.৬৩৮৯
				৪১৪১	১১১৮	লবণমাঠ	০.৫৬৩৬
				৪১৪০	৫১৬	নাল	১৪.০২৭৭
						মোট জমির পরিমান(শতক)	৪৩৭.০৪

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম:উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে"Madunaghat—Moheshkhali 765kV Transmission Line Project"প্রকল্পকে নিম্নেবর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ: স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল
নুর পেয়ারা বেগম
সহকারী কমিশনার (ভূমি) ও
প্রশাসক
৬নং উজানটিয়া ইউনিয়ন পরিষদ
পেকুয়া, কক্সবাজার

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Email : ujantiaunionparishad@gmail.com

গাছ লাগান পরিবেশ বাঁচান | আইনগত ঝামেলা রোধে জন্ম ও মৃত্যুর ৪৫ দিনের মধ্যে জন্ম ও মৃত্যু নিবন্ধন নিশ্চিত করুন। | নিয়মিত পরিষদের গৃহকর পরিশোধ করুন। তথ্য প্রযুক্তির সাথে নিজেকে সম্পৃক্ত করুন।

বিসমিল্লাহির রাহ্‌মানির রাহীম

৪নং পেকুয়া ইউনিয়ন পরিষদ কার্যালয়

ডাক ও তার অফিস : পেকুয়া, উপজেলা : পেকুয়া, জেলা : কক্সবাজার।
চেয়ারম্যান : বাহাদুর শাহ্ মোবাইল: ০১৭১৫-০৩১২০৭

Govt. of the People's Republic of Bangladesh
Office of The
4No. Pekua Union Parishad
P.O: Pekua, Upazila: Pekua
District: Cox's Bazar.

স্মারক নং- পেকুইউপি/- ৫৫/২০২৫ তারিখ ২১ ০৮ ২০২৫ ইং

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।
২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।
৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd
৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।
৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
কক্সবাজার	পেকুয়া	পেকুয়া	পেকুয়া	১০০২৩	৪৯২৮	নাল	১৮.৯৬০২
				১০০০২	৯২৮১	নাল	১৬.১৪৩৭
				৭৬৬৩		নাল	১৬.৭০৪৩
				৭৫১২		নাল	১৬.৮০৭৫
				৭৪৬০	৪৬৮৫	নাল	৬.২৭২০
				৭৪৫৯	৮৫৬২	নাল	৭.০৭৯১
				৭৪৫৮	৮৫৬২	নাল	২.৭৯২৭
				৭১৩৩		নাল	২.৪৫১০
				৭১২৭	৫৩৬২	নাল	৫.৫৫০৯
				৭১৩৫	৯১১৯	নাল	২৪.০৬২৭
				৭১৪০		নাল	৪.৪৬৮৪
				৪০৮৯		নাল	৮.৫১২৬
				৪০৮৩	৭৬৭৮	নাল	৮.৭০৯৬
						মোট জমির পরিমাণ (শতক)	১৩৮.৫১

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ:

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল
বাহাদুর শাহ
চেয়ারম্যান
৪নং পেকুয়া ইউনিয়ন পরিষদ
পেকুয়া, কক্সবাজার।

বিছমিল্লাহির রাহমানির রাহিম

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

৩নং বারবাকিয়া ইউনিয়ন পরিষদ

ডাকঘর ঃ বারবাকিয়া, উপজেলা ঃ পেকুয়া,
জেলা ঃ কক্সবাজার।

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সাবেক অধ্যক্ষ, এ.এইচ.এম বদিউল আলম (ফাঃইঃকাঃ মাদ্রাসা) ও চেয়ারম্যান, ৩নং বারবাকিয়া ইউনিয়ন পরিষদ। ০১৮১৭-৭৬২৭১১, এন.আই.ডি নং ১৯২১৩১৮৪৮৯

স্মারক নংঃ ৩৪/২০২৫ তারিখ ১৬/০৬/২০২৫ ইং

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী।

২. পিতা/স্বামীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং)দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পি.এলসি, পজিসিবি ভবন ১২ তলা,আফতাবনগর, বাড্ডা ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমইলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	মোট জমির পরিমান (শতক)
কক্সবাজার	পেকুয়া	বারাবাকিয়া	বারাবাকিয়া	১৫৯১	৩৬৩৫	নাল	১.৭৭৭০
				১৫৯৩	৪৯৭১	নাল	৪.৪০২৭
				১৬২১		নাল	৮.৯৯৩৭
				১৪৪৭		নাল	৮.৭৩৩৫
				১৪৪৬		নাল	০.৫৪৯৮
				১৪৪৫	১৭০	বাড়ী	৩.৩৭৫৭
				১৫২৮		নাল	০.৩৬৭৪
				১৫০৭	৩২৪১	নাল	১৮.১৪৭৭
				১০০	৯৯	নাল	২.২৬৬৬
				১০২		নাল	১৩.১৮৪১
				১০৭		নাল	০.৬৯৩০
				২২৪০		নাল	১.৮২৭০
				২২৪১	৪৭৭৮	নাল	১১.৩৫৮৮
				২২৩০	১০০২	নাল	২.৫৫০২
				২২৩১	১০০২	নাল	০.৭২৪৯
				২২৭২	১০০২	নাল	১১.১৪১৩
				২২৭০	১০০২	নাল	০.১৭৪৯
				২০৫০	৪৬৭৭	নাল	৬.০৬৮১
				২০৪৮	৫১৪১	নাল	১২.৮৯২১
				৪৩৩৭	৭৬০	পথ	৩.৪৮২৩
				৪৩৩৯	৯০৬	নাল	৯.৩৮৫৯
				৪৩৪১		নাল	৩.৯৩৯১
				৪১৪৫	১৬১৭	নাল	১.৫৭৩৬
				৪১৬৫	৩৫০৫	নাল	১২.৫৭৩০
				৪১৬১	৫৮২৬	নাল	০.০৭৯৬
				৪১৬২	৩৭৩৪	নাল	২.৫৮১৩
				৪১১৫	৫২৮৮	নাল	১.৬৪৭৫
				৪১২০	৪৭৫৪	নাল	৭.৯৪২৭
				৪১১৯	৪৬৬৫	নাল	৫.৫৮৩৩
				৬৫৬৩	৫৭২৭	নাল	১৬.০৬৮০
						মোট জমির পরমিান(শতক)	১৭৪.০৮

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অধ্যক্ষ এ.এইচ.এম বদিউল আলম
চেয়ারম্যান
৩নং বারবাকিয়া ইউনিয়ন পরিষদ
পেকুয়া, কক্সবাজার।

জন্ম নিবন্ধন শিশুর নাগরিক অধিকার, আপনার শিশুর জন্ম নিবন্ধন নিশ্চিত করুন।

বিছমিল্লাহির রাহমানির রাহিম

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
৩নং বারবাকিয়া ইউনিয়ন পরিষদ
ডাকঘর ঃ বারবাকিয়া, উপজেলা ঃ পেকুয়া,
জেলা ঃ কক্সবাজার।

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সাবেক অধ্যক্ষ, এ.এইচ.এম বদিউল আলম (ফাঃইঃকাঃ মাদ্রাসা) ও চেয়ারম্যান, ৩নং বারবাকিয়া ইউনিয়ন পরিষদ। ০১৮১৭-৭৬২৭১১, এন.আই.ডি নং ১৯২১৩১৮৪৮৯

স্মারক নংঃ তারিখ ইং

৬। প্রকল্পরে উপাদতি/উপাদতিব্য পণ্যরে নাম:উচ্চচাপ বশিষ্টি বদি্যু সঞ্চালন লাইন।

উপরোক্ত তথ্যাদরি আলোকে"Madunaghat—Moheshkhali 765kV Transmission Line Project"প্রকল্পকে নম্নিবের্ণতি শর্তসাপক্ষেয অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরচিালনার ক্ষত্রেে পরবিশে সংরক্ষণ আইন ও বধিি যথাযথভাবে অনুসরণ করতে হবে।
২. পরবিশে অধদিপ্তর হতে বধিি দ্বারা নর্িধারতি পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমকিদরে পশোগত স্বাস্থ্য ও নরিাপত্তা নশ্চিতি করতে হবে।
৪. উপযুক্ত অগ্নি নর্িবাপক ব্যবস্থা রাখতে হবে এবং অগ্নকিান্ড কংিবা অন্য কোন দূর্ঘটনার সময় জরুরী নর্িগমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরশিোধতি অবস্থায় বাইরে নর্িগমণ করা যাবে না।

উল্লেখিত যে কোন শর্ত লংগন করলে যথোপুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যভস্থা নেওয়া যাবে।

তারখি:

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল
অধ্যক্ষ এ.এইচ.এম বদিউল আলম
চেয়ারম্যান
৩নং বারবাকিয়া ইউনিয়ন পরিষদ
পেকুয়া, কক্সবাজার।

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জন্ম নিবন্ধন শিশুর নাগরিক অধিকার, আপনার শিশুর জন্ম নিবন্ধন নিশ্চিত করুন।

বিসমিল্লাহির রাহমানির রাহীম

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

২নং টইটং ইউনিয়ন পরিষদ

ডাক: টইটং, উপজেলা: পেকুয়া
জেলা: কক্সবাজার, বাংলাদেশ।

Govt. People Republic of Bangladesh
OFFICE OF THE
TOITONG UNION PARISHAD
P.O: Toitong, Upazilla: Pekua
Dist: Cox's Bazar, Bangladesh
E-mail: toitongup3@gmail.com

স্মারক নং: টইটং ইউপি/ পেকুয়া/ কক্সবাজার- ৪৮/২৫ তারিখ: ১৭/০৬/২৫

(সংশ্লিষ্ট স্থানীয় কর্তৃপক্ষের ঠিকানা সম্বলিত প্যাড - এ হবে)

১. আবেদনকারীর নাম : প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।
২. পিতা/স্বামী/স্ত্রীর নাম : প্রযোজ্য নহে।
৩. আবেদনকারীর ঠিকানা : প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd
৪. প্রকল্পের অবস্থান ঠিকানা : চট্টগ্রাম ও কক্সবাজার।
৫. কারখানা প্রকল্পের তফসিল :

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমাণ (শতক)
কক্সবাজার	পেকুয়া	টেতাং	টেতাং	৪৭৭৮	২০৪৬	নাল	১৬.০৬৮১
				৪৭৬৭	২০৬৭	নাল	১১.৮৭৩১
				৪৭২৯	১২৭৪	নাল	৯.৮৫৮৩
				৪৭৫৫		নাল	২.০১৪৯
				৪২৮৯	২০১৩	নাল	৬.২৩৭৭
				৪৬৬৪		নাল	৬.৯১৪১
				৪৬৬৩	৩১৯	নাল	২.৯৪২১
				৪১৫৯	২৩৪৯	নাল	২.৮৮৪৩
				৪১৬৬		নাল	৬.৩৬৪০
				৪১৬৪		নাল	৫.৯২৫২
				৪০৫০		নাল	১৪.৮৮৮৬
				৪০০৯	১২২৫	নাল	৪.০৭১৬
				২২২	২০২৫	নাল	৯.৪০৭০
				২২৭		নাল	৬.৫৭৯৩
				২৫৫	১১৪	নাল	০.১৫৭২
				১৩৫		নাল	২.৩৭৩৪
				১৩৬		নাল	১২.৭২৯৯
				৯		নাল	১৬.৭১১৪
				১০৬		নাল	০.৮১৬১
				১২		নাল	১.৪৩২৬
				২২২	২০২৫	নাল	৯.৪০৭০
				২২৭		নাল	৬.৫৭৯৩
				২৫৫	১১৪	নাল	০.১৫৭২
				১৩৫		নাল	২.৩৭৩৪
				১৩৬		নাল	১২.৭২৯৯
				৯		নাল	১৬.৭১১৪
				১০৬		নাল	০.৮১৬১
				১২		নাল	১.৪৩২৬
				২২২	২০২৫	নাল	৯.৪০৭০
				২২৭		নাল	৬.৫৭৯৩
				২৫৫	১১৪	নাল	০.১৫৭২
				১৩৫		নাল	২.৩৭৩৪
				১৩৬		নাল	১২.৭২৯৯
				৯		নাল	১৬.৭১১৪
				১০৬		নাল	০.৮১৬১
				১২		নাল	১.৪৩২৬
						মোট জমির পরিমাণ(শতক)	১৪০.৩২

১৭/০৬/২৫
মোহাম্মদ মঈনুল হোসেন চৌধুরী
উপজেলা নির্বাহী অফিসার ও
প্রশাসক
২নং টইটং ইউনিয়ন পরিষদ
পেকুয়া, কক্সবাজার

* আপনার সন্তানকে স্কুলে পাঠান, * জন্ম ও মৃত্যু নিবন্ধন নিশ্চিত করুন, * পাচ শনাক্ত-পরিবেশ বাঁচান * নির্ধারিত হোল্ডিং ট্যাক্স আদায় করুন।

বিসমিল্লাহির রাহমানির রাহীম

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
২নং টইটং ইউনিয়ন পরিষদ
ডাক: টইটং, উপজেলা: পেকুয়া
জেলা: কক্সবাজার, বাংলাদেশ।

Govt. People Republic of Bangladesh
OFFICE OF THE
TOITONG UNION PARISHAD
P.O: Toitong, Upazilla: Pekua
Dist: Cox's Bazar, Bangladesh
E-mail: toitongup3@gmail.com

স্মারক নং: টইটং ইউপি/ পেকুয়া/ কক্সবাজার- ৪৮/২৫ তারিখ: ২৭/০৬/২৫

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম:উচ্চচাপবিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন ।

উপরোক্ত তথ্যাদির আলোকে"Madunaghat—Moheshkhali 765kV Transmission Line Project"প্রকল্পকে নিম্নেবর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ:স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

২৭/০৬/২৫
মোহাম্মদ মঈনুল হোসেন চৌধুরী
উপজেলা নির্বাহী অফিসার ও.
প্রশাসক
২নং টইটং ইউনিয়ন পরিষদ
পেকুয়া, কক্সবাজার

* আপনার সন্তানকে স্কুলে পাঠান, * জন্ম ও মৃত্যু নিবন্ধন নিশ্চিত করুন, * গাছ লাগান-পরিবেশ বাঁচান * নিয়মিত হোল্ডিং ট্যাক্স আদায় করুন।

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

১নং রাজাখালী ইউনিয়ন পরিষদ

ডাকঘর: রাজাখালী-৪৭৭০, উপজেলা+থানা: পেকুয়া
জেলা: কক্সবাজার, বাংলাদেশ
https://rajakhaliup.coxsbazar.gov.bd

বিসমিল্লাহির রাহমানির রাহিম

Govt. People Republic of Bangladesh
OFFICE OF THE
1 NO RAJAKHALI UNION PARISHAD
P.O: Rajakhali-4770 Upazilla+Thana: Pekua
Dist: Cox's Bazar, Bangladesh
E-mail: rajakhaliup@gmail.com

স্মারক নং: রাজা/ইউপি/পেকু/কক্স: ৪৫/২৫ তারিখ: ২৭ ০৬ ২০২৫

(সংশ্লিষ্ট স্থানীয় কর্তৃপক্ষের ঠিকানা সম্বলিত প্যাড - এ হবে)

স্মারক নং: তারিখ:

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ
প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	মোট জমির পরিমান (শতক)
কক্সবাজার	পেকুয়া	রাজাখালী	রাজাখালী	২৬৪২		নাল	৫.৫৮৪৫
				২৬৩৯		নাল	৯.৪৫৬৪
				২৬২৪		নাল	০.১০০৮
				২৫৬৭		নাল	১৪.৯৭০৫
				২৫৭৬		নাল	১.২৭৩২
						মোট জমির পরিমান (শতক)	৩১.২৮৫৪

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলীঃ

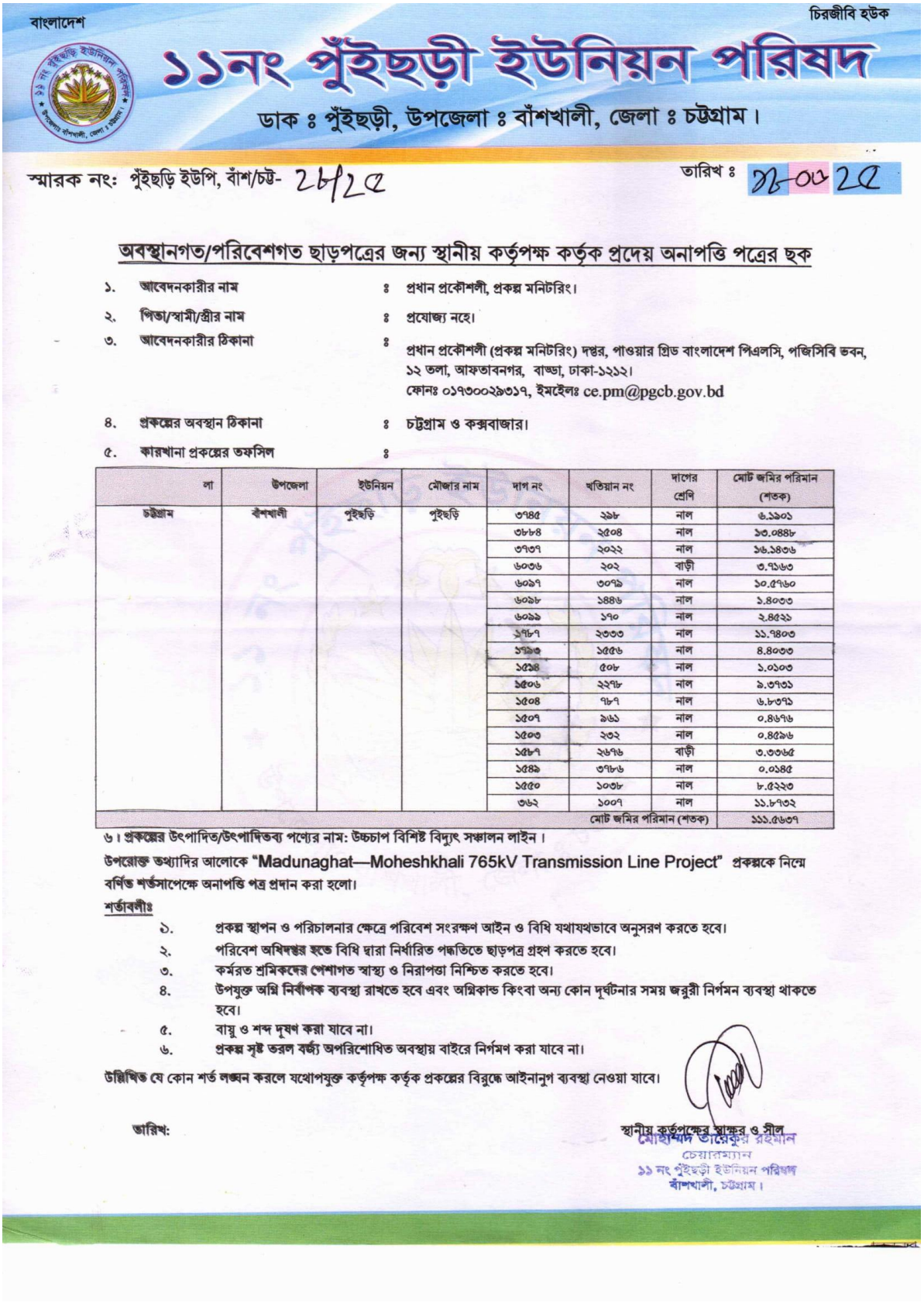
১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ: ২৭/০৬/২৫

২৭/০৬/২৫
স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল
উপজেলা নির্বাহী অফিসার ও
প্রশাসক
১নং রাজাখালী ইউনিয়ন পরিষদ

আপনার সন্তানকে স্কুলে পাঠান • জন্ম ও মৃত্যু নিবন্ধন করুন • নিয়মিত কর পরিশোধ করুন



বাংলাদেশ

চিরজীবি হউক

১১নং পুঁইছড়ী ইউনিয়ন পরিষদ

ডাক ঃ পুঁইছড়ী, উপজেলা ঃ বাঁশখালী, জেলা ঃ চট্টগ্রাম।

স্মারক নং: পুঁইছড়ি ইউপি, বাঁশ/চট্ট- ২৮/২৫

তারিখ ঃ ২৮-০৩-২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

লা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	মোট জমির পরিমান (শতক)
চট্টগ্রাম	বাঁশখালী	পুইছড়ি	পুইছড়ি	৩৭৪৫	২৯৮	নাল	৬.১৯০১
				৩৮৮৪	২৫০৪	নাল	১৩.০৪৪৮
				৩৭৩৭	২০২২	নাল	১৬.১৪৩৬
				৬০৩৬	২০২	বাড়ী	৩.৭১৬৩
				৬০৯৭	৩০৭৯	নাল	১০.৫৭৬০
				৬০৯৮	১৪৪৬	নাল	১.৪০৩৩
				৬০৯৯	১৭০	নাল	২.৪৫২১
				১৭৮৭	২৩৩৩	নাল	১১.৭৪০৩
				১৭৯৩	১৫৫৬	নাল	৪.৪০৩৩
				১৫১৪	৫০৮	নাল	১.০১০৩
				১৫০৬	২২৭৮	নাল	৯.৩৭৩১
				১৫০৪	৭৮৭	নাল	৬.৮৩৭১
				১৫০৭	৯৬১	নাল	০.৪৬৭৬
				১৫০৩	২৩২	নাল	০.৪৫৯৬
				১৫৮৭	২৬৭৬	বাড়ী	৩.৩৩৬৫
				১৫৪৯	৩৭৮৬	নাল	০.০১৪৫
				১৫৫০	১০৩৮	নাল	৮.৫২২৩
				৩৬২	১০০৭	নাল	১১.৮৭৩২
						মোট জমির পরিমান (শতক)	১১১.৫৬৩৭

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে **"Madunaghat—Moheshkhali 765kV Transmission Line Project"** প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ:

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

মোহাম্মদ তারেকুর রহমান
চেয়ারম্যান
১১ নং পুঁইছড়ী ইউনিয়ন পরিষদ
বাঁশখালী, চট্টগ্রাম।

বাংলাদেশ | বিসমিল্লাহির রাহমানির রাহিম | জিন্দাবাদ

১২নং (ক) শেখেরখীল ইউনিয়ন পরিষদ
12No. (ka) Shakerkhil Union Parishad

ডাকঘর : শেখেরখীল, উপজেলা : বাঁশখালী, চট্টগ্রাম, বাংলাদেশ।

সূত্র : শেখেরখীল/বাঁশ/চট্ট/২১/২৫ তারিখ ১৮ ০৬ ২০২৫

(সংশ্লিষ্ট স্থানীয় কর্তৃপক্ষের ঠিকানা সম্বলিত প্যাড - এ হবে)

স্মারক নং: তারিখ:

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
চট্টগ্রাম	বাঁশখালী	সেখেরখিল	সেখেরখিল	১৮৯৯৭	১৬৮৩	নাল	২.০০২৪
				১৮৯৯৯	১৬৮৩	নাল	৯.৮৭০৮
				১৮৯৫৬	৪৩১৫	নাল	১১.৭৭৮৭
				১৮৯৫৫	১৬৮৩	নাল	০.০৯৪৫
				১৮৯৫৪	২৬৩০	নাল	৫.৩৭৮৩
				১৮৯৪৬		নাল	৩.৮৯০৭
				১৮৯৪৭	৩৫৬	নাল	৯.১৪৭৫
				১৮৭১১	৩৩১	নাল	২.৪৮৮৭
				১৮৭০৭	১২০৮	নাল	২.৬২৫৭
				১৮৭০৮	৭৩১	নাল	৯.০৪৪৬
				১৮৭০৯	১২০৮	নাল	১.০১৪৫
				১৮৫৯৫	৪১৫৩	নাল	৭.২২১৮
				১৮৫৯৭	৪	রাস্তা	৪.৫৯২৮
				১৮৬০৩	৪১৩৪	নাল	৩.৩৫৮৯
				৪৭৫৫	৫৬৫	নাল	১৫.১৭৩৬
				৪৭৭৮	২১৫২	নাল	১৩.৫২৫৬
				৪৭৭৯	১২৩২	নাল	১.৬৪৭৯
				৪৩২৩	২৩২০	নাল	৯.২৭২৩
				৪৩২২	১৯৭০	নাল	৫.৯০১২
				৩৬১০	২৯৫৭	নাল	২.১১৭৯
				৩৬০৫	৫৬৩	নাল	১৩.০৫৫৭
				৩৭১২	৩০০২	নাল	১.৩৭৫০
				৩৭১১	২৪১০	নাল	১৩.৭৯৮৫
				১২১০	২৯৮৩	নাল	০.৭০৯৯
				১২০৪	৫৬৯	নাল	২.৫৪৫৬
				১২০০	১৭৬০	নাল	১১.৯৬৭৩
				১২০৯	৩১০২	নাল	০.৮৪৫২
				১১১২	৩৩৬১	নাল	১৪.২৩৩৩
				১১৩৪	৪৩৪৫	নাল	২.৯৩৪৪
				১১৩৫	৭১৯	নাল	২.২২৫৩
				১১৩৩	৩৮৩১	নাল	৯.৪৩১৭
						মোট জমির পরিমান (শতক)	১৯৩.২৭০৩

১৮/০৬/২০২৫
সামতল আলম
প্যানেল চেয়ারম্যান-২
১২নং (ক) শেখেরখীল ইউনিয়ন পরিষদ
বাঁশখালী, চট্টগ্রাম।

বাংলাদেশ | বিসমিল্লাহির রাহমানির রাহিম | জিন্দাবাদ

১২নং (ক) শেখেরখীল ইউনিয়ন পরিষদ
12No. (ka) Shakerkhil Union Parishad

ডাকঘর : শেখেরখীল, উপজেলা : বাঁশখালী, চট্টগ্রাম, বাংলাদেশ।

সূত্র : শেখেরখীল/বাঁশ/৪১/২০/২৫ তারিখ ১৮ ০৬ ২০২৫ইং

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

১৮/০৬/২০২৫ইং
সামশুল আলম
চেয়ারম্যান
স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল
১২নং (ক) শেখেরখীল ইউনিয়ন পরিষদ
বাঁশখালী, চট্টগ্রাম।

তারিখ:

বাংলাদেশ

বিসমিল্লাহির রাহমানির রাহিম

চিরজীবী হউক

১০ নং চাম্বল ইউনিয়ন পরিষদ

10 NO. CHAMBAL UNION PARISHAD

ডাকঘর - চাম্বল নতুন বাজার, উপজেলা - বাঁশখালী, চট্টগ্রাম।

Chambal Natun Bazar, Banskhali, Chattogram.

প্যানেল চেয়ারম্যান : মোহাম্মদ শহিদ উল্লাহ

Panel Chairman : Mohammed Shahid Ullah

সূত্র: ১০ নং চা: ই: ০১/২৪-২৫ সংশ্লিষ্ট স্থানীয় কর্তৃপক্ষের ঠিকানা সম্বলিত প্যাড - এ হবে)

তারিখ: তারিখ: ১৯/০৮/২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

আবেদনকারীর নাম — প্রধান প্রকৌশলী প্রকল্প মনিটরিং।

পিতা/স্বামী/স্ত্রীর নাম — প্রযোজ্য নহে।

আবেদনকারীর ঠিকানা — প্রধান প্রকৌশলী প্রকল্প মনিটরিং) দপ্তর পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন ১২ তলা আফতাবনগর বাড্ডা ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭ ইমেইলঃ.....

প্রকল্পের অবস্থান ঠিকানা — চট্টগ্রাম ও কক্সবাজার।

কারখানা প্রকল্পের তফসিল

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান শতক)
চট্টগ্রাম	বাঁশখালী	চম্বল	পশ্চিম চম্বল	৭০৫৩	৩২৩	নাল	২.৩২২৪
				৭০৪৯	৪৩৪৪	নাল	৪.৫৮৭৭
				৭০৪৮	৩২৩	নাল	১.২১৫৮
				৭০৬৮	৪১৬৬	নাল	০.৫১৬৬
				৭৭৫৫	১১২৫	নাল	৭.৪২৫৫
				৭১৫৬	৩৮৬১	নাল	০.৪২৪৩
				৭১৪৬	৩৮৪	নাল	৩.৮৩১৫
				৭১৫৭	৩৮৬১	নাল	৮.৭৭০৬
				৭২৮৩	৪৪৬৭	নাল	১৩.০২৬৪
				৪৭৮৪	১৭৫২	নাল	০.৯৭৮৩
				৪৭৮৫	১১৭	নাল	১২.৪৮৯১
				৪৭৮৬	৮১৯	নাল	২.৫৭০৬
				৪৭৮৯	৩০০১	নাল	০.০৩০০
				৪১৯২	৬৪৫	নাল	৩.৪৮০১
				৪৭০০	১৫৭৫	নাল	১১.৬৯৩৪
				৪০১৩	১০৮৮	নাল	৬.৭২০৭
				৩৯০৭	৪৪২৯	নাল	৬.৪৪০২
				৩৯০৬	৩৬১৩	নাল	২.০১২৬
				৩৩৪৫	১৪১৫	নাল	৬.১০০১
				৩৩৪৯	৪৯২	নাল	০.৫৩৮৯
				৩৩৪৬	২৪৯	নাল	৮.২৮১০
				৩৩৪৮	৭৩৮	নাল	০.২৫৩৪
				৩৫৮৬	৩৫৬	নাল	২.১২৬১
				৩৫৬৩	৪১৪৮	নাল	১.৫৮৮৩
				৩৫৮৫	৪৪৯৮	নাল	৩.৪৭০৩
				৩৫৬৪	৩৫৯২	পুকুর	৫.৮০২৭
				৩৫৮৪	৪৩৩	নাল	৪.১২৩৭
				৩৫৬৫	৩৬২২	পুকুর	১.০৩৬৭
						মোট জমির পরিমাণ শতক)	১২১.৮৫৭০

প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "_____"প্রকল্পকে নিম্নেবর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬ প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ:

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

মোহাম্মদ শহিদ উল্লাহ
চেয়ারম্যান
১০ নং চাম্বল ইউনিয়ন পরিষদ
বাঁশখালী, চট্টগ্রাম।

E-mail : 10no.chambalunion@gmail.com

বিছমিল্লাহির রাহমানির রাহিম

৯নং (ক) শীলকূপ ইউনিয়ন পরিষদ
9 NO. (KA) SHILKUP UNION PARISHAD

রাশেদ. নূরী (প্যানেল চেয়ারম্যান-১)

ডাকঘর ঃ মনকিচর, উপজেলা ঃ বাঁশখালী
জেলা ঃ চট্টগ্রাম, বাংলাদেশ।

সূত্র ঃ ৩৭/২৫

তারিখ ঃ ২২/০৫/২০২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১.	আবেদনকারীর নাম	ঃ	প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।
২.	পিতা/স্বামী/স্ত্রীর নাম	ঃ	প্রযোজ্য নহে।
৩.	আবেদনকারীর ঠিকানা	ঃ	প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২। ফোনঃ ০১৭৩০০২৯৩১৭, ইমইেলঃ ce.pm@pgcb.gov.bd
৪.	প্রকল্পের অবস্থান ঠিকানা	ঃ	চট্টগ্রাম ও কক্সবাজার।
৫.	কারখানা প্রকল্পের তফসিল	ঃ	

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমিরপরিমান (শতক)
চট্টগ্রাম	বাঁশখালী	শিলকুপ	শিলকুপ	৮১৯	৭৪	নাল	১৪.৮৮১৬
				৮৪০	৯৬৭	নাল	০.২৯১৯
				৩১৯	৮৯৩	নাল	০.১৩৮৯
				৩৫৬	৪৭৩	নাল	২.০৫২০
				৩৬০	১০৪১	নাল	০.৯১৮৯
				৩৫৭	৩১৩	নাল	৮.৮৭৮৪
				৩৫৮	৩১৩	নাল	৪.৯৭৪২
			মুলকিরচর	৪১৯৬	৬৫৫	নাল	১০.৮০২১
				৪১৫৪	৩৫৮	নাল	৬.০০৫২
						মোট জমির পরিমান(শতক)	৪৮.৯৪৩২

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম:উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে"Madunaghat—Moheshkhali 765kV Transmission Lines Project"প্রকল্পকে নিম্নেবর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. র্কমরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নিরাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন র্দূঘটনার সময় জরুরী র্নিগমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল র্বজ্য অপরিশোধিত অবস্থায় বাইরে র্নিগমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত র্কতৃপক্ষ র্কতৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

রাশেদ নূরী
চেয়ারম্যান (ভারপ্রাপ্ত)
৯ নং (ক) শীলকূপ ইউনিয়ন পরিষদ
বাঁশখালী, চট্টগ্রাম।

তারিখ:স্থানীয় র্কতৃপক্ষের স্বাক্ষর ও সীল

Email : silkup.up@gmail.com

সমস্ত প্রশংসা মহান আল্লাহর

৬নং বৈলছড়ি ইউনিয়ন পরিষদ
6NO BAILCHHARI UNION PARISHAD

সূত্র : বৈ.ইউপি.বাঁশ/চট্ট.০০.০৬.০৬.২০২৫/১০৯০ তারিখ : ২২/০৬/২০২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২। ফোনঃ ০১৭৩০০২৯৩১৭, ইমইেলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
চট্টগ্রাম	বাঁশখালী	বৈলছড়ি	চেচুরিয়া	১৯১৫	১০৩০	নাল	৩.০৬৪৭
				১৯১৪	৬৩৫	নাল	৮.৮০৮৫
				১৫৯৭	৯৯৯	নাল	১.০৫১৭
				১৫৯৯	৪৬২	নাল	০.৪৩০৪
				১৫৭৩	৩০১৪	নাল	১.৬৭৬৫
				২০৬৯	৯৯০	নাল	১০.০৯৫২
				১৬০০	৪৫৯	নাল	০.২৩১৭
				২০৬৬	১৩৯৯	নাল	০.৭৪৭৯
				১৩৮৭	১২০২	নাল	৫.৯০৯৮
				১৩৮৮	১২০৫	নাল	৩.৪৮৯৩
				১৫১৬	৩২৭	নাল	৪.৮৩৪২
				১৩৩০	২৮৯৩	নাল	১৪.৫৬৭৪
				১৩৪১	২৭২০	নাল	০.০২৩৯
				মোট জমির পরিমাণ (শতক)			৫৪.৯৩১১

৬| প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন ।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী ৪

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ: 22-06-2525

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

বিকাশ দত্ত
প্যানেল চেয়ারম্যান
বাঁশখালী, চট্টগ্রাম।

বৈলছড়ি, ডাকঘর : কে. বি. বাজার- ৪৩৯১, উপজেলা : বাঁশখালী, জেলা : চট্টগ্রাম।
Bailchhari, P.O- K. B. Bazar-4391, Upazila : Banshkhali, Zila : Chattogram.
মোবাইল ঃ ০১৯৭৩-১৫১৬২০, E-mail : bailchhariup@gmail.com

বাংলাদেশ | বিসমিল্লাহির রাহমানির রাহিম | চিরজীবী হউক

৪নং বাহারছড়া ইউনিয়ন পরিষদ
4 NO. BAHARCHARA UNION PARISHAD

প্যানেল চেয়ারম্যান: মাহমুদুল ইসলাম (মাবুদ)
Panel Chairman: Mahmudul Islam (Mabud)

ডাকঘর: ইলশা, উপজেলা: বাঁশখালী, চট্টগ্রাম। মোবাইল: ০১৯১৯-৯২০৪৪৫

সূত্র: স্মারক নং- ৪৬.১৫.৮১ ২৩(১)/২১/২৫ তারিখ: ২৩ ০৬ ২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমইলেঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমিরপরিমান (শতক)
চট্টগ্রাম	বাঁশখালী	বাহারছড়া	মাইজপাড়া	৪৫৫	৬৫	নাল	১৫.২৫০৮
				৪৫৬	৬৫	নাল	১.৫৫৬৫
				১০৫	৭৯	নাল	০.০৯৭৮
				১৪৮	১৫৬	নাল	১৬.৭০৯৬
			কোকদন্ডী	৪৪০	২৫৯৩	নাল	১০.২০৯৩
				৪২৭	২৩৮৬	নাল	০.৫০৩৯
				৪২৯	২০৬৫	নাল	৬.০৯৪২
				৩৩১	৮৯৬	নাল	১.৫০১৯
				৩৩৩	৮৯৬	নাল	০.৮১১৭
				৩৪৪	৫৮২	নাল	৪.১০৭০
				৩২৮	২৫৪	নাল	২.১০৮৭
				৩৩০	৮৯৬	নাল	৮.২৫৬১
				৩২৯	১০৪	নাল	০.০২১৯
				২৪১	৮৭	নাল	৫.৬৯২২
				২৪২	৪০১	নাল	৭.৫০০৫
				২৪৩	৩৪১	নাল	৩.৬১৪৮
				৮২২	১১৭	নাল	১৬.৪২২৭
				৮২৩	১১৭	নাল	০.৩৮৪৭
			চাপাছড়ি	৩৯৯৫	৮৪৩	নাল	১.৫৭৬৬
				৩৯৩৩	৫৯১	নাল	১৬.৫৭১১
				৩৬৩৯	২২৯	নাল	১৬.৮০৭৩
						মোট জমির পরিমান(শতক)	১৩৫.৭৯৯৩

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম:উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে"Madunaghat—Moheshkhali 765kV Transmission Line Project"প্রকল্পকে নিম্নেবর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

২৩/৬/২৫
মাহমুদুল ইসলাম
প্যানেল চেয়ারম্যান-২
৪নং বাহারছড়া ইউনিয়ন পরিষদ
ইলশা, বাঁশখালী, চট্টগ্রাম।
মোবাইল ঃ ০১৯১৯৯২০৪৪৫
এনআইডি নং- ২৩৯০৮৬৬৫৩৭

04no.baharcharaunion@gmail.com

বিসমিল্লাহির রাহমানির রাহিম

১নং পুকুরিয়া ইউনিয়ন পরিষদ

চেয়ারম্যান ঃ আলহাজ্ব মোঃ আসহাব উদ্দিন
ডাকঘর- বেলগাঁও, উপজেলা- বাঁশখালী, চট্টগ্রাম।

সূত্র স্মারক নং: ৪৬.১৫.১০.৮৬.১৩.২৫/৫১ তারিখ : ২৩/০৬/২০২৫ইং

(সংশ্লিষ্ট স্থানীয় কর্তৃপক্ষের ঠিকানা সম্বলিত প্যাড - এ হবে)

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।
২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।
৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd
৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।
৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
চট্টগ্রাম	বাঁশখালী	পুকুরিয়া	হাজীগাঁও	১৯৩২	৫৪৪	নাল	৪.৪৯৯৮
				১৯১৮	৫৫৮	নাল	৭.৪৫০০
				১৯৩৫	১০৬	নাল	০.৯৮৪৫
				১৯১৭	৫৫৮	নাল	৩.২০৯৪
				২০৮৫	১৯১	নাল	১৫.২৫৭৫
				২০৮৪	১৪০	নাল	৩.৯৭৭৪
			চন্দ্রপুর	৭	৭৯	নাল	০.২৪৫৮
				২২	৭৮	নাল	৪.৩৩৭৫
				২১	৭৮	নাল	০.৫২৪৫
				২০	৭৯	নাল	০.৪৪৭৮
				৬	৭	নাল	০.০৬৮০
				২৩	৭৮	নাল	৭.৭২৬২
				৫২	১১০	নাল	২.৪৬৭২
			হাজীগাঁও	৭১৭	৪১	নাল	১৪.৩৫২২
			চাঁদপুর	৮২৫	১৬	নাল	০.৯৫২৯
				৮২৪	২৮০	নাল	০.১৫১৩
				৭৮৩	৩৩	নাল	১৫.০৩৯৪
				১		নাল	১৬.১৪৩৬
				১		নাল	১৭.২২২৩
				১		নাল	২.৩৩৩০
				৩		নাল	১০.৫৯৯৭
				৪		নাল	২.১৮৯৬
				৪		নাল	২.১৮৯৬
			নাটমুড়া	৯১৫	৩৮৬	নাল	৩.৫৬৬১
				৯২০	৬৯	নাল	২.৮৭৪৫
				৯১৩	১০৬	নাল	৭.৭৯২৭
				৩৯১	৩৬	নাল	২.৫৫৮৩
				৩৯০	৩৬	নাল	২.৮২২৬
				৩৮৯	৭৫৪	নাল	৯.৯৮০৩
				৩৯৩	৩৬	নাল	২.৭৯২৯
				৩৯২	৫৪২	নাল	৯.৯৮০৩
			পুকুরিয়া	৯০	১৩০	নাল	৭.৩০৩৫
				৮৯	১৩০	নাল	৮.৪৭৬৪
				৮৬	১১০	নাল	৪.৫৪৫৬
				২০৬		নাল	২০.৩২৫৫
						মোট জমির পরিমান (শতক)	২১৫.৩৮৭৮

বিসমিল্লাহির রাহমানির রাহিম

১নং পুকুরিয়া ইউনিয়ন পরিষদ

চেয়ারম্যান ঃ আলহাজ্ব মোঃ আসহাব উদ্দিন
ডাকঘর- বেলগাঁও, উপজেলা- বাঁশখালী, চট্টগ্রাম।

সূত্র ঃ

তারিখ : ২৬/০৮/২০২৫

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ: ২৬/০৮/২০২৫

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

আলহাজ্ব মোঃ আসহাব উদ্দিন
চেয়ারম্যান
১নং পুকুরিয়া ইউনিয়ন পরিষদ
বাঁশখালী, চট্টগ্রাম।

বিস্‌মিলাহির রাহ্‌মানির রাহিম
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
স্থানীয় সরকার

১০নং হাইলধর ইউনিয়ন পরিষদ

প্যানেল চেয়ারম্যান-২ : আবু ফয়েজ, মোবাইল ঃ ০১৮২৪-০৮০৮০৮

সূত্র : স্মারক নং: ৩১/২৫ তারিখ ঃ 22 ৬ ২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমইেলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা /প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
চট্টগ্রাম	আনোয়ারা	হাইলধর	চর পুকুরিয়া	১৭৬	৬৩	নাল	০.০৭
				১৭৭	২৬	নাল	১০.৩২
				১৭৮	২৬	নাল	২.৬৪
				৬৯	৭৯	নাল	৩.৫২
				৫২	২৪	নাল	৯.০৯
				৫০	২৪	নাল	০.৪২
				৩০	৯	নাল	১৯.০৩
			ইছাখালী	১১৫৩	৪৮৭	নাল	১.৪৪
				১১৫৯	৯৫৫	নাল	৮.৪৮
				১১৩৯	২৪৪	নাল	১.১৮
				১১৩৮	২২৮	নাল	৪.৩৯
				১১৩১	৪৮৮	নাল	১.৪৮
				৮৬৬	১৯৯	নাল	১১.৫৯
				১০১৩	৪৮৩	নাল	১.৪৩
				৮৬৪	৩৩৭, ৫৫৪, ১০৯৩	নাল	০.০৪
				৮৬৫	১০৬২, ৫৫৪	নাল	১.১৮
				২৬৩২	৮৩৯	নাল	০.৬৩
				২৬২৯	২২৮	নাল	৫.৭৬
				২৬২৮	২১১ / ১	নাল	১.৩
				২৬৩১	৮৪৩	নাল	০.২
				২৬৩০	৮৪৮	নাল	৫.৪৬
				২৬২৭	৩৯১	নাল	০.৮৮
						মোট জমির পরিমান (শতক)	৯০.৫২

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।

আবু ফয়েজ
চেয়ারম্যান (ভারপ্রাপ্ত)
১০নং হাইলধর ইউনিয়ন পরিষদ
আনোয়ারা, চট্টগ্রাম।

ডাকঘর ঃ হাইলধর, উপজেলা ঃ আনোয়ারা, চট্টগ্রাম। web : www.haildharup.chittagong.gov.bd

বিস্‌মিল্লাহির রাহ্‌মানির রাহিম
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
স্থানীয় সরকার

১০নং হাইলধর ইউনিয়ন পরিষদ

প্যানেল চেয়ারম্যান-২ : আবু ফয়েজ, মোবাইল ঃ ০১৮২৪-০৮০৮০৮

সূত্র : আনোয়ারা, চট্টগ্রাম

তারিখ ঃ ২২/৬/২৫

৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

আবু ফয়েজ
চেয়ারম্যান (ভারপ্রাপ্ত)
১০নং হাইলধর ইউনিয়ন পরিষদ
আনোয়ারা, চট্টগ্রাম।

তারিখ:

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

ডাকঘর ঃ হাইলধর, উপজেলা ঃ আনোয়ারা, চট্টগ্রাম। web : www.haildharup.chittagong.gov.bd

বিসমিল্লাহির রাহমানির রাহিম

৯নং পরৈকোড়া ইউনিয়ন পরিষদ

9 NO PARAIKORA UNION PARISHAD

মোরশেদ হোসেন চৌধুরী

প্যানেল চেয়ারম্যান-০১

সূত্র ঃ পরৈকোড়া/আনো-১৪৮/২৫ তারিখ ঃ ২৬/৩/২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd

প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
চট্টগ্রাম	আনোয়ারা	পারিকোড়া	সাইতপেটুয়া	৫৫৯	১৮৮	নাল	১১.৪৬২৪
				৫৫২	১১১	নাল	০.৪১০৭
			ভিংরোল	৩১৭	৪৯০	বাড়ী	৭.৬৫৬৫
				৩২০	১৫২	নাল	০.৪০৯৫
				৩১৯	১৩৮	নাল	৩.১৯৭৭
				৩১৮	৪৮৯	পুকুর	১.৯২২১
				১৫৫	২৯৭	নাল	১০.৩২০৫
				১৫৮	৩৭৮	নাল	১.৫৫২৬
			পারিকোড়া	১৭২৭	৪৫	নাল	২.৫০৮৬
				১৮৬৪	৬৬	নাল	৪.০১১৮
				১৭২৬	৩৯৭	নাল	২.২৭৭৯
				১৮৬৫	৬৬	নাল	৩.০৭৪৯
				১৩৪৫	৫৫০	নাল	৪.৭০৮০
				১৩৪৬	৪১৫	নাল	৬.২১০৯
				১৩৪৪	৪১৫	নাল	৫.৮৮৮৪
				৭৭৫	৯৯৭	বাড়ী	৩.০১৫০
				৭৫২	১২৬	খিলা	৬.৩০০৫
				৭৫৩	৫৫৬	নাল	১.০৭৪৫
				৭৭৩	১২৫	নাল	২.৩১২৪
				৭৫৯	১২৫	খাই	৪.১০৪৮
				১২২	৩৮২/৩	নাল	১৬.৮০৭৩
						মোট জমির পরিমান (শতক)	৯৯.২২৭৩

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।

২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।

৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।

৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।

বায়ু ও শব্দ দূষণ করা যাবে না।

৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ: ২৬/৩/২০২৫

মোরশেদ হোসেন চৌধুরী
প্যানেল চেয়ারম্যান-০১
৯নং পরৈকোড়া ইউনিয়ন পরিষদ
আনোয়ারা, চট্টগ্রাম।

উপজেলা ঃ আনোয়ারা, চট্টগ্রাম।

বাংলাদেশ

বিসমিল্লাহির রাহমানির রাহিম

চিরজীবি হোক

৯নং জঙ্গলখাইন ইউনিয়ন পরিষদ
9 No. Jangalkhain Union Parishad

ডাকঘর: উজিরপুর, থানা/উপজেলা, পটিয়া, জেলা: চট্টগ্রাম। P.O Ujirpur, P.S Upazila, Patiya, District: Chattagram

চেয়ারম্যান: সাহাদাত হোসেন সবুজ মোবাইল: 01788 482044

স্মারক নঃ Jangalkhain UP. Patiya. etg.-283/25

তারিখ: তারিখ: ২৫-০৫-২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

1. আবেদনকারীর নাম t প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।
2. পিতা/স্বামী/স্ত্রীর নাম t প্রযোজ্য নহে।
3. আবেদনকারীর ঠিকানা t প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
   ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd
4. প্রকল্পের অবস্থান ঠিকানা t চট্টগ্রাম, কক্সবাজার।
5. কারখানা প্রকল্পের তফসিল t

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	টাওয়ার নং	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	টাওয়ার এর অংশ (শতক)	মোট জমির পরিমান (শতক)
চট্টগ্রাম	পটিয়া	জঙ্গলখাইন	উজিরপুর	২১৯	৫০৯	৩১	নাল	১.৯৩২০	১৪.৫৯১৩
					৫১০	৩১	নাল	০.৪৩৩৯	
					৫০৮	১৭১	নাল	৫.৭৬৬১	
					৫০৭	১৬৪	নাল	৫.৯৩৮৩	
					৫০৫	১৬৪	নাল	০.৩৩২৬	
					৫০৬	১৮০	নাল	০.১৮৮৪	
				২২০	২৬৮	৩৪০	নাল	৩.১৪০০	১১.৮৭৩২
					২৭৫	২১৯	নাল	৮.৭৩৩২	
চট্টগ্রাম	পটিয়া	জঙ্গলখাইন	তিয়ারকুল	২২১	৮৯৭	২০৪	পুকুর	৯.১৪৯০	১১.৮৭৩২
					৮৯৮	১৮১	নাল	২.৭২৪২	
				২২২	৭৭৮	৩৮৯	নাল	৬.৭৩৪৮	১৯.২৩৪৯
					৮০০	১২৪	নাল	৩.৯৭৪১	
					৭৭৭	২৫০	নাল	৭.৮৫৯৪	
					৭৭৬	২৫০	নাল	০.৬৬৬৬	
				২২৩	৪৮৮	৪৩৫	নাল	৪.৭৯২২	১৫.১৭৩৫

E-mail :udc9jangalkhain32@gmail.com

Gazi Md. Bokhtiar Uddin Bokul
Panel Chairman-1
9 No Jongolkhain Union Parishad
Patiya, Chattogram.

বিসমিল্লাহির রাহমানির রাহিম

চিরজীবি হোক

৯নং জঙ্গলখাইন ইউনিয়ন পরিষদ
9 No. Jangalkhain Union Parishad

ডাকঘর: উজিরপুর, থানা/উপজেলা, পটিয়া, জেলা: চট্টগ্রাম। P.O Ujirpur, P.S Upazila, Patiya, District: Chattagram

চেয়ারম্যান: সাহাদাত হোসেন সবুজ মোবাইল: 01788 482044

তারিখ: ২৮-০৮-২৫

					৪৮৪	১২৫	নাল	১০.৩৮১২	
				২২৪	১০৫	১৯১	নাল	৪.১৩০৩	১৬.৮০৭৩
					১১০	২৮৫	নাল	৩.৪৮১৮	
					১১১	২৬৪	নাল	০.০০৭৮	
					১০৬	৩৭৬	নাল	০.৫৯৬৯	
					১০৯	৪০৫	নাল	৮.৫৯০৫	
মোট জমির পরিমান								৮৯.৫৫৩৪	৮৯.৫৫৩৪

6| প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: হাই-ভোল্টেজ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Lines Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।

২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।

৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।

৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।

৫. বায়ু ও শব্দ দূষণ করা যাবে না।

৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ:

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

Gazi Md. Bokhtiar Uddin Bokul
Panel Chairman-1
9 No Jongolkhain Union Parishad
Patiya, Chattogram.

E-mail :udc9jangalkhain32@gmail.com

বিস্‌মিল্লাহির রাহমানির রাহিম

৫নং সারোয়াতলী ইউনিয়ন পরিষদ

NO. 5 SAROATALI UNION PARISHAD

ডাকঘর- বেঙ্গুরা, উপজেলা- বোয়ালখালী, চট্টগ্রাম, বাংলাদেশ।

চেয়ারম্যান : আলহাজ্ব মোঃ বেলাল হোসেন

স্মারক নং- সা. ইউ. পি. / ৪৬ তারিখ ০৪/০৭/২০১৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম, কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	টাওয়ার নং	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	টাওয়ার এর অংশ (শতক)	মোট জমির পরিমান (শতক)
চট্টগ্রাম	বোয়ালখালী	সরোয়াতলী	কাজুরী	২৩৫	৭৯৭৩	১৯৯৩	নাল	৭.২৯৮৬	১৯.২৩৪৯
					৭৯৭২	৬৮০	নাল	২.৬৫২২	
					৭৯৬৮	৯৭৬	নাল	৪.২১৮৯	
					৭৯৭৪	৬৮০	নাল	৩.৭৮৪৭	
					৭৯৭৫	২১৯০	নাল	১.২৮০৫	
				২৩৬	৯৮৯৫			১০.৯৭৩৯	১৬.৮০৭৪
					৯৮৯৬			৫.৮৩৩৫	
				২৩৭	৭৫১৪	৭৯০	নাল	১৪.৩৭০৪	১৬.৮০৭৩
					৭৬০৮	১৭৩৩	নাল	০.৬৬০৫	
					৭৬০৯	১৭১৯	নাল	১.৩৫৩৫	
					৭৬১০	১৭১৯	নাল	০.৪২২৯	
				২৩৮	৭৪৩০	১৫২৭	নাল	১২.৮৬০৩	১৬.৮০৭৪
					৭৪৩১	৪৪	নাল	০.৭২৫৯	
					৭৪২৭	১৬০০	নাল	৩.১৮০৮	
					৭৪২৬	১৬০০	নাল	০.০৩৭০	
					৭৪২৮	৩৩৯৯	নাল	০.০০৩৪	
				২৩৯	৬৬০১	১৪২৬	নাল	১৫.১৭৩৬	১৫.১৭৩৬
				২৪০	২৯১৭	১৫৯৩	নাল	০.৩৭৪৮	১৬.৮০৭৪
					২৯২২	১২৩৯	নাল	৩.৪৯৭৫	
					২৯২৩	৯৩৯	নাল	৯.৮০৯২	
					২৯২৪	১৮৯৮	নাল	৩.১২৫৮	
				২৪১	২৪১৬	২১৬৪	নাল	১.৭৬৬৬	১৮.৯৬০৭
					২৪২১	২১৬৪	নাল	১.৬৭৫২	
					২৪১৮	৩৫৭	নাল	২.১৪৫৬	
					২৪১৯	৩৫৭	নাল	৭.১৭৩৮	
					২৪২০	৩৫২	নাল	৬.১৯৯৬	
				২৪২	২২৮৭	১৫৭৬	নাল	২.৬১৪৬	১৬.৮০৭৪
					২২৮৮	১৬৩১	নাল	১৪.১৯২৭	
মোট জমির পরিমান								১৩৭.৪০৬০	১৩৭.৪০৬০

নিলুফার বেগম ০৪.৭.১৫
প্যানেল চেয়ারম্যান
৫নং সারোয়াতলী ইউ, পি
বোয়ালখালী, চট্টগ্রাম।

দুইয়ের অধিক সন্তান নয়, একটি হলে ভাল হয়। পাঁচ বছর বয়সী সন্তানকে স্কুলে পাঠান। গাছ লাগান পরিবেশ বাঁচান। সময়মত ইউ, পি, কর পরিশোধ করুন। স্বাস্থ্যসম্মত ল্যাট্রিন ব্যবহার করুন।

বিস্‌মিল্লাহির রাহমানির রাহিম

৫নং সারোয়াতলী ইউনিয়ন পরিষদ
NO. 5 SAROATALI UNION PARISHAD

ডাকঘর- বেঙ্গুরা, উপজেলা- বোয়ালখালী, চট্টগ্রাম, বাংলাদেশ।

চেয়ারম্যান : আলহাজ্ব মোঃ বেলাল হোসেন

স্মারক নং- সা. ইউ. পি./-৪৬ তারিখ ০৪/০৭/২০২৫

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: হাই-ভোল্টেজ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Lines Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

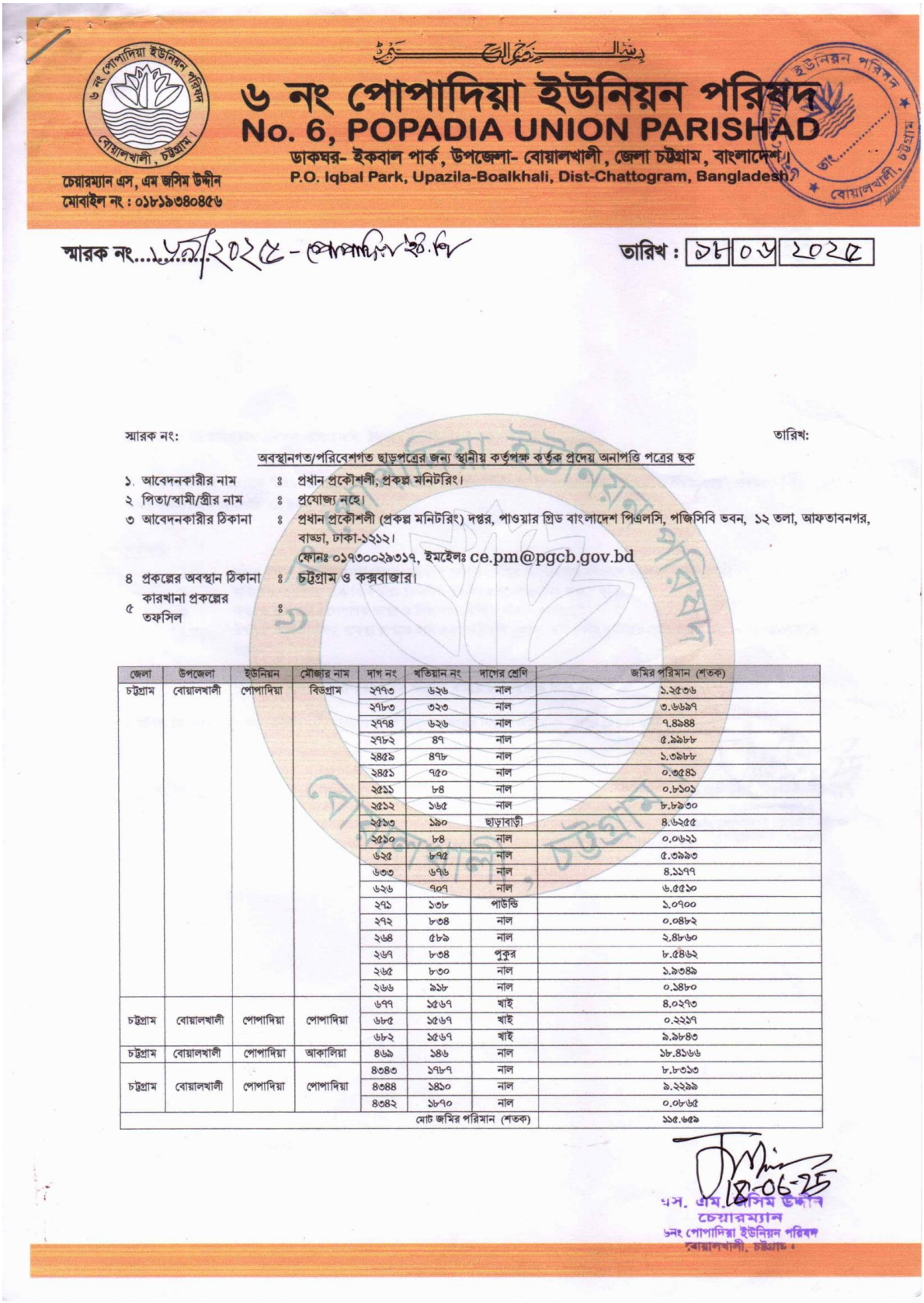
তারিখ: ০৪/৭/২০২৫

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

নিলুফার বেগম
প্যানেল চেয়ারম্যান
৫নং সারোয়াতলী ইউ, পি
বোয়ালখালী, চট্টগ্রাম।

৪.৭.২৫

দুইয়ের অধিক সন্তান নয়, একটি হলে ভাল হয়। পাঁচ বছর বয়সী সন্তানকে স্কুলে পাঠান। গাছ লাগান পরিবেশ বাঁচান। সময়মত ইউ, পি, কর পরিশোধ করুন। স্বাস্থ্যসম্মত ল্যাট্রিন ব্যবহার করুন।



৬ নং পোপাদিয়া ইউনিয়ন পরিষদ
No. 6, POPADIA UNION PARISHAD
ডাকঘর- ইকবাল পার্ক, উপজেলা- বোয়ালখালী, জেলা চট্টগ্রাম, বাংলাদেশ।
P.O. Iqbal Park, Upazila-Boalkhali, Dist-Chattogram, Bangladesh

চেয়ারম্যান এস, এম জসিম উদ্দীন
মোবাইল নং : ০১৮১৯৩৪০৪৫৬

স্মারক নং...১৫৯/২০২৫ - পোপাদিয়া ই.ই

তারিখ : ১৮/০৬/২০২৫

স্মারক নং:

তারিখ:

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।
২ পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।
৩ আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd
৪ প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।
৫ কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
চট্টগ্রাম	বোয়ালখালী	পোপাদিয়া	বিডগ্রাম	২৭৭৩	৬২৬	নাল	১.২৫৩৬
				২৭৮৩	৩২৩	নাল	৩.৬৬৯৭
				২৭৭৪	৬২৬	নাল	৭.৪৯৪৪
				২৭৮২	৪৭	নাল	৫.৯৯৮৮
				২৪৫৯	৪৭৮	নাল	১.৩৯৮৮
				২৪৫১	৭৫০	নাল	০.৩৫৪১
				২৫১১	৮৪	নাল	০.৮১০১
				২৫১২	১৬৫	নাল	৮.৮৯৩০
				২৫১৩	১৯০	ছাড়াবাড়ী	৪.৬২৫৫
				২৫১০	৮৪	নাল	০.০৬২১
				৬২৫	৮৭৫	নাল	৫.৩৯৯৩
				৬৩৩	৬৭৬	নাল	৪.১১৭৭
				৬২৬	৭০৭	নাল	৬.৫৫১০
				২৭১	১৩৮	পাউন্ডি	১.০৭০০
				২৭২	৮৩৪	নাল	০.০৪৮২
				২৬৪	৫৮৯	নাল	২.৪৮৬০
				২৬৭	৮৩৪	পুকুর	৮.৫৪৬২
				২৬৫	৮৩০	নাল	১.৯৩৪৯
				২৬৬	৯১৮	নাল	০.১৪৮০
চট্টগ্রাম	বোয়ালখালী	পোপাদিয়া	পোপাদিয়া	৬৭৭	১৫৬৭	খাই	৪.০২৭৩
				৬৮৫	১৫৬৭	খাই	০.২২১৭
				৬৮২	১৫৬৭	খাই	৯.৯৮৪৩
চট্টগ্রাম	বোয়ালখালী	পোপাদিয়া	আকালিয়া	৪৬৯	১৪৬	নাল	১৮.৪১৬৬
চট্টগ্রাম	বোয়ালখালী	পোপাদিয়া	পোপাদিয়া	৪৩৪৩	১৭৮৭	নাল	৮.৮৩১৩
				৪৩৪৪	১৪১০	নাল	৯.২২৯৯
				৪৩৪২	১৮৭০	নাল	০.০৮৬৫
						মোট জমির পরিমান (শতক)	১১৫.৬৫৯

18-06-25
এস. এম. জসিম উদ্দীন
চেয়ারম্যান
৬নং পোপাদিয়া ইউনিয়ন পরিষদ
বোয়ালখালী, চট্টগ্রাম।

بسم الله الرحمن الرحيم

৬ নং পোপাদিয়া ইউনিয়ন পরিষদ
No. 6, POPADIA UNION PARISHAD

ডাকঘর- ইকবাল পার্ক, উপজেলা- বোয়ালখালী, জেলা চট্টগ্রাম, বাংলাদেশ।
P.O. Iqbal Park, Upazila-Boalkhali, Dist-Chattogram, Bangladesh.

চেয়ারম্যান এস, এম জসিম উদ্দীন
মোবাইল নং : ০১৮১৯৩৪০৪৫৬

স্মারক নং.....

তারিখ : ১৮/০৫/২০২৫

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

১৮-০৫-২৫

তারিখ:

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

এস এম জসিম উদ্দীন
চেয়ারম্যান
৬নং পোপাদিয়া ইউনিয়ন পরিষদ
বোয়ালখালী, চট্টগ্রাম।

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

৮নং শ্রীপুর-খরদ্বীপ ইউনিয়ন পরিষদ কার্যালয়

বোয়ালখালী, চট্টগ্রাম।

স্মারক নং: ২৪২৫/১৫৪ তারিখ: ২৩/৮/২০২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
চট্টগ্রাম	বোয়ালখালী	শ্রীপুর খরদ্বীপ	খরদ্বীপ	৫৪৪৯	১৩১৭	নাল	৪.৬৬
				৫৪৫০	১০১২	নাল	৬.৭৮
				৫৪৫৩	২০২০	পুকুর	৪.৭০
				৪৮৫৪	১৭৬০	খাই	১৫.১৭
				৪৬২১	৮৭৮	নাল	৯.৫৪
				৪৬২০	৮৭৮	নাল	৮.৫৬
				৪৬২৫	১৫৮৭	নাল	০.০৪
				৪১৪৪	২৭৫	খিলা	২.৩৭
				৪১৪৬	২৭৫	নাল	৩.১১
				৪১৪৫	২৭৫	খাই	৩.০৯
				৪১৪৬	২৭৫	খাই	১.৭৫
				৪১৫৭	৪১১	খাই	৩.২৬
				৪১৬৫	১৫৮৭	নাল	০.৪৬
				৪১৫৯	৪১১	নাল	১.১২
				৪০২৩	৪৮	খিলা	২.৯২
				৪০২২	৪৪২	নাল	১২.০৬
				৪০২১	৪৪২	খিলা	৩.৮৭
				৪০২৫	৪৫	নাল	০.৩৭
				৪০৩১	১৩৬৮	নাল	০.০১
						মোট জমির পরিমান (শতক)	৮৩.৮৭

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।

২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।

মুহাম্মদ হাসান চৌধুরী
প্যানেল চেয়ারম্যান-১
৮নং শ্রীপুর-খরদ্বীপ ইউনিয়ন পরিষদ
বোয়ালখালী, চট্টগ্রাম।
২৩/৮/২০২৫

৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ:

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল
মুহাম্মদ হাসান চৌধুরী
প্যানেল চেয়ারম্যান-১
৮নং শ্রীপুর-খরদীপ ইউনিয়ন পরিষদ
বোয়ালখালী, চট্টগ্রাম।
২৯/৫/২০২৫

বিসমিল্লাহির রাহমানির রাহিম

৭নং চরণদ্বীপ ইউনিয়ন পরিষদ
NO-7 CHARANDWIP UNION PARISHAD

স্মারক নং- চ.ই.উপি ৬৩/২০২৫ তারিখ: ২৩/০৮/২০২৫

অবস্থানগত/ পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কৃর্তক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নামঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং

২. পিতা/ স্বামী/ স্ত্রীর নামঃ প্রযোজ্য নয়

৩. আবেদনকারীর ঠিকানাঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাব নগর, বাড্ডা, ঢাকা- ১২১২।

ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইল- ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানাঃ চট্টগ্রাম, কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিলঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	টাওয়ার নং	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	টাওয়ার এর অংশ (শতক)	মোট জমির পরিমাণ (শতক)
চট্টগ্রাম	বোয়ালখালী	চরণদ্বীপ	চরণদ্বীপ		১১৩৪১	১১৩৬	নাল		২.৪৪
					১১৩৪০	১১৪৪	নাল		৩.৩৮
					১১৩৪২	৩১৪৬	নাল		৭.২৭
					১১৩৪৩	২২২৯	নাল		২.১৮
					১১৩৪৫	২২২৯	নাল		১.৫২
					১১৪৩১	৭৪৩	নাল		০.০৯
					১১৪৩০	২২৯	নাল		২.০৫
					৯৮৪২		নাল		১.৫৬
					১১২১৪	২২১	নাল		৭.৫১
					১১৪১৯	১৫৮৩	নাল		৮.০৩
					১১৩৯৫	৯৭৭	নাল		১.১২
					৯৬৫৬	৮৮০	নাল		৩.৯৪
					৯৬৫৭	১৮৯২	নাল		২.১৯
					৯৬৫৫	১০৮৩	নাল		৩.৮৯
					১১৪০৩	১০৮৩	নাল		৩.৭৯
					৯৬৫৪		নাল		৭.৫০
					৯৬৬০	২৩৩৭	নাল		৪.৭২
					৯৬৫৯	১০৮৩	নাল		০.৫০
					৯৬৫৯	১০৮৩	নাল		০.৭২
মোট জমির পরিমণ									৬৩.৯৫ (শতক)

৬। প্রকল্পের উৎপাদিত/ উৎপাদিতব্য পণ্যের নামঃ উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

মোহাম্মদ শামসুল আলম
চেয়ারম্যান
৭নং চরণদ্বীপ ইউনিয়ন পরিষদ
বোয়ালখালী, চট্টগ্রাম

গ্রাম ঃ চরণদ্বীপ, ডাকঘর ঃ চরণদ্বীপ, বোয়ালখালী, চট্টগ্রাম।
Vill: Charandwip, P/O: Charandwip, Boalkhali, Chattogram. E-mail: charandwip7.boalkhali@gmail.com

বিসমিল্লাহির রাহমানির রাহিম

৭নং চরণদ্বীপ ইউনিয়ন পরিষদ
NO-7 CHARANDWIP UNION PARISHAD

বোয়ালখালী, চট্টগ্রাম

স্মারক নং- চ,ইউপি

তারিখ: ২০/০৮/২০২৫

উপরোক্ত তথ্যাদির আলোকে "Madunaghat - Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

শর্তাবলীঃ

১। প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।

২। পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।

৩। কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।

৪। উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।

৫। বায়ু ও শব্দ দূষণ করা যাবে না।

৬। প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লেখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা ওেয়া যাবে।

তারিখঃ

মোহাম্মদ শামসুল আলম
চেয়ারম্যান
৭নং চরণদ্বীপ ইউনিয়ন পরিষদ
বোয়ালখালী, চট্টগ্রাম
২০/৮/২০২৫

গ্রাম ঃ চরণদ্বীপ, ডাকঘর ঃ চরণদ্বীপ, বোয়ালখালী, চট্টগ্রাম।
Vill: Charandwip, P/O: Charandwip, Boalkhali, Chattogram. E-mail: charandwip7.boalkhali@gmail.com

বাংলাদেশ

আল্লাহু আকবর

চিরজীবি হউক

১৪নং বাগোয়ান ইউনিয়ন পরিষদ

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ডাকঘর ঃ দেওয়ানপুর (৪৩৪৭), উপজেলা ঃ রাউজান, জেলা ঃ চট্টগ্রাম, বাংলাদেশ।
Post: Dewanpur(4347), Upzila : Raozan, Dist : Chattogram, Bangladesh.

সূত্র ঃ ১৪০৫-২০২৫/০১ তারিখ ঃ ০৪ ০৮ ২০২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১ আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।
২ পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।
৩ আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd
৪ প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।
৫ কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	টাওয়ার এরঅংশ (শতক)
চট্টগ্রাম	রাউজান	বাগোয়ান	বাগোয়ান	৬২৬০	১০৮	নাল	৭.৫৪৬৭
				৬২৭৪	৭৯৫	ভিটা	২.০৩৩১
				৬২৭২	৭৯৫	পুকুরপাড়	৮.৫৯২৫
				৬২৭৩	৬৫৫	ভিটা	৬.২৭০০
				৬২৭১	৮২০	নদী	০.২৯২৪
				৬২৭০	৮২০	ভিটা	০.৮৩৯৫
				৬২৬৯	২৮৯	খাই	১.২০০৮
				৬২৭৮	৬৫৫	ভিটা	১.৫৮৯০
				৬০৫১	১৩২৯	পুকুর	৪.৯১৪০
				৬০৫২	১৩৭৮	নাল	৭.৫৯৮৩
				৬০৫০	১৩৭০	নাল	০.৩২৬৮
				৬০৫৪	১৪২৬	নাল	৩.৪২৭৩
				৬০৫৫	১৫৬৯	নাল	০.৬৬৪৮
				৬০৫৩	১৫৫২	নাল	১.৮৯৪৭
				৬০৭৪	২৬০	নাল	০.৪০৯০
				১১৯২	৫৫৪	নাল	১৩.২৯০৭
				১১৯১	১৭৯৭	খাই	০.৮২২৬
				১১৭৬	২৫১৮ / ১	খাল	০.১২০২
				১১০১	১৬২১	নাল	২.১৮৪২
				১১০০	১৬২১	নাল	১১.০০১৭
				১১০২	২৫১৩ / ১	নাল	০.৩১০৯
				১১০৪	২৫১৩ / ১	নাল	১.৩৯১৫
				১০৯৮	১৬২৩	নাল	১.২৩৩৪
				১০৯৯	১৬২৩	নাল	০.০২২১
				৭৬৪	৪৩০	নাল	০.১২০৬
				৭৬৩	৮৪৬	নাল	৪.৫০২৩
				৭৬৬	৪৩০	নাল	১.১৭৬৫
				৭৬২	৯৪৬	নাল	৬.০২৬৫
				৭৬৮	১১৫৪	নাল	২.৩১১৮
				৭৬১	৪৩০	নাল	২.২২১৮
				৭৬০	১১৫৪	নাল	১.৫২৫৮
				৭৫৯	১৪৪০	নাল	০.২৬০৫
চট্টগ্রাম	রাউজান	বাগোয়ান	গাশচি	৮৫১৫	২৩৯২	নাল	০.২৫৯৪
				৮৫১৬	২৩৯২	নাল	৫.৪৬৭৯
				৮৫১৭	২৩৯২	নাল	২.২৬২৯
				৮৫৬১	২৩৯২	খাই	৫.২৩৭৩
				৮৪৬৫	২১১৯	নাল	০.৮২৪৫
				৮৪৫৫	১৭৩৭	নাল	০.১৮৫৫

রাজশ্রী বিশ্বাস
০৪-০৮-২০২৫
রাজশ্রী বিশ্বাস
ভারপ্রাপ্ত চেয়ারম্যান
১৪নং বাগোয়ান ইউনিয়ন পরিষদ
রাউজান, চট্টগ্রাম।

বাংলাদেশ

আল্লাহু আকবর

চিরজীবি হউক

১৪নং বাগোয়ান ইউনিয়ন পরিষদ

14NO. BAGOAN UNION PARISHED

ডাকঘর ঃ দেওয়ানপুর (৪৩৪৭), উপজেলা ঃ রাউজান, জেলা ঃ চট্টগ্রাম, বাংলাদেশ।
Post: Dewanpur(4347), Upzila : Raozan, Dist : Chattogram, Bangladesh.

সূত্র ঃ

তারিখ ঃ ০৪-০৬-২০২৫

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	টাওয়ার এরঅংশ (শতক)
				৭৮৬৫	১৯২৬	পথ	০.০৪৩৫
				৭৮৬৪	১৯২৬	নাল	০.০৩২৩
				৮৬৮৮	২৪০৬	নাল	০.৮৬৪২
				৮৬৬৭	২৪০১	নাল	৪.৫৯০৭
				৮৬৯১	২৪০১	নাল	৩.২৮১৩
				৮৬৯৩	৭৬৪	নাল	০.৪২১১
				৮৬৮৬	৭৬৯	নাল	০.৯১৪৬
				৮৬৯২	১৯২৬	নাল	০.২৬৫১
				৭৯৯৯	১৪৪১	নাল	০.৫০০৯
				৭৯৫৪	২১৫	নাল	৩.৬৭৪৯
				৭৯৫৮	১৪৪৬	নাল	১.৯২৮৫
				৭৯৫৬	২০১৪	নাল	৩.৭৭৫৭
				৭৯৫৭	২০১৪	নাল	০.৮৯৩০
				৬২২১	৪১৫	নাল	৫.৭৪১৫
				৬২২২	৭৬৪	নাল	১.৭৮৭৩
				২৫৪৭	১৭৭১	নাল	১.০৬০০
				২৫৪৮	৬৩	নাল	৩.২৬২৬
				২৫১৭	৭৬৪	নাল	২.৯৬৮১
				২৫১৬	১৬৬২	নাল	৪.৫৯৭৫
				২৫১৫	৪২১	নাল	৯.১৬১২
						মোট	১৬০.১২

6| প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম:হাই-ভোল্টেজ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন ।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Lines Project" প্রকল্পকে নিম্নেবর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখ:

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

রাজশ্রী বিশ্বাস
ভারপ্রাপ্ত চেয়ারম্যান
১৪নং বাগোয়ান ইউনিয়ন পরিষদ
রাউজান, চট্টগ্রাম।

Government of the People's Republic of Bangladesh

১০নং পূর্ব গুজরা ইউনিয়ন পরিষদ

10 No Purba Guzra Union Parishad

কার্যালয়-আধার মানিক, অলিমিয়া হাট, রাউজান, চট্টগ্রাম-৪৩৪১

Office-Adhar Manik, Oli Meah Hat, Raozan, Chattogram-4341

সূত্র/Ref: স্মারক নং-৪৪/১০-পূঃ গুঃ ইউপি/২৫

তারিখ/Date : ২৬ | ০৬ | ২০২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২। ফোনঃ ০১৭৩০০২৯৩১৭, ইমেইলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
চট্টগ্রাম	রাউজান	পূর্ব গুজারা	পূর্ব গুজারা	৩২৯৬৩	৩৬৬	নাল	১৬.৮১
				৩২২২২	৮৩৪	নাল	২.৫৩
				৩২২২১	৮৩৪	নাল	৫.০৩
				৩২২২০	৮৩৪	নাল	৫.৪৪
				৩২২১৯			০.২৫
				৩২২২৭	১০৯৩	নাল	০.০১
				৩২২২৮	১৮৫৩	নাল	১.০৮
				৩২২২৯	১০৯৩	নাল	০.২৫
						মোট জমির পরিমান (শতক)	৩১.৪০

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।

২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।

৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।

৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।

৫. বায়ু ও শব্দ দূষণ করা যাবে না।

৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

বীনা চৌধুরী
ভারপ্রাপ্ত চেয়ারম্যান
১০নং পূর্ব গুজরা ইউনিয়ন পরিষদ
রাউজান, চট্টগ্রাম।

বাংলাদেশ বিসমিল্লাহির রাহমানির রাহিম চিরজীবিহউক

৯নং পাহাড়তলী ইউনিয়ন পরিষদ

9 NO PAHARTALI UNION PARISHAD

ডাকঘর- মহামুনি, উপজেলা- রাউজান, জেলা -চট্টগ্রাম।
Post- Mahamuni, Upazilla- Raozan, Chattogram,Bangladesh.
Website: pahartali.chittagong.gov.bd

চেয়ারম্যান- মোঃ রোকন উদ্দিন
ফোন: ০১৭৮৮-৩২৪০০০, ০১৮১৮-১১৯৯৭২

Chairman: MOHAMMED ROKAN UDDIN
Phone: 01788-324000, 01818-119972

স্মারক নং: পাউ, রাউ, চট্টগ্রাম ৩২৫ ইং তারিখ: ২২/০৬/২০২৫ ইং

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তি পত্রের ছক

১. আবেদনকারীর নাম ঃ প্রধান প্রকৌশলী, প্রকল্প মনিটরিং।

২. পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নহে।

৩. আবেদনকারীর ঠিকানা ঃ প্রধান প্রকৌশলী (প্রকল্প মনিটরিং) দপ্তর, পাওয়ার গ্রিড বাংলাদেশ পিএলসি, পজিসিবি ভবন, ১২ তলা, আফতাবনগর, বাড্ডা, ঢাকা-১২১২।
ফোনঃ ০১৭৩০০২৯৩১৭, ইমইলঃ ce.pm@pgcb.gov.bd

৪. প্রকল্পের অবস্থান ঠিকানা ঃ চট্টগ্রাম ও কক্সবাজার।

৫. কারখানা প্রকল্পের তফসিল ঃ

জেলা	উপজেলা	ইউনিয়ন	মৌজার নাম	দাগ নং	খতিয়ান নং	দাগের শ্রেণি	জমির পরিমান (শতক)
চট্টগ্রাম	রাউজান	পাহাড়তলী	দেওয়ানপুর	৮৫৪৪	৭২	নাল	০.৮৮
				৮৫৪৫	১৯৭	নাল	৩.৩৫
				৮৫৫১	৭০৪	নাল	৯.৯৯
				৮৫৫২		নাল	০.০২
				৭৬৩৯	১৬৮৭	নাল	৪.২৫
				৭৭০৩	৬১৭	নাল	৯.৬৯
				৭৭০৭	১১৭৯	খাই	০.১২
				৭৭০৮	১৪০৪	নাল	০.১২
				৭৭০০	১৪০৪	নাল	০.০৬
				৭৪২৬	৭৯০	নাল	০.১১
				৭৪২৪	৯৩৬	নাল	১৬.৮৪
				৭৪২১	৯৩৬	নাল	২.২৮
						মোট জমির পরিমান (শতক)	৪৭.৭০

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম: উচ্চচাপ বিশিষ্ট বিদ্যুৎ সঞ্চালন লাইন।

উপরোক্ত তথ্যাদির আলোকে "Madunaghat—Moheshkhali 765kV Transmission Line Project" প্রকল্পকে নিম্নে বর্ণিত শর্তসাপেক্ষে অনাপত্তি পত্র প্রদান করা হলো।

শর্তাবলী:

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমণ করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

Amulfidel
অর্পিতা মুৎসুদ্দী
ভারপ্রাপ্ত চেয়ারম্যান
৯নং পাহাড়তলী ইউনিয়ন পরিষদ
রাউজান, চট্টগ্রাম।

তারিখ: স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীল

Annex-II: Photographs of Tower Site

Tower: 1

Tower: 2

Tower: 3

Tower: 4

Tower: 5

Tower: 6

Tower: 7

Tower: 8

Tower: 9

Tower: 10

Tower: 11

Tower: 12

Tower: 13

Tower: 14

Tower: 15

Tower: 16

Tower: 17

Tower: 18

Tower: 19

Tower: 20

Tower: 21

Tower: 22

Tower: 23

Tower: 24

Tower:25

Tower:26

Tower:27

Tower:28

Tower:29

Tower:30

Tower:31

Tower:32

Tower:33

Tower:34

Tower:35

Tower:36

Tower:37

Tower:38

Tower:39

Tower:40

Tower:41

Tower:42

Tower:43

Tower:44

Tower:45

Tower:46

Tower:47

Tower:48

Tower:49

Tower:50

Tower:51

Tower:52

Tower:53

Tower:54

Tower:55

Tower:57

Tower:58

Tower:59

Tower:59

Tower:60

Tower:61

Tower:62

Tower:63

Tower:64

Tower:65

Tower:66

Tower:67

Tower:68

Tower:69

Tower:70

Tower:71

Tower:72

Tower:73

Tower:74

Tower:75

Tower:76

Tower:77

Tower:78

Tower:79

Tower:80

Tower:81

Tower:82

Tower:83

Tower:84

Tower:85

Tower:86

Tower:87

Tower:88

Tower:89

Tower:90

Tower:91

Tower:92

Tower: 93

Tower:94

Tower:95

Tower:96

Tower:97

Tower:98

Tower:99

Tower:100

Tower:101

Tower:102

Tower:103

Tower:104

Tower: 105

Tower: 106

Tower: 107

Tower: 108

Tower:109

Tower:110

Tower:111

Tower:112

Tower: 113

Tower: 114

Tower: 115

Tower: 116

Tower:117

Tower:118

Tower:119

Tower: 120

Tower:121

Tower:122

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Tower:124

Tower:125

Tower: 126

Tower:127

Tower:128

Tower:129

Tower:130

Tower: 131

Tower:132

Tower:133

Tower: 134

Tower:135

Tower:136

Tower: 137

Tower: 138

Tower: 139

Tower: 140

Tower: 141-142-143-144

Tower:145

Tower:146

Tower:147

Tower:148

Tower:149

Tower:150

Tower:151

Tower:152

Tower:153

Tower:154

Tower:155

Tower:156

Tower:157

Tower:158

Tower:159

Tower:160

Tower:161

Tower:162

Tower:163

Tower:164

Tower:165

Tower:166

Tower:167

Tower:168

Tower:169

Tower:170

Tower:171

Tower:172

Tower:173

Tower:174

Tower:175

Tower:176

Tower: 177

Tower:178

Tower:179

Tower:180

Tower:181

Tower:182

Tower:183

Tower:184

Tower:185

Tower:186

Tower:187

Tower: 188

Tower:189

Tower:190

Tower: 191

Tower:192

Tower: 193

Tower:194

Tower:195

Tower:196

Tower:197

Tower:198

Tower:199

Tower:200

Tower:201

Tower:202

Tower:203

Tower:204

Tower:205

Tower:206

Tower:207

Tower:208

Tower:209

Tower:210

Tower:211

Tower:212

Tower:213

Tower:214

Tower:215

Tower:216

Tower:217

Tower:218

Tower:219

Tower:220

Tower:221

Tower:222

Tower:223

Tower:224

Tower:225

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Tower:227

Tower:228

Tower:229

Tower:230

Tower:231

Tower:232

Tower: 233

Tower:234

Tower:235

Tower:236

Tower: 237

Tower:238

Tower:239

Tower:240

Tower: 241

Tower: 242

Tower: 243

Tower: 244

Tower: 245

Tower: 246

Tower: 247

Tower:248

Tower: 249

Tower:250

Tower:251

Tower:252

Tower: 253

Tower: 254

Tower:255

Tower: 256

Tower: 257

Tower: 258

Tower: 269

Tower: 260

Tower: 261

Tower: 262

Tower: 263

Tower: 264

Tower: 265

Tower: 266

Tower: 267

Tower: 268

Tower: 269

Tower: 270

Tower: 271

Tower: 272

Annex-III: Structure Counting in the RoW

Tower		Residential					Commercial/ industrial					Common properties					
From	To	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Total
1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	13	-	4	1	-	-	-	-	-	-	-	-	-	-	-	-	5
13	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	15	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
15	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	19	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
19	20	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
20	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	43	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	4
43	44	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
44	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	48	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
48	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	51	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
51	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	54	1	8	-	-	-	-	-	-	-	-	-	-	-	-	-	9

Tower		Residential					Commercial/ industrial					Common properties					
From	To	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Total
54	55	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
55	56	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
56	57	3	10	10	1	-	-	-	-	-	-	-	-	-	-	-	24
57	58	1	3	6		-	-	-	-	-	-	-	-	-	1	-	11
58	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
59	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
62	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64	65	1	4	7	6	4	-	-	-	-	-	-	-	-	-	-	22
65	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
67	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68	69	5	10	5	6	-	-	-	-	-	-	-	-	-	-	-	26
69	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
72	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	75	2	6	20	10		-	-	-	-	-	-	2	-	-	-	40
75	76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76	77	-	5	3	2		-	-	-	-	-	-	-	-	1		11
77	78	1	5	3			-	-	-	-	-	-	-	-	-	-	9
78	79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79	80	1	2	2	1		1	-	-	-	-	1	3	-	1	-	12
80	81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81	82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82	83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83	84	1	1		13		-	-	-	-	-	-	-	-	-	-	15
84	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85	86	-	-	4			-	-	-	-	-	-	-	-	-	-	4
86	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87	88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
88	89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	90	1		3	4		-	-	-	-	-	-	-	-	-	-	8
90	91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
91	92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
92	93	1		1			-	-	-	-	-	-	-	-	-	-	2
93	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
94	95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
96	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
97	98	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	7
98	99	1	3	6	2		-	-	-	-	-	-	-	-	-	-	12
99	100	-	-	-	-	-		1		4		-	-	-	-	-	5
100	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
101	102	3	1	7	5		-	-	-	-	-	1	-	-	-	-	17
102	103	2	-	-	-	-	1	-	-	-	-		-	-	1		4
103	104	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
104	105	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
105	106	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
106	107	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
107	108	1	2	11	2		1	-	1	-	-	1	-	1	-		20
108	109	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	6
109	110	0	-	1	-	-	-	-	-	-	-		-	-	-	-	1

Tower		Residential					Commercial/ industrial					Common properties					
From	To	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Total
110	111	9	5	10	2	-	-	-	-	-	-	2	-	-	1		29
111	112	0	2	4	-	-	-	-	-	-	-		-	-	-	-	6
112	113	4	7	8	-	-	-	-	-	-	-		3		1		23
113	114	0	-	-	-	-	-	-	-	-	-			-	-	-	-
114	115	0	2	7	-	-	-	-	2	-	-	2	-	-	-	-	13
115	116	5	4	3	3	-	-	-	-	-	-	2	-	-	-	-	17
116	117	0	1	3		-	-	-	-	-	-	-	-	-	-	-	4
117	118	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
118	119	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
119	120	4	4	5		-	-	-	-	-	-	-	-	-	-	-	13
120	121	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
121	122	3	2	9		-	-	-	-	-	-	-	-	-	-	-	14
122	123	6	3	17	-	-	-	-	-	-	-	1	-	-	-	-	27
123	124	1	3	7					7			1					19
124	125	0	-	-	-	-	10	22	10	-	-	4	-	-	-	-	46
125	126	5	4	6	10					-	-	-	-	-	-	-	25
126	127	2	3	6	5	-	-	-	1	-	-	-	-	-	1	-	18
127	128	1	1	4	-	-	-	-	-	-	-	-	-	-	-	-	6
128	129	4	-	9	-	-	-	-	-	-	-	-	-	-	-	-	13
129	130	0	-	5	-	-	-	-	-	-	-	-	-	-	-	-	5
130	131	1	2	3	1	-	-	-	1	-	-	-	-	-	-	-	8
131	132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
132	133	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
133	134	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
134	135	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
135	136	-		2	-	-	-	-	-	-	-	-	-	-	-	-	2
136	137	-	1	3	1	-	-	-	-	-	-	-	-	-	-	-	5
137	138	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
138	139	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
139	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
140	141	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
141	142	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
142	143	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	3
143	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
144	145	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
145	146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
146	147	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
147	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
148	149	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
149	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	151	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
151	152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
152	153	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
153	154	-	3					2				1	-	-	-	-	6
154	155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
155	156	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
156	157	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
157	158	-	-	-	-	-	-	-	-	-	-	-	-	-	1		1
158	159	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
159	160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160	161	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
161	162	2	1	7	1	-	-	-	-	-	-	-	-	-	-	-	11
162	163	2	1									-	-	-	-	-	3
163	164	0		-	-	-	-	-	-	-	-	-	-	-	-	-	-
164	165	4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	6
165	166	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Tower		Residential					Commercial/ industrial					Common properties					
From	To	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Total
166	167	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
167	168	-	1	2					1			-	-	-	-	-	4
168	169	-			-	-	-	-	-	-	-	-	-	-	-	-	-
169	170	-	1		-	-	-	-	-	-	-	-	-	-	-	-	1
170	171	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	3
171	172	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
172	173	2	1	12	1	-	-	-	-	-	-	-	-	-	-	-	16
173	174	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
174	175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
175	176	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
176	177	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
177	178	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
178	179	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
179	180	2	1	2			1	-	-	-	-	-	-	-	-	-	6
180	181	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
181	182	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
182	183	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
183	184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
184	185	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
185	186	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
186	187	-	2	4				-	-	-	-	-	-	-	-	-	6
187	188	-	-	-	-	-	-	-	-	-	-	-	-		1		1
188	189	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
189	190	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
190	191	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
191	192	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
192	193	2	1	4				-	-	-	-	-	-	-	-	-	7
193	194	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
194	195	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	4
195	196	1	-	2	1	-	-	-	-	-	-	-	-	-	-	-	4
196	197	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
197	198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
198	199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
199	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200	201	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
201	202	3	1	10					3			1		-	-	-	18
202	203	-			-	-	-	-	-	-	-	-	-	-	-	-	-
203	204	-			-	-	-	-	-	-	-	-	-	-	-	-	-
204	205	-	1	6	-	-	-	-	-	-	-	-	-	-	-	-	7
205	206	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
206	207	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
207	208	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
208	209	6	3	10		-	-	-	-	-	-	-	-	-	-	-	19
209	210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210	211	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
211	212	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
212	213	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
213	214	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
214	215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
215	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
216	217	6	3	10		-	-	-	-	-	-	-	-	-	-	-	19
217	218	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
218	219	1	2			-	-	-	-	-	-	1	-	-	-	-	4
219	220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
220	221	-	-	2		-	-	-	-	-	-	-	-	-	-	-	2
221	222	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Tower		Residential					Commercial/ industrial					Common properties					
From	To	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Pucca	Semi Pucca	Tin Shed	Kancha	Others	Total
222	223	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
223	224	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
224	225	2	1	8	3	-	-	-	-	-	-	1	-	-	4	-	19
225	226	-	-	2		-	-	-	-	-	-	1	-	-	3	-	6
226	227	-	-			-	-	-	-	-	-	-	-	-	-	-	-
227	228	3	1	2		-	-	-	-	-	-	-	-	-	-	-	6
228	229	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
229	230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
230	231	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
231	232	-	3	2		-	-	-	-	-	-	1	-	-	-	-	6
232	233	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
233	234	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
234	235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
235	236	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
236	237	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
237	238	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
238	239	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
239	240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
240	240	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
241	242	6	3		-	-	-	-	-	-	-	-	-	-	-	-	9
242	243	3	1		-	-	-	-	-	-	-	-	-	-	-	-	4
243	244	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	4
244	245	-	-	-		1		-	-	-	-	-	-	-	-	-	1
245	246	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
246	247	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
247	248	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
248	249	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
249	250	5	2	1	-	-	-	-	-	-	-	-	-	-	-	-	8
250	251	-			-	-	-	-	-	-	-	-	-	-	-	-	-
251	252	5	4	4	-	-	-	-	-	-	-	-	-	-	-	-	13
252	253	3	3	7	-	-	-	-	-	-	-	-	-	-	-	-	13
253	254	1	-	-	-	7		1	3	-	-	1	2	-	-	-	15
254	255	12	5	5	3	-	-	-	-	-	-	1	-	-	-	-	26
255	256	4	3	10	3	-	-	-	-	-	-	-	-	-	-	-	20
256	257	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
257	258	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
258	259	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
259	260	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
260	261	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
261	262	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
262	263	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-	5
263	264	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
264	265	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	8
265	266	4	3	6	3		1	-	-	-	-	1	-	-	-	-	18
266	267	1	-	1	3	-	-	-	-	-	-	1	-	-	-	-	6
267	268	-	1	3	-	-	-	-	-	-	-		-	-	-	-	4
268	269	1	2		-	-	-	-	-	-	-	10	-	-	-	-	13
269	270	1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	5
270	271	-	-	-	-	-		1	-	-	-	-	-	-	-	-	1
271	272	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		**177**	**202**	**341**	**92**	**12**	**15**	**27**	**31**	**4**	**1**	**40**	**10**	**2**	**16**	**0**	**970**

Annex IV: Photographs of Structure in the RoW

Tower: 63-64

Tower: 63-64

Tower: 64-65

Tower64-65:

Tower: 67-68

Tower:67-68

Tower: 68-69

Tower: 74-75

Tower: 74-75

Tower: 75-76

Tower: 76-77

Tower: 77-78

Tower: 77-78

Tower: 83-84

Tower: 83-84

Tower: 85-86

Tower: 89-90

Tower: 89-90

Tower: 101-102

Tower: 101-102

Tower: 101-102

Tower: 107-108

Tower: 107-108

Tower: 107-108

Tower: 107-108

Tower: 107-108

Tower: 107-108

Tower: 110-111

Tower: 110-111

Tower: 110-111

Tower: 110-111

Tower: 110-111

Tower: 111-112

Tower: 114-115

Tower: 114-115

Tower: 115-116

Tower: 115-126

Tower: 124-125

Tower: 124-125

Tower: 124-125

Tower: 128-129

Tower: 128-129

Tower: 128-129

Tower: 128-129

Tower: 128-129

Tower: 162-163

Tower: 162-163

Tower: 162-163

Tower: 169-170

Tower: 170-171

Tower: 172-173

Tower: 172-173

Tower: 179-180

Tower: 179-180

Tower: 179-180

Tower: 182-183

Tower: 182-183

Tower: 185-186

Tower: 185-186

Tower: 185-186

Tower: 189-190

Tower: 189-190

Tower: 194-195

Tower: 196-197

Tower: 216-217

Tower: 217-218

Tower: 217-218

Tower: 218-219

Tower: 218-219

Tower: 219-220

Tower: 219-220

Tower: 228-229

Tower: 242-243

Tower: 242-243

Tower: 243-244

Tower: 253-254

Tower: 253-254

Tower: 253-254

Tower: 253-254

Tower: 254-255
10 or 15 House

Tower: 259-260

Tower: 259-260

Tower: 260-261

Tower: 260-261

Tower: 262-263

Tower: 269-270

Annex-V: Details of the Tower Base Area

Tower No.	Tower Type	Leg Ext. (m)	Maximum Tower Base Width (m)	Additional for foundation (m)	Maximum Tower Base Width (m) Total	Tower Area (sqm)	Required Land for Tower Footing	Station (m)	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)
1	7DT25	0	15.70	6.00	21.70	470.89	11.64	0	387164.819	2395211.177	5.81
2	7DL	04	15.92	6.00	21.92	480.49	11.87	247	387165.029	2395458.407	6.257
3	7DL	12	18.00	6.00	24.00	576.00	14.23	499	387165.243	2395710.297	6.894
4	7DL	12	18.00	6.00	24.00	576.00	14.23	803	387165.501	2396014.57	7.242
5	7DL	12	18.00	6.00	24.00	576.00	14.23	1,153	387165.797	2396363.699	6.484
6	7DL	12	18.00	6.00	24.00	576.00	14.23	1,504	387166.096	2396715.26	8.124
7	7DL	12	18.00	6.00	24.00	576.00	14.23	1,839	387166.38	2397049.895	4.881
8	7DL	12	18.00	6.00	24.00	576.00	14.23	2,194	387166.681	2397405.176	6.933
9	7DL	12	18.00	6.00	24.00	576.00	14.23	2,534	387166.97	2397745.274	7.944
10	7D45	12	19.50	6.00	25.50	650.25	16.07	2,886	387167.269	2398097.285	7.64
11	7DL	15	18.78	6.00	24.78	614.05	15.17	3,252	387387.32	2398389.201	6.985
12	7DL	15	18.78	6.00	24.78	614.05	15.17	3,595	387593.706	2398662.989	7.055
13	7DL	15	18.78	6.00	24.78	614.05	15.17	3,947	387805.912	2398944.498	8.64
14	7D25	12	19.30	6.00	25.30	640.09	15.82	4,325	388033.289	2399246.132	8.1
15	7DL	08	16.96	6.00	22.96	527.16	13.03	4,656	388116.734	2399566.616	6.979
16	7DL	12	18.00	6.00	24.00	576.00	14.23	4,991	388201.162	2399890.879	8.145
17	7D25	12	19.30	6.00	25.30	640.09	15.82	5,355	388292.786	2400242.775	8.48
18	7DL	04	15.92	6.00	21.92	480.49	11.87	5,668	388448.863	2400513.918	8.397
19	7D45	08	18.30	6.00	24.30	590.49	14.59	5,978	388603.956	2400783.35	7.37
20	7DL	12	18.00	6.00	24.00	576.00	14.23	6,318	388601.352	2401122.733	7.919
21	7DL	20	20.08	6.00	26.08	680.17	16.81	6,689	388598.501	2401494.399	6.296
22	7DL	20	20.08	6.00	26.08	680.17	16.81	7,077	388595.525	2401882.354	5.403
23	7D25	20	21.70	6.00	27.70	767.29	18.96	7,178	388594.751	2401983.242	4.21
24	7DL	20	20.08	6.00	26.08	680.17	16.81	7,569	388755.5	2402339.525	5.132
25	7DL	18	19.56	6.00	25.56	653.31	16.14	7,909	388895.045	2402648.81	5.52
26	7DL	18	19.56	6.00	25.56	653.31	16.14	8,209	389018.638	2402922.741	3
27	7DL	18	19.56	6.00	25.56	653.31	16.14	8,590	389175.452	2403270.3	4.175
28	7DL	18	19.56	6.00	25.56	653.31	16.14	8,971	389331.997	2403617.265	4.101
29	7DL	12	18.00	6.00	24.00	576.00	14.23	9,337	389482.484	2403950.802	7.248
30	7DL	12	18.00	6.00	24.00	576.00	14.23	9,672	389620.442	2404256.572	5.863
31	7D45	04	17.10	6.00	23.10	533.61	13.19	9,999	389754.72	2404554.184	9.29
32	7D25	08	18.10	6.00	24.10	580.81	14.35	10,302	389709.951	2404853.563	7.18

Tower No.	Tower Type	Leg Ext. (m)	Maximum Tower Base Width (m)	Additional for foundation (m)	Maximum Tower Base Width (m) Total	Tower Area (sqm)	Required Land for Tower Footing	Station (m)	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)
33	7DL	18	19.56	6.00	25.56	653.31	16.14	10,655	389783.705	2405198.729	4
34	7DL	18	19.56	6.00	25.56	653.31	16.14	11,025	389861.136	2405561.102	2.501
35	7DL	18	19.56	6.00	25.56	653.31	16.14	11,395	389938.524	2405923.274	1.344
36	7DL	18	19.56	6.00	25.56	653.31	16.14	11,762	390015.033	2406281.332	3.338
37	7D1	10	25.28	6.00	31.28	978.44	24.18	12,074	390080.364	2406587.077	0.693
38	7D1	20	25.28	6.00	31.28	978.44	24.18	12,510	390171.42	2407013.217	1.864
39	7D1	20	25.28	6.00	31.28	978.44	24.18	12,717	390214.639	2407215.481	4.166
40	7D45	20	21.90	6.00	27.90	778.41	19.23	12,934	390260.05	2407428	6.6
41	7DL	20	20.08	6.00	26.08	680.17	16.81	13,331	390477.755	2407760.11	4.805
42	7DL	12	18.00	6.00	24.00	576.00	14.23	13,705	390682.699	2408072.752	4.043
43	7D25	20	21.70	6.00	27.70	767.29	18.96	14,059	390876.615	2408368.571	2.041
44	7DL	20	20.08	6.00	26.08	680.17	16.81	14,450	391012.608	2408735.481	5.267
45	7DL	12	18.00	6.00	24.00	576.00	14.23	14,782	391128.041	2409046.917	11.4
46	7DL	12	18.00	6.00	24.00	576.00	14.23	15,119	391244.931	2409362.285	4.86
47	7DL	12	18.00	6.00	24.00	576.00	14.23	15,456	391362.373	2409679.144	4.174
48	7DL	12	18.00	6.00	24.00	576.00	14.23	15,791	391478.794	2409993.246	4.015
49	7DL	08	16.96	6.00	22.96	527.16	13.03	16,123	391594.053	2410304.214	3.642
50	7D45	08	18.30	6.00	24.30	590.49	14.59	16,457	391710.048	2410617.169	4.78
51	7D25	20	21.70	6.00	27.70	767.29	18.96	16,796	391735.315	2410955.726	6.51
52	7DL	18	19.56	6.00	25.56	653.31	16.14	17,153	391636.862	2411298.891	4.189
53	7DL	20	20.00	6.00	26.00	676.00	16.70	17,535	391531.674	2411665.535	4.551
54	7D25	20	20.08	6.00	26.08	680.17	16.81	17,925	391423.987	2412040.887	5.89
55	7DL	18	19.56	6.00	25.56	653.31	16.14	18,323	391407.975	2412437.822	5.016
56	7D45	18	21.10	6.00	27.10	734.41	18.15	18,713	391392.235	2412828.029	5.52
57	7D45	15	20.40	6.00	26.40	696.96	17.22	19,092	391205.284	2413157.265	4.49
58	7DL	15	18.78	6.00	24.78	614.05	15.17	19,434	391216.385	2413499.458	9.12
59	7DL	08	16.96	6.00	22.96	527.16	13.03	19,773	391227.368	2413838.014	6.363
60	7D25	18	21.10	6.00	27.10	734.41	18.15	20,118	391238.576	2414183.492	6.61
61	7DL	18	19.56	6.00	25.56	653.31	16.14	20,508	391335.882	2414560.356	5.027
62	7D45	04	17.10	6.00	23.10	533.61	13.19	20,866	391425.465	2414907.308	6.84
63	7D45	08	18.30	6.00	24.30	590.49	14.59	21,190	391678.414	2415109.123	6.41
64	7D25	20	21.70	6.00	27.70	767.29	18.96	21,570	391785.495	2415474.26	7.96
65	7DL	20	20.08	6.00	26.08	680.17	16.81	21,963	391912.274	2415845.971	5.79
66	7DL	20	20.08	6.00	26.08	680.17	16.81	22,367	392042.66	2416228.254	8.506
67	7DL	15	18.78	6.00	24.78	614.05	15.17	22,757	392168.514	2416597.253	7.739

Tower No.	Tower Type	Leg Ext. (m)	Maximum Tower Base Width (m)	Additional for foundation (m)	Maximum Tower Base Width (m) Total	Tower Area (sqm)	Required Land for Tower Footing	Station (m)	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)
68	7D45	12	19.50	6.00	25.50	650.25	16.07	23,128	392288.291	2416948.432	6.19
69	7D45	12	19.50	6.00	25.50	650.25	16.07	23,497	392183.596	2417302.422	6.93
70	7DL	04	15.92	6.00	21.92	480.49	11.87	23,829	392233.166	2417630.42	7.036
71	7DL	04	15.92	6.00	21.92	480.49	11.87	24,117	392276.309	2417915.886	7.485
72	7DL	15	18.78	6.00	24.78	614.05	15.17	24,436	392323.929	2418230.983	5.834
73	7DL	15	18.78	6.00	24.78	614.05	15.17	24,798	392378.04	2418589.019	7.309
74	7D25	20	21.70	6.00	27.70	767.29	18.96	25,200	392438.04	2418986.03	6.765
75	7DL	15	18.78	6.00	24.78	614.05	15.17	25,565	392363.828	2419343.966	6.26
76	7DL	18	19.56	6.00	25.56	653.31	16.14	25,932	392289.262	2419703.61	7.049
77	7DL	18	19.56	6.00	25.56	653.31	16.14	26,316	392211.356	2420079.364	7.486
78	7DL	15	18.78	6.00	24.78	614.05	15.17	26,703	392132.899	2420457.775	8.537
79	7D25	20	21.70	6.00	27.70	767.29	18.96	27,091	392054.085	2420837.909	6.17
80	7D45	20	21.90	6.00	27.90	778.41	19.23	27,470	391874.425	2421172.049	7.025
81	7DL	18	19.56	6.00	25.56	653.31	16.14	27,865	391945.743	2421560.397	7.049
82	7D45	18	21.10	6.00	27.10	734.41	18.15	28,259	392016.905	2421947.899	6
83	7DL	18	19.56	6.00	25.56	653.31	16.14	28,648	391842.057	2422295.387	7.532
84	7D25	18	21.10	6.00	27.10	734.41	18.15	28,989	391688.703	2422600.159	7.296
85	7DL	04	15.92	6.00	21.92	480.49	11.87	29,328	391662.282	2422938.119	6.285
86	7DL	04	15.92	6.00	21.92	480.49	11.87	29,623	391639.324	2423231.78	6.654
87	7DL	04	15.92	6.00	21.92	480.49	11.87	29,925	391615.802	2423532.661	7.08
88	7DL	04	15.92	6.00	21.92	480.49	11.87	30,221	391592.657	2423828.729	8.039
89	7D45	18	21.30	6.00	27.30	745.29	18.42	30,568	391565.613	2424174.66	5.98
90	7DL	15	18.78	6.00	24.78	614.05	15.17	30,945	391602.962	2424549.404	5.465
91	7DL	15	18.78	6.00	24.78	614.05	15.17	31,308	391638.913	2424910.109	7.487
92	7DL	15	18.78	6.00	24.78	614.05	15.17	31,673	391675.19	2425274.086	6.021
93	7DL	15	18.78	6.00	24.78	614.05	15.17	32,037	391711.287	2425636.262	5.987
94	7DL	15	18.78	6.00	24.78	614.05	15.17	32,391	391746.32	2425987.757	5.981
95	7DL	15	18.78	6.00	24.78	614.05	15.17	32,749	391781.878	2426344.528	5.621
96	7DL	15	18.78	6.00	24.78	614.05	15.17	33,114	391818.082	2426707.772	5.867
97	7D60	12	19.50	6.00	25.50	650.25	16.07	33,466	391852.929	2427057.407	6.12
98	7DL	12	18.00	6.00	24.00	576.00	14.23	33,825	391608.141	2427320.351	5.834
99	7D45	08	18.30	6.00	24.30	590.49	14.59	34,156	391382.363	2427562.876	4.789
100	7D45	12	19.50	6.00	25.50	650.25	16.07	34,489	391343.681	2427893.926	5.111
101	7DL	08	16.96	6.00	22.96	527.16	13.03	34,823	391463.191	2428205.884	5.291
102	7DL	08	16.96	6.00	22.96	527.16	13.03	35,147	391578.931	2428508.002	6.465

Tower No.	Tower Type	Leg Ext. (m)	Maximum Tower Base Width (m)	Additional for foundation (m)	Maximum Tower Base Width (m) Total	Tower Area (sqm)	Required Land for Tower Footing	Station (m)	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)
103	7D60	12	19.50	6.00	25.50	650.25	16.07	35,495	391703.431	2428832.986	6.554
104	7DL	15	18.78	6.00	24.78	614.05	15.17	35,862	391533.366	2429158.266	6.337
105	7DL	15	18.78	6.00	24.78	614.05	15.17	36,230	391362.737	2429484.622	5.43
106	7DL	15	18.78	6.00	24.78	614.05	15.17	36,602	391190.752	2429813.574	5.481
107	7D25	18	21.10	6.00	27.10	734.41	18.15	36,980	391015.184	2430149.378	5.89
108	7DL	15	18.78	6.00	24.78	614.05	15.17	37,352	390939.361	2430513.041	6.281
109	7D25	15	20.20	6.00	26.20	686.44	16.96	37,697	390868.964	2430850.679	5.03
110	7D1	20	20.08	6.00	26.08	680.17	16.81	38,044	390853.579	2431197.148	5.828
111	7D45	20	21.90	6.00	27.90	778.41	19.23	38,434	390836.242	2431587.572	5.18
112	7D45	08	18.30	6.00	24.30	590.49	14.59	38,796	391029.357	2431893.338	5.04
113	7DL	12	18.00	6.00	24.00	576.00	14.23	39,151	391068.814	2432245.74	5.735
114	7DL	04	15.92	6.00	21.92	480.49	11.87	39,476	391105.043	2432569.305	4.314
115	7D25	12	19.30	6.00	25.30	640.09	15.82	39,801	391141.156	2432891.835	6.45
116	7D25	18	21.10	6.00	27.10	734.41	18.15	40,179	391052.247	2433259.36	5.1
117	7DL	15	18.78	6.00	24.78	614.05	15.17	40,561	390835.608	2433574.331	5.354
118	7DL	15	18.78	6.00	24.78	614.05	15.17	40,921	390631.862	2433870.558	5.723
119	7DL	15	18.78	6.00	24.78	614.05	15.17	41,280	390428.522	2434166.196	6.863
120	7DL	20	20.08	6.00	26.08	680.17	16.81	41,665	390210.038	2434483.85	7.001
121	7D45	20	21.90	6.00	27.90	778.41	19.23	42,059	389986.883	2434808.295	8.84
122	7DL	12	18.00	6.00	24.00	576.00	14.23	42,375	389939.079	2435121.178	5.624
123	7DL	04	15.92	6.00	21.92	480.49	11.87	42,670	389894.601	2435412.289	8.078
124	7D1	12	18.00	6.00	24.00	576.00	14.23	42,997	389845.183	2435735.736	5.309
125	7DL	12	18.00	6.00	24.00	576.00	14.23	43,351	389791.72	2436085.655	8.462
126	7DL	04	15.92	6.00	21.92	480.49	11.87	43,650	389746.582	2436381.086	7.246
127	7DL	12	18.00	6.00	24.00	576.00	14.23	43,976	389697.388	2436703.064	6.521
128	7DL	12	18.00	6.00	24.00	576.00	14.23	44,325	389644.635	2437048.34	5.959
129	7D45	08	18.30	6.00	24.30	590.49	14.59	44,668	389592.855	2437387.247	6.18
130	7DL	12	18.00	6.00	24.00	576.00	14.23	44,973	389375.147	2437600.758	6.061
131	7DL	15	18.78	6.00	24.78	614.05	15.17	45,325	389123.501	2437847.554	6.185
132	7D45	18	21.30	6.00	27.30	745.29	18.42	45,700	388855.567	2438110.323	6.26
133	7DL	18	19.56	6.00	25.56	653.31	16.14	46,086	388765.25	2438484.839	6.485
134	7DL	18	19.56	6.00	25.56	653.31	16.14	46,476	388673.661	2438864.631	6.979
135	7DL	15	18.78	6.00	24.78	614.05	15.17	46,838	388588.893	2439216.14	5.899
136	7D45	20	21.90	6.00	27.90	778.41	19.23	47,222	388498.907	2439589.283	6.46
137	7DL	20	20.08	6.00	26.08	680.17	16.81	47,631	388452.726	2439995.687	8.516

Tower No.	Tower Type	Leg Ext. (m)	Maximum Tower Base Width (m)	Additional for foundation (m)	Maximum Tower Base Width (m) Total	Tower Area (sqm)	Required Land for Tower Footing	Station (m)	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)
138	7DL	20	20.08	6.00	26.08	680.17	16.81	48,020	388408.778	2440382.426	6.571
139	7DL	20	20.08	6.00	26.08	680.17	16.81	48,406	388365.155	2440766.315	7.312
140	7DL	20	20.08	6.00	26.08	680.17	16.81	48,799	388320.792	2441156.714	7.724
141	7DL	20	20.08	6.00	26.08	680.17	16.81	49,192	388276.429	2441547.113	7.096
142	7DL	20	20.08	6.00	26.08	680.17	16.81	49,599	388230.457	2441951.668	7.239
143	7D45	20	21.90	6.00	27.90	778.41	19.23	49,994	388185.953	2442343.308	7.2
144	7DL	08	16.96	6.00	22.96	527.16	13.03	50,337	388076.72	2442668.732	5.184
145	7DL	0	14.88	6.00	20.88	435.97	10.77	50,613	387988.901	2442930.358	8.781
146	7DL	04	15.92	6.00	21.92	480.49	11.87	50,887	387901.754	2443189.982	9.243
147	7D25	18	21.10	6.00	27.10	734.41	18.15	51,205	387800.389	2443491.965	7.85
148	7DL	20	20.08	6.00	26.08	680.17	16.81	51,579	387692.218	2443849.42	7.338
149	7DL	12	20.08	6.00	26.08	680.17	16.81	51,895	387600.519	2444152.444	6.76
150	7DL	20	20.08	6.00	26.08	680.17	16.81	52,215	387507.909	2444458.477	7.991
151	7D45	20	21.90	6.00	27.90	778.41	19.23	52,601	387396.205	2444827.606	6.66
152	7DL	20	20.08	6.00	26.08	680.17	16.81	52,972	387482.957	2445188.759	6.552
153	7D25	20	21.70	6.00	27.70	767.29	18.96	53,371	387576.013	2445576.157	7.24
154	7DL	20	20.08	6.00	26.08	680.17	16.81	53,769	387691.1	2445958.043	7.03
155	7D45	18	21.30	6.00	27.30	745.29	18.42	54,030	387766.396	2446207.89	7.73
156	7DL	20	20.08	6.00	26.08	680.17	16.81	54,427	387692.663	2446597.529	7.23
157	7DL	20	20.08	6.00	26.08	680.17	16.81	54,831	387617.453	2446994.975	7.97
158	7DL	12	18.00	6.00	24.00	576.00	14.23	55,161	387556.154	2447318.912	6.661
159	7DL	15	18.78	6.00	24.78	614.05	15.17	55,505	387492.209	2447656.828	7.668
160	7DL	15	18.78	6.00	24.78	614.05	15.17	55,872	387424.026	2448017.143	6.903
161	7DL	12	18.00	6.00	24.00	576.00	14.23	56,230	387357.447	2448368.98	6.777
162	7D25	20	21.70	6.00	27.70	767.29	18.96	56,605	387287.597	2448738.1	8.31
163	7DL	18	19.56	6.00	25.56	653.31	16.14	56,995	387334.282	2449124.948	11.08
164	7D45	20	21.90	6.00	27.90	778.41	19.23	57,384	387380.833	2449510.698	6.41
165	7D25	12	19.30	6.00	25.30	640.09	15.82	57,746	387608.746	2449792.474	8.5
166	7D25	08	18.10	6.00	24.10	580.81	14.35	58,105	387758.553	2450118.713	6.94
167	7DL	18	19.56	6.00	25.56	653.31	16.14	58,457	387772.213	2450470.068	7.201
168	7DL	18	19.56	6.00	25.56	653.31	16.14	58,834	387786.889	2450847.566	9.274
169	7D60	15	20.40	6.00	26.40	696.96	17.22	59,187	387800.567	2451199.367	9.04
170	7DL	15	18.78	6.00	24.78	614.05	15.17	59,563	388082.322	2451448.575	9.498
171	7DL	12	18.00	6.00	24.00	576.00	14.23	59,894	388330.676	2451668.24	7.915
172	7D25	20	21.70	6.00	27.70	767.29	18.96	60,219	388573.726	2451883.215	8.4

Tower No.	Tower Type	Leg Ext. (m)	Maximum Tower Base Width (m)	Additional for foundation (m)	Maximum Tower Base Width (m) Total	Tower Area (sqm)	Required Land for Tower Footing	Station (m)	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)
173	7D1	0	110.00	6.00	28.68	822.54	20.32	60,635	388743.801	2452263.093	10.971
174	7D1	0	110.00	6.00	28.68	822.54	20.32	60,995	388891.016	2452591.909	4.242
175	7DL	08	16.96	6.00	22.96	527.16	13.03	61,331	389028.435	2452898.846	10.438
176	7DL	08	16.96	6.00	22.96	527.16	13.03	61,625	389148.19	2453166.33	8.88
177	7D45	20	21.90	6.00	27.90	778.41	19.23	61,955	389283.274	2453468.053	6.67
178	7DL	20	20.08	6.00	26.08	680.17	16.81	62,352	389300.382	2453864.09	7.03
179	7DL	20	20.08	6.00	26.08	680.17	16.81	62,710	389315.845	2454222.058	5.934
180	7DL	20	20.08	6.00	26.08	680.17	16.81	63,089	389332.195	2454600.556	6.061
181	7DL	15	18.78	6.00	24.78	614.05	15.17	63,455	389348.008	2454966.619	8.01
182	7DL	15	18.78	6.00	24.78	614.05	15.17	63,810	389363.332	2455321.352	7.423
183	7D25	15	20.20	6.00	26.20	686.44	16.96	64,176	389379.12	2455686.837	6.98
184	7DL	12	18.00	6.00	24.00	576.00	14.23	64,538	389242.997	2456022.38	6.606
185	7DL	12	18.00	6.00	24.00	576.00	14.23	64,889	389111.141	2456347.403	7.904
186	7DL	15	18.78	6.00	24.78	614.05	15.17	65,246	388976.849	2456678.432	7.045
187	7DL	18	19.56	6.00	25.56	653.31	16.14	65,618	388836.86	2457023.503	6.847
188	7D45	18	21.30	6.00	27.30	745.29	18.42	65,990	388697.227	2457367.698	6.99
189	7DL	12	18.00	6.00	24.00	576.00	14.23	66,345	388734.536	2457721.083	6.973
190	7DL	12	18.00	6.00	24.00	576.00	14.23	66,699	388771.645	2458072.563	8.612
191	7DL	12	18.00	6.00	24.00	576.00	14.23	67,026	388806.032	2458398.265	7.555
192	7DL	08	16.96	6.00	22.96	527.16	13.03	67,362	388841.239	2458731.736	8.055
193	7DL	04	15.92	6.00	21.92	480.49	11.87	67,655	388872.022	2459023.3	6
194	7D45	04	17.10	6.00	23.10	533.61	13.19	67,959	388903.984	2459326.032	7.5
195	7DL	04	15.92	6.00	21.92	480.49	11.87	68,248	388894.024	2459614.844	8.636
196	7DL	04	15.92	6.00	21.92	480.49	11.87	68,520	388884.647	2459886.777	10.157
197	7DL	20	20.08	6.00	26.08	680.17	16.81	68,840	388873.643	2460205.895	8.372
198	7DL	20	20.08	6.00	26.08	680.17	16.81	69,233	388860.081	2460599.209	7.969
199	7DL	20	20.08	6.00	26.08	680.17	16.81	69,630	388846.418	2460995.434	7.499
200	7DL	20	20.08	6.00	26.08	680.17	16.81	70,008	388833.361	2461374.071	6.443
201	7DL	12	18.00	6.00	24.00	576.00	14.23	70,342	388821.881	2461706.991	7.66
202	7DL	20	20.08	6.00	26.08	680.17	16.81	70,692	388809.807	2462057.131	7.936
203	7D60	20	21.90	6.00	27.90	778.41	19.23	71,073	388796.689	2462437.577	5.85
204	7DL	20	20.08	6.00	26.08	680.17	16.81	71,471	389088.058	2462709.742	8.495
205	7DL	20	20.08	6.00	26.08	680.17	16.81	71,859	389371.221	2462974.242	7.059
206	7DL	08	16.96	6.00	22.96	527.16	13.03	72,169	389597.628	2463185.725	7.262
207	7D60	08	18.30	6.00	24.30	590.49	14.59	72,480	389825.328	2463398.418	7.24

Tower No.	Tower Type	Leg Ext. (m)	Maximum Tower Base Width (m)	Additional for foundation (m)	Maximum Tower Base Width (m) Total	Tower Area (sqm)	Required Land for Tower Footing	Station (m)	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)
208	7DL	18	19.56	6.00	25.56	653.31	16.14	72,836	389823.041	2463754.375	6.502
209	7DL	18	19.56	6.00	25.56	653.31	16.14	73,211	389820.629	2464129.64	7.7
210	7DL	18	19.56	6.00	25.56	653.31	16.14	73,592	389818.186	2464509.836	7.079
211	7DL	18	19.56	6.00	25.56	653.31	16.14	73,973	389815.733	2464891.37	6.892
212	7D60	18	21.30	6.00	27.30	745.29	18.42	74,342	389813.361	2465260.536	7.6
213	7DL	20	20.08	6.00	26.08	680.17	16.81	74,735	390119.61	2465506.886	8.589
214	7DL	20	20.08	6.00	26.08	680.17	16.81	75,126	390423.99	2465751.731	6.486
215	7DL	20	20.08	6.00	26.08	680.17	16.81	75,524	390734.467	2466001.481	8.357
216	7D25	20	21.70	6.00	27.70	767.29	18.96	75,881	391012.209	2466224.899	6.42
217	7DL	20	20.08	6.00	26.08	680.17	16.81	76,218	391170.134	2466523.069	8.294
218	7DL	20	20.08	6.00	26.08	680.17	16.81	76,349	391231.492	2466638.915	7.908
219	7D60	08	18.30	6.00	24.30	590.49	14.59	76,709	391399.944	2466956.959	7.34
220	7DL	04	15.92	6.00	21.92	480.49	11.87	77,024	391260.904	2467239.523	8.772
221	7DL	04	15.92	6.00	21.92	480.49	11.87	77,329	391126.141	2467513.396	7.341
222	7D45	20	21.90	6.00	27.90	778.41	19.23	77,674	390973.948	2467822.69	6.79
223	7DL	10	25.28	6.00	31.28	978.44	24.18	78,017	391028.553	2468160.958	7.494
224	7DL	18	19.56	6.00	25.56	653.31	16.14	78,386	391087.334	2468525.101	7.487
225	7DL	10	25.28	6.00	31.28	978.44	24.18	78,772	391148.966	2468906.903	8.693
226	7D45	20	21.90	6.00	27.90	778.41	19.23	79,555	391273.677	2469679.476	7.07
227	7DL	20	20.08	6.00	26.08	680.17	16.81	79,955	391557.843	2469960.877	6.179
228	7DL	08	20.08	6.00	26.08	680.17	16.81	80,302	391804.377	2470205.011	7.99
229	7D45	12	19.50	6.00	25.50	650.25	16.07	80,655	392055.602	2470453.792	8.32
230	7DL	08	16.96	6.00	22.96	527.16	13.03	81,004	392133.172	2470793.946	10.343
231	7D25	08	18.10	6.00	24.10	580.81	14.35	81,337	392207.08	2471118.035	8
232	7DL	04	15.92	6.00	21.92	480.49	11.87	81,656	392367.7	2471393.637	6.859
233	7DL	04	15.92	6.00	21.92	480.49	11.87	81,958	392519.733	2471654.503	9.483
234	7DL	20	20.08	6.00	26.08	680.17	16.81	82,297	392690.819	2471948.062	7.663
235	7D45	20	21.90	6.00	27.90	778.41	19.23	82,687	392887.064	2472284.789	9.41
236	7DL	20	20.08	6.00	26.08	680.17	16.81	83,005	393000.004	2472582.106	7.608
237	7DL	20	20.08	6.00	26.08	680.17	16.81	83,397	393139.271	2472948.728	8.837
238	7DL	20	20.08	6.00	26.08	680.17	16.81	83,805	393283.999	2473329.725	9.601
239	7DL	15	18.78	6.00	24.78	614.05	15.17	84,188	393420.168	2473688.191	7.826
240	7DL	20	20.08	6.00	26.08	680.17	16.81	84,578	393558.417	2474052.135	8.585
241	7D25	20	21.70	6.00	27.70	767.29	18.96	84,999	393708.033	2474446.001	9.88
242	7DL	20	20.08	6.00	26.08	680.17	16.81	85,394	393756.086	2474838.138	8.365

Tower No.	Tower Type	Leg Ext. (m)	Maximum Tower Base Width (m)	Additional for foundation (m)	Maximum Tower Base Width (m) Total	Tower Area (sqm)	Required Land for Tower Footing	Station (m)	X Easting (m)	Y Northing (m)	Centerline Z Elevation (m)
243	7D60	18	21.30	6.00	27.30	745.29	18.42	85,793	393804.587	2475233.942	7.74
244	7DL	18	19.56	6.00	25.56	653.31	16.14	86,194	393523.075	2475520.134	8.619
245	7D60	12	19.50	6.00	25.50	650.25	16.07	86,570	393259.761	2475787.825	7.55
246	7DL	12	18.00	6.00	24.00	576.00	14.23	86,830	393264.198	2476048.426	6.996
247	7DL	12	18.00	6.00	24.00	576.00	14.23	87,182	393270.177	2476399.591	8.866
248	7D45	18	21.30	6.00	27.30	745.29	18.42	87,432	393274.44	2476650.007	9.8
249	7D25	18	21.10	6.00	27.10	734.41	18.15	87,822	393065.108	2476979.294	8.86
250	7DL	18	19.56	6.00	25.56	653.31	16.14	88,210	392990.969	2477359.843	6.199
251	7DL	15	18.78	6.00	24.78	614.05	15.17	88,582	392919.884	2477724.715	6.106
252	7D25	18	21.10	6.00	27.10	734.41	18.15	88,948	392849.841	2478084.241	7.36
253	7DL	15	18.78	6.00	24.78	614.05	15.17	89,317	392857.881	2478453.372	6.753
254	7D45	20	21.90	6.00	27.90	778.41	19.23	89,684	392865.87	2478820.18	7.53
255	7DL	20	20.08	6.00	26.08	680.17	16.81	90,084	392623.337	2479138.727	8.309
256	7D45	20	21.90	6.00	27.90	778.41	19.23	90,453	392400.29	2479431.68	5
257	7D1	20	27.88	6.00	33.88	1147.85	28.36	90,744	392401.833	2479723.145	5.333
258	7D1	20	27.88	6.00	33.88	1147.85	28.36	91,256	392404.545	2480235.255	8.704
259	7D45	20	21.90	6.00	27.90	778.41	19.23	91,525	392405.967	2480503.751	6
260	7DL	12	18.00	6.00	24.00	576.00	14.23	91,832	392213.913	2480743.116	6.507
261	7DL	18	19.56	6.00	25.56	653.31	16.14	92,126	392029.843	2480972.53	6.688
262	7D25	18	21.10	6.00	27.10	734.41	18.15	92,512	391787.957	2481274.003	7.62
263	7DL	12	18.00	6.00	24.00	576.00	14.23	92,868	391694.15	2481617.613	8.369
264	7DL	12	18.00	6.00	24.00	576.00	14.23	93,230	391598.953	2481966.318	7.371
265	7D60	20	21.90	6.00	27.90	778.41	19.23	93,576	391507.88	2482299.913	6.93
266	7DL	20	20.08	6.00	26.08	680.17	16.81	93,982	391144.01	2482480.892	10.496
267	7D60	04	17.10	6.00	23.10	533.61	13.19	94,192	390956.023	2482574.391	6.71
268	7DL	0	14.88	6.00	20.88	435.97	10.77	94,471	390873.651	2482840.671	6.092
269	7D45	0	15.90	6.00	21.90	479.61	11.85	94,730	390797.149	2483087.977	7.53
270	7DL	20	20.08	6.00	26.08	680.17	16.81	94,971	390601.475	2483228.906	7.503
271	7DL	20	20.08	6.00	26.08	680.17	16.81	95,143	390461.633	2483329.623	6.572
272	7D45	08	18.30	6.00	24.30	590.49	14.59	95,440	390278.147	2483461.774	8.76
					Total Land (Decimal)		**4347.28**				
					Total Land (Acre)		**43.47**	**95.5 km**			

Annex-VI: Tree Counting Survey Database in the RoW

Tower		Total Fruits Bearing			Total Timber Trees			Total Medecinial Trees			Total Bamboo Trees			Total
From	To	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
1	2	0	0	0	0	0	0	0	0	0	0	0	0	0
2	3	0	0	0	0	0	0	0	0	0	0	0	0	0
3	4	0	0	0	0	0	0	0	0	0	0	0	0	0
4	5	0	0	0	0	0	0	0	0	0	0	0	0	0
5	6	0	0	0	0	0	0	0	0	0	0	0	0	0
6	7	0	0	0	0	0	0	0	0	0	0	0	0	0
7	8	0	0	0	0	0	0	0	0	0	0	0	0	0
8	9	0	0	0	0	0	0	0	0	0	0	0	0	0
9	10	0	0	0	0	0	0	0	0	0	0	0	0	0
10	11	0	0	0	0	0	0	0	0	0	0	0	0	0
11	12	0	0	0	0	0	0	0	0	0	0	0	0	0
12	13	1	2	0	4	5	7	0	0	0	0	0	0	19
13	14	0	0	0	0	0	0	0	0	0	0	0	0	0
14	15	3	7	2	0	0	0	0	0	0	0	0	0	12
15	16	0	0	0	0	0	0	0	0	0	0	0	0	0
16	17	0	0	0	0	0	0	0	0	0	0	0	0	0
17	18	4	7	2	4	5	3	0	0	0	0	0	0	25
18	19	0	0	0	0	0	0	0	0	0	0	0	0	0
19	20	0	0	0	0	0	0	0	0	0	0	0	0	0
20	21	0	0	0	0	0	0	0	0	0	0	0	0	0
21	22	0	0	0	0	0	0	0	0	0	0	0	0	0
22	23	0	0	0	0	0	0	0	0	0	0	0	0	0
23	24	0	0	0	0	0	0	0	0	0	0	0	0	0
24	25	0	0	0	0	0	0	0	0	0				0
25	26	0	0	0	0	0	0	0	0	0				0
26	27	0	0	0	0	0	0	0	0	0				0
27	28	0	0	0	0	0	0	0	0	0	0	0	0	0
28	29	0	0	0	0	0	0	0	0	0	0	0	0	0
29	30	0	0	0	0	0	0	0	0	0	0	0	0	0

Tower		Total Fruits Bearing			Total Timber Trees			Total Medecinial Trees			Total Bamboo Trees			Total
From	To	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
30	31	0	0	0	0	0	0	0	0	0	0	0	0	0
31	32	0	0	0	0	0	0	0	0	0	0	0	0	0
32	33	0	0	0	0	0	0	0	0	0	0	0	0	0
33	34	0	0	0	0	0	0	0	0	0	0	0	0	0
34	35	0	0	0	0	0	0	0	0	0	0	0	0	0
35	36	0	0	0	0	0	0	0	0	0	0	0	0	0
36	37	0	0	0	0	0	0	0	0	0	0	0	0	0
37	38	0	0	0	0	0	0	0	0	0	0	0	0	0
38	39	0	0	0	0	0	0	0	0	0	0	0	0	0
39	40	0	0	0	0	0	0	0	0	0	0	0	0	0
40	41	0	0	0	0	0	0	0	0	0	0	0	0	0
41	42	0	0	0	0	0	0	0	0	0	0	0	0	0
42	43	3	5	3	0	0	0	0	0	0	0	0	0	11
43	44	1	9	4	0	1	0	0	0	0	0	0	0	15
44	45	0	0	0	0	0	0	0	0	0	0	0	0	0
45	46	0	0	0	0	0	0	0	0	0	0	0	0	0
46	47	0	0	0	0	0	0	0	0	0	0	0	0	0
47	48	0	2	4	0	0	0	0	0	0	0	0	0	6
48	49	0	0	0	0	0	0	0	0	0	0	0	0	0
49	50	0	0	0	0	0	0	0	0	0	0	0	0	0
50	51	0	5	3	0	2	0	0	0	0	0	0	0	10
51	52	0	0	0	0	0	0	0	0	0	0	0	0	0
52	53	0	0	0	0	0	0	0	0	0	0	0	0	0
53	54	10	17	18	13	21	20	0	0	0	0	0	0	99
54	55	0	2	1	0	2	1	0	0	0	0	0	0	6
55	56	0	0	0	0	0	0	0	0	0	0	0	0	0
56	57	0	0	0	6	21	23	0	0	0	0	0	0	50
57	58	0	40	10	0	0	0	0	0	0	0	0	0	50
58	59	0	0	0	0	0	0	0	0	0	0	0	0	0
59	60	0	0	0	0	0	0	0	0	0	0	0	0	0
60	61	0	0	0	0	0	0	0	0	0	0	0	0	0

Tower		Total Fruits Bearing			Total Timber Trees			Total Medecinial Trees			Total Bamboo Trees			Total
From	To	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
61	62	0	0	0	0	0	0	0	0	0	0	0	0	0
62	63	0	0	0	0	0	0	0	0	0	0	0	0	0
63	64	0	0	0	0	0	0	0	0	0	0	0	0	0
64	65	0	26	51	40	190	40	0	0	0	0	50	10	407
65	66	0	0	0	0	0	0	0	0	0	0	0	0	0
66	67	0	0	0	0	0	0	0	0	0	0	0	0	0
67	68	0	0	0	0	0	0	0	0	0	0	0	0	0
68	69	0	0	9	0	0	15	0	0	0	0	0	0	24
69	70	0	0	0	0	0	0	0	0	0	0	0	0	0
70	71	0	0	0	0	0	0	0	0	0	0	0	0	0
71	72	0	0	0	0	0	0	0	0	0	0	0	0	0
72	73	0	0	0	0	0	0	0	0	0	0	0	0	0
73	74	0	0	0	0	0	0	0	0	0	0	0	0	0
74	75	0	0	30	40	40	60	0	0	10	0	0	0	180
75	76	0	0	0	0	0	0	0	0	0	0	0	0	0
76	77	0	0	20	0	10	15	0	0	0	0	0	0	45
77	78	0	5	0	60	60	20	0	0	0	4	100	0	249
78	79	0	0	0	0	0	0	0	0	0	0	0	0	0
79	80	0	0	0	606	340	460	0	10	21	0	200	100	1737
80	81	0	0	0	0	0	0	0	0	0	0	0	0	0
81	82	0	0	0	0	0	0	0	0	0	0	0	0	0
82	83	0	0	0	0	0	0	0	0	0	0	0	0	0
83	84	0	20	10	50	40	50	0	0	0	0	0	0	170
84	85	0	0	0	0	0	27	0	0	0	0	0	0	27
85	86	0	0	0	0	0	0	0	0	0	0	0	0	0
86	87	0	0	0	0	0	0	0	0	0	0	0	0	0
87	88	0	0	0	0	0	0	0	0	0	0	0	0	0
88	89	0	0	0	0	0	0	0	0	0	0	0	0	0
89	90	0	5	12	0	0	18	0	0	0	0	0	0	35
90	91	0	0	0	0	0	0	0	0	0	0	0	0	0
91	92	0	0	0	0	0	0	0	0	0	0	0	0	0

Tower		Total Fruits Bearing			Total Timber Trees			Total Medecinial Trees			Total Bamboo Trees			Total
From	To	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
92	93	0	10	14	0	12	5	0	0	0	0	0	0	41
93	94	0	0	0	0	0	0	0	0	0	0	0	0	0
94	95	0	0	0	0	0	0	0	0	0	0	0	0	0
95	96	0	0	0	0	0	0	0	0	0	0	0	0	0
96	97	0	0	0	0	22	50	0	0	0	0	0	0	72
97	98	0	8	27	0	19	7	0	0	0	0	0	0	61
98	99	0	60	95	80	20	20	0	0	0	0	0	0	275
99	100	0	0	0	0	35	17	0	0	0	0	0	0	52
100	101	0	0	0	0	0	0	0	0	0	0	0	0	0
101	102	50	70	10	8	120	30	0	0	0	0	0	0	288
102	103	0	0	7	0	20	20	0	0	0	0	0	0	47
103	104	0	0	0	0	0	0	0	0	0	0	0	0	0
104	105	0	0	0	0	0	0	0	0	0	0	0	0	0
105	106	0	0	0	0	0	0	0	0	0	0	0	0	0
106	107	0	0	70	22	45	20	0	0	0	0	0	0	157
107	108	0	30	120	210	140	50	0	0	0	0	0	0	550
108	109	0	10	60	0	75	70	0	0	0	0	0	0	215
109	110	0	0	0	33	137	60	0	0	0	0	0	0	230
110	111	0	190	30	130	180	40	0	0	0	0	0	0	570
111	112	200	227	200	150	480	140	0	0	0	0	0	0	1397
112	113	0	0	28	180	317	220	0	0	0	0	0	0	745
113	114	0	0	0	30	100	200	0	0	0	0	0	0	330
114	115	0	0	0	150	100	30	0	0	0	0	0	0	280
115	116	20	30	50	100	115	60	0	0	0	0	0	0	375
116	117	0	90	0	0	280	0	0	0	0	0	0	0	370
117	118	0	0	0	0	7	0	0	0	0	0	600	0	607
118	119	8	3	2	30	55	52	0	0	0	0	0	0	150
119	120	0	4	0	10	27	40	0	0	0	0	100	200	381
120	121	0	0	0	0	0	20	0	0	0	0		0	20
121	122	0	5	13	90	30	60	0	0	0	0	20	0	218
122	123	0	0	61	55	32	50	0	0	0	0	100	20	318

Tower		Total Fruits Bearing			Total Timber Trees			Total Medecinial Trees			Total Bamboo Trees			Total
From	To	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
123	124	0	0	70	30	10	20	0	0	0	0	0	0	130
124	125	0	0	0	0	0	0	0	0	0	0	0	0	0
125	126	0	13	0	60	200	105	0	0	0	0	0	0	378
126	127	0	0	9	260	260	160	0	0	0	0	30	0	719
127	128	0	7	12	296	240	140	0	0	0	0	0	0	695
128	129	2	15	10	80	76	37	0	0	0	0	0	0	220
129	130	0	0	153	45	27	17	0	0	0	70	100	120	532
130	131	2	51	36	28	20	5	0	0	0	0	0	0	142
131	132	0	10	12	4	9	17	0	0	0	0	0	0	52
132	133	0	0	0	0	0	0	0	0	0	0	0	0	0
133	134	0	6	4	4	17	26	0	0	0	0	0	0	57
134	135	0	0	0	7	4	0	4	3	0	0	0	0	18
135	136	2	0	0	5	26	130	0	0	0	0	0	0	163
136	137	53	36	37	56	41	37	0	0	0	0	0	0	260
137	138	0	0	0	0	9	0	0	0	0	0	0	0	9
138	139	0	220	250	0	0	0	0	0	0	15	40	30	555
139	140	0	0	0	0	0	0	0	0	0	0	0	0	0
140	141	0	0	0	0	0	0	0	0	0	0	0	0	0
141	142	0	0	0	0	300	400	0	0	0	0	0	0	700
142	143	0	5	12	0	15	110	0	0	0	0	0	0	142
143	144	0	0	0	0	0	0	0	0	0	0	0	0	0
144	145	0	0	0	0	0	0	0	0	0	0	0	0	0
145	146	0	0	0	0	0	0	0	0	0	0	0	0	0
146	147	0	0	0	0	0	0	0	0	0	0	0	0	0
147	148	0	0	0	0	0	0	0	0	0	0	0	0	0
148	149	0	0	0	0	0	0	0	0	0	0	0	0	0
149	150	0	0	0	0	0	0	0	0	0	0	0	0	0
150	151	0	0	0	0	0	0	0	0	0	0	0	0	0
151	152	0	0	0	0	0	0	0	0	0	0	0	0	0
152	153	12	13	10	27	10	0	0	0	0	0	0	0	72
153	154	15	75	85	35	49	52	0	0	0	0	0	0	311

Tower		Total Fruits Bearing			Total Timber Trees			Total Medecinial Trees			Total Bamboo Trees			Total
From	To	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
154	155	0	6	15	0	0	0	0	0	0	0	0	0	21
155	156	0	0	0	10	39	45	0	0	0	0	0	0	94
156	157	0	0	0	0	0	0	0	0	0	0	0	0	0
157	158	0	2	1	18	30	25	0	0	0	0	0	0	76
158	159	10	33	23	30	55	245	0	0	0	25	20	22	463
159	160	5	45	15	0	0	0	0	0	0	0	0	0	65
160	161	0	0	0	0	0	0	0	0	0	0	0	0	0
161	162	0	16	1	73	15	22	0	0	0	0	0	0	127
162	163	0	25	0	45	25	17	0	0	0	0	20	0	132
163	164	20	21	207	100	100	171	0	0	0	0	200	80	899
164	165	4	24	20	2	7	3	0	0	0	0	200	0	260
165	166	2	8	4	1	12	5	0	0	0	10	25	15	82
166	167	0	0	0	0	0	0	0	0	0	0	0	0	0
167	168	0	94	38	22	104	27	0	0	0	0	0	0	285
168	169	0	0	0	0	0	0	0	0	0	0	0	0	0
169	170	0	0	17	3	7	5	0	0	0	0	0	0	32
170	171	0	0	51	0	0	0	0	0	0	0	0	0	51
171	172	0	0	0	15	22	12	0	0	0	0	0	0	49
172	173	13	28	12	48	40	22	0	0	0	0	0	0	163
173	174	0	0	0	0	0	0	0	0	0	0	0	0	0
174	175	0	0	0	0	0	0	0	0	0	0	0	0	0
175	176	0	0	0	0	0	0	0	0	0	0	0	0	0
176	177	0	0	0	0	0	0	0	0	0	0	0	0	0
177	178	1	0	0	76	37	15	0	0	0	0	0	0	129
178	179	0	0	30	90	76	45	0	0	0	0	0	30	271
179	180	10	24	24	74	40	10	0	0	0	0	0	0	182
180	181	4	0	0	215	97	87	0	0	0	200	150	300	1053
181	182	0	0	0	22	25	13	0	0	0	0	0	0	60
182	183	32	40	49	3	15	14	0	0	0	0	0	20	173
183	184	0	0	0	0	0	0	0	0	0	0	0	0	0
184	185	0	0	0	0	0	0	0	0	0	0	0	0	0

Tower		Total Fruits Bearing			Total Timber Trees			Total Medecinial Trees			Total Bamboo Trees			Total
From	To	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
185	186	40	20	10	15	10	3	0	0	0	0	0	0	98
186	187	0	27	5	34	77	41	0	0	0	0	0	0	184
187	188	0	1	0	17	18	10	0	0	0	0	0	0	46
188	189	0	0	0	0	0	0	0	0	0	0	0	0	0
189	190	0	20	2	25	17	2	0	0	0	0	0	50	116
190	191	0	0	0	137	70	46	0	0	0	30	40	50	373
191	192	0	0	0	5	37	15	0	0	0	0	0	0	57
192	193	15	8	102	25	7	8	0	0	0	150	100	50	465
193	194	0	0	0	0	0	0	0	0	0	0	0	0	0
194	195	11	18	19	24	22	23	0	0	0	5	50	10	182
195	196	0	0	0	0	0	0	0	0	0	0	0	0	0
196	197	30	225	449	85	72	118	0	0	0	20	150	60	1209
197	198	0	0	0	0	0	0	0	0	0	0	0	0	0
198	199	0	0	0	0	0	0	0	0	0	0	0	0	0
199	200	0	0	0	0	0	0	0	0	0	0	0	0	0
200	201	3	10	21	55	37	48	0	0	0	0	0	0	174
201	202	40	67	51	51	26	30	0	0	0	0	0	0	265
202	203	0	0	0	0	0	0	0	0	0	0	0	0	0
203	204	0	0	0	2	5	7	0	0	0	0	0	0	14
204	205	29	23	18	34	40	38	0	0	0	0	0	0	182
205	206	0	0	0	0	0	0	0	0	0	0	0	0	0
206	207	4	47	13	10	29	18	0	0	0	3	15	7	146
207	208	0	0	0	0	0	0	0	0	0	0	0	0	0
208	209	0	0	0	0	0	0	0	0	0	0	0	0	0
209	210	0	0	0	0	0	0	0	0	0	0	0	0	0
210	211	0	0	0	0	0	0	0	0	0	0	0	0	0
211	212	0	0	0	0	0	0	0	0	0	0	0	0	0
212	213	0	0	0	0	0	0	0	0	0	0	0	0	0
213	214	0	0	0	0	0	0	0	0	0	0	0	0	0
214	215	0	0	0	0	0	0	0	0	0	0	0	0	0
215	216	30	6	8	108	96	87	0	0	0	0	0	0	335

Tower		Total Fruits Bearing			Total Timber Trees			Total Medecinial Trees			Total Bamboo Trees			Total
From	To	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
216	217	30	36	18	0	0	0	0	0	0	0	0	0	84
217	218	23	47	26	42	36	28	0	0	0	0	0	0	202
218	219	4	7	30	62	26	66	0	0	0	0	0	0	195
219	220	0	0	0	0	0	0	0	0	0	0	0	0	0
220	221	3	0	0	40	88	40	0	0	0	0	0	0	171
221	222	0	0	0	10	12	1	0	0	0	0	0	0	23
222	223	0	0	0	0	0	0	0	0	0	0	0	0	0
223	224	0	0	0	10	3	2	0	0	0	250	100	0	365
224	225	51	29	117	140	190	5	0	0	0	402	135	50	1119
225	226	1	7	6	86	40	42	0	0	0	200	50	20	452
226	227	0	0	0	0	0	0	0	0	0	0	0	0	0
227	228	7	11	14	27	10	18	0	0	0	0	0	0	87
228	229	0	0	0	13	100	112	17	5	6	0	0	0	253
229	230	0	0	0	34	22	23	0	0	0	0	0	0	79
230	231	0	0	0	5	26	27	0	0	0	0	0	0	58
231	232	0	4	0	7	18	8	0	1	0	0	0	0	38
232	233	3	0	0	310	110	60	0	0	0	200	50	30	763
233	234	0	0	0	0	0	0	0	0	0	0	0	0	0
234	235	0	0	0	0	0	0	0	0	0	0	0	0	0
235	236	21	56	75	49	190	115	0	0	0	0	0	0	506
236	237	0	0	0	0	0	0	0	0	0	0	0	0	0
237	238	18	40	0	46	59	32	0	0	0	180	260	40	675
238	239	0	0	0	0	0	0	0	0	0	0	0	0	0
239	240	0	0	0	0	0	0	0	0	0	0	0	0	0
240	240	2	0	0	26	24	24	0	3	0	0	0	0	79
241	242	0	4	2	41	68	42	0	0	0	0	0	0	157
242	243	19	8	7	70	32	22	0	0	0	0	0	0	158
243	244	5	10	20	27	17	18	0	0	0	0	0	0	97
244	245	0	0	0	30	15	0	0	0	0	50	10	5	110
245	246	0	0	0	0	0	0	0	0	0	0	0	0	0
246	247	0	0	0	0	0	0	0	0	0	0	0	0	0

Tower		Total Fruits Bearing			Total Timber Trees			Total Medecinial Trees			Total Bamboo Trees			Total
From	To	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
247	248	0	0	0	0	0	0	0	0	0	0	0	0	0
248	249	0	0	0	0	0	0	0	0	0	0	0	0	0
249	250	142	90	55	116	137	65	0	0	0	300	450	150	1505
250	251	0	0	0	0	0	0	0	0	0	0			0
251	252	8	8	9	77	64	82	0	0	0	0	30	40	318
252	253	121	29	27	145	30	27	0	0	0	0			379
253	254	35	15	10	107	74	120	0	0	0	100	40	10	511
254	255	90	134	117	203	133	90	0	0	0	0	0	0	767
255	256	13	32	14	69	34	0	0	0	0	0	0	0	162
256	257	0	0	0	0	0	0	0	0	0	0	0	0	0
257	258	2	3	0	6	23	0	0	0	0	0	35	10	79
258	259	0	0	91	0	0	0	0	0	0	0	0	0	91
259	260	0	5	30	90	163	20	0	0	0	0	0	0	308
260	261	0	0	0	0	0	0	0	0	0	0	0	0	0
261	262	0	0	0	34	38	17	0	0	0	0	0	0	89
262	263	0	10	15	0	35	17	0	0	0	0	0	0	77
263	264	17	7	3	180	117	212	0	0	0	5	2	1	544
264	265	18	3	0	22	17	0	0	0	0	0	0	0	60
265	266	23	42	6	60	85	31	0	0	0	900	450	0	1597
266	267	30	10	0	350	162	0	0	6	0	1000	100	0	1658
267	268	2	153	95	43	35	50	0	0	0	30	80	120	608
268	269	14	7	18	16	11	14	0	0	0	0	0	0	80
269	270	0	0	47	16	23	0	0	0	0	0	0	0	86
270	271	20	12	7	10	5	3	0	0	0	0	0	0	57
271	272	1	3	2	35	13	14	0	0	0	0	150	20	238
		1412	3000	3732	7166	8012	6000	21	28	37	4149	4252	1670	**39,479**
Total		**8144**			**21178**			**86**			**10071**			

Annex-VII: Trees in the RoW

Tower: 57

Tower: 58

Tower: 64

Tower: 65

Tower: 68

Tower: 69

Tower: 74

Tower: 75

Tower: 76

Tower: 77

Tower: 83

Tower: 84

Tower: 89

Tower: 92

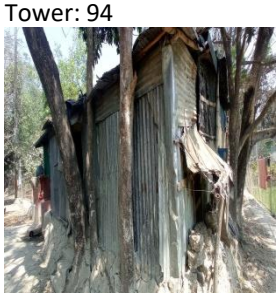
Tower: 93

Tower: 94

Tower: 95

Tower: 97

Tower: 98


Tower: 99

Tower: 100

Tower: 102

Tower: 103

Tower: 104

Tower:105

Tower:106

Tower:108

Tower:109

Tower:110

Tower:111

Tower:112

Tower:113

Tower:114

Tower:115

Tower:118

Tower:119

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Tower: 121

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Tower: 237

Tower: 238

Tower: 241

Tower: 242

Tower: 244

Tower: 252

Tower: 153

Tower: 154

Tower: 155

Tower: 159

Tower: 260

Tower: 161

Tower: 263

Tower: 269

Tower: 270

Tower: 271

Tower: 272

Annex-VIII: Tree Counting Survey Work in the RoW

Annex-IX: Photographs of Socio-economic Survey

GIVENCHY
PARIS

Annex-X: Environmental Code of Practice (ESCP)

Introduction

The objective of the Environmental Code of Practices (ESCPs) is to address all potential and general construction related impacts during implementation of the Project. The ESCPs will provide guidelines for best operating practices and environmental management guidelines to be followed by the contractors for sustainable management of all environmental issues. These ESCPs shall be annexed to the general conditions of all the contracts, including subcontracts, carried out under the Project. The list of ESCPs prepared for the Project is given below.

- ESCP 1: Waste Management
- ESCP 2: Fuels and Hazardous Substances Management
- ESCP 3: Water Resources Management
- ESCP 4: Drainage Management
- ESCP 5: Soil Quality Management
- ESCP 6: Erosion and Sediment Control
- ESCP 7: Top Soil Management
- ESCP 8: Topography and Landscaping
- ESCP 9: Borrow Areas Management
- ESCP 10: Air Quality Management
- ESCP 11: Noise and Vibration Management
- ESCP 12: Protection of Flora
- ESCP 13: Protection of Fauna
- ESCP 14: Road Transport and Road Traffic Management
- ESCP 15: Construction Camp Management
- ESCP 16: Cultural and Religious Issues
- ESCP 17: Workers Health and Safety
- ESCP 18: Construction and Operation Phase Security
- ESCP 19: Operation of Heavy Equipment Management
- ESCP 20: Excavation
- ESCP 21: Transportation of Oversized Equipment
- ESCP 22: Lifting and Materials Handling
- ESCP 23: Stringing conductors at road, river, and existing transmission line crossings

Contractors will prepare Construction Environmental and Social Management Plan CESMP, in compliance with Government of Bangladesh requirements and based on the guidance given in the ESCPs. The CESMP will form the part of the contract documents and will be used as monitoring tool for compliance. It is mandatory for the main contractors procured directly by the project to include these ESCPs in their subcontracts. Violation of the compliance requirements will be treated as non-compliance leading to the corrections or otherwise imposing penalty on the contractors.

Moreover, Resettlement Plan (RP), Stakeholder Engagement Plan (SEP), Construction Labor Management Plan (LMP) and Gender Based Violence/Action Plan provided in Annex-IV, V, VI and VII respectively.

ESCP 1: WASTE MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
General Waste	Soil and water pollution from the improper management of wastes and excess materials from the construction sites.	The Contractor shall- • Develop site specific waste management plan for various specific waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior to commencing of construction and submit to supervision consultant for approval. • Organize disposal of all wastes generated during construction in the designated disposal sites approved by the Project. • Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. • Segregate and reuse or recycle all the wastes, wherever practical. • Vehicles transporting solid waste shall be covered with tarps or nets to prevent spilling waste along the route. • Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process. • Provide refuse containers at each worksite. • Request suppliers to minimize packaging where practicable. • Place a high emphasis on good housekeeping practices. • Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal. • Potable water should be supplied in bulk containers to reduce the quantity of plastic waste (plastic bottles). Plastic bag use should be avoided.
Hazardous Waste	Health hazards and environmental impacts due to improper waste management practices	The Contractor shall • Collect chemical wastes in 200-liter drums (or similar sealed container), appropriately labeled for safe transport to an approved chemical waste depot. • Store, transport and handle all chemicals avoiding potential environmental pollution. • Store all hazardous wastes appropriately in bunded areas away from water courses. • Make available Material Safety Data Sheets (MSDS) for hazardous materials on-site during construction. • Collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at approved locations. • Construct concrete or other impermeable flooring to prevent seepage in case of spills.

ESCP 2: FUELS AND HAZARDOUS GOODS MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals and hazardous goods/materials on-site, and potential spills from these goods may harm the environment or health of construction workers.	The Contractor shall • Prepare spill control procedures and submit them for supervision consultant approval. • Train the relevant construction personnel in handling of fuels and spill control procedures. • Store dangerous goods in bunded areas on top of a sealed plastic sheet away from watercourses. • Refueling shall occur only within bunded areas. • Store and use fuels in accordance with material safety data sheets (MSDS). Make available MSDS for chemicals and dangerous goods on-site. • Transport waste of dangerous goods, which cannot be recycled, to a designated disposal site. • Provide absorbent and containment material (e.g., absorbent matting) where hazardous materials are used and stored; and ensure personnel trained in the correct use. • Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to materials in use. • Make sure all containers, drums, and tanks that are used for storage are in good condition and are labeled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. • Store and use fuels in accordance with material safety data sheets (MSDSs). • Store all liquid fuels in fully bunded storage containers, with appropriate volumes, a roof, a collection point and appropriate filling/decanting point. • Store hazardous materials above flood level considered for construction purposes • Put containers and drums in temporary storages in clearly marked areas, where they will not be run over by vehicles or heavy machinery. The area shall preferably slope or drain to a safe collection area in the event of a spill. • Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. • Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials.

ESCP 3: WATER RESOURCES MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Hazardous material and Waste	Water pollution from the storage, handling and disposal of hazardous materials and general construction waste, and accidental spillage	The Contractor shall • Follow the management guidelines proposed in ESCPs 1 and 2. • Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways or storm water systems
Discharge from construction sites	Construction activities, sewerages from construction sites and work camps may affect the surface water quality. The construction works will modify groundcover and topography changing the surface water drainage patterns of the area. These changes in hydrological regime lead to increased rate of runoff, increase in sediment and contaminant loading, increased flooding, and	The Contractor shall • Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials. • Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site. • Divert runoff from undisturbed areas around the construction site. • Stockpile materials away from drainage lines • Prevent all solid and liquid wastes entering waterways by collecting solid waste, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport to an approved waste disposal site or recycling depot. • Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved bunded areas on site. Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each construction vehicle to ensure the local roads are kept clean.
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall • Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion. • Ensure that roads used by construction vehicles are swept regularly to remove dust and sediment. • Water the loose material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds).
Construction activities in water bodies	Construction works in the water bodies will increase sediment and contaminant loading, and effect habitat	The Contractor Shall • Dewater sites by pumping water to a sediment basin prior to release off site – do not pump directly off site.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	of fish and other aquatic biology.	• Monitor the water quality in the runoff from the site or areas affected by dredge/excavation plumes, and improve work practices as necessary. • Protect water bodies from sediment loads by silt screen or other barriers. • Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways or storm water systems. • Do not discharge cement and water curing used for cement concrete directly into water courses and drainage inlets.
Drinking water	Untreated surface water is not suitable for drinking purposes due to presence of suspended solids and E. coli.	The Contractor Shall • Provide the drinking water that meets national and WBG EHS Guidelines. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time.

ESCP 4: DRAINAGE MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Excavation and earth work, and construction yards	Lack of proper drainage for rainwater/liquid waste or wastewater owing to the construction activities harms environment in terms of water and soil contamination, and mosquito growth.	The Contractor shall • Prepare drainage management procedures and submit them for supervision consultant approval. • Prepare a program to prevent/avoid standing waters, which supervision consultant will verify in advance and confirm during implementation. • Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line. • Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there. • Rehabilitate road drainage structures immediately if damaged by contractors' road transports. • Build new drainage lines as appropriate and required for wastewater from construction yards connecting to the available nearby recipient water bodies. Ensure wastewater quality conforms to national and WBG EHS Guidelines, before it is being discharged into the recipient water bodies. • Ensure that there will be no water stagnation at the construction sites and camps. • Provide appropriate silt collector and silt screen at the inlet and manholes and periodically clean the drainage system to avoid drainage congestion. • Protect natural slopes of drainage channels to ensure adequate storm water drains. • Regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem.
Ponding of water	Health hazards due to mosquito breeding	• Do not allow ponding of water especially near the waste storage areas and construction camps. • Discard all the storage containers that are capable of storing of water, after use or store them in inverted position.

ESCP 5: SOIL QUALITY MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Storage of hazardous and toxic chemicals	Spillage of hazardous and toxic chemicals will contaminate the soils	The Contractor shall • Strictly manage the wastes management plans proposed in ESCP1 and storage of materials in ESCP2. • Construct appropriate spill contaminant facilities for all fuel storage areas. • Establish and maintain a hazardous material register detailing the location and quantities of hazardous substances including the storage, and their disposals. • Train personnel and implement safe work practices for minimizing the risk of spillage. • Identify the cause of contamination, if it is reported, and contain the area of contamination. The impact may be contained by isolating the source or implementing controls around the affected site. • Remediate the contaminated land using the most appropriate available method.
Construction material stock piles	Erosion from construction material stockpiles may contaminate the soils	The Contractor shall • Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds.

ESCP 6: EROSION AND SEDIMENT CONTROL

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Clearing of construction sites	Cleared areas and slopes are susceptible for erosion of top soils, which affects the growth of vegetation and causes ecological imbalance.	The Contractor shall • Prepare site specific erosion and sediment control measures and submit them for supervision consultant approval. • Reinstate and protect cleared areas as soon as possible. • Cover unused area of disturbed or exposed surfaces immediately with mulch/grass turf/tree plantations
Construction activities and material stockpiles	The impacts of soil erosion are (i) Increased run off and sedimentation causing a greater flood hazard to the downstream, and (ii) destruction of aquatic environment by erosion and/or deposition of sediment damaging the spawning grounds of fish	The Contractor shall • Locate stockpiles away from drainage lines. • Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds. • Remove debris from drainage paths and sediment control structures. • Cover the loose sediments of construction material and water them if required. • Divert natural runoff around construction areas prior to any site disturbance. • Install protective measures on site prior to construction, for example, sediment traps. • Install 'cut off drains' on large cut/fill batter slopes to control water runoff speed and hence erosion. • Observe the performance of drainage structures and erosion controls during rain and modify as required.
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall • Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion. • Ensure that roads used by construction vehicles are swept regularly to remove sediment. • Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g., high winds).

ESCP 7: TOP SOIL MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Earthworks will impact the fertile top soils that are enriched with nutrients required for plant growth or agricultural development.	The Contractor shall • Strip the top soil to a depth of 15 cm and store in stock piles of height not exceeding 2m. • Remove unwanted materials from top soil like grass, roots of trees and similar others. • The stockpiles will be done in slopes of 2:1 to reduce surface runoff and enhance percolation through the mass of stored soil. • Locate topsoil stockpiles in areas outside drainage lines and protect from erosion. • Construct diversion channels and silt fences around the topsoil stockpiles to prevent erosion and loss of topsoil. • Spread the topsoil to maintain the physico-chemical and biological activity of the soil. The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites. • Prior to the re-spreading of topsoil, the ground surface will be ripped to assist the bunding of the soil layers, water penetration and revegetation
Transport	Vehicular movement outside RoW or temporary access roads will affect the soil fertility of the agricultural lands	• Limit equipment and vehicular movements to within the approved construction zone. • Plan construction access to make use, if possible, of the final road alignment.

ESCP 8: TOPOGRAPHY AND LANDSCAPING

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Construction activities especially earthworks will change topography and disturb the natural rainwater/flood water drainage as well as will change the local landscape.	The Contractor shall • Prepare landscaping and plantation plan and submit the plan for supervision consultant approval. • Ensure the topography of the final surface of all raised lands (construction yards, approach roads and rails, access roads, etc.) are conducive to enhance natural draining of rainwater/flood water. • Keep the final or finished surface of all the raised lands free from any kind of depression that causes water logging. • Undertake mitigation measures for erosion control/prevention by grass-turfing and tree plantation, where there is a possibility of rain-cut that will change the shape of topography. • Cover immediately the uncovered open surface that has no use of construction activities with grass-cover and tree plantation to prevent soil erosion and bring improved landscaping. • Reinstate the natural landscape of the ancillary construction sites after completion of works.

ESCP 9: BORROW AREA MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Development and operation of borrow areas	Borrow areas will have impacts on local topography, landscaping and natural drainage	The Contractor shall • Prepare quarry area management plan and submit the plan for supervision consultant approval. • Use only approved quarry and borrow sites • Identify new borrow and quarry areas in consultation with Project Director, if required. • Reuse excavated or disposed material available in the project to the maximum extent possible. • Store top soil for reinstatement and landscaping. • Develop surface water collection and drainage systems, anti-erosion measures (berms, revegetation etc.) and retaining walls and gabions where required. Implement mitigation measures in ESCP 3: Water Resources Management, ESCP 6: Erosion and Sediment Control • The use of explosive should be used in as much minimum quantity as possible to reduce noise, vibration and dust. • Control dust and air quality deterioration by application of watering and implementing mitigation measures proposed in ESCP 10: Air Quality Management • Noise and vibration control by ESCP 11: Noise and Vibration Management

ESCP 10: AIR QUALITY MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Air quality can be adversely affected by vehicle exhaust emissions and combustion of fuels.	The Contractor shall • Prepare air quality management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. • Fit vehicles with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition. • Operate the vehicles in a fuel-efficient manner. • Cover hauls vehicles carrying dusty materials moving outside the construction site. • Impose speed limits on all vehicle movement at the worksite to reduce dust emissions. • Control the movement of construction traffic. • Water construction materials prior to loading and transport. • Service all vehicles regularly to minimize emissions. • Limit the idling time of vehicles not more than 2 minutes.
Construction machinery	Air quality can be adversely affected by emissions from machinery and combustion of fuels.	The Contractor shall • Fit machinery with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition in accordance with the specifications defined by their manufacturers to maximize combustion efficiency and minimize the contaminant emissions. Proof or maintenance register shall be required by the equipment suppliers and contractors/subcontractors. • Focus special attention on containing the emissions from generators. • Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites. • Service all equipment regularly to minimize emissions. • Provide filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete batching and mixing plant to control the particle emissions in all its stages, including unloading, collection, aggregate handling, cement dumping, circulation of trucks and machinery inside the installations.
Construction activities	Dust generation from construction sites, material stockpiles and access roads are a nuisance in the environment and can be a health hazard, and also can affect the local crops;	The Contractor shall • Water the material stockpiles, access roads and bare soils on an as required basis to minimize the potential for environmental nuisance due to dust. Increase the watering frequency during periods of high risk (e.g. high winds). Stored materials such as gravel and sand shall be covered and confined to avoid their being wind-drifted. • Minimize the extent and period of exposure of the bare surfaces. • Restore disturbed areas as soon as practicable by vegetation/grass-turfing. • Store the cement in silos and minimize the emissions from silos by equipping them with filters.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations. • Not water as dust suppression on potentially contaminated areas so that a liquid waste stream will be generated. • Crushing of rocky and aggregate materials shall be wet-crushed, or performed with particle emission control systems. • Not permit the burning of solid waste.

ESCP 11: NOISE AND VIBRATION MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Noise quality will be deteriorated due to vehicular traffic	The Contractor shall • Prepare a noise and vibration management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. • Maintain all vehicles in order to keep it in good working order in accordance with manufactures maintenance procedures. • Make sure all drivers will comply with the traffic codes concerning maximum speed limit, driving hours, etc. • Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site.
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall • Appropriately site all noise generating activities to avoid noise pollution to local residents. • Use the quietest available plant and equipment. • Maintain all equipment in order to keep it in good working order in accordance with manufactures maintenance procedures. Equipment suppliers and contractors shall present proof of maintenance register of their equipment. • Install acoustic enclosures around generators to reduce noise levels. • Fit high efficiency mufflers to appropriate construction equipment. • Avoid the unnecessary use of alarms, horns and sirens.
Construction activity	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall • Notify adjacent landholders prior any typical noise events outside of daylight hours. • Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions. • Employ best available work practices on-site to minimize occupational noise levels. • Install temporary noise control barriers where appropriate. • Notify affected people if major noisy activities will be undertaken, e.g., blasting. • Plan activities on site and deliveries to and from site to minimize impact. • Monitor and analyze noise and vibration results and adjust construction practices as required. • Avoid undertaking the noisiest activities, where possible, when working at night near the residential areas.

ESCP 12: PROTECTION OF FLORA

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Vegetation clearance	Local flora is important to provide shelters for the birds, offer fruits and/or timber/fire wood, protect soil erosion and overall keep the environment very friendly to human-living. As such damage to flora has wide range of adverse environmental impacts.	The Contractor shall • Prepare a plan for protection of flora and submit the plan for supervision consultant approval. • Minimize disturbance to surrounding vegetation. • Use appropriate type and minimum size of machine to avoid disturbance to adjacent vegetation. • Get approval from supervision consultant for clearance of vegetation. • Make selective and careful pruning of trees where possible to reduce need of tree removal. • Control noxious weeds by disposing of at designated dump site or burn on site. • Clear only the vegetation that needs to be cleared in accordance with the engineering plans and designs. These measures are applicable to both the construction areas as well as to any associated activities such as sites for stockpiles, disposal of fill a, etc. • Not burn off cleared vegetation – where feasible, chip or mulch and reuse it for the rehabilitation of affected areas, temporary access tracks or landscaping. Mulch provides a seed source, can limit embankment erosion, retains soil moisture and nutrients, and encourages re-growth and protection from weeds. • Return topsoil and mulched vegetation (in areas of native vegetation) to approximately the same area of the roadside it came from. • Avoid work within the drip-line of trees to prevent damage to the tree roots and compacting the soil. • Minimize the length of time the ground is exposed or excavation left open by clearing and re-vegetate the area at the earliest practically possible. • Ensure excavation works occur progressively and re-vegetation done at the earliest • Provide adequate knowledge to the workers regarding nature protection and the need of avoid felling trees during construction • Supply appropriate fuel in the work camps to prevent fuel wood collection.

ESCP 13: PROTECTION OF FAUNA

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	The location of construction activities can result in the loss of wild life habitat and habitat quality,	The Contractor shall • Prepare a plan for protection of fauna and submit the plan for supervision consultant approval. • Limit the construction works within the designated sites allocated to the contractors. • Check the site for animals trapped in, or in danger from site works and use
	Impact on migratory birds, its habitat and its active nests	The Contractor shall • Not be permitted to destruct active nests or eggs of migratory birds. • Minimize the tree removal during the bird breeding season. If works must be continued during the bird breeding season, a nest survey will be conducted by a qualified biologist prior to commence of works to identify and locate active nests. • If bird nests are located/ detected within the ledges and roadside embankments then those areas should be avoided. • Petroleum products should not come in contact with the natural and sensitive ecosystems. Contractor must minimize the release of oil, oil wastes or any other substances harmful to migratory birds' habitats, to any waters, wetlands or any areas frequented by migratory birds.
Vegetation clearance	Clearance of vegetation may impact shelter, feeding and/or breeding and/or physical destruction and severing of habitat areas	The Contractor shall • Restrict the tree removal to the minimum numbers required. • Relocate hollows, where appropriate. • Fell the hollow bearing trees in a manner which reduces the potential for fauna mortality. Felled trees will be inspected after felling for fauna and if identified and readily accessible will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will remain unmoved overnight to allow animals to move of their own volition.
Night time lighting	Lighting from construction sites and construction camps may affect the visibility of night time migratory birds that use the moon and stars for navigation during their migrations.	The Contractor shall • Use lower wattage flat lens fixtures that direct light down and reduce glare, thus reducing light pollution, • Avoid flood lights unless they are absolutely required. • Use motion sensitive lighting to minimize unneeded lighting. • Use, if possible, green lights that are considered as bird's friendly lighting instead of white or red colored lights. • Install light shades or plan the direction of lights to reduce light spilling outside the construction area.
Construction camps	Illegal poaching	The Contractor shall • Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching. • Ensure that staff and Subcontractors are trained and empowered to identify, address and report potential environmental problems.

ESCP 14: ROAD TRANSPORT AND ROAD TRAFFIC MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Increased traffic use of road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	The Contractor shall • Prepare a traffic management plan and submit the plan for supervision consultant approval. • Strictly follow the Project's 'Traffic Management Plan' and work with close coordination with the Traffic Management Unit. • Prepare and submit additional traffic plan, if any of his traffic routes are not covered in the Project's Traffic Management Plan, and requires traffic diversion and management. • Include in the traffic plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary bridges temporary diversions, necessary barricades, warning signs / lights, road signs, etc. • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the national Traffic Regulations.
	Accidents and spillage of fuels and chemicals	The Contractor shall • Restrict truck deliveries, where practicable, to day time working hours. • Restrict the transport of oversize loads. • Operate vehicles, if possible, to non-peak periods to minimize traffic disruptions. • Enforce on-site speed limit.

ESCP 15: CONSTRUCTION CAMP MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	The Contractor shall • Prepare a construction camp management plan and submit the plan for supervision consultant's approval. • Locate the construction camps within the designed sites or at areas which are acceptable from environmental, cultural or social point of view; and approved by the supervision consultant. • Consider the location of construction camps away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. • Submit to the supervision consultant for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps. • Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters.
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	Contractor shall provide the following facilities in the campsites • Adequate housing for all workers. • Safe and reliable water supply, which should meet the national and WBG EHS Guidelines. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time (WHO guideline). • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by location. The minimum number of toilet facilities required is one toilet for every ten persons. • Treatment facilities for sewerage of toilet and domestic wastes. • Storm water drainage facilities. • Paved internal roads. • Provide child crèches for women working construction site. The crèche should have facilities for dormitory, kitchen, indoor and outdoor play area. Schools should be attached to these crèches

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		so that children are not deprived of education whose mothers are construction workers. • Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by the construction camps to be discouraged/prohibited to the extent possible.
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	The Contractor shall • Ensure proper collection and disposal of solid wastes within the construction camps. • Insist waste separation by source; organic wastes in one container and inorganic wastes in another container at household level. • Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems with the manpower and equipment/vehicles needed. • Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall • Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or another biomass. • Made available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking. • •Conduct awareness campaigns to educate workers on preserving the protecting the biodiversity and wildlife of the project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	The Contractor shall • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals. • Initial health screening of the laborers coming from outside areas. • Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work. • Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis. • Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as stagnant water bodies and puddles do not form.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		Regular mosquito repellant sprays during rainy season in offices and construction camps and yards. • Not dispose food waste openly as that will attract rats and stray dogs. • Carryout short training sessions on best hygiene practices to be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygienic practices.
Safety	In adequate safety facilities to the construction camps may create security problems and fire hazards	The Contractor shall • Provide appropriate security personnel (police or private security guards) and enclosures to prevent unauthorized entry in to the camp area. • Maintain register to keep a track on a head count of persons present in the camp at any given time. • Encourage use of flameproof material for the construction of labor housing / site office. Also, ensure that these houses/rooms are of sound construction and capable of withstanding wind storms/cyclones. • Provide appropriate type of firefighting equipment suitable for the construction camps • Display emergency contact numbers clearly and prominently at strategic places in camps. • Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors.
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps.	The Contractor shall • Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work. • Dismantle camps in phases and as the work gets decreased and not wait for the entire work to be completed. • Give prior notice to the laborers before demolishing their camps/units. • Maintain the noise levels within the national standards during demolition activities. • Different contractors should be hired to demolish different structures to promote recycling or reuse of demolished material. • Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site. • Handover the construction camps with all built facilities as it is if agreement between both parties (contactor and land-owner) has been made so. • Restore the site to its condition prior to commencement of the works or to an agreed condition with the landowner.

ESCP 16: CULTURAL AND RELIGIOUS ISSUES

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities near religious and cultural sites	Disturbance from construction works to the cultural and religious sites, and contractors lack of knowledge on cultural issues cause social disturbances.	The Contractor shall • Communicate to the public through community consultation regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction. • Not block access to cultural and religious sites, wherever possible. • Restrict all construction activities within the foot prints of the construction sites. • Stop construction works that produce noise (particularly during prayer time) should there be any mosque/religious/educational institutions close to the construction sites and users make objections. • Take special care and use appropriate equipment when working next to a cultural/religious institution. • Stop work immediately and notify the site manager if, during construction, an archaeological or burial site is discovered. It is an offence to recommence work in the vicinity of the site until approval to continue is given. • Provide separate prayer facilities to the construction workers. • Show appropriate behavior with all construction workers especially women and elderly people. • Allow the workers to participate in praying during construction time. • Resolve cultural issues in consultation with local leaders and supervision consultants. • Establish a mechanism that allows local people to raise grievances arising from the construction process. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters. • Chance Find Procedures for Protection of Cultural Property attached in Annex-VII shall be followed.

ESCP 17: WORKER'S HEALTH AND SAFETY

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g., noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc.), (ii) risk factors resulting from human behavior (e.g., STD, HIV etc.) and (iii) road accidents from construction traffic.	The Contractor shall • Prepare an Occupational Health and Safety plan and submit the plan for supervision consultant's approval. • Implement suitable safety standards for all workers and site visitors which should not be less than those laid down on the international standards (e.g., International Labor Office guideline on 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own national standards or statutory regulations, in addition to complying with national and WBG EHS Guidelines. • Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas. • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job. • Appoint an environment, health and safety manager to look after the health and safety of the workers. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters.
	Child and pregnant labor	The Contractor shall • Not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks.
Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	The Contractor shall • Ensure health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		should be easily accessible throughout the place of work. • Document and report occupational accidents, diseases, and incidents. • Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards, in a manner consistent with good international industry practice. • Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. • Provide awareness to the construction drivers to strictly follow the driving rules. • Provide adequate lighting in the construction area, inside the tunnels, inside the powerhouse cavern and along the roads.
Construction Camps	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services substandard living standards and health hazards, and generate	The Contractor shall provide the following facilities in the campsites to improve health and hygienic conditions as mentioned in ESCP 15 Construction Camp Management • Adequate ventilation facilities • Safe and reliable water supply. • Hygienic sanitary facilities and sewerage system. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Recreational and social facilities • Safe storage facilities for petroleum and other chemicals in accordance with ESCP 2 • Solid waste collection and disposal system in accordance with ESCP1. • Arrangement for trainings • Paved internal roads. • Security fence at least 2 m height. • Sick bay and first aid facilities
Water and sanitation facilities at the construction sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	The contractor shall • Provide portable toilets at the construction sites, if about 25 people are working the whole day for a month. Location of portable facilities should be at least 6 m away from storm drain system and surface waters. These portable toilets should be cleaned once a day and all the sewerage should be pumped from the collection tank once a day and should

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		be brought to the common septic tank for further treatment. • Provide safe drinking water facilities to the construction workers at all the construction sites.
Other ESCPs	Potential risks on health and hygiene of construction workers and general public	The Contractor shall follow the following ESCPs to reduce health risks to the construction workers and nearby community • ESCP 2: Fuels and Hazardous Goods Management • ESCP 4: Drainage Management • ESCP 10: Air Quality Management • ESCP 11: Noise and Vibration Management • ESCP 14: Road Transport and Road Traffic Management
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall • Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of sexually transmitted infections (STI) HIV/AIDS. • Train all construction workers in general health and safety matters, and on the specific hazards of their work. Training should consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. • Implement malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on ongoing and regular basis. This should be complemented by easy access to condoms at the workplace as well as to voluntary counseling and testing.

ESCP 18: CONSTRUCTION AND OPERATION PHASE SECURITY

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction Phase	Inadequate construction site security poses a significant risk to assets, construction materials and property. Theft/vandalism of assets, materials and property would increase construction costs and cause delays in project completion.	The Contractor shall • Provide appropriate security personnel (i.e., security guards) to prevent unauthorized entry into the camp area. • Employ night watchman for periods of significant on-site storage or when the area necessitates. • Ensure all assets (i.e., tools, equipment, etc.) and construction materials at construction site are identified, inventoried and tracked as closely as possible. All assets should be clearly labeled and marked. Keep records of tool serial numbers and check inventory on a regular basis. • All tools and equipment should have a check out/in system, if not in use should be secured and stored in a proper place to prevent theft or loss. Provide storage sheds for the secure storage of equipment and tools when not in use. • Ensure there is proper fencing around construction site perimeter. Fencing should be chain-link at least 2.4 m high and secured with a steel chain and lock. If possible, the entire site should be fenced; if this is not possible, make sure construction trailer and any equipment storage areas are fenced. • Ensure construction site has controlled access points (one or two entry points at most), allowing for close monitoring of comings and goings from the site. • Workers should be easily identified and have credentials that indicate site access. • No trespassing signs should be posted in conspicuous areas throughout the job site. • List of employees who have after hour access to the property should be available to the BWB and local authorities. • Ensure job site is properly lighted at night. Well-lit areas should include any office trailers and equipment storage trailers. Floodlights operated by sensors should also be installed where appropriate. • Pre-employment screening investigations should be used to verify the applicants relating to their employment, education and criminal history background.
	Improper security measures may pose security risk for construction workers	The Contractor shall: • Prepare site specific security plan.

	and especially foreign staff on construction sites.	• Maintain register to keep track of number of persons present in the camp at any given time. • Provide appropriate security personnel at job sites as mentioned above. • Ensure proper fencing as mentioned above. • Ensure controlled access points to job site as mentioned above. • Ensure works have easily identified credentials as mentioned above. • Ensure job sites are properly lighted at night, as mentioned above.
Operation Phase	Vandalism/damage (including use of explosives) and theft of infrastructure (i.e., metals and etc.).	Ensure strategic infrastructure sites are secure and fenced with controlled access points. Fencing should be chain-link at least 2.4 m high and secured with a steel chain and lock.

ESCP 19: OPERATION OF HEAVY EQUIPMENT MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Grid station, tower erection	Hazards associated with Heavy equipment movement are: • Run over • Pinch in / caught in between • Falling of equipment form road edge / into excavations • Falling of loads • Overturning • Driver negligence / poor operations	The Contractor shall: • All above listed hazards shall be prevented through safe working procedures, training of the operators and workers and exclusion of the operation, ensuring visibility and providing signaler etc. where applicable.
Before Operations		• All construction equipment shall be maintained, equipped and operated in accordance with manufactures' requirements. • Only authorized and trained personnel shall operate equipment. • Equipment operators and truck drivers shall make a pre-shift safety inspection of their equipment. Any conditions that effect safe operation shall be corrected before use. • All visibility aids like side / back view mirrors will be available with all site vehicles and machinery. • Blocking of side / back wind shields will not be allowed by any means like curtains, posters, wall papers etc. • Use 3-point mounting and dismounting technique off of heavy equipment - NEVER JUMP OFF HEAVY EQUIPMENT • Predefined hand signals or use of two-way radios between the operator and person in charge of the work crew to accomplish any and all movement
During Operation		• Designate the route for earth moving machinery; avoid reversing where possible by providing in – out route. • Separate routes will be established for site vehicles and pedestrians where applicable. • All site staff will be trained for the following: • Always try to walk on the driver side of equipment as the passenger side has a larger blind spot. • Arrange to provide enough space to allow the equipment and workers to perform the planed tasks safely otherwise safe distance will be maintained from all sides of the heavy equipment while they are in use. • Use of high visibility vest for all site personnel. • Prohibition of cell phone use while operating any equipment. • Restriction in transporting workers on equipment or vehicles that are not equipped with seats for passengers. • Deployment of flagman when heavy equipment is in motion, especially where machinery and workers are working at close distance to ensure communication between the operator and flagman to maintain safe movement. • Cordon of swing radius of vehicles in danger zones with warning tape of barriers. • Restriction of work under any suspended or overhead load. • Restrictions in overloading of dumpers and insurance of offloading at level ground with rear wheels stop logs at the edges. • Insurance of reverse alarm with the site vehicles. • Ensure three main principles at site to avoid any mishap.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Exclusion: exclusion will be done by specifying the work area by barricades / fencing/isolating from pedestrian / worker. • Visibility: best view around machinery directly from the operator position will be ensured by adequate visibility aids (clear front, side and rare screens with side / back view mirrors covering all blind areas). • Signaler: A signaler will be provided in a safe position to direct operation and any pedestrian movements in danger zones.
After Operation		The Contractor shall • Never leave any machinery / vehicle unattended in running position or key inside. • After completion of operation all equipment shall be switched off and doors locked where applicable. • Bucket of excavator, loader shall be grounded. • All power transmission shall be neutral. • All equipment shall be parked in secured ground

ESCP 20: EXCAVATION

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Sloping and Benching	Landslides, cave-ins, excavation collapse • Falling, rolling or dislodging material • Personal Falls, machinery falls into excavated area or trenches • Water accumulation • Confined Space • Being struck or crushed by a workplace vehicle, • Machinery Hazards; Loading and dumping hazards, e.g. struck by or pinch in between object, crushed by when reversing, overloading, overturning of the vehicles while unloading	The slopes and configurations of sloping and benching systems will be selected and constructed by contractor and will be in accordance with the approved design following applicable code and designed by a registered professional engineer. i. Allowable configurations and slopes: Excavations will be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the contractor follows other applicable design procedures approved by the engineer. ii. Sloping and benching systems not utilizing previous options will be approved by a registered professional engineer. Designs shall be in written form and shall include at least the following: (a) The magnitude of the slopes that were determined to be safe for the particular project; (b) The configurations that were determined to be safe for the particular project; (c) The identity of the registered professional engineer approving the design; and (d) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the PMU upon request.
Design of support systems, shield systems, and other protective systems		Designs of support systems, shield systems, and other protective systems shall be selected and constructed by contractor and shall be in accordance with the approved design specifications following applicable code and designed by a registered professional engineer. i. Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer. ii. Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval. iii. Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available to the PMU upon request.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		iv. Support systems, shield systems, and other protective systems not utilizing Option i, Option ii or Option iii, above, shall be approved by a registered professional engineer. v. Designs shall be in written form and shall include the following: (a) A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and (b) The identity of the registered professional engineer approving the design. (c) At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the PMU upon request.
Selection of Materials and equipment.		Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function. Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards. i. When material or equipment that is used for protective systems is damaged, the competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service. ii. Installation and removal of support - Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure. iii. iii. Support systems shall be installed and removed in a manner that protects workers from cave-ins, structural collapses, or from being struck by members of the support system. iv. iv. Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand. v. Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system. vi. Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation. vii. Backfilling shall progress together with the removal of support systems from excavations. viii. Additional requirements for support systems for trench excavations: (a) Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system. (b) Installation of a support system shall be closely coordinated with the excavation of trenches
Shield systems		• Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand. • Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads. • Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields. • Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically. • Excavations of earth material to a level not greater than 2 feet (0.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

ESCP 21: TRANSPORTATION OF OVERSIZED EQUIPMENTS

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Grid Station	Hazards associated with transportation of oversized equipment: • Traffic disruptions along the way • Traffic accidents • Impact on infrastructure, roads, bridges • Nuisance to people along the transportation route	The Contractor shall: • Identify the appropriate special vehicles depending on the characteristics of the load • Ensure that special vehicles are maintained, in good operating condition and have all permits required under the national laws • Ensure that the drivers are trained for the particular type of vehicles • Ensure that drivers are in good physical condition • Ensure that the equipment is loaded appropriately and secured on the vehicle • Ensure that the transportation route avoids schools, hospitals, mosques, markets or other places of concentration of people, as far as possible • Ensure that the vehicle route is surveyed and that its geometric design and condition is appropriate for the transportation of the big and heavy load. • Ensure that turning curves are appropriate for the special vehicles. • Ensure that the necessary clearance is available, i.e., bridges, transmission lines along the way • Ensure that a pilot vehicle is available to inform people on the coming load and to inform the vehicle driver on likely obstacles • Liaise with the traffic police to inform on the dates and the route of the transportation, and request their permit • Liaise with the communities along the route, at least a week before, to inform them on the dates of the transportation

ESCP 22: LIFTING AND MATERIALS HANDLING

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Mechanical Handling	Injuries associated with mechanical handling of loads may result from: • Unsafe operating practices • Inappropriate condition of equipment • Improper loading • Carrying too heavy a load • Improper training	General Requirements • Lifting equipment selection shall be based on a risk assessment and shall be suitable for the task for which it will be used. • Lifting equipment selection should also consider the various operating environments under which the equipment may be used. • All lifting equipment used will comply with the necessary legal requirements. • All lifting equipment must be clearly marked with its safe working load as well as a unique identification number. Where the load capacity is variable, a table of load to conditions must be affixed. • Testing, including non-destructive testing where relevant, must be carried out by accredited contractors. • No equipment may be used if proof of inspection and test is not available (as recorded in the register). • No purpose made or adapted lifting equipment will be used, unless the special adaptation has been approved (after risk assessment) by the respective Responsible Engineer and the approval as well as limitations on use or special instructions are held with the register and communicated to the user. • Only employees who have been tested, found competent and authorized will be allowed to operate lifting equipment.
Manual Handling	Injuries associated with manual handling of loads may result from: • Unsafe working habits • Improper lifting • Carrying too heavy a load • Incorrect gripping • Failure to wear correct personal protective equipment • Improper training	Training in safe manual handling methods. • Inspect material for the physical size and weight, and sharp or jagged edges, rough or slippery surfaces, slivers or burrs. • Adequate supervision. • Wearing of the correct personal protective equipment. • Pre-employment medical examinations and periodic examinations may reveal a hernia, knee or back injuries. • Consider physical matters such as small worker – heavy load. • Keep fingers away from pinch points, especially when setting down material. • When handling timber, pipes or other long objects, keep the hands away from the ends to prevent them from being pinched. • Wipe off grease, wet, slippery or dirty objects before handling them. • Keep hands free from oil and grease. • When possible, use holders, containers, handles or tongs when manually handling material.

ESCP 23: STRINGING CONDUCTORS AT ROAD, RIVER, AND EXISTING TRANSMISSION LINE CROSSINGS

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Stringing conductors at road crossings	Hazards associated with stringing conductors at road crossing are; • Traffic disruptions along the way • Traffic accidents • Damage to equipment • Accidents and spillage of fuels and chemicals • Less working time	The Contractor shall: • Prepare and submit a traffic management plan to the CSC for his approval at least 30 days before commencing work on any project component involved in traffic diversion and management. Coordinate with local administration to communicate traffic closures for the construction work, along with traffic closure schedules. • Include in the traffic management plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary bridges temporary diversions, necessary barricades, warning signs / lights, and road signs. • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Country's Traffic Regulations. • Install and maintain a display board at each important road intersection on the roads to be used during construction, which shall clearly show the following information in Bangla: ○ Location: chainage and village name ○ Duration of construction period ○ Period of proposed detour / alternative route ○ Suggested detour route map ○ Name and contact address/telephone number of the concerned personnel ○ Name and contact address / telephone number of the Contractor • Inconvenience is sincerely regretted.
Stringing conductors at river crossings	Hazards associated with the stringing at river crossings; • Risk of drowning of worker and machinery • Corrosion of material and equipment • Electrocution • Slip trips and fall • Chemical Spillage • Flood in rivers • Slope failure • Cold-water shock and immersion	The contractor shall; • Ensure the provision of Lifejackets/buoyancy aids worn by workers with risk of falling into water. Lifejackets/buoyancy aids should conform to BS EN ISO 12402-1, 2, 3 or 4, or other equivalent international standards according to working conditions. • Ensure the checking of Lifejackets thoroughly by the user before each use • Provide a lifebuoy with sufficient lifeline (not less than 30 metre) and the locations of the lifebuoys should be at less than 50-metre intervals along the edges of places where work is being carried out over side. To avoid any delays to rescue operations, lifebuoys should not be tightly tied to posts. • Provide safety harnesses with continuous and effective anchorage system when it is impracticable to provide a suitable working platform, access and egress and safe place of work. • Ensure the provision of Rescue facilities, including sufficient stretcher(s), portable resuscitation

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		equipment and first aid facilities, and kept readily accessible for emergency use. • Ensure the presence of Shelters, vessels for evacuation from adverse weather, etc. in the vicinity of workplaces over/near water. • Ensure the Job specific safety training and regular refresher training to workers to enhance/maintain their safety awareness of potential hazards associated with work over water/near water. • Ensure the safe handling of the chemicals while transporting or using. • Ensure the implementation of the safety standards • Ensure the usage of PPEs by the Workers
Stringing conductors at existing transmission line crossings	Hazards associated with the stringing over existing transmission line includes; • Electrocution • Electromagnetic interference • Falling of existing line/conductor	The Contractor shall: • Coordinate with the transmission line staff/concerned Power Grid to plan the work • Take necessary approval from the concerned department • Take necessary shutdown on the live transmission lines • Provide training and appropriate personal protection equipment for workers; • Maintain construction equipment in good condition; • Test structures for integrity prior to undertaking work; • Ensure Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; among others; • Ensure hoisting equipment should be properly rated and maintained and hoist operators properly trained; • Ensure the specs of safety belts which should be of not less than 16 millimeters (5/8inch) two-in-one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibers become evident; • Ensure when operating power tools at height, workers should use a second (backup) safety strap; • Provide safe working space for workers when working at properties with additional structure around the power poles

Annex-XI: Stakeholder Engagement Plan (SEP)

1. Introduction

Power Grid under Ministry of Energy, Power and Mineral Resources (MoEPMR) has taken up a project for transmission lines named "Madunaghat – Moheshkhali 765kV Transmission Line" for reliable power supply funded by the Government of Bangladesh (GoB). Stakeholder consultations are important processes through which a two-way dialogue is created between the Power Grid and the stakeholders. Stakeholders are persons or groups who are directly or indirectly affected by a Project, as well as those who may have interests in a Project and/or the ability to influence its outcome, either positively or negatively. They can comprise individuals, communities, social groups, organizations, etc. It is often observed that the poor and the marginalized are often ignored either due to the fact that they are unaware or do not have a forum to voice their opinion. Where properly designed and implemented, it supports the development of strong, constructive and responsive relationships that are important for successful management of a project's environmental and social risks. By identifying and consulting all stakeholders, especially the poor and the vulnerable, it is essential to ensure that the Project meets the need of all sections of the people. This SEP has been developed as per findings of Stakeholder Engagement during preparation of Resettlement Plan (RP), Environmental and Social Impact Assessment (ESIA), Labor Management Plan (LMP) and Gender Based Violence (GBV) prevention plan.

2. Objectives

The overall objective of this Stakeholder Engagement Plan (SEP) is to define a program for stakeholder engagement, including public information disclosure and consultation, throughout the construction of sub-stations (SS) and Transmission Lines (TL), other project activities, and operation of the proposed projects. The SEP outlines the ways in which the project will engage national stakeholders, labors, and contractors, and provide them with a mechanism through which people can raise concerns, provide feedback, or make positive and negative complaints about the project(s) themselves.

The involvement of the local population and interested stakeholders is essential to the success of the project in order to ensure smooth collaboration between project staff and local communities and to minimize and mitigate environmental and social risks related to the proposed project. Stakeholder engagement is an inclusive process conducted throughout the project life cycle. Where properly designed and implemented, it supports the development of strong, constructive and responsive relationships that are important for successful management of environmental and social risks identified in a project. Communicating early, often, and clearly with stakeholders helps manage expectations and avoid risks, potential conflict, and project delays.[13] In addition, the plan assists in managing stakeholder expectations, which will have a bearing throughout the lifespan of the project. Hence, this SEP provides a plan to interact effectively with stakeholders to support project interests. The key objectives are:

- ✓ Providing meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s) including all affected households and interested groups including women in the community;
- ✓ Providing information in advance of consultation activities and decision-making;
- ✓ Disseminating information in ways and locations that make it easy for stakeholders to access it;
- ✓ Respect for local traditions, languages, timeframes and decision-making processes;

[13]Pollet., T (2014), A Strategic Approach to Early Stakeholder Engagement

- ✓ Two-way dialogue that gives both sides the opportunity to exchange views and information, to listen, and to have their issues heard and addressed;
- ✓ Inclusiveness in representation of views, including women, vulnerable and/or minority groups
- ✓ Processes free of intimidation or coercion;
- ✓ Clear mechanisms for responding to people's concerns, suggestions, and grievances;
- ✓ Incorporating feedback into Project or program design and reporting back to stakeholders.

This SEP:

- ✓ Involves interactions between and among identified groups of people and provides stakeholders with an opportunity to raise their concerns and share their opinions and ensures that this information is taken into consideration when making decisions pertaining to the project.
- ✓ Begins early during the project planning process to gather initial views on the project proposal and design.
- ✓ Encourages stakeholder's feedback, especially as a way of informing the project design and engagement by stakeholders in the identification and mitigation of environmental and social risks and impacts.
- ✓ Ensures prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information in a timeframe that enables meaningful consultation with stakeholders in a culturally appropriate format, in relevant local languages and is understandable to stakeholders.
- ✓ Considers and responds to feedback.
- ✓ Supports active and inclusive engagement with project affected parties, project beneficiary group, and interested parties.
- ✓ Ensures that implementation of the SEP will be documented and disclosed prior to Project appraisal.
- ✓ Suggest formation of Grievance Redressed Committees at different levels so that people can raise their concern without any fear.

In addition, this SEP will endeavor to disclose information that will allow stakeholders to understand the risks and impacts of the project as well as potential opportunities.

3. Previous Stakeholder Engagement Activities

In order to assess stakeholder needs, expectations, perceptions, and choices, and to ensure their rights and voices, a two-fold consultation processes was carried out during the survey. Thus, Consultations were conducted firstly with both the primary and secondary stakeholders. Later, affected persons of different occupations were consulted through FGDs. People have the right to know what will happen in their area, including both the positive and negative impacts. Their opinions, views, and feedback are valuable for understanding and managing the changes a project may bring. For this reason, 13 public consultation meetings (PCMs) were held in different locations around the project area.

Table 2: Schedule and number of participants of SMCs

SN	Tower Location	Address	Date	No. of participants		Total
				Male	Female	
14.	210-216	Baralia Union Parishad, Baralia, Patia, Chattogram	25.06.2025	03	02	5
15.	210-216	Baralia Union Parishad, Baralia, Patia, Chattogram	25.06.2025	0	05	5
16.	267-269	Goschi High School, Raozan, Chattogram	26.05.2025	23	02	25

17.	101-102	Paschim Chambol, Banshkhali, Chattogram	22.05.2025	06	0	6
18.	111-115	Noth Juladhi, Banshkhali, Chattogram	18.05.2025	05	0	5
19.	57	Katakhali, Pekua, Cox's Bazar	28.02.2025	05	0	5
20.	145	Hazigao, Gunaguri, Kalipur, Banshkhali, Chattogram	26.02.2025	08	0	8
21.	207	Pingala, Kashiais, Patia, Chattogram	23.02.2025	09	0	9
22.	227	Mukitline, Dholghat, Patia, Chattogram	22.02.2025	08	0	8
23.	250	Popadia, Boalkhali, Chattogram	20.02.2025	10	0	10
24.	257	Charandip, Boalkhali, Chattogram	20.02.2025	08	0	8
25.	259	Lamburhat, Bagoyan, Raozan, Chattogram	19.02.2025	05	0	5
26.	263	Bagoyan, Bagoyan, Raozan, Chattogram	19.02.2025	07	0	7
			Total	**97**	**9**	**106**

The details and/or summary of consultations for different areas held with issues raised or discussed and suggestions provided by the respective primary stakeholders are presented in 4.

Table 4: Details of Consultations Held for the Project

Major Issues	Issues and concerns raised	Response from the project
Awareness about the proposed project	• During public consultations, consultant informed about the proposed project to the affected persons; • Most of the participants expressed concerns about the proposed project, emphasizing that the project authority should avoid installing transmission lines over existing housing structures. They pointed out that if transmission lines pass above residential buildings, it would create difficulties in constructing multi-storied buildings in the future; • Md. Shafiqul Alam, President of Guschi High School in Raozan, Chattogram, stated that the project authority should avoid routing the proposed transmission line over educational institutions, as there are future plans to expand the school into a multi-storied building. He further mentioned that they would have no objections if the transmission line were installed across agricultural land. Most of the participants also expressed their willingness to support the project, on condition that that no structural damage occurs during the construction works; • Mr. Subrato Kumar, Assistant Upazila Primary Education Officer, Raozan, Chattogram said that,	• The consultant informed participants that the revised proposed route of the transmission line has already been adjusted to avoid important structures such as educational institutions, religious establishments, and residential buildings along the route. • Representatives from the Power Grid and the consultants stated that, before the commencement of the project, the Power Grid will conduct a detailed check survey through the EPC contractor, as well as carry out a socio-economic impact assessment survey to identify any potential losses. The project will consider public concerns and make every effort to avoid damage to structures. If avoiding damage is not possible, compensation will be provided in accordance with the Electricity Act 2018. • The Power Grid will give top priority to preventing impacts on any educational institutions before starting construction. • Land compensation for the areas required for tower footings will be provided to the affected people by the DC office as per the Electricity Rules 2020 (Amendment 2022). •

Major Issues	Issues and concerns raised	Response from the project
	before the construction work started, Power Grid will conduct revision of the propose route avoiding any educational institution; • Most participants from Moheshkhali, Patia, Boalkhali, and Raozan emphasized that the Power Grid should ensure payment of compensation for any loss of land, crops, salt, and trees before commencing construction work.	
Benefits of the Project	• Participants asked about the expected benefits of the project; • They expressed hope that uninterrupted power supply in the Chattogram Division would encourage the establishment of medium and large industries; • They anticipated that the new transmission lines would enhance power supply capacity and help reduce load shedding in the area; • Some unskilled laborers from the project area are expected to gain income opportunities during the construction phase; • Overall, participants expected the project to ensure a continuous electricity supply at full voltage within the project area.	• The consultant informed participants that the project would bring numerous positive benefits, not only to the project area but also by enhancing the power capacity of the national grid; • Economic and social development is expected to accelerate, with new industries being established due to the availability of reliable power supply. Local people will have increased job opportunities in these industries, thereby improving their economic conditions. As a stable power supply is essential for any development activities; • The project will ensure uninterrupted electricity supply at full voltage in the project area; • The Power Grid will coordinate with the EPC contractors to give priority to hiring local labor during civil construction works.
Loss of land, livelihoods and incomes and compensation	• Most participants stated that they would lose crops during the construction of the transmission line and demanded proper compensation; • Participants from Moheshkhali Upazila mentioned that the transmission line would cross salt-cultivated areas, leading to a loss of salt production during construction, for which they also demanded compensation; • Many participants from Anwara, Banshkhali, Boalkhali, and Raozan reported that they would lose homestead trees due to the construction of the transmission line and expected appropriate compensation for the loss of trees.	• In accordance with the Electricity Act 2018 and the Electricity Rules 2020 (Amendment 2022), compensation for the loss of land, crops, salt, and trees will be provided to the affected persons; • Land compensation will be disbursed to affected persons through the DC office, while compensation for crops and trees will be paid either by the EPC contractor or through the Resettlement Plan (RP) implementing INGO. •
Agriculture Impact	• Majority of participants stated that they will loss crops due to use of	• Power Grid will provide compensation due to loss of crops.

Major Issues	Issues and concerns raised	Response from the project
	land for tower foundation. It was estimated that 31.27 acre of agriculture land will be affected by the project. They demanded proper compensation due to loss of crops during construction period of transmission line.	
Impact on Salt Production	• Majority of participants from Moheshkhali and Pekua stated that due to construction of tower footing, they will loss salt production, they demand proper compensation.	• Power Grid will provide compensation due to loss of salt field.
Impact on Fisheries	• The impact on fish will be very minimal by intervention of the project in the area.	• Power Grid will provide compensation due to loss of fishes.
Environmental Impact	• As per inventory of loss survey, approximately 39,479 trees will need to be cut due to installation of 765kV transmission line. Participants from these areas have strongly emphasized the need for fair and adequate compensation for the loss of trees. Additionally, they have called for a tree plantation program to be implemented in the affected areas to replace the lost vegetation and mitigate environmental impacts.	• To mitigate environmental impact due to cut of trees, Power grid will provide tree compensation as well as will effectively take initiative to plant tree sapling as of 1:3 basis that mean three tree will be planted by replace of one tree cut.
Traffic congestion and road impact	• Transportation of construction materials may lead to traffic congestion, as well as dust and noise emissions. Additionally, stringing works for the transmission line—particularly at road crossings—can further disrupt traffic flow. Local communities have requested that effective measures be implemented to minimize traffic jams in these areas.	• Contractors will be obliged to avoid traffic congestion and follow health and safety guidelines to control dust emissions and noise generation. Power Grid officers and monitoring consultant will monitor the performance of the contractors and compliance with safeguards requirements;
Avoidance and safeguards	• Locals stated that during the stringing works of the transmission line, the contractor must ensure appropriate safety measures to prevent any accidents involving community members. The EPC contractor will install adequate safety signs, conduct safety awareness activities, and hold public consultations to alert people in the affected areas along the transmission line route.	• Power Grid will ensure that all required safety measures are followed by contractors during construction of TL. Power Grid and monitoring consultant will strongly monitor the community safety during its operations; • Power Grid will establish a code of conduct with EPC to take effective measures related to safety concern.
Risks and hazards	• Locals said that sound and air pollution will increase during	• Necessary safety measures such as erecting bamboo sheds over the built

Major Issues	Issues and concerns raised	Response from the project
	construction of TL; • Civil works of the project will lead to influx of migrant labor teams; their possible misconduct and engagement in sexual harassment of women; • Compensation payments should not be delayed. Middlemen interfering with compensation process and seeking bribes should be avoided. It should be a trouble-free process for APs; • Locals expected that they seek help from power grid in preparing proper documentation for land compensation from DC office.	structures and fencing off the construction sites will be adopted by the contractors during conductor stringing. Civil works will be scheduled to avoid cultivation seasons, and peak periods for other livelihood activities; • The final engineering designs will study the drainage systems and necessary measures would be incorporated to avoid environmental hazards; • Power Grid and the contractors will endeavor to minimize labor influx and place priority in local labor. Awareness raising programs will be conducted for labor teams. It will be a mandatory requirement for the contractors to enforce a code of conduct for the labor teams. Power Grid will establish a grievance redress mechanism (GRM) to facilitate any affected/aggrieved parties to report their grievances/complaints and seek resolution within a reasonable time frame; • Power Grid together with DC will ensure that compensation is paid on due time and before taking possession of land. Compensation will be paid directly to the landowner/ claimant through banking channel. Implanting INGO and EPC contractor will assist affected landowners to prepare proper documents for land compensation from DC office.
Job Opportunity	• During construction period some local workers may have been required such as civil helper, earth workers, security guards etc. Local people said project authority should engage local workers as priority basis.	• Power Grid will hire local people as civil helpers, earth workers and security guards during construction work.
Opinion	• Local people expected uninterrupted electric supply in the area by implementation of the project. They think project will reduce load shedding in the area resulted people will be benefited by the project. • Most of the local expected proper compensation due to loss of land, crops, trees etc.	• As per Electricity Act 2018 and Electricity Rules 2020 (Amendment 2022) DC will provide compensation due to use of land for tower footings; additionally, Power Grid through EPC contractor will provide compensation due to loss of crops, salt production, trees etc.

4. Stakeholder identification and analysis

In order to ensure effective engagement and open, frequent and honest dialogue with local communities and other key stakeholders, a stakeholder engagement plan is designed throughout

the life of the Project. This plan is to be developed and implemented in order to identify stakeholder and their issues of concern, establishes the methods for consultation, and provides a specific action plan for stakeholder engagement throughout the life of the Project.

Table 5: Stakeholder Assessment

Key Stakeholders		
Project Proponent	:	Power Grid Bangladesh PLC (Power Grid)
Related organizations/ Local government	:	DOE, DOF, DAE, RHD, BR, BWDB, Department of Fisheries, Ward Commissioner/UP member (male and female)
Local people	:	Businessmen, Service holder, Farmers, Day Labor, Teacher, Transport Worker, Homemaker, Student, Shopkeeper, etc.
Engagement Methods		
IEE phase	:	– Organizing consultation meetings by inviting key stakeholders above at draft scoping report and draft IEE report
Pre-construction/ Construction phase/ Regular operation Phase	:	– Regular communication with local community through personal contact; – Meeting with the representative of village on the quarterly basis; – Participatory meeting with villagers; – Interpersonal Interview with villagers.
Information Disclosure		
ESIA phase: Pre-construction/ Construction phase/ Regular operation Phase	:	– Disclosures of draft scoping report and draft ESIA report.
– Grievance mechanism process and complaints register		
All phase	:	– Receiving complaints and opinions from the public on regular basis through the engagement method; – Meeting with the representative of villagers; – Participatory meeting with villagers.

All the stakeholders have been primarily categorized into two categories that have been identified as:

- **Primary Stakeholders:** include people, groups, institutions that either have a direct influence on the project or are directly impacted (positively or adversely) by the project and its activities i.e. the grass-root stakeholders, such as project affected persons and general public including women and people with physical disabilities residing in the project area (for the proposed project: people living in the project area particularly the RoW) has been considered as primary stakeholders for this project;
- **Secondary stakeholders:** are those that have a bearing on the project and its activities by the virtue of their being closely linked or associated with the primary stakeholders and due to the influence, they have on the primary stakeholder groups.
- Apart from categorization, the stakeholders have also been classified in accordance with the level of influence they have over the project as well as their priority to the project proponent in terms of importance.

The stakeholders have been classified in accordance with the level of influence they have over the Project as well as their priority to the Project proponent in terms of importance. The influence and priority have both been primarily rates as:

- **High Influence/Priority:** This implies a high degree of influence of the stakeholder on the Project in terms of participation and decision making or high priority for Project proponent to engage that stakeholder.

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

Based on the above attributes, the following table delineates the stakeholders identified for the Project and their analysis.

Table 6: Stakeholder Mapping for the Project

Stakeholders	Category of stakeholder	Brief profile	Influence status	Basis of Influence Rating
Management				
Project affected persons (PAPs)	Primary	Loss of land for the construction of tower footing. Loss of trees, crops, etc. in the width of RoW of transmission lines	Medium	• No major restrictions around the Project site • Project bring development to the area • Increase in employment opportunities and preference in job during construction phase • Improvement in electrical supply and infrastructure in the area • Minimize impact
Power Grid Bangladesh PLC (Power Grid)	Secondary	Power Grid is the Project proponent own a controlling stake of 100% in the Project	Highest	• Primary Project proponent • Responsible for construction and operation of this Project • Primary financial beneficiaries • Responsible for all the Project related risks and impact liabilities
Regulatory/Administrative Authorities & Agencies				
Department of Environment (DOE)	Secondary	The Department of Environment is the primary government regulatory authority for Environmental protection in Bangladesh.	High	Responsible for environmental clearance, management and monitoring including necessary compliance throughout the Project lifecycle
Department of Forest (DOF)	Secondary	The Department of Forest is the primary government regulatory authority for protection of forest in Bangladesh.	High	Responsible for forest protection, conservation and management and provide permit for cutting trees for width clearing of TL during construction phase
Ministry of Railway	Secondary	Ministry of Railway is the primary government regulatory authority for construction and maintenance of railways in Bangladesh	High	Responsible for the construction of new railway and maintenance of existing. Provides permit while use the right-of-way and/or crossing (overhead and underground) power and gas transmission and distribution lines, etc.

Roads and Highways Department (RHD)	Secondary	Roads and Highways Department is the primary government regulatory authority for the construction and repair of roads and highways in Bangladesh	High	Responsible for the construction of new roads and highways, and maintenance of existing. Provides permit while use the right-of-way and/or crossing (overhead and underground) power and gas transmission and distribution lines, etc.
Other Regulatory & Permitting Authorities	Primary		High	• Agencies required for obtaining permits and licenses for operation of the Project • Primary involvement during operation phases
Political Administration				
Upazila (sub–District Level) Political Administration	Secondary	Elected representatives of people at sub-district level for a fixed tenure	Medium	• Key linkage between the community and the Power Grid
Union/Ward leaders & local representative	Secondary	Elected representatives at Union/Ward level i.e., village level for a fixed tenure	Medium	• Plays important role in providing public opinion and sentiment on the Project • Empowered to provide consent and authorization for establishment of Project on behalf of the community

5. Stakeholder Engagement Program

Stakeholder engagement becomes a successful exercise when proper and participatory communicative methods are used. This ensures that the stakeholders are kept engaged and well informed of the Project development at every stage. A combination of communicative methods is usually used to engage with the stakeholders. To determine which option is best suited to the various stakeholders, a benefit analysis of each option can be carried out. The communicative methods are:

- General Information consisting of the Project's various activities, the operation stage and impacts that might arise shall be made available:
  - on information board of Chattogram and Cox's Bazar districts and Moheshkhali, Pekua, Banskhali, Anwara, Patiya, Boalkhali, and Raozan upazila and union offices of the project areas.
  - on information board of Power Grid
  - on Power Grid's website
  - in local newspaper
- Detailed information including documents like ESIA report; Environment, Health & Safety and Social Policy, Environment Management Plan, RP, LMP including environmental decisions shall be in hard copies and disseminated to:
  - district, upazila, union/ward council offices of the project areas
  - Project Site Offices
  - Electronic version of these documents will be made available at Power Grid's website.
- In addition to this, a host of tools and techniques can be adopted to engage with the stakeholders in a transparent and accountable manner. Below a list of the tools and techniques which can be adopted are mentioned:

- Public Meeting: Public meeting should be arranged to disclose information on a large scale involving the stakeholders of a particular village/union regarding project sites. A schedule of the meeting can be circulated well in advance and discussions can involve feedback session from the stakeholders. The meeting can be conducted in the premise of the adjacent school of the Project for proximity and familiarity purposes. Once the meeting concludes, minutes of the same should be kept as a record with the site office and a copy given to the ward member of the respective area. Schedules of future meetings should be discussed and finalized so that the stakeholders can gauge the seriousness of the Project proponent in continuing the engagement process.

- Focus Group Discussion (FGDs): FGDs are important when gauging with a particular group of stakeholders on issues related to the Project activities. FGDs should be conducted to understand the needs, perceptions, concerns of the group. The discussion will give space for the participants to voice their concerns and suggestions. The moderator of the FGD should be impartial in his/ her view and should encourage everyone present to participate in the discussion. Records of the FGDs should be maintained and updated regularly.

- Participatory Workshops: Participatory workshops are meetings which enable local people to analyze, share and enhance their knowledge to plan, manage and evaluate development Projects and program. Visual aids–such as mapping, videos, illustrations, timelines, card sorting and ranking, Venn diagrams, seasonal calendar diagramming and body maps can be used in participatory workshops to engage participants and capture knowledge. Participatory Workshop is an effective means of getting participants to reflect on issues and their own personal experiences. These workshops also pay particular attention to group dynamics and breaking down distinctions between 'uppers' – those with power, standing, influence, etc. within a community – and 'lowers' – those with less power, influence and standing within a community. To initiate such a workshop, an expert familiar with participatory tools and conducting such workshops shall be engaged.

- Participatory Rural Appraisal (PRA) Techniques: PRA techniques are usually adopted to emphasize local knowledge by enabling local people to make their own appraisal, analysis and plan. PRA uses group animation and exercises to facilitate information sharing, analysis and action among stakeholders. This process can be useful when the Project proponent initiates any developmental activities in the area and uses the local knowledge to plan and strategize so that they feel responsible for delivery of the objectives.

The consultation with the stakeholders will be conducted by Power Grid, RP implementing NGO/firm and all relevant project officials in collaboration with the Environment, Project Director/Site In charge at the site level. Any grievances from the community relating to any issues that might arise from the Project activities will be managed by the Power Grid or its consultant, and/or RP implementing NGO/firm based at the Site Office.

The stakeholders will be informed in advance of the planned Project activities. The development of the facilities will be based on the ESIA procedures and mitigation issues once an ESIA study has been completed. Information on the summary of the ESIA draft will be disclosed to the public in the Bangla for easier accessibility.

Consultations with the direct internal stakeholders will be provided separately from this document. At a minimum, communication will involve meetings, information boards announcements and an Intranet system to apprise the direct employees of Power Grid regarding the procedures of

emergency response system, incident/accident reporting, grievance redressal mechanism, HR Policies and Procedures, welfare measures etc. In addition, communication of general employment conditions, company's code of conduct for work site, EHS concerns, use of Personal Protective Equipment's (PPEs), information and awareness about the requirements of Bangladesh labour laws and minimum wages, working hours, grievance redressal, retrenchment process etc. should be conducted with workers engaged with contractors.

Project related information will be posted on the informational boards at the site office as well as at the Corporate Level. Information on the Project milestones will be published in advance on the company's website to be available for the public and non-governmental organization to comprehend the attitude of the external stakeholders. In addition, Power Grid will publish information on the Project in the local newspapers.

In turn, if any issues are raised by the stakeholders, the Project proponent management comprising of the Grievance Committee at the Site Level will respond accordingly in the shortest possible time. Details of which have been provided in the Grievance Redressal Mechanism Plan developed for Power Grid.

The responsibility for the SEP implementation will be held by the Social Specialist based at the Head Office of Power Grid in Dhaka. He will be supported by the Director (HR & Administration - Corporate Level), EHS Manager (from contractor site) and the Community Liaison Officer (both at the Site Level) of the Company.

6. Description of Engagement Methods

Various methods of engagement will be used as part of the project's interaction with the stakeholders, to ensure that different stakeholder groups are successfully reached and are involved in the process of consultation, decision-making and the development of impact management solutions.

Information that is communicated in advance of public consultations primarily includes an announcement thereof in the public media – local, regional and national, as well as the distribution of invitations and full details of the forthcoming meeting well in advance, including the agenda. In case of international stakeholders' engagement, advance invitation will be sent or be connected through social media such as Skype, Viber, and WhatsApp etc. Due to Covid-19, tools and methods will be different-using digital technology, phone calls, or traditional methods of communication. It is crucial that this information is widely available, readily accessible, clearly outlined, and reaches all areas and segments of the target community. Following parameters will be used to achieve a successful stakeholder's engagement program:

8.1 Engagement methods and tools in light of COVID-19 outbreak

With the outbreak and spread of COVID-19, people have been mandated by national or local law to exercise social distancing, and specifically to avoid public gatherings to prevent and reduce the risk of the virus transmission. Various restrictive measures have been adopted including some imposing strict restrictions on public gatherings, meetings and people's movement, and others advising against public group events. At the same time, the general public has become increasingly aware and concerned about the risks of transmission, particularly through social interactions at large gatherings.

WHO has issued technical guidance in dealing with COVID-19, including: (i) Risk Communication and Community Engagement (RCCE) Action Plan Guidance Preparedness and Response; (ii) Risk

Communication and Community engagement (RCCE) readiness and response; (iii) COVID-19 risk communication package for healthcare facilities; (iv) Getting your workplace ready for COVID-19; and (v) a guide to preventing and addressing social stigma associated with COVID-19. All these documents are available on the WHO website through the following link: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance.

Given the COVID-19 pandemic situation, managing public consultation and stakeholder engagement in the Project needs to adhere to national requirements and any updated guidance issued by WHO and the World Bank. The alternative ways of managing consultations and stakeholder engagement will be in accordance with the local applicable laws and policies, especially those related to media and communication. The suggestions set out below are subject to confirmation that they are in accordance with existing laws and regulations applying to the project.

With growing concern about the risk of virus spread, there was an urgent need to adjust the approach and methodology for continuing stakeholder consultation and engagement. Considering the importance of complying with national law requirements, below are some suggestions for stakeholder consultation amidst COVID-19 outbreak:

- Identify and review planned activities under the project requiring stakeholder engagement and public consultations.
- Assess the level of proposed direct engagement with stakeholders, including location and size of proposed gatherings, frequency of engagement, and categories of stakeholders.
- Assess the level of risks of the virus transmission for these engagements, and how restrictions that are in effect in the country / project area would affect these engagements.
- Identify project activities for which consultation/engagement is critical and cannot be postponed without having significant impact on project timelines.
- Assess the level of ICT penetration among key stakeholder groups, to identify the type of communication channels that can be effectively used in the project context.

Based on the above, specific channels of communication that will be used while conducting further stakeholder consultation and engagement activities need additional considerations. The following are some considerations while selecting channels of communication, in light of the current COVID-19 situation:

- Avoid public gatherings (taking into account national restrictions), including public hearings, workshops and community meetings;
- If smaller meetings are permitted, conduct consultations in small-group sessions, such as focus group meetings; If not permitted, make all reasonable efforts to conduct meetings through online channels, including WebEx, Zoom and Skype;
- Be sure that everyone involved in stakeholder planning articulate and express their understandings on social behavior and good hygiene practices, and that any stakeholder engagement events be preceded with the procedure of articulating such hygienic practices.
- Diversify means of communication and rely more on social media and online channels. Where possible and appropriate, create dedicated online platforms and chat groups appropriate for the purpose, based on the type and category of stakeholders;
- Where direct engagement with project affected people or beneficiaries is necessary, identify channels for direct communication with each affected household via a context specific combination of email messages, mail, online platforms, dedicated phone lines with knowledgeable operators;
- Each of the proposed channels of engagement should clearly specify how feedback and suggestions can be provided by stakeholders;
- However, in situations where none of the above means of communication are considered adequate for required consultations with stakeholders, Power Grid should discuss whether

the project activity can be rescheduled to a later time. Where it is not possible to postpone the activity or where the postponement is likely to be for more than a few weeks, IA should consult AIIB Teams to obtain advice and guidance.

8.2 Advance Public Notification

Advance public notification of an upcoming consultation meeting will be given and it will be available via publicly accessible locations and channels. The primary means of notification may include mass media and the dissemination of posters/ advertisements in public places. The project keeps proof of the publication (e.g., a copy of the newspaper announcement) for the accountability and reporting purposes. Existing notice boards in the communities may be particularly useful for distributing the announcements, such as boards adjacent to the widely visited public premises like local government office (ward commissioner office/union Parishad), village markets, post offices, transport links, and offices of the local NGOs. When the notifications are placed on public boards in open air, it should be remembered that the posters are exposed to weather, may be removed by bypasses or covered by other advertisements. The project's staff will therefore maintain regular checks in order to ensure that the notifications provided on the public boards remain in place and legible. In case of international stakeholders, notice will be given through email, phone calls, through websites etc.

8.3 Communication with project affected people and vulnerable communities

Another critical aspect of the meeting preparation process is selecting the methods of communication that reach the potential audience with lower levels of literacy or those who are not well-versed in the technical aspects of the project. Oral communication is an option that enables the information to be readily conveyed to such persons. This includes involving the selected community representatives/ village leaders/ local NGOs and initiative groups to relay up-to-date information on the project and consultation meetings to other members of the community, particularly to those in remote areas of the vicinity of the project sites of Power Grid for a larger part of the year. Moreover, due to the construction of TLs, local communities, and local business might be affected as well. Advertising the project and the associated meetings could be made via announcements or television and making direct calls and through dedicated websites, social media and local FM Radio (mobile phone communication with internet facility is widely available in Bangladesh) could be adopted for reaching out to the remote audiences. The announcement of a public meeting or a hearing is made sufficiently in advance, thereby enabling participants to make necessary arrangements, and provides all relevant details, including date, time, location/venue and contact persons. The following, when adopted give dividend:

- Making available a register for comments and suggestions by any member of the affected community and general public to provide their written feedback on the contents of the presented materials. As a rule, the register is made available for the entire duration of the requisite disclosure period. Where necessary, a project representative or an appointed consultant should be made available to receive and record any verbal feedback in case some stakeholders experience a difficulty with providing comments in the written form.
- Drafting and communicating an agenda for the consultation meeting provides a clear and itemized outline of the meeting's structure, sequence, chairpersons, a range of issues that will be discussed and a format of the discussion. This gives the prospective participants an opportunity to prepare their questions and comments in advance. It is essential to allocate a sufficient amount of time for a concluding Q&A session at the end of any public meeting or a hearing to record comments and suggestions for subsequent incorporation into the project design. The recorded comments and how they have been addressed by the project become an appropriate material for inclusion in the project's regular reporting to the stakeholders.

- Knowledge and advice of the community representatives and local NGOs are invaluable to ensure that these aspects are fully observed. If deemed necessary, separate meetings and focus group discussions will be held, as described above.

An attendance list is made available at the commencement of the consultation/hearing in order to record all participants who are present at the meeting and their affiliation. Wherever possible, attendees' signatures should be obtained as a proof of their participation. Details of the attendees who were not initially on the list (e.g., those participating in place of somebody else, or general public) should be included in addition to those who have registered for the meeting in advance.

In most cases and as a general practice, the introductory initial part of the meeting or a hearing will be delivered in a format that is readily understandable to the audience of laypersons and should be free of excessive technical jargon. If necessary, preference should be given, whenever possible, to the oral and visual methods of communication (including presentations, pictorials, illustrations, graphics and animation) accompanied by hand-out materials imparting the relevant information in understandable terms rather than as text laden with technical intricacies. Where technical specifics of the project's particular activities or solutions are required to be delivered in a greater detail, it will be ensured that the information conveyed remains comprehensible to all members of the audience and that the description of complex technicalities is adapted to their level of understanding, thereby enabling productive feedback and effective discussion.

If a large audience is expected to attend a public meeting or a hearing, necessary arrangements will be made to ensure audibility and visibility of the presentation and any demonstrations involved. This includes provision of a microphone, proper illumination, projector, places allocated for the wheelchair users and covid management procedures etc.

Taking records of the meeting is essential both for the purposes of transparency and the accuracy of capturing public comments. At least three ways of recording may be used, including: Taking of written minutes of the meeting by a specially assigned person or a secretary; Audio recording (e.g., by means of voice recorders); and Photographing.

Questions provided in the evaluation form on the consultation may cover the following aspects:

- ✓ Participant's name and affiliation (these items are not mandatory if the participant prefers to keep the form confidential)
- ✓ How did they learn about the Project and the consultation meeting?
- ✓ Are they generally in favor of the Project?
- ✓ What are their main concerns or expectations/hopes associated with the Project or the particular activity discussed at the meeting?
- ✓ Do they think the Project will bring some advantages to their community as a whole?
- ✓ Is there anything in the Project and its design solutions that they would like to change or improve?
- ✓ Do they think that the consultation meeting has been useful in understanding the specific activities of the Project, as well as associated impacts and mitigation measures? What aspects of the meeting they particularly appreciated or would recommend for improvement?

Bearing in mind that some of the participants might find completion of the evaluation form challenging due to the literacy constraints or concerns about their confidentiality, the distribution of the feedback forms should always be explained that filling the form is optional. Some persons may be willing to express their feedback verbally and in this case a member of Project staff will be allocated to take notes.

Table 7: Methods, Tools and Techniques for Stakeholder Engagement

Method / Tool	Description and Use	Contents	Dissemination Method	Target Groups
Information Provision				
Distribution of printed public materials: leaflets, brochures, fact sheets	Used to convey information on the Project and regular updates on its progress to local, regional and national stakeholders.	Printed materials present illustrative and written information on Project activities, facilities, technologies and design solutions, as well as impact mitigation measures. Presented contents are concise and adapted to a layperson reader. Graphics and pictorials are widely used to describe technical aspects. Information may be presented both in Bangla for local and national stakeholders, and in English for international audience.	Distribution as part of consultation meetings, public hearings, discussions and meetings with stakeholders, as well as household visits in remote areas. Placement at the offices of local administrations and NGOs, libraries and other public venues. Once the project will be approved by the Bank and line ministry, documents will be disclosed	Households in Project Area of Influence. Residents in the project area and adjacent communities
Distribution of printed public materials: newsletters/ updates	A newsletter or an updated circular sent out to Project stakeholders on a regular basis to maintain awareness of the Project development.	Important highlights of Project achievements, announcements of planned activities, changes, and overall progress.	Circulation of the newsletter or update sheet with a specified frequency in the Project Area of Influence, as well as to any other stakeholders that expressed their interest in receiving these periodicals. Means of distribution – post, emailing, electronic subscription, delivery in person.	Households in Project Area of Influence. Public venues in Project Area of Influence – local administrations, communities.
Visual presentations	Visually convey Project information to affected communities and other interested audiences.	Description of the Project and related solutions/impact management measures. Updates on Project development.	Presentations are widely used as part of the public hearings and other consultation events with various stakeholders. Power Grid will make use of this tool during	Affected communities in in the project area, participants of the public hearings, consultations, rounds tables,

Method / Tool	Description and Use	Contents	Dissemination Method	Target Groups
			all public consultations, FGDs and other meetings where large group of people will be gathered either to ventilate their concerns or to be informed of progress of work of new component/sub component.	focus group discussions and other forums attended by Project stakeholders.
Notice boards	Displays of printed information on notice boards in public places.	Advance announcements of the forthcoming public events, commencement of specific Project activities, or changes to the scheduled process.	Printed announcements and notifications are placed in visible and easily accessible places frequented by the local public, including libraries, village cultural centers, post offices, shop, local administrations. These would be regularly updated as the simplest and most cost-effective means to educate all about the progress of the project, changes in the plan or what is in the offing. Notice Boards could also be used as a tool for circulation of jobs for the local population	Directly affected communities in the project area
Websites Use of Dedicated Website by Power Grid including dedicated social media platform like Twitter, Facebook, WhatsApp, etc.	All the project activities, documentation, notices, project updates will be published in the project websites.	All contents mentioned above will be displayed in the project websites.	Through websites Websites would be updated on regular basis. All circulation that are communicated through other means must be included in the website.	For all types of stakeholders
Information Feedback				
Information repositories accompanied by a feedback mechanism	Placement of Project-related information and printed materials in dedicated/designated locations that also provide visitors and	Various Project-related materials, ESIA/SEP/RP/LMP and other safeguard documentation, environmental	Deposition of materials in publicly available places (offices of local NGOs, local administrations, libraries) for the duration of a disclosure	Directly affected communities in the project area and all interested stakeholders

Method / Tool	Description and Use	Contents	Dissemination Method	Target Groups
	readers with an opportunity to leave their comments in a feedback register.	and social action plans.	period or permanently. Audience is also given free access to a register for comments and suggestions. As and when new material is available, it should be kept in the repository	
Surveys, Interviews and Questionnaires	The use of public opinion surveys, interviews and questionnaires to obtain stakeholder views and to complement the statutory process of public hearings.	Description of the proposed Project and related solutions/impact management measures. Questions targeting stakeholder perception of the Project, associated impacts and benefits, concerns and suggestions.	Soliciting participation in surveys/interviews with specific stakeholder groups or community wide. Administering questionnaires as part of the household visits. To be conducted on need basis	Directly affected households in the Project Area of Influence. Other communities within the Project Area of Influence.
Feedback & Suggestion Box	A suggestion box can be used to encourage residents in the affected communities to leave written feedback and comments about the Project. Contents of the suggestion box should be checked by designated Project staff on a regular basis to ensure timely collection of input and response/action, as necessary.	Any questions, queries or concerns, especially for stakeholders that may have a difficulty expressing their views and issues during public meetings.	Appropriate location for a suggestion box should be selected in a safe public place to make it readily accessible for the community. Information about the availability of the suggestion box should be communicated as part of Project's regular interaction with local stakeholders. Should always be available at the project site throughout the lifecycle of the project. Feedbacks/Suggestions must be addressed regularly and actions to be circulated using appropriate means.	Directly affected households in the Project Area of Influence. Other communities within the Project Area of Influence.
Consultation & Participation				
Public hearings	Project representatives, the affected public, authorities, regulatory bodies and	Detailed information on the activity and/or facility in question,	Wide and prior announcement of the public hearing and the relevant details, including notifications	Directly affected communities in the Project Area of Influence.

Method / Tool	Description and Use	Contents	Dissemination Method	Target Groups
	other stakeholders for detailed discussion on a specific activity or facility that is planned by the Project and which is subject to the statutory expert review.	including a presentation and an interactive Questions & Answers session with the audience.	in local, regional and national mass media. Targeted invitations are sent out to stakeholders. Public disclosure of Project materials and associated impact assessment documentation in advance of the hearing. Viewers/readers of the materials are also given free access to a register of comments and suggestions that is made available during the disclosure period. Public hearing must be arranged as and when required. Leaving aside the construction related work, rest of the project work is primarily academic and may not be useful for public hearing but useful for the relevant stakeholders. Public hearing must the relevant and address specific components and subcomponents	Other communities within the Project Area of Influence. Residents of in the Project Area of Influence
Focus Group discussion (FGD)	Used to facilitate discussion on Project's specific issues that merit collective examination with various groups of stakeholders.	Project's specific activities and plans, design solutions and impact mitigation/ management measures that require detailed discussion with affected stakeholders. Invitation for FGD to be uploaded in the relevant website	Announcements of the forthcoming meetings are widely circulated to participants in advance. Targeted invitations are sent out to stakeholders. To be arranged as and when relevant. Dissemination of the outcome of the FGD to be uploaded in the relevant website and its reflection would also be made conspicuous in the curricula, and other linked platforms.	Directly affected households in the Project Area of Influence, youth, elderly, women, and other vulnerable groups.
Information centers and field offices	Project's designated venue for depositing Project-related information that also	Project-related materials. Any issues that are of interest or	Information about the info center or a field office with open hours for the public, together	Directly affected communities in the Project Area of Influence and

Method / Tool	Description and Use	Contents	Dissemination Method	Target Groups
	offers open hours to the community and other members of the public, with Project staff available to respond to queries or provide clarifications.	concern to the local communities and other stakeholders.	with contact details, is provided on the Project's printed materials distributed to stakeholders, as well as during public meetings and household visits.	any other stakeholders and interested parties.
Site Tours	Visits to Project Site and facilities organized for local communities, authorities and the media to demonstrate Project solutions. Visitors are accompanied by the Project's staff and specialists to cover various aspects and to address questions arising from the public during the tour.	Demonstration of specific examples of Project's design solutions and approaches to managing impacts.	Targeted invitations distributed to selected audience offering an opportunity to participate in a visit to the Project Site. Limitation: possible safety restrictions on the site access during active construction works. To be conducted periodically to monitor the progress of the project or certain specific component/ subcomponent	Local communities within the Project Area of Influence. Elected officials. Media groups. NGOs and other initiative groups.

8.4 Planned stakeholder engagement activities

Stakeholder engagement activities will need to provide stakeholder groups with relevant information and opportunities to voice their views on issues that matter to them. Table 8 presents the stakeholder engagement activities PIU and PMU will undertake for their project(s). The activity types and their frequency are adapted to the three main project stages: project preparation (including design, procurement of contractors and supplies), construction, and operation and maintenance.

Table 8: Stakeholder Engagement Activities

Stage	Target stakeholders	Topic(s) of engagement	Method(s) used	Location/frequency	Responsibilities
Stage 1: Project preparation (Project design, Scoping, Resettlement Planning, ESIA, LMP, GVP Plan and SEP preparation	Project Affected People: People potentially affected by land acquisition, when triggered People residing in project area Vulnerable households	ESIA, LMP, Gender and GBV prevention plan, SEP, RP disclosures; Land acquisition process; Assistance in gathering official documents for authorized land use; Compensation rates and methodology; Compensation packages; Project scope and rationale; Project E&S principles; Resettlement and livelihood restoration options; Grievance mechanism process;	Public meetings, separate meetings for women and vulnerable Face-to-face meetings Mass/social media communication (as needed) Disclosure of written information: brochures, posters, flyers, website Information boards or desks Grievance mechanism Local news paper The following modes to be adopted specifically for the vulnerable groups:	During preparation and detailed design stage- that would affect the area. Continuous communication through mass/social media and routine interactions throughout RP development as needed.	Power Grid staff responsible for land acquisition or its consultant

			• Robust engagement with local community-based organizations. • The project would arrange separate consultation sessions for different target groups • Resources allocation towards local administration representatives and councilors. • Provision of transportation or transportation cost particularly for the disabled, marginalized and the elderly ones including women • Engagement of local NGO's and CBO's who work with vulnerable people at the community level to help disseminate information and organize consultations • Separate consultation with men and women to be arranged • Manageable and gendered FGD to be arranged so that women can speak freely • The project must have adequate means to reach the disabled ones in the community. If need be, teams must visit the disabled ones in their habitat • Information may be printed in Braille to allow the blind		

Stage	Target stakeholders	Topic(s) of engagement	Method(s) used	Location/frequency	Responsibilities
			ones to have access to the project details		
	Other Interested Parties (Internal) Press and media NGOs Businesses and business organizations Workers' organizations Academic institutions National Government Ministries Different Government Departments General public, Rohingya communities, jobseekers	ESIA, RP, LMP, SEP disclosures Grievance mechanism Project scope, rationale and E&S principles	Public meetings, Mass/social media communication Disclosure of written information: Brochures, posters, flyers, website Information boards Grievance mechanism Notice board for employment recruitment	Throughout RP/ESIA/LMP/SEP and GBV prevention plan development as needed; Project launch meetings at local Power Grid office and Power Grid head quarter; Quarterly meetings in affected villages and affected communities Disclosure meetings in local, national level	Power Grid responsible for land acquisition or its consultant
	Other Interested Parties (External) Other Government Departments from which permissions/clearances are required; Other project developers, donors	Legal compliance issues Project information scope and rationale and E&S principles Coordination activities Land acquisition process Grievance mechanism process Disclosures of E&S documents	Face-to-face meetings Invitations to public/community meetings Submission of required reports	Disclosure meetings Reports as required	Power Grid and PIU
STAGE 2:	Project Affected People	Grievance mechanism	Public meetings, open houses, trainings/workshops;	Quarterly meetings during construction seasons	Power Grid, PIU, ESU, or its

Stage	Target stakeholders	Topic(s) of engagement	Method(s) used	Location/frequency	Responsibilities
	People potentially affected by land acquisition People residing in project area Vulnerable households	Health and safety impacts (ESMP, community H&S, community concerns) Employment opportunities Project status	Separate meetings as needed for women and vulnerable; Individual outreach to PAPs as needed; Disclosure of written information: brochures, posters, flyers, website Information boards in Power Grid Notice board(s) at construction sites, Grievance mechanism and as guided with ESF documents mainly RP and ESIA.	Communication through mass/social media as needed Notice boards updated weekly Routine interactions Brochures in local offices	consultants contractors, RP implementing NGO
	Rohingya Camp authority and communities	Project activities, duration, OHS measures, fire safety measures, etc.	Face to face meetings, meeting at site management, RRRC and IOL office	As and when required. 1st meeting before the construction starts	Power Grid, PIU, ESU or its consultant, contractors,
	Vulnerable communities and project affected people	Vulnerable group has to be identified considering the households which are (i) living below the official poverty line; (ii) women headed households living below the official poverty line; and (iii) headed by elderly persons or disabled persons. Announcement of vacancies (skilled/unskilled) at proposed site; Announcement of contract work for small scale work associated with the proposed Project;	Face to face, consultation, FGD etc.	Before the construction starts and during the construction period	Power Grid, PIU, ESU or its consultants, contractors, RP implementing NGO

Stage	Target stakeholders	Topic(s) of engagement	Method(s) used	Location/frequency	Responsibilities
	Other Interested Parties (External) Governmental committees for land use and compensation representatives in villages	Project scope, rationale and E&S principles Grievance mechanism Project status Bank compensation requirements	Face-to-face meetings Joint public/community meetings with PAPs	As needed (monthly during construction season)	Power Grid, PIU, ESU or its consultant, contractors
	Other Interested Parties (External) Press and media NGOs Businesses and business organizations Workers' organizations Academic institutions National Government Ministries Various Government Departments General public, tourists, jobseekers	Project information - scope and rationale and E&S principles Project status Health and safety impacts Employment opportunities Environmental concerns Grievance mechanism process	Public meetings, open houses, trainings/workshops Disclosure of written information: brochures, posters, flyers, website, Information boards Notice board(s) at construction sites Grievance mechanism	Same as for PAPs	Same as above
	Other Interested Parties (External) Press and media NGOs Businesses and business organizations Workers' organizations Academic institutions Local Government Departments General public, tourists	Grievance mechanism process Issues of concern Status and compliance reports	Grievance mechanism Power Grid website Face-to-face meetings Submission of reports as required	As and when required	Power Grid Staff, PIU, ESU or its consultant

7. Grievance Redress Mechanisms

The Project Proponent would establish a procedure to deal with and resolve any queries as well as address complaints and grievances about any irregularities. In this regard, a policy and/or guideline will be prepared and adopted for assessing and mitigating potential social and environmental impacts through grievance redress mechanism (GRM). The GRM will deal with complaints and grievances related to both social/resettlement and environmental issues of the Project. Grievance Redress Committees (GRC) will be formed to receive and resolve complaints as well as grievances from aggrieved persons from the local stakeholders including the Project-affected persons. Based on consensus, the procedure will help resolving issues/conflicts amicably and quickly, saving the aggrieved persons from having to resort to expensive, time-consuming legal actions. The GRCs will be established through a gazette notification from the Ministry of Power, Energy and Mineral Resources (MoPEMR); therefore, the GRC will be a legally constituted body.

The Grievance Redress Committee (GRC) will be established locally at Project sites and centrally at the Project level to receive and settle grievances from the affected persons and other local stakeholders. Most of the grievances will be resolved at the local-level GRC (LGRC), but those cases that cannot be resolved at the local level will be forwarded to central level. The local level GRC will be constituted with the following persons:

1. Executive Engineer, Power Grid: Convener
2. Representative of INGO (Non-voting): Member-Secretary
3. Chairman of Union Perished (UP) concerned: Member
4. Female member of ward of the UP concerned: Member
5. Retired teacher from the union concerned: Member
6. Representative of PAPs: Member

The RP implementing NGO will keep a close liaison with the affected people and discuss any type of issues, observation, complaints at focus group discussion (FGD) meetings on a weekly or fortnightly basis. Most of the issues will hopefully be settled in the focus group meeting but some issues requiring formal hearing and resolution will be brought to the Grievance Redress Committee (GRC) for resolution in form of a formal complaint. All complaints will have to be received at the local (Union) level GRC (LGRC) and resolved within a certain period (maximum four weeks from the date of lodging the complaints) as per circular of the MoPEMR (gazette notification). If the resolution attempt at the local level fails, the LGRC will refer the complaint with the minutes of the hearings to the PGRC.

To ensure impartiality and transparency, hearings on complaints will remain open to the public. The GRCs will record the details of the complaints and their resolution in a register, including intake details, resolution process and the closing procedures. Power Grid will maintain the following three Grievance Registers:

Intake Register: (1) Case number, (2) Date of receipt, (3) Name of complainant, (4) Gender, (5) Father or husband, (6) Complete address, (7) Main objection (loss of land/property or entitlements), (8) Complainants' story and expectation with evidence, and (8) Previous records of similar grievances.

Resolution Register: (1) Serial no., (2) Case no., (3) Name of complainant, (4) Complainant's story and expectation, (5) Date of hearing, (6) Date of field investigation (if any), (7) Results of hearing and field investigation, (8) Decision of GRC, (9) Progress (pending, solved), and (10) Agreements or commitments.

Closing Register: (1) Serial no., (2) Case no., (3) Name of complainant, (4) Decisions and response to complainants, (5) Mode and medium of communication, (6) Date of closing, (7) Confirmation of complainants' satisfaction, and (8) Management actions to avoid recurrence.

Grievance resolution will be a continuous process in project level activities and implementation of those. The PIC will keep records of all resolved and unresolved complaints and grievances (one file for each case record) and make them available for review as and when asked for by Bank and any other interested persons/entities. The PIU also prepares periodic reports on the grievance resolution process and publish these on the Power Grid website.

The Power Grid intends to strengthen the GRM through information and communication technology to ensure that all complaints including those of sexual exploitation and abuse are immediately reported to the Power Grid. The complaints registered in this system will be managed by a dedicated administrator that will liaise immediately any GBV and SEA complaints with the contractors, consultant and Power Grid/PIU/ESU for immediate measures. If the GRM receives a case on sexual exploitation and abuse related to the project, it will be recorded with due consideration to the confidentiality and privacy of the complainant, and with the consent of the complainant will be referred to the relevant assistance, if needed, for referral to any other service providers. The first cut of mapping of GBV service providers focused exclusively on services that respond to gender-based violence in Bangladesh. The mapping includes nation-wide a total of 135 service providers, within which around 50 SPs are based in the Chattogram division. The ESU/Power Grid or its consultant will keep the information confidential to protect privacy of GBV and SEA complainants. In cases, where the perpetrator(s) is linked to project activities then the contractor will take appropriate actions as per the Code of Conduct signed by the particular person and under the effective law in Bangladesh. Power Grid will report activities and outcomes of GBV and SEA surveillance and management to the AIIB on a regular basis. For further details, please GBV prevention plan.

To ensure that grievance redress decisions are made in formal hearings and in a transparent manner, the Convener will apply the following guidelines:

i. A standard application format will be used for receiving grievances which will be available at the office of NGO /Consulting firm. This application format would be concurred by the PD.
ii. Reject a grievance redress application with any recommendations written on it by a GRC member or others such as politicians and other influential persons.
iii. Remove a recommendation by any person that may separately accompany the grievance redress application.
iv. Disqualify a GRC member who has made a recommendation on the application separately before the formal hearing.
v. Where a GRC member is removed, appoint another person in consultation with the Project Director.
vi. The Convener will also ensure strict adherence to the impact mitigation policies and guidelines adopted in this RAP and the mitigation standards, such as compensation rates established through market price surveys.

The following steps will be followed for the successful implementation of GRM.

- ***Step 1:*** Project stakeholders will be able to provide feedback and report/record complaints through several channels: in person at offices and at project sites, and by mail, telephone, and email.
- ***Step 2:*** Complaints and feedback will be compiled by the secretary in each level and recorded in a register. He or she will place the grievances to the committee and the complained person with the goal to resolve complaints within 15 days of receipt.
- ***Step 3:*** Within seven (7) days of the date a complaint is submitted; the responsible person will communicate with the complainant and provide information on the likely course of action and the anticipated timeframe for resolution of the complaint. If

complaints are not resolved within 15 days, the responsible person will provide an update about the status of the complaint/question to the complainant and again provide an estimate of how long it will take to resolve the issue.

- ***Step 4:*** This step involves gathering information about the grievance to determine the facts surrounding the issue and verifying the complaint's validity, and then developing a proposed resolution. Depending on the nature of the complaint, the process can include site visits, document reviews, a meeting with the complainant (if known and willing to engage), and meetings with others (both those associated with the project and outside) who may have knowledge or can otherwise help resolve the issue. It is expected that many or most grievances would be resolved at this stage. All activities taken during this and the other steps will be fully documented, and any resolution logged in the register.
- ***Step 5:*** This step involves informing those to submit complaints, feedback, and questions about how issues were resolved, or providing answers to questions. Whenever possible, complainants should be informed of the proposed resolution in person. If the complainant is not satisfied with the resolution, he or she will be informed of further options, which would include pursuing remedies through the World Bank, as described below. Data on grievances and/or original grievance logs will be made available to AIIB missions on request, and summaries of grievances and resolutions will be included in periodic reports to the AIIB.

8. Monitoring and Reporting

Monitoring of Project activities is necessary to cater to the stakeholder's concerns by ensuring transparency in guaranteeing the Power Grid's commitment in implementing the mitigation measures that addresses the environmental and social impacts arising from the Project.
Through this information flow, the local stakeholders feel the sense of responsibility for the environment and welfare in relation to the Project and feel empowered to act on issues that might affect their lives.

Power Grid should undertake a commitment in undertaking internal audits every quarter. All related information shall be readily maintained at the site office and produced at the time of the audits. Audit reports shall be accordingly created after every quarterly audit and submitted to the Social Officer. All records of these reports shall be maintained at the site office as well as the Corporate Office. In addition, an external auditor shall be engaged every six monthly to assess the activities of the Project and its mitigation measures. The auditor shall accordingly submit a report to the company for review and this should be forwarded to the lender financing the Project as well.

The monitoring report will include clear and specific indicators both as regard the engagement with stakeholders and also the project's grievance redress management. Power Grid or its consultant will work on a reporting matrix in this regard.

Table 09: Monitoring report Matrix

Key elements	Timeframe	Methods	Responsibilities
Stakeholders' access to project information and consultations	Periodic (during project preparation and maintained throughout project implementation)	Interviews, observations, survey	PIU and ESU together with Social and Environmental monitor
Project beneficiaries' awareness of project activities, their entitlements and responsibilities	Periodic (during project implementation)	Interviews, observations, survey	PIU/ESU and/or its consultant

Key elements	Timeframe	Methods	Responsibilities
Acceptability and appropriateness of consultation and engagement approaches	Periodic (during project implementation)	Interviews, observations, survey, score-card as relevant	Same as above
Community facilitators' engagement with target beneficiaries	Periodic (during project implementation)	Interviews, observations, survey, score-card as relevant	Same as Above
Accessibility and readability of public information dissemination materials	Periodic (during project implementation)	Spot checks, interviews, desk-review	ES Monitor
Tones in social media and broader public perceptions (including NGOs/CSOs)	Periodic (during project implementation)	Social media monitoring, interviews, observations	Power Grid/PIU
Rate of grievances and complaints (reported and unreported)	Periodic (during project implementation)	Desk review, interviews, survey	Power Grid and/or its consultant

10.1 Closing the Feedback Loop: Reporting back to stakeholder groups

The project team will ensure regular/periodic reporting back and information sharing with the PAPs and as well as the stakeholders' groups. This 'reporting back' measures vis-à-vis the PAPs should be always carried through face-to-face meeting or direct interactions, for the other stakeholders' group, although this may be adjusted considering the COVID-19 situation. Other pertinent media, such as website, social media, press briefing, may also be used.

Monthly summaries and internal reports on public grievances, enquiries and related incidents, together with the status of implementation of associated corrective/preventative actions will be collated by responsible staff and referred to the senior management of the project(s). The monthly summaries will provide a mechanism for assessing both the number and the nature of complaints and requests for information, along with the Project's ability to address those in a timely and effective manner.

The Project through the social monitor will arrange necessary training associated with the implementation of this SEP that will be provided to the members of staff who, due to their professional duties, may be involved in interactions with the external public, as well as to the senior management. Specialized training will also be provided to the staff appointed to deal with community stakeholder grievances as per the Public Grievance Procedure. Project contractors will also receive necessary instructions for the Grievance Procedure and in relation to the main principles of community relations.

Information on public engagement activities undertaken by the Project during the year may be conveyed to the stakeholders in two possible ways:

1. Publication of a standalone annual report on project's interaction with the stakeholders.
2. A number of Key Performance Indicators (KPIs) will also be monitored by the project on a regular basis, including the following parameters:
   - ✓ Number of public hearings, consultation meetings and other public discussions/forums conducted within a reporting period (e.g., monthly, quarterly, or annually);
   - ✓ Frequency of public engagement activities;

- ✓ Geographical coverage of public engagement activities – number of locations and settlements covered by the consultation process, including the settlements in remote areas within the Project Area of Influence (PAI);
- ✓ Number of public grievances received within a reporting period (e.g., monthly, quarterly, or annually) and number of those resolved within the prescribed timeline;
- ✓ Type of public grievances received;
- ✓ Number of press materials published/broadcasted in the local, regional, and national media;
- ✓ Amount of Project's charitable investments in the local communities in the Project Area of Influence.

The outcomes/feedback from these 'reporting back' measures will be compiled and shared/disclosed with the stakeholders' and general public through the use of proper media, such as Power Grid websites, social media accounts, communication materials, etc.

10.2 Points of contact

Information on the project and future stakeholder engagement programs will be available on the project's website and will be posted on information boards in the project site, local government offices, local markets and point of assembly etc. Information can also be obtained from Power Grid offices and from their websites. There should be a dedicated point of contact for recording project related complaints (including GBV related complaints) and passing those to the GRC for necessary action at their end. GRM should be user friendly and easily approachable, particularly by the disabled, marginalized and the vulnerable groups including the elderly.
The point of contact regarding the stakeholder engagement program at Power Grid should provide the following information:

Description	Contact details
Name and position	
Address:	
E-mail:	
Telephone:	
Toll Free Number: - **For Power Grid**	

10.3 Roles and Responsibilities

The specific role/responsibilities as regard the project's stakeholders' management is provided below:

Table 10: Role and Responsibilities for SEP Implementation

Actor/Stakeholder/ responsible person	Responsibilities
ESU/PIU-Power Grid and/or its consultant	- Overall planning and implementation of the SEP; - Lead activities on stakeholders' engagement - Management and resolution of grievances; - Guide/coordinate/supervise the contractors for activities related to the SEP - Monitoring and reporting on SEP to Power Grid and AIIB - Take lead in carrying out the beneficiary satisfaction survey - Supervision/monitoring of Contractor on SEP and GRM
Site Contractor(s) / sub-contractors	- Report/inform Power Grid on issues related to the implementation of the SEP / engagement with the stakeholders. - Resolve and convey management/resolution of grievance cases to the project GRM team, in particular labor related grievance cases. - Prepare, disclose and implement the contractor's code of conduct, CESMP, etc. - Collaborate/inform the local communities and other local level stakeholders on the E&S monitoring - Provide SEP and other E&S documents implementation with monthly/quarterly/half yearly progress report.

Annex-XII: Attendance of Public Consultation Meeting

Power Grid Bangladesh PLC

Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: ২৫/০৬/২৫ **Time:** ১২'২০মি:- **Venue:** ইউপি কার্যালয় বড়লিয়া ইউনিয়ন পরিষদ বড়লিয়া, পটিয়া, চট্টগ্রাম

LIST OF PARTICIPANTS

Sl. Nº	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
০১	কেরদৌসি বেগম	F	No	No	up Member	01812834581
০২	আশা বড়ুয়া	F	No	No	"	01838670330
০৩	ফজলুল হক	M	No	No	[illegible]	01834908302
০৪	মনছুরুল আলম	M	No	No	ইউপি (সেক্রেটারী)	01749202950
০৫	মো:- নূরুল ইসলাম	M	No	No	তথ্য সংগ্রহ কারী	01815974480.

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Power Grid Bangladesh PLC

Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: ২৫.৬.২৫ Time: ২' ৪০ মিনি Venue: চেয়ারম্যান (ভাঃ) নিজস্ব কার্যালয় বড়লিয়া ইউনিয়ন পরিষদ বড়লিয়া, পটিয়া, চট্টগ্রাম

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)	
০১	রাবেয়া বেগম	F	NO	NO	গৃহিনী		01871369526
০২	আসমা বেগম	F	NO	NO	বীমাকর্মী		01641-4175/6
০৩	রাশেদা বেগম	F	NO	NO	পশুপালন		01759389224
০৪	রাশেদা বেগম	F	NO	NO	ভারপ্রাপ্ত চেয়ারম্যান		01822113987
০৫	মোঃ- নুরুল ইসলাম	M	NO	NO	[illegible]	[illegible]	01815971180

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Power Grid Bangladesh PLC

Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet of Public Consultation

Date: 26/05/2025 **Time:** 10:30 AM **Venue:** Groschi High School, Raozan Chattagram

LIST OF PARTICIPANTS

SN	Name of the Participant	Male/ Female	Occupation	Mobile	Signature (If agreed by the participants)
1.	[illegible]	Male	UAP EO	01712545418	
2.	[illegible]	Male	[illegible] GHS	01819496461	
3.	[illegible]	Male	[illegible]	01817757458	
4.	[illegible]	"	[illegible] GHS	01660-108533	
5.	Hamidur Rahman Asif	M	SDE, Power Grid	01769458777	
6.	Ruma Das	Female	Teacher	01875-608378	Ruma Das
7.	Shamima Nasrin	Female	Primary Teacher	01819630298	
8.	SUJAN DAS GUPTA	MALE	Primary Teacher	01817703065	
9.	Nur Mohammad Khan	M		01810084775	
10.	[illegible]	M		01813407147	
11.	[illegible]	Male		9819-41699	

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SN	Name of the Participant	Male/ Female	Occupation	Mobile	Signature (If agreed by the participants)
12.	সৈয়দ মোহাম্মদ ইয়াছিন	Male		01309715020	[signature]
13.	মোহাম্মদ নুর নবী	M	শিক্ষকতা	01819642700	[signature]
14.	মো: জাহাঙ্গীর আলম	M		01979141339	[signature]
15.	গিয়াস উদ্দীন সোকন	M		01818620391	[signature]
16.	এস ও ম তাহুল খালেক প্রধান শিক্ষক [illegible]	M	প্রধান শিক্ষক	01813574280	[signature]
17.	মো: হাসান	M		01893645064	
18.	মো: নাছির	M		01828656463	[signature]
19.	শহীদ রেজা	M		01845686844	[signature]
20.	[illegible]	M		0671249068	[signature]
21.	হাজী সামসুল হক	M			
22.	[illegible]				
23.	মো: রাশেদ	M		01819377735	[signature]
24.	M. A. Foysal	M	Environmental Expert IIFC	01672143582	[signature]
25.	Tareque Ahmed Bhuiyan Deputy Manager Power Grid	M		01709643586	[signature]

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: 22.05.25 Time: 10.00 AM Venue: Pachimchaipbol Nurur Dokan. P chombol, Banskhali chattogram Tower -101-102

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
01	হাছন আহমদ	Male	No	No	ব্যবসা	হাছন
02	রফিক আহমেদ	"	No	"	ব্যবসা	রফিক
03	দিল মোহাম্মদ	"	No	"	কৃষি	দিল মোহা
04	বাদশা মিয়া	"	No	"	কৃষি	বাদশা
05	করম আলী	"	No	"	ব্যবসা	করম
06	জিয়া উদ্দিন	"	No	"	লেবার	জিয়া

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: ১৮/০৫/২৫ Time: ১১.২৫ এএম Venue: দক্ষিন ভুলদি (পুকুরের পাড়) বাঁশখালী চট্টগ্রাম T-711-115

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
১.	মো: মজিবল মুনিস	M	NO	NO	ব্যবসা	[signature]
২.	শাজাহান	M	NO	NO	কৃষক	শাজাহান
৩.	জামাল আহমেদ	M	NO	NO	চাকরি	জামাল
৪.	ইউসুফ হাওলাদার	M	NO	NO	ব্যবসা	ইউসুফ
৫.	আবু কালাম	M	NO	NO	দিন মজুর	নিরক্ষর

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultation

Date: 28.02.2025 **Time:** 04:30 Pm **Venue:** কাটাখালী প্রিজ সংলগ্ন লবনক্ষেত। পেকুয়া, কক্সবাজার

LIST OF PARTICIPANTS

Sl. Nº	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
০১	মো: কোরবান আলী	M	No	No	ব্যবসা	কোরবান আলী
০২	মো: রফিকুল ইসলাম	M	No	No	"	রফিক ইসলাম
০৩	মো: জাকির হোসেন	M	No	No	"	Sohel
০৪	মো: ইয়াকুব আলী	M	No	No	"	ইয়াকুব আলী
০৫	মো: আলমগীর	M	No	No	চাকরি	আলমগীর

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: 26.02.2025 Time: ১১' ৩০ মিঃ- Venue: [illegible]

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
১	[illegible]	M	No	No	ব্যবসা	[illegible]
২	[illegible]	M	No	No	[illegible]	[illegible]
৩	[illegible]	M	No	No	ব্যবসা	[illegible]
৪	[illegible]	M	No	No	কৃষি	[illegible]
৫	[illegible]	M	No	No	কৃষি	[illegible]
৬	[illegible]	M	No	No	ব্যবসা	[illegible]
৭	[illegible]	M	No	No	কৃষি	[illegible]
৮	[illegible]	M	No	No	চাকরি	[illegible]

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: 23.02.2025 **Time:** 10.25 am **Venue:** [illegible]

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
১	নজরুল ইসলাম	M			[illegible]	[illegible]
২	মনিরুল ইসলাম	M			চাকুরী	[illegible]
৩	মহিউদ্দিন	M			[illegible]	[illegible]
৪	[illegible]	M			গাড়ী চালক	
৫	মো: আলি আক্রাম খাঁন	M			চাকুরী	[illegible] 01832969249
৬	আক্কাস আলী	M			চাকুরী	[illegible]
৭	নজরুল ইসলাম সওদাগর	M			[illegible]	
৮	সরোয়ার	M			ব্যবসা	
৯	মো: ইউনুছ	M			ব্যবসা	[illegible]
					নজরুল ইসলাম	

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: 22.02.2025 **Time:** ৬:০০ **Venue:** [illegible]

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
১	মোহাম্মদ আলী	M	NO	NO	ব্যবসা	[illegible]
২	মোতাহেল আলী	M	NO	NO	চাকুরী	[illegible]
৩	সুমন	M	NO	NO	চাকুরী	Soman
৪	মো: ফারুক	M	NO	NO	[illegible]	[illegible]
৫	কমল	M	NO	NO	[illegible]	Kamil Barua
৬	মো:- ইউসুফ	M	NO	NO	[illegible]	[illegible]
৭	মো: হেলাল	M	NO	NO	ব্যবসায়ী	[illegible]
৮	মো: কামাল	M	NO	NO	ব্যবসা	[illegible]

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: 20.02.2025 Time: ২'০০ Venue:

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
১		M	No	No		
২		M	No	No		
৩		M	No	No		
৪		M	No	No		
৫		M	No	No		
৬		M	No	No		
৭		M	No	No		
৮		M	No	No		
৯		M	No	No		
১০		M	No	No		

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: 20.02.2025 Time: 09.30am Venue:

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
১		M	No	No		
২		M	No			
৩		M				
৪		M				
৫		M				
৬		M				
৭		M				
৮		M				

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultation

Date: ১৯.০২.২০২৫ **Time:** ০৪.০০ pm **Venue:** লাম্বর হাট বাগোয়ান, রাউজান চট্টগ্রাম

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
১.	আবদুল শুকুর	M	No	No	কৃষি	[illegible]
২.	মো: হাছি মিয়া	M	No	No	"	[illegible]
৩.	মির কাসিম	M	No	No	"	[illegible]
৪.	মো: ওসমান	M	No	No	রাজমিস্ত্রী	ওসমান
৫.	ফজলুল কাদের	M	No	No	"	ফজলুল কাদের

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Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultation

Date: 19/02/2025 **Time:** 2:00 **Venue:** বাগোয়ান মুছার বাড়ীর সামনে, বাগোয়ান, রাউজান, চট্টগ্রাম

LIST OF PARTICIPANTS

Sl. N°	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)
০১	মো: মুছা	M	NO	NO	প্রবাসী	মো: মুছা
02	মো: ফয়সাল করিম	M	NO	NO	প্রবাসী	[illegible]
০৩	মুজাহিদুল ইসলাম	M	NO	NO	কৃষি	মোজাহেদুল
08	মো: আব্দুস সাত্তার	M	NO	NO	কৃষি	আব্দুস সাত্তার
০৫	আব্দুল রশীদ	M	NO	NO	রাজমিস্ত্রি	আ: রশীদ
০৬	আমির হোসেন	M	NO	NO	কৃষি	আমির হোসেন
০৭	মো: জাফর	M	NO	NO	অবসর প্রাপ্ত	জাফর

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Annex-XIII: Labor Management Plan (LMP)

1. Overview of labor use on the project

Power Grid under Ministry of Energy, Power and Mineral Resources (MoEPMR) has taken up a project for construction of transmission lines named "Madunaghat – Moheshkhali 765kV Transmission Line" for reliable power supply funded by Korean Eximbank through EDCF. Construction of proposed power transmission lines facility is likely to start after the appointment of Contractor, and will continue for a period of 60 months. Operational Phase of the Project will commence thereafter.

1.2. Potential labors to be used in the project

Direct workers, contracted workers and community workers will be employed for the project. Two contractors may be engaged for the implementation of the project. One contractor will be engaged for construction of transmission lines. It is assumed that contractors will not start all the construction activities at the same time. Rather contractor will start work in a site and after completing each site he will start another site. Moreover, due to the linear type of project, it is not expected that there will be high concentrate of workers at the same place and at the same time**.** So, no severe labor influx is expected. It is assumed that 20 labors will be required during normal operations and 30 labors will be required during peak operations. The nationality of labors during construction phase comprises of Foreign (maximum 4) and remaining from domestic. During operation phase, maximum 16 nos. of manpower would be of local (Power Grid). So, it is expected that the total number of labors may not exceed 50 at any sub-project areas due to the phase wise activities. As the unskilled labors will be hired locally, no severe labor influx is expected at any time of the construction. It is assumed that about 50% of the labor will be migrant, for which accommodation will be required. The migrant workers and staff will be accommodated on-site at temporary labor camps or in rented houses in surrounding villages of the Project. Local workers will be employed for carrying out civil works and other masonry works. Setting up of labor camps is not envisaged during the construction phase of the Project. Moreover, temporary tent would be made near the towers area to provide the security of construction machineries.

1.3 Objectives of LMP

The objective of this LMP is to ensure appropriate worker management procedures and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions for project sustainability. During the construction period, contractors will follow this LMP to prepare a simplified labor management plan and Code of Conduct (CoC). Considering the facts, Labour and Working Conditions and Bangladesh Labour Act, 2006 (amendment in 2018), has set following specific objectives:

- To promote health and safety at work.
- To promote the fair treatment, non-discrimination and equal opportunity of project workers.
- To protect project workers, including vulnerable workers such as women, persons with disabilities, children and migrant workers, contracted workers, and primary supply workers, as appropriate.
- To prevent the use of all forms of forced labour and child labour.

- To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law.
- To provide project workers with accessible means to raise workplace concerns.

2. Assessment of the potential labor risk

The main labour risks associated with the project are assessed to be related to the potentially hazardous work environment during construction of sub-stations and Transmission lines and other constructions, the associated risk of accidents, transmission of COVID 19 to the community and labour influx. The possible risks include:

- The conduct of hazardous work, such as working at heights or in confined spaces, use of heavy machinery, or use of hazardous materials during construction of sub-stations (SS) and towers;
- Likely presence of migrants or seasonal workers from other regions and abroad;
- Risks of labor influx
- Risk of engaging child labors
- Risk of gender-based violence;
- Possible accidents or emergencies, with reference to the sector or locality;
- General understanding and implementation of occupational health and safety (OHS) requirements
- Risk of engaging unskilled labors
- Risk of transmitting COVID 19 among the labors and community people;

Based on current conditions in the sector, it is assessed that the risk of engaging child labour or forced labour in the project is almost negligible, and adequately addressed by national legislations. Moreover, during engagement of the labors, screening procedures will be followed to ensure that no child and forced labor are engaged. A screening procedure is attached with annex 3 (certificate of age and fitness). COVID-19 situation in Bangladesh is getting worse and if the COVID safety protocols are not maintained adequately, it may spread among the labors and adjacent communities. As there will be 50% migrant labors with the project and local people may believe that COVID is being spread to the adjacent community through the migrant labors.

2.1 Labour influx

Though project will create substantial number of jobs, it is expected that labor influx will not be significant in number as the construction will be over the period of 30 months. Most of the unskilled labors will be hired locally. As all the construction will be conducted in the urban, rural and peri-urban areas, it is expected that unskilled labors will be available in the locality. If skilled labors are found locally, will be hired at priority basis which will be mentioned with the contractors bidding documents. The contractor will be responsible for the accommodation of the stay-in labor and ensuring labor travel from off site. Some accommodation on site, water supply and sanitation services, etc. will be provided by the contractor. The labor site plan and facilities will be a part of the ESMP. A stand-alone Labor Management Plan will be prepared by contractors for each project site.

However, this minor to medium scale labor influx, may raise many complex issues, particularly regarding potential transmission risks for COVID-19 both within the worksite and for nearby communities. These risks are not only from workers that are mobilized from abroad or returning from abroad, but also workers moving from other regions, where it is likely that migrant workers are expected to work on the project.

Adverse Social Impacts due to labor influx can be identified as follows:

- Risk of Social conflict between labors and community people
- Increased risk of illicit behaviour and crime
- Influx of additional population and burden on public services
- Increased risk of communicable disease and burden on local health services
- Gender Based violence, child labor and school dropout
- Local inflation of price and increased pressure on accommodation and rent
- Increased of traffic and related accident

Adverse Environmental Impacts:

- Inadequate waste disposal and illegal waste disposal sites
- Wastewater discharge
- Increased demand on freshwater resources
- Camp-related land use, access road, noise and lights
- Increased deforestation, ecosystem degradation, and species loss
- Increased use of/demand of natural resources

2.2 Gender-based violence

Construction workers are predominantly younger males. Those who are away from home on the construction job are typically separated from their family and act outside their normal sphere of social control. This can lead to inappropriate, unsocial and criminal behavior, such as sexual harassment of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community. Female workers are sometimes harassed in their workplace and become victims of inappropriate and indecent behavior towards them. The GBV prevention plan address these issues in detail. A summary is provided in the chapter on mitigation measures. A separate GBV prevention is being prepared for this project.

2.3 Occupational health and safety

There are several risks associated with project, especially during the construction period. Several hazards can be encountered while lifting cranes, drilling or using heavy machineries. Beside these, lack of clean and ventilated workspace and fire hazard are also associated risks during the project. The expected risks may lead to personal injury, traffic-related accidents, fall from height, poor working and living conditions of workers, and lack of PPEs. Power Grid must make arrangements for contractors training on health and safety, records of their compliance have to be inspected monthly and audited bi-annually by PMU-Power Grid and/or its consultant. The key potential OHS risk associated at construction and operation stages are listed below.

- Hazardous work and process: risk due to working at heights or in confined spaces, use of heavy machinery, or use of hazardous materials.
- Accidents or emergencies: exposure to unsafe machineries, flammable chemicals/fuel, construction materials, landslide at workplace.
- General understanding and implementation of occupational health and safety requirements. Work related diseases (e.g., Allergies, Respiratory problems, Muscular-skeletal disorder, Eye problem), communicable diseases including Sexually Transmitted Infections (STIs)

2.4 Spread of infections in the community

Project involving a lot of construction/civil works which is likely to involve a large workforce on a frequent basis, together with suppliers and supporting functions and services. The workforce may comprise of workers from international, national, regional, and local labor markets. They may need to live in on-site accommodation, lodge within communities close to work sites or return to their homes after work. There may be several contractors, carrying out their obligations at the same time and with their own group of dedicated workers. Supply chains may involve international, regional and national suppliers facilitating the regular flow of goods and services to the project (including supplies essential to the project such as fuel, food, and water). As such there will also be regular flow of parties entering and exiting the site; support services, such as catering, cleaning services, equipment, material and supply deliveries, and specialist sub-contractors, brought in to deliver specific elements of the works.

Given the complexity and the concentrated number of workers, the potential for the spread of infectious disease in projects involving construction is extremely serious, as are the implications of such a spread. Projects may experience large numbers of the workforce becoming ill, which will strain the project's health facilities, have implications for local emergency and health services and may jeopardize the progress of the construction work and the schedule of the project. Such impacts will be exacerbated where a workforce is large and/or the project is in remote or under-serviced areas. In such circumstances, relationships with the community can be strained or difficult and conflict may arise, particularly if people get the feeling that they are getting exposed to diseases by the project or are having to compete for scarce resources. The project must also exercise appropriate precautions against introducing the infection to local communities. Thus, the contractor has to ensure that the project is taking adequate precautions to prevent or minimize an outbreak of COVID-19, and have identified what to do in the event of an outbreak.

2.5 Risk of engaging child labor and forced labor

Due to the COVID-19 situation, vulnerable and low-income communities are the most sufferer. All the school are closed for the last one year. Secondary data confirms that child labors increased in the country as lots of family members have lost their jobs.

In Bangladesh, there are highly low risk of engagement of the forced labor in the construction works. However, PMU with the support of the contractors needs to screen the labors before recruiting following the guidelines of Bangladesh Labor Act 2006.

3. Brief overview of labor and OHS legislation: terms and conditions

Standards for labor and Working Conditions are defined in Bangladesh Labor Act, 2006 (amendments in 2013 and 2018) and Bangladesh Labor Rules 2015 and Occupational Health and Safety Policies 2013. Bangladesh Labor Act, 2006 is a comprehensive legislation. The Act addresses three areas: (i) Conditions of service and employment including wages and payment, establishment of Wages Boards, employment of young people, maternity benefits, working hours and leave; (ii) health, safety, hygiene, and welfare, and compensation for injury; and, (iii) trade unions and industrial relations. Beside this, due to ongoing pandemic of COVID 19 World Health Organization (WHO) and Directorate General of Health Services (DGHS), under the Ministry of Health and Family Welfare, provided guideline for infection prevention and control. The government has incorporated the life-threatening novel corona virus (COVID-19) in 'The Communicable Diseases (Prevention, Control and

Eradication) Act, 2018'. With the issuance of the gazette the government has got a legal power to take action against the people not following the government's direction that relates to COVID 19. The health and safety issues relevant to COVID-19 should be addressed with reference to ILO Occupational Safety and Health Convention, 1981 (No. 155), ILO Occupational Health Services Convention, 1985 (No. 161), ILO Safety and Health in Construction Convention, 1988 (No. 167), WHO International Health Regulations, 2005, WHO Emergency Response Framework, 2017.

3.1 Child and forced labor

Bangladesh's Children Act 2013 identifies anyone under the age of 18 as children and the Bangladesh Labor Act, 2006 does not permit any children under the age of 14 years to work. Bangladesh Labor Act, 2006 also states that children aged between 14 till 18, can be authorized to do light and hazard-free jobs without compromising their education. As the project will require a considerable number of labors for its implementation, there remains a minor risk of engagement of child labors, even beyond the parameter. However, the risk of child labor will be mitigated through certification of labors' age. This will be done by using the legally recognized documents such as the National Identification Card (NID), and Birth Certificate. Further, sessions on raising awareness will be conducted on a regular basis by Power Grid and/or its consultant to the communities to sensitize on prohibition and negative impacts of child and forced labor.

3.2 Health and safety offenses in Bangladesh

There are five offences in the Bangladesh Labour Act, 2006 specifically relating to health, safety and welfare – the selling of unguarded machinery (Section 208), failure to give notice of an accident (Section 290), a breach causing death (Section 309a), a breach causing grievous bodily harm (Section 309b) and a breach causing any harm (Section 309c).

In addition, there is a 'catch-all' offence that allows prosecutions against "whoever contravenes of fails to comply with any provisions of the Code, or any rules of scheme made under it" – which is punishable by up to 3 (three) months imprisonment or with a fine of up to Tk. 1,000 (One thousand) or both (Section 307). This offence would, for example, apply to any breach of the obligations involving health, safety and welfare, not already covered by the offences above. A repeat conviction for the same offence can result in double the fine or sentence of imprisonment (Section 308).

When there has been a breach of a duty imposed upon an employer, any one of individuals defined as an employer can be prosecuted. In addition, when a company is prosecuted, "every director, partner, shareholder or manager or secretary or any other officer or representative directly involved in [its] administration" shall be deemed guilty unless he can prove the offence has been committed without his knowledge.

3.3 COVID 19 considerations

Section 10, of 'The Communicable Diseases (Prevention, Control and Eradication) Act, 2018, states that if a boarding, residential or temporary residence owner or person in charge has reason to believe that a person living in the place has been infected, he shall promptly notify the concerned Civil Surgeon and the Deputy Commissioner. As per section 24 of 'The Communicable Diseases (Prevention, Control and Eradication) Act, 2018, in case of failure to prevent transmission or concealment of facts a person may be sentenced up to 6 (six) months imprisonment and/or fine. Accordingly, contractors will develop specific procedures or plans so that adequate precautions are in place to prevent or minimize an outbreak of COVID-19 which will include:

- Assessing the characteristics of the workforce, including those with underlying health issues or who may be otherwise at risk;
- Confirming workers are fit for work, to include temperature testing and refusing entry to sick workers;
- Considering ways to record and minimize entry/exit to site or the workplace, and limiting contact between workers and the community/general public;
- Training workers on hygiene and other preventative measures, and implementing a communication strategy for regular updates on COVID-19 related issues and the status of affected workers;
- Treatment of workers who are or should be self-isolating and/or are displaying symptoms;
- Assessing risks to continuity of supplies of medicine, water, fuel, food and PPE, taking into account international, national and local supply chains;
- Reduction, storage and disposal of medical waste;
- Adjustments to work practices, to reduce the number of workers and increase social distancing;
- Expanding health facilities on-site compared to usual levels, developing relationships with local health care facilities and organize for the treatment of sick workers;
- Building worker accommodations further apart, or having one worker accommodation in a more isolated area, which may be easily converted to quarantine and treatment facilities, if needed;
- Establishing a procedure to follow if a worker becomes sick (following WHO guidelines);
- Implementing a communication strategy with the community, community leaders and local government in relation to COVID-19 issues on the site.

3.5 Overview of the OHS Legislation

There are basically two additional components of OHS that relates to the adjacent community. One is the physical safety of project communities who are exposed to the project activities during construction and operation, including risks of accidents and risks of violence due to increase in crimes and cultural conflict between locals and migrant population. The other pertains to the exposure and/or increased risks of diseases by the community due to influx of people during construction and operation and due to the changes in the project area, including pollution and ecological change.

Bangladesh has a well-structured health system with three tiers of primary health care – Upazila Health Complexes (UHC) at the sub-district level, Union Health and Family Welfare Centers (UHFWC) at the Union (collection of few villages) level, and Community Clinics (CC) at the village level. These are backed by the District Hospitals providing secondary level care and the tertiary hospitals of various kinds in large urban centers. The system is decentralized covering all districts, sub-districts and rural towns and villages in the country. Bangladesh has a good infrastructure for delivering primary health care services. However, due to inadequate logistics the full potential of this infrastructure has never been realized. The legal obligations on OHS according to Labor Act 2006, applicable to LMP of project, are listed below:

- Provision to demonstrate OHS policy at workplace.
- Responsibility of employers towards worker such as information, facility, personal protective equipment and training on all kinds of OHS related training.
- Provision regarding the protection of non-labours such as visitors and others.

- Fundamental provision on Occupational Health and Safety including role and responsibility of manufacturer, importer and suppliers for assurance of OHS for their goods and services.
- Provision of non-discrimination based on caste/ethnicity, gender, religion, language, origin and ideology.
- Provision responsible towards employee such as information, facility, personal protective equipment and training on OHS and responsibility of labours for work and use of safety gears.
- Provision for appointment responsible person (OHS Officer) at the workplace for OHS implementation. Under this there will be joint safety and health committee comprising of supervisor and workers at worksite.
- Provision for immediate shutdown of work and machineries in case of severe COVID-19 concern.
- Special provision for OHS for eye protection, protection against harmful chemicals, operation of pressurized machine/vessel, machine guarding, handling/lifting of load, fire protection, provision against fatigue.
- Provision for treatment and prevention of communicable diseases.
- Provision of onsite first aid and primary health care.
- Provision of accident investigation, inventory of work-related diseases and compensation.

In the Bangladesh Labor Law health and hygiene related provisions are mentioned at section 51 to 60 and safety of workers related provisions are mentioned at section 61 to 78.

Cleanliness: As per this section 51, every establishment shall be kept clean and free from effluvia arising from any drain, privy or other nuisance. The floors of every work-room shall be cleaned regularly, effective means of drainage shall be provided and maintained, the factory shall be re-painted or re varnished at least once in every three years and be cleaned at least once in every fourteenth months, finally the date on which the processes are carried out shall be entered in the prescribed register.

Ventilation and temperature: Section 52 of the law states that, in every work-room and in every establishment adequate ventilation by the circulation of fresh air and comfortable temperature shall be maintained to prevent workers' injury to health.

Dust and fume: As per the section 53 of the law, in every establishment effective exhaust appliance shall be applied as near as possible to the point of origin of the dust, fume or other impurity, which are likely to be injurious to the workers and such point shall be enclosed so far as possible.

Disposal of wastes and effluents: According to Section 54, effective arrangements shall be made in every establishment for disposal of wastes and effluents due to the manufacturing process carried on therein.

Overcrowding: As per Section 56 of the Act, to prevent injury to the health of the workers, overcrowding of every work-room in any establishment shall be prevented and at least 9.5 cubic meter of space for every worker employed in a work-room in the establishment shall be provided.

Lighting: As per section 57 of the Act, in every part of an establishment where workers are working or passing, there shall be provided and maintained sufficient and suitable lighting, natural or

artificial, or both and all glazed windows and skylights used for the lighting of the work-room shall be kept clean on both the outer and inner surfaces and free from obstruction as far as possible.

Drinking water: As per section 58 of the act, effective arrangement of sufficient supply of wholesome drinking water for all workers employed in every establishment shall be provided and maintained at a suitable point conveniently situated therein.

Latrines and urinals: As per section 59 of the act, in every establishment sufficient latrines and urinals, separately for male and female workers, adequately lighted, ventilated, conveniently situated and accessible to workers at all times while they are in the establishment shall be provided and maintained in a clean and sanitary condition at all times with suitable detergents and disinfectants.

Dustbin and spittoon: As per section 60 of the act, in every establishment there shall be provided, at convenient places, sufficient number of dustbins and spittoons which shall be maintained in a clean and hygienic condition. No person shall throw any dirt or spit within the premises of an establishment except in the dustbins and spittoons provided for the purpose.

Fire safety: Section 62 of the act states that, every establishment shall be provided with at least one alternative connection stairway with each floor and such means of escape in case of fire and for carrying fire-fighting apparatus. In every establishment the doors affording exit from any room shall not be locked or fastened so that they can be easily and immediately opened from inside while work is being carried on in the room. In every establishment, every window or other exit affording means of escape in case of fire shall be distinctively marked in red Bangla letters of adequate and clearly understandable size. A free passage-way giving access to each means of escape in case of fire shall be maintained for the use of all workers in every room of the establishment.

Fencing of machinery: Section 63 of the act states that, in every establishment all dangerous machinery must be securely fenced; e.g., every moving part of a prime mover and every fly wheel connected to a prime mover, the head-race and tail-race of every water wheel and water turbine, every part of an electric generator, every part of transmission machinery and every dangerous part of any machinery.

Work on or near machinery in motion: Section 64 of the act states that, work on or near machinery in motion shall be carried out only by a specially trained adult male worker wearing tight-fitting clothing whose name has been recorded in the register prescribed in this behalf and while engaged he shall not handle a belt at a moving pulley unless the belt is less than fifteen centimeters in width and unless the belt-joint is either laced or flush with the belt.

Cranes and other lifting machinery: Section 68 of the act states that, every part of cranes and other lifting machinery, including the working gear, whether fixed or movable, ropes and chains and anchoring and fixing appliances shall be of good construction, sound material and adequate strength, properly maintained, thoroughly examined by a competent person at least once in every period of twelve months and a register shall be kept containing the prescribed particulars of every such examination.

Hoists and lifts: Section 69 of the act states that, in every establishment every hoist and lift shall be of good mechanical construction, sound material and adequate strength, properly maintained, shall

be thoroughly examined by competent person at least once in every period of six months, a register shall be kept containing the prescribed particulars of every such examination, every hoist way and lift way shall be sufficiently protected by an enclosure fitted with gates, and the hoist or sift and every such enclosure shall be so constructed as to prevent any person or thing from being trapped between any part of the hoist or lift and any fixed structure or moving part, every gate shall be fitted with interlocking or other efficient device to secure that the gate cannot be opened except when the cage is at the landing and that the cage cannot be moved unless the gate is closed.

Excessive weights: Section 74 of the act states that, no person shall be employed in any establishment to lift, carry or move any load so heavy as to be likely to cause him injury.

In summary, In accordance to the, Bangladesh labor act, 2006, Power Grid shall:

1) Comply with legislation and other applicable requirements which relate to the substation's occupational health and safety hazards.
2) Enable active participation in OH&S risks elimination through promotion of appropriate skills, knowledge and attitudes towards hazards.
3) Continually improve the occupational health and safety management system and performance.
4) Communicate this policy statement to all persons working under the control of Power Grid with emphasis on individual OH&S responsibilities.
5) Avail this policy statement to all interested parties at all Power Grid facilities and sites. In accordance Labour Acts, correspondence from Power Grid should:
    (a) Identify potential hazards;
    (b) In collaboration with the employer, investigate the cause of accidents at the workplace;
    (c) Inspect the workplace with a view to ascertaining the safety and health of employees provided that the employer is informed about the purpose of the inspection;
    (d) Accompany an inspector whilst that inspector is carrying out the inspector's duties in the workplace;
    (e) Attend meetings of the safety and health committee to which that safety and health representative is a member;
    (f) Subject to (g), make recommendations to the employer in respect of safety and health matters affecting employees, through a safety and health committee; and
    (g) Where there is no safety and health committee, the safety and health representatives shall make recommendations directly to the employer in respect of any safety and health matters affecting the employees.

4. Mitigation measures to be followed

Most environmental and social impacts of project resulting from activities directly under the control of contractors will be mitigated directly by the same contractors. Consequently, ensuring that contractors effectively mitigate project activities related impacts is the core of the Project's approach. Power Grid will incorporate standardized environmental and social clauses in the tender documentation and contract documents, in order for potential bidders to be aware of environmental and social performance requirements that shall be expected from them, should be able to reflect that in their bids, and are required to implement the clauses for the duration of the contract. Power Grid will enforce compliance by contractors with these clauses. The health and safety procedure illustrated in the Labor Acts, EDCF Safeguard Policy will be referenced all activities during Project implementation. PMU and/or its ES monitoring consultant is expected to carry out field visits and

inspections of the construction from time to time. However, the Labor Acts, EDCF Safeguard Policy may not have sufficient details and specific requirements to deal with various occupational health and safety issues posed by the project, thus the IA should put in place specific standards meeting, Good International and Industry Practices (GIIP) in the bidding documents and contracts reflecting appropriate level of risk.

As a core contractual requirement, the contractor is required to ensure all documentation related to environmental and social management, including the LMP, to be available for inspection at any time by the Power Grid. The contractual arrangements with each project worker must be clearly defined in accordance with Labor Acts. A full set of contractual requirements related to environmental and social risk and impact management will be provided in the Projects' Environmental and Social Impact Assessment. All environmental and social requirements shall be included in the bidding documents and contracts in addition to any additional clauses, which are contained, in the Projects environmental and social instruments.

Under no circumstances will Power Grid, the Ministry, Contractors, suppliers or sub-contractors engage forced labor. Forced labor includes bonded labor (working against an impossible debt), excessive limitations of freedom of movement, excessive notice periods, retaining the worker's identity or other government-issued documents or personal belonging, imposition of recruitment or employment fees payable at the commencement of employment, loss or delay of wages that impede the workers' right to end employment within their legal rights, substantial or inappropriate fines, physical punishment, use of security or other personnel to force or extract work from project workers, or other restrictions that compel a project worker to work in a non-voluntary basis.

The risk of OHS will be mitigated by contractor, providing personal protective equipment (PPE) for workers, such as safety shoes, helmets, safety vests, masks, gloves, protective clothing, goggles, full-face eye shields and ear protection based on the work requirements. A model of Register of workers working on or near machinery in motion and provided with personal safety materials is annexed herewith and marked as Annex 5, the contractor is obliged to hire trained operators, using appropriate equipment's, providing appropriate cautions, training of fire extinguishment etc. A model of Record book on the training of Fire Extinguishment is annexed herewith and marked as Annex 4. Workers shall maintain the PPE properly by cleaning dirty ones and contractors should replace damaged ones. PIU will require the contractors to prepare and implement Occupational Health & Safety Plan (OHSP) following the World Bank Group Environment, Health and Safety (EHS) Guidelines and local legislations to be monitored by Power Grid and/or its consultant.

4.1 Labour influx and gender-based violence

Contractors will need to maintain labor relations with local communities through a CoC. The CoC commits all persons engaged by the contractor, including sub-contractors and suppliers, to acceptable standards of behavior. The CoC must include sanctions for non-compliance, including non-compliance with specific policies related to gender-based violence, sexual exploitation and sexual harassment (e.g., termination). The CoC should be written in plain language and signed by each worker to indicate that they have:

- received a copy of the CoC as part of their contract;
- had the CoC explained to them as part of induction process;
- acknowledged that adherence to this CoC is a mandatory condition of employment;

- understood that violations of the CoC can result in serious consequences, up to and including dismissal, or referral to legal authorities. A copy of the CoC shall be displayed in a location easily accessible to the community and project affected people. It shall be provided in English and Bangla.

Contractors must address the risk of gender-based violence, through:

- Mandatory training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women. Training may be repeated;
- Informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted;
- Adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence;
- Developing a system to capture gender-based violence, sexual exploitation and workplace sexual harassment related complaints/issues.

This process will be under the portfolio of the ES Social Monitor with exclusive communication with the Project Director who shall identify and engage the relevant stakeholders on GBV.

The risk of GBV will be mitigated by implementing a Code of Conduct (CoC)[14] before employing any labor in the project and ensuring necessary training. The Contractor's monthly training program will also cover topics related to CoC such as sexual harassment, particularly towards women and children, violence, including sexual and/or gender-based violence and respectful attitude while interacting with the local community. This should be monitored by Power Grid on a regular basis by consulting with the female workers. However, a standalone Gender-Based Violence Prevention Plan (GVP) action plan has been prepared to deal with the such issues. Contractors must address the risk of gender-based violence, through:

- Mandatory training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women. Training may be repeated. All such training should be conducted in Bengali;
- Informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted;
- Adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence;
- Developing a system to capture gender-based violence, sexual exploitation and workplace sexual harassment related complaints/issues.

Power Grid or its consultant shall identify and engage the relevant stakeholders on GBV issues and shall keep regular communication with the project director in this regard. A separate GBV prevention plan is prepared for this project which will be followed during implementation of any GBV related case.

[14] See Annex 1 as an example

4.2 Terms and conditions

The terms and conditions of employment in Bangladesh are governed by the provisions of Bangladesh Labour Act, 2006 in connection with The Control of Employment Ordinance, 1965. For this project, contractors will be required to provide all its employees with written particular of employment. The contractor shall certify in writing that the wages, hour and conditions of work or persons to be employed by him on the contract are not less favorable than those contained in the most current wages regulation issued by the government recommended by the Wages Board Chairman. The employer shall maintain worker's register which will be available for inspection during working hours. In ensuring full compliance with the law in this regard, contractors will be required to furnish Power Grid with copies of the Service Book or copies of contract of its entire workforce. Contractors will not be allowed to deploy any employee to work in the project if such copy of employment of that employee has not been handed to Power Grid. As a monitoring mechanism, a contractor shall not be entitled to any payment unless he has filed, together with his claim for payment, a certificate: - a) stating whether any wages due to employees are in arrears; b) stating that all employment conditions of the contract are being complied with. It will be a material term of the contract to allow Power Grid to withhold payment from contractor should the contractor not fulfil their payment obligation to their workers.

4.3 Grievance mechanism

Section 33 of Bangladesh Labour Act, 2006 explicitly states that every employer, including contractors, to have a Formal Grievance Procedure which should be known and explained to the employee.

1) Any worker including a worker who has been laid-off, retrenched, discharged, dismissed, removed, or otherwise terminated from employment, who has any complaint in respect of anything and intends to get redress thereof, shall send his complaint in writing to his employer, by registered post within 30 (thirty) days of being informed of the cause of such complaint: Provided that if the appointing authority accepts the complaint directly and acknowledges the receipt thereof in writing, such complaint shall not be required to be sent by registered post.
2) The employer shall within 30 (thirty) days of receipt of the complaint, make enquiry into the complaint and shall after giving the concerned worker an opportunity of being heard, communicate with him in writing his decision thereon.
3) If the employer fails to give any decision, or if the concerned worker is dissatisfied with such decision, he may submit a complaint in writing, to the Labour Court within 30 (thirty) days from the date of expiry or, as the case may be, within 30 (thirty) days from the date of the decision of the employer.
4) The Labour Court shall, on receipt of the complaint, give notice to both the parties and hear their statement on the complaint, and considering the circumstances of the case shall pass such order as it may deem just.
5) The Labour Court may amongst other reliefs, direct for reinstatement of the complainant in service, with or without arrear wages and convert the order of dismissal, removal or discharge to any minor punishment specified in section 23(2).
6) Any person aggrieved by an order of the Labour Court, may, within thirty days of the order, prefer an appeal to the Tribunal, and the decision of the Tribunal on such appeal shall be final.
7) No Court-fee shall be payable for making any complaint or preferring an appeal.

8) No complaint shall amount to a criminal prosecution under this Act.
9) No complaint shall lie against an order of termination of employment, unless such order is alleged to have been made for his welfare society activities or passed with an ill motive or unless the worker concerned has been deprived of the benefits specified in that section.

All the contractors who will be engaged for the project will be required to produce their grievance procedure as a requirement for tender which at a minimum comply with these requirements. In addition, good international practice recommends that the procedures be transparent, is confidential, adheres to non-retribution practices and includes right to representation. After they are engaged, they will be required to produce proof that each employee has been inducted and signed that they have been inducted on the procedure.

4.4 Contractor management

Power Grid and/or its consultant shall make sure that contractors monitor, keep records and report on terms and conditions related to labour management. The contractor must provide workers with evidence of all payments made, including social security benefits, pension contributions or other entitlements regardless of the worker being engaged on a fixed term contract, full-time, part-time or temporarily. The application of this requirement will be proportionate to the activities and to the size of the contract, in a manner acceptable to Power Grid:

Labour conditions: records of workers engaged under the Project, including contracts, service book, registry of induction of workers including CoC, hours worked, remuneration and deductions (including overtime), collective bargaining agreements;

Safety: recordable incidents and corresponding Root Cause Analysis (lost time incidents, medical treatment cases), first aid cases, high potential near misses, and remedial and preventive activities required (for example, revised job safety analysis, new or different equipment, skills training, and so forth).

Workers: number of workers, indication of origin (expatriate, local, nonlocal nationals), gender, age with evidence that no child labor is involved, and skill level (unskilled, skilled, supervisory, professional, management).

Training/induction: dates, number of trainees, and topics.

Details of any security risks: details of risks the contractor may be exposed to while performing its work—the threats may come from third parties external to the project.

Worker grievances: details including occurrence date, grievance, and date submitted; actions taken and dates; resolution (if any) and date; and follow-up yet to be taken—grievances listed should include those received since the preceding report and those that were unresolved at the time of that report.

The Project's oversight of contractors is set out in this LMP. The following procedures are to be followed by Power Grid for contractor management, adhering to LMP provisions and the project management unit shall be liable to comply with these procedures:

1) Ensure that Contractors have valid contracts with clearly define service level agreement and all environmental and social clauses

2) Contractor induction to Power Grid standards and LMP
3) Monthly submission of records: Contractor submission to Project Management Unit, copied to Project Management Unit. This includes:
   (a) Incidents and accidents, the Incident Reporting and Investigation Procedure is followed, and the Incident/Accident Monitoring Register is used to monitor (see Annex
   (b) Contractor employees recorded using Contractors Employee List
4) Monthly site visits (at a minimum) and reports
5) Concerns or issues tracking using monitoring register.
6) Evaluation of contractor requirements. These includes training, OH&S files, certifications and other. The evaluation results in Portfolio Reports which includes recommendations for contract extension or termination.
7) Training needs identification recorded in Contractor Training Schedule
8) Annual Contractor Management Plans

Further guidance on Social and Environmental Mitigation Measures in Contracts is found in Annex 2.

4.5 COVID Management by the contractors

Contractors should develop specific procedures or plans so that adequate precautions are in place to prevent or minimize an outbreak of COVID-19, and it is clear what should be done if a worker gets sick. A sample reporting form is attached with Annex 7. Details of issues include:

- Assessing the characteristics of the workforce, including those with underlying health issues or who may be otherwise at risk
- Confirming workers are fit for work, to include temperature testing and refusing entry to sick workers
- Considering ways to minimize entry/exit to site or the workplace, and limiting contact between workers and the community/general public
- Training workers on hygiene and other preventative measures, and implementing a communication strategy for regular updates on COVID-19 related issues and the status of affected workers
- Treatment of workers who are or should be self-isolating and/or are displaying symptoms
- Assessing risks to continuity of supplies of medicine, water, fuel, food and PPE, taking into account international, national and local supply chains
- Reduction, storage and disposal of medical waste
- Adjustments to work practices, to reduce the number of workers and increase social distancing
- Expanding health facilities on-site compared to usual levels, developing relationships with local health care facilities and organize for the treatment of sick workers
- Building worker accommodations further apart, or having one worker accommodation in a more isolated area, which may be easily converted to quarantine and treatment facilities, if needed
- Establishing a procedure to follow if a worker becomes sick (following WHO guidelines)
- Implementing a communication strategy with the community, community leaders and local government in relation to COVID-19 issues on the site.

5. Responsible Staff

Power Grid should appoint project management unit in order to oversee the whole project and should have the overall responsibility to oversee all aspects of the implementation of the LMP, particularly to ensure contractor compliance. The contractor is subsequently responsible for management in accordance with contract specific Labour Management Plans, implementation of which will be supervised by Power Grid's Project Management Unit and/or its consultant on a monthly basis or at shorter intervals as defined by specific Plans. The detailed approach is described in the following sections.

Occupational Health and Safety: Contractors must engage a minimum of one health & safety representative. Smaller contracts may permit for the health & safety representative to carry out other assignments as well. The health & safety representative ensures the day-to-day compliance with specified safety measures and records of any incidents. Minor incidents shall be reported to Power Grid on a monthly basis, serious incidents shall be reported immediately. Minor incidents will be reflected in the quarterly reports to the Power Grid, major issues will be flagged to the Power Grid immediately. Sample forms on training record on fire, OHS incident record, accident reporting forms are attached with Appendix 4, 5 and 6.

Labour and Working Conditions: Contractors will keep records in accordance with specifications set out in this LMP. Power Grid may at any time require records to ensure that labor conditions are met. The Project Management Unit and/or its ES monitoring consultant will review records against actual at a minimum on a monthly basis and can require immediate remedial actions if warranted. A summary of issues and remedial actions will be included in quarterly reports to the Power Grid.

Worker Grievances: Contractors will be required to present a worker grievance redress mechanism which responds to the minimum requirements in this LMP. The Project Management Unit's or its consultant will review records on a monthly basis. Where worker concerns are not resolved, the national system will be used as set out in the section, but the Project Management Unit will keep abreast of resolutions and reflect it in quarterly reports to the Power Grid. Given the anticipated number of the project workers the labor GRM will be a separate document apart from the Project level GRM, though personnel in the committees (GRC) on both the GRMs may have overlapping functions. Reporting Channels for the GRMs may also be same.

Additional Training: Contractors are required to, at all times, have a qualified safety officer on board. If training is required, this will be the contractor's responsibility. The safety officer will provide instructions to contractor staff. Power Grid will procure for training to address risks associated with labor influx and will provide a schedule for trainings required. The contractor will be obligated to make staff available for this training, as well as any additional mandatory trainings required by Power Grid, as specified by the contract.

Table 2: Summary of Risks, Mitigation Measures and Responsible person

Potential Impacts/Risks	Mitigation Measures	Responsibility
Engagement of child and forced labor	• Contractor will be prohibited to employ anyone under the age of 14 and policies stated above will apply for children aged above 14 and below 18 years for employment. • Verify NID cards and/or birth certificate • Sessions on awareness raising within the local community and contractors	Implementation: Contractors/sub-contractors Supervision: PMU, and relevant local Power Grid offices where

Potential Impacts/Risks	Mitigation Measures	Responsibility
	• Prepare and implement code of conduct • Engagement of labor expert/focal point • An age verification form is attached with Annex 3.	construction related activities will be conducted. PMU will supervise the construction of TLs Monitoring: Power Grid or its consultant
Risk of potential transmission of COVID-19	• Conducting pre-employment health check • controlling entry and exit from site/workplace; • adequate and designed accommodation arrangements to reduce contact with the community; • reviewing contract durations, to reduce the frequency of workers entering/exiting the site; • rearranging work tasks or reducing numbers on the worksite to allow social/physical distancing, or rotating workers through a 24-hour schedule; • providing appropriate forms of personal protective equipment (PPE); • putting in place alternatives to direct contact, like tele-medicine appointments and live stream of instructions; • quarantining immediately of any suspected COVID 19 employees. • Contractor is under an obligation to designate a Covid 19 focal point.	
Risk of labor Influx	• Engagement of unskilled labors from the local community • If available, engagement of skilled labors from the community • Screening and assessment of the type and significance of potential social and environmental impacts that may be generated by labor influx; • Development of a management plan for social and environmental impacts in consultation with affected communities; • Implementation of appropriate mitigation and monitoring programs, which includes development and implementation of a stakeholder engagement program; • Establishment of a grievance redress mechanism (GRM) for workers and host community; and • Monitoring and supervision, and, as needed, adaptive management actions.	
Sexual exploitation and abuse and sexual harassment	• The risk of GBV and discrimination will be mitigated implementing a code of conduct, contract before employing any labor in the work and ensuring necessary training. • The Contractor's monthly training program will also cover topics related to Code of Conduct such as discrimination, sexual harassment, particularly towards women and children, violence, including sexual and/or gender-based violence and respectful attitude while interacting with the local community. • Contractor engaged Labour Expert will be responsible to ensure the mitigation measure.	
Hazardous work and process	• The Risk will be mitigated by Contractor, providing personal protective equipment (PPE) for workers, such as safety shoes, helmets, safety vests, masks, gloves, protective clothing, goggles, full-face eye shields and ear protection based on the work requirements. • Workers shall maintain the PPE properly by cleaning dirty ones and replacing damaged ones. • Contractor must engage a minimum of one Occupational Health and Safety representative who will be responsible to ensure the mitigation measure.	
Accidents or emergencies: exposure to unsafe machineries, flammable chemicals/fuel, construction	• The Risk will be mitigated by Contractor hiring trained operators for the safe operation of specialized vehicles such as forklifts, including safe loading and unloading. Moving equipment with restricted rear visibility shall be outfitted with audible back-up alarms.	

Potential Impacts/Risks	Mitigation Measures	Responsibility
materials, landslide at workplace.	• Flagman will be provided to each moving equipment operator to guide the movement of equipment. • Contractor shall mark all energized electrical devices and lines with warning signs. • Contractor shall mark the fire escape routes and train the workers on emergency evacuation from the terminal in case of fire. • Emergency drills shall be conducted on a regular basis. • Contractor engaged Occupational Health and Safety representative will be responsible to ensure the mitigation measure.	

6. Provision of LMP in bidding document

This Labour Management Plan will be included in the general specification of the bidding documents. The preparation and implementation of site-specific Labour Management Plan by the contractor will be incorporated in the Bill of Quantities (BoQ) as a component of the general items of bidding document. Moreover, LMP can be incorporated in the "Scope of Works and Particular Requirement" under the section "Work Requirements" along with Environmental.

7. Monitoring and evaluation

Power Grid and or its consultant will conduct day to day monitoring in coordination with contractors and sub-contractors. This will be done through setting a special score board approach based on the activities accomplished during project interval. This will be done annually and applies both for the project including project parties and labors as well based on the set criteria.

Appendix-1

Sample Labor Code of Conduct covering the GBV/SEA/SHA related risks

Introduction

The company is committed to ensuring a work environment which minimizes any negative impacts on the local environment, communities, and its workers. The company also strongly commits to creating and maintaining an environment in which Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) have no place, and where they will not be tolerated by any employee, sub-contractor, supplier, associate, or representative of the company. The purpose of this Code of Conduct is to:

- Create a common understanding of what constitutes Sexual exploitation and abuse, and sexual harassment.
- Create a shared commitment to standard behaviors and guidelines for company employees to prevent, report, and respond to SEA and SH, and
- Create understanding that breach of this code of conduct will result in disciplinary action.

Definitions

Sexual Exploitation and Abuse (SEA)[15]
is defined as any actual or attempted abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another[16].

Sexual Abuse: "The actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions."

Sexual Harassment:[17]
Unwelcome sexual advances, request for sexual favors, and other verbal or physical conduct of sexual nature.

Sexual Harassment versus SEA[18]
SEA occurs against a beneficiary or member of the community. Sexual harassment occurs between personnel/staff of an organization or company and involves any unwelcome sexual advance or unwanted verbal or physical conduct of a sexual nature. The distinction between the two is important so that agency policies and staff trainings can include specific instruction on the procedures to report each.

Consent is the choice behind a person's voluntary decision to do something. Consent for any sexual activity must be freely given, ok to withdraw, made with as much knowledge as possible, and specific to the situation. If agreement is obtained using threats, lies, coercion, or exploitation of power

[15] As defined in the UN Secretary's bulletin – Special Measures for protection from sexual exploitation and abuse October, 9, 2003 ST/SGB/2003/13

[17] Inter-Agency Standing Committee *Protection against Sexual Exploitation and Abuse (PSEA): Inter-agency cooperation in community-based complaint mechanism. Global standard Operating Procedures*. May 2016
[18] Ibid

imbalance, it is not consent. Under this Code of Conduct[19] consent cannot be given by anyone under the age of 18, regardless of the age of majority or age of consent locally. Mistaken belief regarding the age of the child is not a defense.

There is no consent when agreement is obtained through:

- the use of threats, force or other forms of coercion, abduction, fraud, manipulation, deception, or misrepresentation
- the use of a threat to withhold a benefit to which the person is already entitled, or
- a promise is made to the person to provide a benefit.

While all forms of violence against a community resident or a co-worker are forbidden, this code of conduct is particularly concerned with the prevention and reporting of sexual exploitation and abuse (SEA) and sexual harassment which constitute gross misconduct, are grounds for termination or other consequences related to employment and employment status:

Examples of sexual exploitation and abuse include, but are not limited to:

A project worker tells women in the community that he can get them jobs related to the work site (cooking and cleaning) in exchange for sex. A worker that is connecting electricity input to households says that he can connect women headed households to the grid in exchange for sex. A project worker gets drunk after being paid and rapes a local woman. A project worker denies passage of a woman through the site that he is working on unless she performs a sexual favor. A manager tells a woman applying for a job that he will only hire her if she has sex with him. A worker begins a friendship with a 17-year-old girl who walks to and from school on the road where project related work is taking place. He gives her rides to school. He tells her that he loves her. They have sex.

Examples of sexual harassment in a work context include, but are not limited to:

Male staff comment on female staffs' appearances (both positive and negative) and sexual desirability.
When a female staff member complains about comments male staff are making about her appearance, they say she is "asking for it" because of how she dresses.
A male manager touches a female staff members' buttocks when he passes her at work.
A male staff member tells a female staff member he will get her a raise if she sends him naked photographs of herself.

Individual signed commitment (to be translated in a language understood by the person signing):

I, _____, acknowledge that sexual exploitation and abuse (SEA) and sexual harassment, are prohibited. As an (employee/contractor) of (contracted agency / sub-contracted agency) in (country), I acknowledge that SEA and SH activities on the work site, the work site surroundings, at workers' camps, or the surrounding community constitute a violation of this Code of Conduct. I understand SEA and SH activities are grounds for sanctions, penalties or potential termination of employment. Prosecution of those who commit SEA and SH may be pursued if appropriate.

I agree that while working on the project I will:

[19]In accordance with the United Nations Convention on the Rights of the Child.

Treat all persons, including children (persons under the age of 18), with respect regardless of sex, race, color, language, religion, political or other opinion, national, ethnic or social origin, gender identity, sexual orientation, property, disability, birth or other status. Commit to creating an environment which prevents SEA and SH and promotes this code of conduct. In particular, I will seek to support the systems which maintain this environment.
Not participate in SEA and SH as defined by this Code of Conduct and as defined under (country) law (and other local law, where applicable). Not use language or behavior towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate. Not participate in sexual contact or activity with anyone below the age of 18. Mistaken belief regarding the age of a child is not a defense. Consent from the child is also not a defense. I will not participate in actions intended to build a relationship with a minor that will lead to sexual activity.
Not solicit/engage in sexual favors in exchange for anything as described above. Unless there is the full consent by all parties involved, recognizing that a child is unable to give consent and a child is anyone under the age of 18, I will not have sexual interactions with members of the surrounding communities. This includes relationships involving the withholding or promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex—such sexual activity is considered “non-consensual” under this Code.

I commit to:

Adhere to the provisions of this code of conduct both on and off the project site. Attend and actively partake in training courses related to preventing SEA and SH as requested by my employer.

If I am aware of or suspect SEA and SH, at the project site or surrounding community, I understand that I am encouraged to report it to the Grievance Reporting Mechanism (GRM) or to my manager. The safety, consent, and consequences for the person who has suffered the abuse will be part of my consideration when reporting. I understand that I will be expected to maintain confidentiality on any matters related to the incident to protect the privacy and security of all those involved.

Sanctions: I understand that if I breach this Individual Code of Conduct, my employer will take disciplinary action which could include:
Informal warning or formal warning
Additional training
Loss of salary
Suspension of employment (with or without payment of salary)
Termination of employment
Report to the police or other authorities as warranted

I understand that it is my responsibility to adhere to this code of conduct. That I will avoid actions or behaviors that could be construed as SEA and SH. Any such actions will be a breach this Individual Code of Conduct. I acknowledge that I have read the Individual Code of Conduct, do agree to comply with the standards contained in this document, and understand my roles and responsibilities to prevent and potentially report SEA and SHA issues. I understand that any action inconsistent with this Individual Code of Conduct or failure to act mandated by this Individual Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Name & Signature: _____ Date:

Sample Text in Bangla

ঠিকাদারের (কন্ট্রাক্টরের) কর্মীদের জন্য আচরণবিধি

আমরা ঠিকাদার, [ঠিকাদারের নাম]। আমরা [নিয়োগকর্তার নাম] এর সাথে [কাজের বিবরণ] জন্য একটি চুক্তি স্বাক্ষর করেছি। এই কাজগুলি [প্রকল্প এলাকা এবং অন্যান্য স্থানে যেখানে কাজ করা হবে তার নাম] এ পরিচালনা করা হবে। আমাদের চুক্তিতে যৌন নিপীড়ন ও নির্যাতন, লিঙ্গ-ভিত্তিক সহিংসতার ঝুঁকিসহ কাজের সাথে সম্পর্কিত পরিবেশগত ও সামাজিক ঝুঁকি মোকাবিলার ব্যবস্থা গ্রহণ ও বাস্তবায়নও আবশ্যক।

এই আচরণবিধিটি শ্রম শিবির এবং কর্মক্ষেত্রে শ্রমিকদের সাথে জড়িত পরিবেশগত ও সামাজিক ঝুঁকি মোকাবেলার জন্য নেওয়া পদক্ষেপসমূহের একটি অংশ। এটি মূলত কর্মএলাকা কিংবা অন্য যেসকল স্থানে কাজ করা হবে সেখানে আমাদের সকল কর্মী, শ্রমিক এবং অন্যান্য কর্মচারীদের জন্য প্রযোজ্য। এই নীতিমালা টি প্রত্যেক সাব-কন্ট্রাক্টরের কর্মী এবং কার্য সম্পাদনের ক্ষেত্রে আমাদের সহায়তা করা অন্য যেকোনো কর্মীদের ক্ষেত্রেও প্রযোজ্য। এই আচরণবিধি অনুযায়ী এই ধরণের সকল ব্যক্তিকে "ঠিকাদারের কর্মী" হিসাবে উল্লেখ করা হয়। এই আচরণবিধিটি যে সমস্ত আচরণ বা নীতিমালা নির্ধারণ করে তা ঠিকাদারের সকল কর্মীদের জন্য আবশ্যক।

আমাদের কর্মক্ষেত্র এমন একটি পরিবেশ যেখানে অনিরাপদ, আপত্তিকর, আপত্তিজনক বা হিংসাত্মক আচরণ সহ্য করা হবে না এবং যেখানে প্রতিশোধের ভয় ছাড়াই সকলের সকল প্রকার সমস্যা বা উদ্বেগ উত্থাপনে স্বাচ্ছন্দ্য বোধ করবে।

কন্ট্রাক্টরের কর্মীদের ক্ষেত্রে যা অনুসরণীয়:

নিয়োগকর্তার নির্দেশ অনুসারে এই আচরণবিধি, অন্য কোনো নথি এবং প্রশিক্ষণে তাঁর দায়িত্বগুলি বিশদভাবে বোঝার জন্য আন্তরিকভাবে সচেষ্ট থাকা। আচরণবিধিটি কঠোরভাবে মেনে কাজ সম্পাদন করার ব্যাপারে সক্রিয় থাকা।

প্রদেয় দায়িত্বসমূহ দক্ষতা এবং পরিশ্রমের সাথে সম্পাদন করা।

অন্য ঠিকাদারের শ্রমিক এবং অন্য কোনো ব্যক্তির স্বাস্থ্য, সুরক্ষা ও মঙ্গলের জন্য এই আচরণবিধি এবং প্রযোজ্য সকল আইন, বিধি এবং অন্যান্য প্রয়োজনীয় বিষয়াদি মেনে চলা।

নিম্নোক্ত উপায় অনুসরণের মাধ্যমে নিরাপদ কর্মপরিবেশ বজায় রাখা:

কর্মক্ষেত্র, যন্ত্রপাতি, সরঞ্জামাদি ও প্রতিটি ব্যক্তির নিয়ন্ত্রণে থাকা প্রক্রিয়াসমূহ নিরাপদ এবং স্বাস্থ্যের জন্য ঝুঁকিবিহীন আছে কিনা তা নিশ্চিত করা।

নির্ধারিত ব্যক্তিগত প্রতিরক্ষামূলক সরঞ্জাম পরিধান করা।

সমস্ত কাজ সুরক্ষা ছাড়পত্রসহ এবং যথাযথ তত্ত্বাবধানে পরিচালন করা।

রাসায়নিক, বাহ্যিক, জৈবিক পদার্থ ও এজেন্টসমূহের সাথে সম্পর্কিত বিষয়াদির ক্ষেত্রে প্রয়োজনীয় নিরাপত্তা সামগ্রী ব্যবহার করা।

প্রয়োগযোগ্য জরুরি কর্মপরিচালনা পদ্ধতি অনুসরণ করা।

প্রকল্প এলাকায় কর্মরত মহিলা এবং পুরুষদের জন্য পৃথক, নিরাপদ এবং সহজেই অভিগমনযোগ্য কাজ এবং আবাসন সুবিধা সরবরাহ করা।

যে সকল কর্মী বিশ্বাস করেন যে তার কর্মক্ষেত্র নিরাপদ বা স্বাস্থ্যকর নয় এবং তিনি নিজেকে এমন একটি কাজের পরিস্থিতি থেকে সরিয়ে নিতে চান যেখানে তিনি দৃঢ়ভাবে বিশ্বাস করেন যে তার জীবন বা স্বাস্থ্যের জন্য এই কর্মক্ষেত্র একটি আসন্ন এবং গুরুতর বিপদ ডেকে আনতে পারে তাহলে কাজের এই পরিস্থিতি সম্পর্কে প্রতিবেদন জমা করা।

সবার সাথে বিনয়ের সাথে আচরণ করা এবং নির্দিষ্ট গোষ্ঠী যেমন মহিলা, সমকামী, প্রতিবন্ধী ব্যক্তি, অভিবাসী কর্মী বা শিশুদের সাথে বৈষম্যমূলক আচরণ না করা।

যৌন হয়রানির সাথে জড়িত যেকোনো অযাচিত মৌখিক বা শারীরিক আচরণ বা কর্মকান্ড থেকে বিরত থাকা।

সম্প্রদায় বা প্রকল্প ক্ষতিগ্রস্ত ব্যক্তিদের সাথে কোনো ব্যাপারে জড়িত হওয়ার সময় পেশাদারিত্ব এবং সম্মান বজায় রেখে চলা। ভয় দেখানো, হুমকি দেওয়া এবং জবরদস্তি আচরণ সহ্য করা হবে না।

যৌন নিপীড়ন ও নির্যাতনের সাথে জড়িত না হওয়া, যার অর্থ হলো দুর্বল অবস্থা, ভিন্ন শক্তি বা বিশ্বাসের অপব্যবহারের মাধ্যমে যৌন উদ্দেশ্য চরিতার্থ করা বা তার চেষ্টা করা, তবে তা কেবল এতেই সীমাবদ্ধ নয় বরং অন্যের যৌন নিপীড়নের মাধ্যমে আর্থিক, সামাজিক ও রাজনৈতিকভাবে লাভবান হওয়াও এর অন্তর্ভুক্ত।

যৌন নিপীড়নের সাথে জড়িত না হওয়া, যার অর্থ পারস্পরিক সম্মতিবিহীন যৌনমিলনে লিপ্ত না হওয়া।

১৮ বছরের কম বয়সী ব্যক্তিদের সাথে কোনো ধরণের যৌনাচারে লিপ্ত না হওয়া।

পার্শ্ববর্তী সম্প্রদায় বা জনবসতিসমূহের কারো প্রতি অনুপযুক্ত এবং অযাচিত যৌন বাসনা প্রকাশ বা স্থাপন স্থাপন না করা।

নেশাজাতীয় কোনো দ্রব্য যেমন এলকোহল কিংবা ড্রাগ দ্বারা প্রভাবিত/ মাতাল অবস্থায় কাজ না করা কিংবা কর্মক্ষেত্রে উপস্থিত না হওয়া।

কাজে কিংবা শ্রম শিবিরে থাকাকালীন অ্যালকোহল বা অন্য কোনো মাদকদ্রব্য গ্রহণ না করা।

রাতের শিফটে কাজ না থাকলে রাত ১০ টা (২২:০০ ঘটিকা) এর ভিতরে শ্রম শিবিরে ফিরে আসা।

স্বাস্থ্য ও সুরক্ষা সম্পর্কিত বিষয়াদি, লিঙ্গ-ভিত্তিক সহিংসতা (GBV), যৌন নির্যাতন, অপব্যবহার এবং হয়রানি (SEAH) সহ চুক্তির পরিবেশগত ও সামাজিক দিকগুলির সাথে সম্পর্কিত প্রশিক্ষণ কোর্সগুলি সম্পূর্ণ করা।

এই আচরণবিধি লংঘিত হলে তার প্রতিবেদন জমা দেওয়া।

এই আচরণবিধি লঙ্ঘনের প্রতিবেদন Power Grid, নিয়োগকর্তা, যে ঠিকাদারের কর্মীদের অভিযোগ ব্যবস্থা নিয়ে কাজ করে তার নিকট কিংবা অভিযোগ নিরসন ব্যবস্থার নিকট যে ব্যক্তিই দিক না কেনো তার বিরুদ্ধে প্রতিশোধ পরায়ণ না হওয়া।

উদ্বেগসমূহ উত্থাপন

যদি কোনো ব্যক্তি কারো আচরণ পর্যবেক্ষণ করে মনে করেন যে তার এই আচরণ উল্লেখিত আচরণবিধি লঙ্ঘন করতে পারে বা তাকে / তার সম্পর্কে উদ্বিগ্ন করে তোলে, তবে তাকে অবিলম্বে বিষয়টি উত্থাপন করা উচিত। এটি নিম্নলিখিত যে কোনো একটি উপায়ে করা যেতে পারে:

এই ঠিকানায় [X] বা টেলিফোনে [X] বা ব্যক্তিগতভাবে [X] যোগাযোগ করুন [ঠিকাদারের সামাজিক বিশেষজ্ঞের নাম]; বা

ঠিকাদারের কাছে পৌঁছানোর জন্য হটলাইনে কল [X] করুন এবং একটি ক্ষুদেবার্তা (যদি থাকে) পাঠিয়ে দিন।

অভিযোগের প্রতিবেদন দেশের আইন কর্তৃক বাধ্যতামূলক না করা হলে অভিযোগ প্রদানকারী ব্যক্তির পরিচয় গোপন রাখা হবে। বেনামী অভিযোগ বা নালিশও জমা দেওয়া যাবে এবং এতে যথাযথ বিবেচনা দেওয়া হবে। সম্ভাব্য অসদাচরণ সংবলিত সমস্ত প্রতিবেদনকে আমরা গুরুত্ব সহকারে নিয়ে থাকি এবং তদন্ত করে যথাযথ ব্যবস্থা গ্রহণ করে থাকি। আমরা পরিষেবা সরবরাহকারীদের সুপারিশ প্রদান করবো যেনো তিনি অভিযোগে বর্ণিত ঘটনাটির শিকার হওয়া ব্যক্তিকে সহায়তা করতে পারেন।

এই আচরণবিধি দ্বারা নিষিদ্ধ যে কোনো আচরণ সম্পর্কে বিশ্বাস ও আন্তরিকতার সাথে যদি কেউ উদ্বেগ প্রকাশ করে তার বিরুদ্ধে কোনো প্রতিশোধমূলক ব্যবস্থা গ্রহণ করা হবে না। এই ধরনের প্রতিশোধমূলক ব্যবস্থা গ্রহণ করা এই আচরণবিধির লঙ্ঘন হবে।

আচরণবিধি লঙ্ঘনের ফলাফল

ঠিকাদারদের কর্মীদের দ্বারা এই আচরণবিধি লঙ্ঘনের ফলাফল মারাত্মক হতে পারে, এর ফলে আইনী কর্তৃপক্ষের কাছে সম্ভাব্য সুপারিশ যেতে পারে কিংবা কাজ থেকে বহিষ্কারও হতে পারে।

ঠিকাদারদের কর্মীদের জন্য:

আমি [ঢ] ভাষায় লিখিত এই আচরণবিধিটির একটি অনুলিপি পেয়েছি যা বুঝতে আমার কোনো সমস্যা হয়নি। আমি বুঝতে পেরেছি যে এই আচরণবিধি সম্পর্কে যদি আমার কোনো প্রশ্ন থাকে তবে আমি [লিঙ্গ-ভিত্তিক সহিংসতা পরিচালনার ক্ষেত্রে অভিজ্ঞ ঠিকাদারের পরিচিত ব্যক্তির নাম লিখুন] একটি ব্যাখ্যার জন্য অনুরোধ করে যোগাযোগ করতে পারবো।ঠিকাদারের কর্মীর নাম: [নাম লিখুন]

ঠিকাদারের কর্মীর নাম: [নাম লিখুন]

স্বাক্ষর:

তারিখ (দিন, মাস, বছর):

ঠিকাদারের অনুমোদিত প্রতিনিধির নাম: [নাম লিখুন]

স্বাক্ষর:

তারিখ (দিন, মাস, বছর):

Appendix-2

Suggested Due Diligence for Social and Environmental Mitigation Measures in Contracts

Stage of Contractual Process	Suggested Due Diligence
Before bidding	Ensure that the terms of reference clearly define the supervision engineer's responsibilities regarding oversight of, and reporting on, labour influx, transmission of infectious disease and workers' camps. For high-risk projects, have independent safeguards supervision. Ensure the team skills in the terms of reference clearly include key staff qualified and experienced in managing similar projects, and demonstrated capacity to manage social and environmental issues, including issues pertaining to community health and safety. Ensure that the project GRM is established and its use is widely publicized.
Preparation of bidding documents	Review contract conditions included in bidding documents to: Ensure that the relevant mitigation measures in the ESMP are reflected and budgeted in the contract, Ensure the ESMP forms part of, and is explicitly referred to in the bidding documents. Identify relevant provisions (workers, camps, child and forced labour, safety, grievance redress, etc.) regulating the contractor's responsibility and identify any gaps, inconsistencies or areas of concern that could be addressed through additional provisions in the "particular conditions of contract" and/or technical specifications Include a requirement that all workers sign 'Codes of Conduct' governing behavior, and identifying sanctions Clearly identify that training programs on implementing the Codes of Conduct, etc. will be undertaken by external providers Ensure the contract conditions clearly specify what type of penalty the contractor will face if the provisions of the ESMP and CESMP are not adhered to—including by sub-contractors. This may include direct incentives to contractors in the form of penalties for poor performance on social and environmental matters or specific Performance Securities for ESMP and CESMP compliance. Ensure bidding documents make clear the responsibilities of the contractor to prepare and adhere to a CESMP based on the ESMP and that no civil works will commence until the CESMP has been approved by the supervision engineer. Ensure the bidding documents detail how the contractor and supervision engineer will be required to monitor and report on the impacts on the local community, issues related to labour influx and workers' camps. Propose Key Performance Indicators (KPIs) for Contract Management, reflecting issues and risks specific to the contract and the monitoring plan.
Bidding evaluation	Review the Borrower's bid evaluation report and request to review the bids where appropriate, to verify for the recommended bidder that documents related to the ESMP, safeguard implementation capacity, and other obligations of the contractor required to be submitted with the bid are sufficiently detailed and cover the contractual requirements. Require the contractor's representative or dedicated community liaison staff to have the ability to communicate in the language of the Borrower and/or the local language. Verify that the contract management framework identifies clearly lines of communication and that these are formalized and a consistent record is provided. Ensure that the contractor meets the project's OHS requirements for capability and experience.
After contract signing	Prior to commencing works, the contractor submits site-specific CESMP(s) based on the ESMP, which includes specific management plans for: (i) work activities; (ii) traffic management; (iii) occupational health and safety; (iv) environmental management; (v) social management; and (vi) labour influx. Supervision engineer reviews and approves the CESMP—with inputs from appropriate Government agencies—before any works start. For high-risk projects, the Bank should also review and clear the CESMP. Borrower should disclose the approved CESMP.

Appendix-3

Certificate of Age and Fitness

Part-A of the Registered Medical Practitioner

Certificate of Age and Fitness		Certificate of Age and Fitness	
Serial No:		Serial No:	
Date:		Date:	
Name:			
Father's Name:		It is being certified that (Name)....., Father…… Mother…… Address…… has been examined by me. His identifying mark is.....He is willing to be employed in establishment, and it has been found in my examination that his age is…… and he is fit to be employed in establishment as an adult/adolescent worker.	
Mother's Name:			
Sex:			
Permanent Address:			
Temporary/Mailing Address:			
Date of Birth according to Birth Certificate/ School Certificate:			
Physical Fitness:			
Identifying Marks:			
Signature/Thumb Impression of the Concerned Person		Signature/Thumb Impression of the Concerned Person	
Signature of the Registered Practitioner		Signature of the Registered Practitioner	

Appendix-4

Record Book on the Training of Fire Extinguishment

Name of Contractor/ Sub- contractor: .....

Address of Contractor/ Sub- contractor: .....

Number of Total Workers and Employees: .....

Male: .....Female: .....

Serial No.	Date & Time	Type of Training			Name of the Training Institution	Number of Participants in Training			Duration of Training	Signature of Owner/ Manager	Remark
		Fire Extinguishment	Rescuer	First Aid		Male	Female	Total			

Appendix-5

Register of Worker working on or near Machinery in motion, and provided with Personal Safety Materials

Name of Establishment: .....
Address of Establishment: .....

Serial No.	Serial No. of Worker's Register	Name of Worker	Age	Type of Work	Description & Date of providing with Tight Garment Personal Safety Materials	Description of Training for Such Work	Signature or Fingerprint of worker	Remark

Appendix-6

Final Report of Accident and Professional Injury

(Sent after two months of the accident or joining work after temporal physical inability)
Name of address of institute: .....
Registration no. of institute: .....
Telephone, mobile, fax and email address: .....
Name and address of management authority (with phone number): .....
Name and address of constructor (if applicable) (with phone number): .....
Type and nature of the manufactured product/service: .....
Date and time of the accident: .....
Place/branch/ division (where the accident has taken place): .....
Description of the victim of the accident:
Name: .....
Present address: .....
Permanent address: .....
Age: .....
Sex.....
Card/token no: .....
Post: .....
Salary: .....
Type of accident: (mark the suitable gap)
Death: .....
Permanent total physical inability: .....
Permanent partial physical inability: .....
If the worker is absent from work for more than 20 days because of the injury: .....
If the worker is absent from work for more than 16 hours and less than 20 days because of the injury (if you mark this …, do not fill up point 9-12)
If the injured person faces permanent physical inability (if applicable) mark the following injury list
Mutilation:

Elbow of right hand or above elbow	Elbow of left hand or above elbow
Below right-hand elbow	Below left-hand elbow
Leg- on the knee or above knee	Leg-below knee
Permanent total hearing	One eye
thumb	All toes of a leg
A bone of thumb	Index finger
Big toe	Any finger except index finger

Class of accident (mark the appropriate option): .....
Fall of a person: .....
Fall of an object: .....
An object hit by other except for the fallen object: .....
Electricity: .....
Poison, fatal object or radiation: .....
Explosive: .....
Fire: .....
Incoming of forceful current of water: .....
Asphyxia due to gas: .....

Other reason (specify, for example: excessive use of force/excessive movement, etc.):
……
Responsible object for accident (mark the suitable option): ……
Main operating machine: ……..
Moderator machine: ……..
Lifting machine: ……..
Operative machine: ……..
Other machine or supporting machine: ……..
Rail or trolley: ……..
Other transportation or goods transportation: ……
Hand run machine: ……..
Others (please specify, e.g., water, transportation, pressure vessel, plant, oven, kilns etc.):
……..
The time of absence form work (working hour): ……
The name and address of the medical officer under whose treatment the injured person produced:
……..
Date of sending report: ……

Sign of manager/representative: ……..
Date: ……

Appendix-7

Report on Toxic and Infectious Disease

[This must be submitted within 24 hours of identifying the disease]
Name of address of Factory/institute: ……
Registration no. of Factory/institute: ……
Telephone, mobile, fax and email no: ……..
Name and address of management authority (with phone number): ……
Name and address of constructor (if applicable) (with phone number): ……
Type and nature of the manufactured product/service: ……
Description of the victim of the accident:
Name: ……
Present address……
Permanent address: ……
Age: ……
Sex……
Card/token no: ……
Post: ……
Salary: ……
Type of work: ……..
Date of joining work: ……..
Name and address of the physician if he/she is undergoing treatment: ……
……
The name of the disease worker is suspected to be suffering from: ……..
……
Name of the notice provider: ……

Date:……

Signature of the assignee or his lawyer or
Authorized officer of the registered trade union

Annex-XIV: Gender Based Violence (GBV) Prevention Plan

1. Introduction

Bangladesh has significantly increased access to electricity and experienced strong economic growth, particularly in recent decades. In 2023, electricity access reached 99.5% of the population, according to the World Bank. In Bangladesh, total electric power, generated from the power plants is first supplied to the national grid then to the whole country through national grid. In spite of increasing the power generation in a considerable amount, our power system does not meet the goal and still we have a large amount of power shortage. Considering the above context, Power Grid has a project titled "Madunaghat – Moheshkhali 765kV Power Transmission Line" which will support to meet the rapidly growing demands of residential, commercial, and industrial consumers in Chattogram and Cox's Bazar districts.

2. Country and Sector Context

Energy shortage has differential impacts on women, and it is a critical constraint on economic development and the quality of life for women in both urban and rural areas. Although poverty reduction and energy access have a direct linkage to each other, most of the time, poverty reduction and gender-related projects do not take this into consideration and the linkages with women's development and empowerment are not made. Since women have an important role to play in energy systems through their subsistence and productive tasks, they are also most affected by energy poverty. Projects, which in some cases have not been successful due to the failure to consider the distinct situations of women and men in relation to energy production and use patterns. In addition, decisions concerning technical and other aspects of projects often only consider male views. There are a few key gender issues regarding energy: women's workloads and time-use; health impacts of cooking, water, and sanitation; security and lighting; energy use in productive activities; access to information; gender-neutral project design in the energy sector; and the lack of women in technical education and professions. All these aspects highlight the need for improved policy and measures related to energy access that are essential for achieving overall well-being and equity for women, confirming that energy is a "critical enabler." This means that access to clean and affordable energy services enables women to improve their health and expand their livelihood opportunities, children can study better, and the opportunity for women to earn income is enhanced.

2.1 Female Labor Force Participation in Bangladesh

Bangladesh's female labor force participation (FLFP) has risen substantially; yet, FLFP and quality of jobs for females are still lagging[20]. There have been remarkable improvements in FLFP made in Bangladesh in recent decades, raising the FLFP rate from 26 percent in 2002 to 35.6 percent in 2016[21], benefiting from the expansion of garment manufacturing industries. Yet, by comparison, male labor force participation is much higher at over 80 percent[22]. Moreover, the improvement in FLFP rates has hit a plateau, remaining at 36 percent in 2017. This gender disparity can be attributed to structural barriers including women's domestic burden, sex segregation in educational subject and occupation, employer discrimination, restricted mobility, limited access to trainings, lack of female friendly facilities, sexual harassment at work, limited childcare provisions. Social norms that influence and limit women's choices as well as a lack of a supportive policy environment also stunts FLFP. Moreover, female employment tends to be more concentrated in low-paid and low-

[20] Labor Force Survey, BBS 2010, 2016/17
[21] World Bank calculations based on LFS 2016 data, page xvii
[22] Share of female youths in NEET is also much higher (47%) compared to male (10%). ILO. (2020). Global Employment Trend.

productivity occupations, which are more vulnerable to technology innovation and automation in the production process[23]. Increasing women's labor force participation and improving the quality of female employment will require more significant support for women's access to employment opportunities and high-quality skills development programs.

2.2 Gender-Based Violence in Bangladesh

Violence against women (VAW) is one type of GBV which is very prevalent in Bangladesh and is often rooted in gender inequalities and harmful gender norms. VAW in Bangladesh is still very high. Report on Violence against Women (VAW) Survey 2015 jointly conducted by the Bangladesh Bureau of Statistics (BBS) and UNFPA found that 73% of married women in Bangladesh have experienced forms of violence from their husband, 55% reported forms of violence in the past 12 months, and 50% reported physical violence in their lifetime. More than 10 million Bangladeshi women experience physical or sexual violence every year. The numbers may be higher but societal stressors often prevent victims of rape and domestic abuse to step forward. Cybercrimes have added a new element to VAW. The Counter Terrorism Unit of Bangladesh Police reported a rapid rise in cases filed with their Cyber Crime Unit, (845 in 2018 up from 566 in 2017) of which 70% of the victims were women and children.

The worst manifestation or existing forms of GBV is child marriage, also known as early marriage. Child marriage and the dowry system puts girls at particular risk of sexual, physical and psychological violence throughout their lives. Bangladesh has one of the highest early marriage rates in the world at 59 percent in 2018 (UNFPA, 2019).

Early marriage nearly always results in school drop-outs or from to pursuing higher education and early childbirth, and is often used as a way for trafficking young girls. This is hazardous from a health perspective and is a hindrance to academic and economic development.

2.3 Status of Gender Based Violence (GBV) in Study Area

The constitution of Bangladesh guarantees equal rights for both men and women in all spheres of state and public life. It also declares that steps shall be taken in ensure participation of women in all spheres of national life. Bangladesh Government has been continuously adopting of the preemptive policies, legislations, strategies and taking national affirmative action plans and program for accelerating the implementation process in achieving the goal of holistic empowerment of women. Violence against women (VAW) is a global phenomenon that exists even beyond cultural, geographical, religious, social, and economic context. Violence against women is widespread in terms of Physical, psychological, sexual, and economic aspects. Despite the increased attention to the problem of VAW, there is still a substantial lack of information and data on the scope and extent of the incidence. Detailed data on women's experience of violence is needed in order to better understanding the phenomenon and developing targeted policies and measures to prevent and combat VAW. Bangladesh has become one of the pioneers through conducting the VAW Survey 2011. The results of VAW Survey 2011 identified that as many as 87% of currently married women have ever experienced any type of violence by current husband and 77% reported any type of violence faced during the past 12 months from the survey time. The higher percentage of any type of violence is predominantly contributed by psychological violence. Almost 90% of those who have ever violated by current husband has the past 12-month experience of violence which implies the persistence nature of violence by the husband. 65 percent of married women reported that they had experienced physical violence committed by their current husbands during their lifetime. About one-third of women who have ever violated by non-partner have the past 12-month experience also.

[23] Raihan, S., & Bidisha, S. H. (2018). Female employment stagnation in Bangladesh. Dhaka.

More than four percent of women have ever experienced sexual violence by non-partner, and one percent of women experienced during the past 12 months. To maintain international comparability the standard questionnaire recommended by United Nations Statistics Division (UNSD) was customized to fit with the socioeconomic context of Bangladesh. For this customization group consultation meetings were conducted with different stakeholders. Local female registrars among BBS's Sample Vital Registration System (SVRS) were recruited as interviewers as they are well trained on data collection and have rapport with the ultimate respondents. Stakeholders like UN agencies, civil society and INGO/NGOs working for VAW issue along with different government bodies were involved with the survey processes. The report on Violence Against Women survey recommended to conduct the survey to follow up the changes in the results at every two years. Consultation with the users, experts, policy makers, planners, researchers and NGOs should be expanded with special care for future episodes of the survey.[24]

2.4 Legal and Institutional Environment for Gender Equality and GBV Prevention in Bangladesh

Existence of laws and regulations as well as mechanisms helps to address SEA/SH risks. Bangladesh has the following mechanisms for SEA/SH/GBV/VAC mitigation, prevention, and response.

- The National Women's Development Policy (NWDP), 2011 seeks to reduce violence; eliminate discrimination; increase access to education, health, and employment; and address the special needs of older women, women with disabilities and women from indigenous and marginalized communities.
- In early 2017, the Parliament of Bangladesh reviewed the Child Marriage Restraint Act 2016 to permit under-18 girls to be married under "special circumstances". This has raised serious concerns among women's groups and legal NGOs working in the country.
- The Multi-Sectoral Program on Violence against Women (MSPVAW)[25] is being implemented jointly by the Government of Bangladesh and Government of Denmark under the Ministry of Women and Children Affairs. The project is being carried out in collaboration with the Ministry of Law, Justice and Parliamentary Affairs, Ministry of Information, Ministry of Social Welfare, Ministry of Home Affairs, Ministry of Health and Family Welfare, Ministry of Education, Ministry of Religious Affairs, Ministry of Youth and Sports and Ministry of Local Government, Rural Development and Cooperative. One of the significant components of the program is the OCC in the Medical College Hospitals (MCHs). The OCCs provides health care, police assistance, DNA test, social services, legal assistance, psychological counseling, and shelter service etc. A training module for combating VAW was developed for OCC staffs, teacher, students, health assistant, family planning officers and other professions. Another intervention set up by the MSPVAW is the National Helpline Center for violence against women, a 24-hour helpline that can be accessed from land lines and mobile numbers.[26][27]

- A High Court decision declared in 2009 that the sexual harassment of girls and women is illegal, and issued a set of guidelines defining sexual delinquency to prevent any kind of physical, mental or sexual harassment of women, girls and children at their workplaces, educational institutions and other public places including roads across the country[28].

[24] https://unstats.un.org/unsd/gender/mexico_nov2014/Session%203%20Bangladesh%20paper.pdf
[25] Website of Multi Sectoral Project; www.mspvaw.gov.bd
[26] Ministry of Women and Children Affairs, Government of People's Republic of Bangladesh. Multi-Sectoral Programme on Violence Against Women. DOI: http://www.mspvaw.gov.bd/, accessed on May 15, 2016
[27] Pande, R. P., Nanda, P., Bopanna, K., & Kashyap, A. (2017). Addressing Intimate Partner Violence in South Asia: Evidence for
Interventions in the Health Sector, Women's Collectives, and Local Governance Mechanisms. New Delhi: International Center for Research on Women.
[28] Chancery Law Chronicles http://www.clcbd.org/content/print/36.html (Accessed 29th March 2020)

- Bangladesh's laws do address the use of corporal punishment in school settings; and in 2010 the Ministry of Education released an Education Circular that forbids corporal punishment in classrooms and schools. This same ban does not, however, extend to alternative care institutions, penitentiary settings or as punishment for specific criminal offenses.
- Bangladesh legislated an 'ICT Act' in 2006 to combat cybercrime and online harassments. However, the provisions of this Act are quite insufficient to undertake legal measures appropriately as it does not address gender-based violence online in a clear and effective manner. The country has also formed a 'Cybercrime Tribunal' that addresses cyber violence[29].
- Other than NWDP, the government has enacted a number of stringent laws and policies to protect men and especially women from gender based violence (GBV) including sexual exploitation and abuse/sexual harassment (SEA/SH): The Criminal Procedure Code, 1889; The Penal Code 1860; The Evidence Act 1972; Child Marriage Restraint Act 1929; Citizenship Act 1951 (Amended 2009); Muslim Family Laws Ordinance 1961; Dowry Prohibition Act 1980; Immigration Ordinance 1982; Immigration Ordinance 1982; Family Court Ordinance 1985; Women and Children Repression Prevention Act 2000 (2003); Women and Children Repression Prevention Act 2000 (2003); Women and Children Repression Prevention Act 2000 (2003); Women and Children Repression Prevention Act 2000 (2003); Women and Children Repression Prevention Act 2000 (2003); Acid Crime Prevention Act,2002;Acid Control Act 2002;The Bangladesh Labor Act 2006;Domestic Violence (Prevention & Protection) Act 2010;Human Trafficking Deterrence and Suppression Act, 2012;The Pornography Control Act, 2012; The Hindu Marriage Registration Act 2012. Multi-Sectoral Program on Violence against Women is being implemented jointly by the Government of Bangladesh and Government of Denmark under the Ministry of Women and Children Affairs. One of the significant components of the program is the OCC (One Stop Crisis Centre) in the Medical College Hospitals (MCHs). The OCCs provide health care, police assistance, DNA test, social services, legal assistance, psychological counseling and shelter service etc.

3. Potential SEA/SH Risks Assessment in the Project Areas

Considering the linear type of project, the project is expected to have minor labor influx. Project will construct around 95.5 km TLs and it is expected that total labor including the skilled and unskilled will not be more than 500 for the entire TLs. At one location, the number of labors is estimated maximum 50 and among the 50% will be unskilled labor.

Construction of T/L may require more labor come from peri-urban or urban areas where regular monitoring will be possible. All the construction camps will be constructed within the proposed near the tower areas. However, based on the social assessment, few GBV risk are identified as below:

- All the construction related activities will be conducted at this COVID situation and it may be difficult to monitor the activities on a regular basis.
- Labor/workers have lack of knowledge on national laws and policies, and actions in case of GBV issues
- Contractors have lack of experience in management of GBV issues.
- There are currently limited awareness raising programs on GBV/SEA/SH in energy sectors in Bangladesh.
- There is significantly more male labor than female labor in the energy infrastructure construction sector.
- Due to the constraints placed by the current COVID-19, further consultations need to be conducted to gauge GBV concerns from stakeholders.
- Job opportunities of local women and girls are generally limited. However, with civil work in the neighborhood, they may avail job opportunities in the project area and as a result be

[29] https://www.genderit.org/articles/cyber-violence-against-women-case-bangladesh (Accessed 3rd April 2020)

victims of SEA and workplace SH.

- Higher wages for workers in the local community can lead to an increase in transactional sex including incidents of sex between laborers and minors.
- Civil work projects can cause shifts in power dynamics between community members and within households. Male jealousy, a key driver of GBV, can be triggered by labor influx on a project when workers are believed to be interacting with community women, or community women are getting better wages than their male members of the family. This may lead to abusive behavior within the homes of those affected by the project.
- Not all GBV service providers have the capacity or the capability to provide phone-based remote service delivery during emergencies such as the current COVID-19 pandemic, where normal life is severely impacted. This could entail a lack of hotlines, adequate call representatives to receive cases, mechanism to file and track GBV cases and status of remote delivery, distance from GBV survivors etc.

4. GBV Prevention Plan

The GBV Prevention Plan takes a comprehensive approach to include both prevention and mitigation measures as the existing policies and measures on mitigation are limited to address GBV. The proposed project involves construction work in the project implemented areas which may have the potential GBV risks in four areas: sexual exploitation and abuse, workplace sexual harassment, and non-sexual exploitation and abuse. Therefore, the purpose of this action plan is to identify the issues, stakeholders, possible service providers and assess their capacity that aid in accessing grievance redressal. The action plan will focus on some corresponding mitigation measures—sensitizing the communities and other stakeholders, strengthening the institutional capacities— to mitigate project related potential risk of GBV in the project affected population.

A survivor-centric approach will be followed - all through, victim/survivors' care and providing access to different referral mechanisms are considered key aspects of this plan. The approach aims to create a supportive environment in which each survivor's rights are respected and in which the person is treated with dignity and respect.

The project will include a general Code of Conduct (CoC) as well as a Labor Code of Conduct (sample given in Annex I), covering the GBV/SEA/SH related risks for the contractors, sub-contractors, and laborers who will be employed under the project.

4.1 Grievance Mechanism

The PIU/ESU will use the existing GRM system with due consideration for confidentiality in case management of GBV issues. The GBV/SEA/SH allegations can be reported, just like any other project-related grievance, using a regular project-level GRM channel (see Annex III for illustration). The GRM focal person of the PMU will link the complainant with the selected service provider (see Appendix II) who will be given responsibility to make the link between the survivor and other local service providers with the consent of the complainant, special emphasis will be given to those who are mainly active remotely in COVID situation. To make the GRM more responsive to SEA/SH and GBV issues, an information sharing protocol with GBV service providers will be developed so that survivor related information is carefully managed, and confidentiality is maintained. A response protocol, reporting of allegation procedures and response framework of the GRM is attached (Annex IV), which follow a six-step value chain (1) uptake; (2) sort and process; (3) acknowledge and follow up; (4) verify, investigate, and act; (5) monitor and evaluate; and (6) provide feedback to the complainant. To respond the COVID situation, GRM will incorporate hotlines, place community leaders and facilitate community 'help center' to ensure access to service provision and to promote safety and well-being of women and girls in need.

GBV Prevention Plan

Action	Activities	Indicator	Responsibility	Risk Management
Awareness raising campaign on SEA/SH in project and trainings	Prepare relevant communication materials on GBV/SEA/SH and dissemination of these materials. Conduct 4 awareness raising workshop in the project areas. Develop content and conduct targeted training and orientation session: - Training/orientation sessions to sensitize IAs on importance of addressing GBV/SEA/SH risks on the project and the mechanisms that will be implemented. - Training/orientation session to sensitize other stakeholders on the importance of addressing GBV/SEA/SH risks including cyber bullying. The training will be targeted at stakeholders identified in SEP.	Communication material related to GBV/SEA/SH disseminated Awareness raising campaign on GBV/ SEA/SH conducted among all stakeholders Number of project actors trained and oriented on GBV/SEA/SH	Social Monitor* and PIU -Power Grid	Monitor the activities and provide additional guidance as necessary
Capacity building for labors, contractors, sub-contractors and stakeholders on anti-GBV/harassment policies.	• Basic ethics and CoC; Contractors, consultants, labor, sub-contractors and community people's rights and responsibilities, positive discipline. • Prepare Code of Conduct (CoC) • Measures for dealing with GBV, complaints and reporting mechanisms, services for survivors, referral mechanisms and redress procedures; *Topics to be covered under the trainings can be determined through consultations on training needs*	• CoC is prepared • All contractors, labor and relevant stakeholders are aware of the CoC	Social Monitor and ESU-Power Grid	Monitor the activities and provide additional guidance as necessary.
Sensitize the Power Grid and PIU to the importance of addressing GBV on the project, and the mechanisms	Develop deep-dive trainings to build capacity of Power Grid on safeguarding mechanisms including CoC, GRM, GBV	Deep-dive trainings conducted.	Social Monitor	Monitor the activities and provide additional guidance as necessary.

Action	Activities	Indicator	Responsibility	Risk Management
that will be implemented.	response protocols on and reporting and procedures to handle cases.			
Organize stakeholder consultations with project actors and community members to inform them properly about the potential GBV risks and project activities to address GBV related issues.	Consultations carried out with different stakeholders and local communities. Share the GBV risk of the project with the relevant stakeholders. Visibly display signs around the project site (if applicable) that signal to workers and the community that the project site is an area where GBV is prohibited.	No. of project actors and community members sensitized	Contractor and PIU	Monitor the implementation of Stakeholder Engagement Plan.
Functionalize effective GBV GRM	As the SEP explicitly entails addressing GBV/SEA/SH, ensure beneficiaries, community members and labor are informed of GBV grievance mechanisms. Map local services providers in project affected areas and develop referral protocol to GBV response services (See Annex II for list of service providers functioning during COVID-19 lockdown.) Train personnel to operate GRM i.e., proper documentation for complaint registration and management; and confidential reporting with safe and ethical documenting of GBV cases. Communicate with local service provider to provide referral and support services to survivors as per Grievance Mechanism guidance on SEA/SH. Organize a stakeholder engagement with CSOs to ensure that they are aware.	Availability of an effective GRM with multiple channels to initiate a complaint / parallel GBV.	PIU, Social Monitor and ESU- Power Grid	Ongoing monitoring and reporting on GRM to verify it is working as intended.
Clearly define the GBV	Formulate and adopt GBV informed bidding	GBV requirement and	PIU- Power Grid	Review by Donor agency

Action	Activities	Indicator	Responsibility	Risk Management
requirements and expectations in the bidding documents for contractor	document. Inform the contractors and provide orientation Include GBV costs in the bill of quantities	expectation are adapted in bid document.	and ESU	
Codes of Conduct (CoC) signed and understood by all those engaged in the project directly receiving project financing	CoC finalized and agreed on. (See Annex 1 for sample of code of conduct) Sensitize project related staff about CoC requirements and obligations. Ensure requirements in CoCs are clearly understood by those signing. Have CoCs signed by all those with a physical presence at the project site. Disseminate CoCs (including visual illustrations) and discuss with employees and surrounding communities.	No. of project-related staff trained and oriented on CoC. No. of project-related staff who signed CoCs	Social Monitor, PIU- Power Grid and ESU of Power Grid	Review implementation during supervision missions.
Codes of Conduct (CoC) for all laborers signed and understood	CoC finalized and agreed on. (See Appendix I for sample of code of conduct) Sensitize project related workers about CoC requirements and obligations. Ensure requirements in CoCs are clearly understood by those signing. Have CoCs signed by all those with a physical presence at the project site. Disseminate CoCs (including visual illustrations) and discuss with employees and surrounding communities.	# of project-related laborers trained and oriented in CoC #of laborers who signed CoCs	Contractor and Social Monitor	Review implementation during supervision missions.
Accountability and response	Create an accountability and response	Record of # of cases and	PIU- Power Grid	Monitor the effective

Action	Activities	Indicator	Responsibility	Risk Management
framework for SEA/SH allegations related to CoC in place.	framework for how allegations of SEA/SH that breach the CoC will be handled and the commensurate disciplinary measures. Sensitize project related staff and laborers about what constitutes as CoC breaching. Ensure repercussions are understood by project related staff and workers. Concrete disciplinary measures created.	disciplinary actions taken if breach in CoC	and Social Monitor	implementation of the SEA/SH accountability and response framework should an allegation come forward
Implement appropriate project related civil works for labor to reduce GBV risks.	Have separate, safe and easily accessible facilities for women and men working on the site. Include security measures such as ensuring adequate security personnel. Locker rooms and/or latrines should be located in separate areas, well-lit and include the ability to be locked from the inside. Visibly display signs around the project site (if applicable) that signal to workers and the community that the project site is an area where GBV is prohibited.	Documentation of measures taken to reduce GBV risks.	Contractor, PIU	Ongoing reporting
Undertake regular M&E of progress on GBV activities.	• Conduct M&E field visits. • Review quarterly the action plan and progress against indicators listed • Provide quarterly report	Successful implementation of agreed GBV Action Plan (Y/N). Quarterly report	PIU, Social Monitor, contractors	Ongoing reporting
Improve safety of project-related civil works for labor to reduce GBV risks during construction works	• Improve lighting around project area • Follow up refurbishment construction activities (Safely demarcated (appropriate signage, lighting)	Clearly demarcated and well-lit spaces.	PIU and contractors.	Monitor the activities and provide additional guidance as necessary.

Appendix I

Sample Labor Code of Conduct covering the GBV/SEA/SHA related risks

Introduction

The company is committed to ensuring a work environment which minimizes any negative impacts on the local environment, communities, and its workers. The company also strongly commits to creating and maintaining an environment in which Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) have no place, and where they will not be tolerated by any employee, sub-contractor, supplier, associate, or representative of the company. The purpose of this *Code of Conduct* is to:

1. Create a common understanding of what constitutes Sexual exploitation and abuse, and sexual harassment
2. Create a shared commitment to standard behaviors and guidelines for company employees to prevent, report, and respond to SEA and SH, and
3. Create understanding that breach of this code of conduct will result in disciplinary action.

Definitions

Sexual Exploitation and Abuse (SEA)[30]

Is defined as any actual or attempted abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another[31].

Sexual Abuse: "The actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions."

Sexual Harassment:[32]

Unwelcome sexual advances, request for sexual favors, and other verbal or physical conduct of sexual nature.

Sexual Harassment versus SEA[33]

SEA occurs against a beneficiary or member of the community. Sexual harassment occurs between personnel/staff of an organization or company and involves any unwelcome sexual advance or unwanted verbal or physical conduct of a sexual nature. The distinction between the two is important so that agency policies and staff trainings can include specific instruction on the procedures to report each.

Consent is the choice behind a person's voluntary decision to do something. Consent for any sexual activity must be freely given, ok to withdraw, made with as much knowledge as possible, and specific to the situation. If agreement is obtained using threats, lies, coercion, or exploitation of power imbalance, it is not consent. **Under this Code of Conduct[34] consent cannot be given by anyone under the age of 18, regardless of the age of majority or age of consent locally. Mistaken belief regarding the age of the child is not a defense**.

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[30] As defined in the UN Secretary's bulletin – Special Measures for protection from sexual exploitation and abuse October, 9, 2003 ST/SGB/2003/13

[32] Inter-Agency Standing Committee *Protection against Sexual Exploitation and Abuse (PSEA): Inter-agency cooperation in community-based complaint mechanism. Global standard Operating Procedures*. May 2016

[33] Ibid

[34] In accordance with the United Nations Convention on the Rights of the Child.

There is no consent when agreement is obtained through:
• the use of threats, force or other forms of coercion, abduction, fraud, manipulation, deception, or misrepresentation
• the use of a threat to withhold a benefit to which the person is already entitled, or
• a promise is made to the person to provide a benefit.

While all forms of violence against a community resident or a co-worker are forbidden, this code of conduct is particularly concerned with the prevention and reporting of sexual exploitation and abuse (SEA) and sexual harassment which constitute gross misconduct, are grounds for termination or other consequences related to employment and employment status:

(1) **Examples of sexual exploitation and abuse** include, but are not limited to:

- A project worker tells women in the community that he can get them jobs related to the work site (cooking and cleaning) in exchange for sex.
- A worker that is connecting electricity input to households says that he can connect women headed households to the grid in exchange for sex.
- A project worker gets drunk after being paid and rapes a local woman.
- A project worker denies passage of a woman through the site that he is working on unless she performs a sexual favor.
- A manager tells a woman applying for a job that he will only hire her if she has sex with him.
- A worker begins a friendship with a 17-year-old girl who walks to and from school on the road where project related work is taking place. He gives her rides to school. He tells her that he loves her. They have sex.

(2) **Examples of sexual harassment in a work context** include, but are not limited to:

- Male staff comment on female staffs' appearances (both positive and negative) and sexual desirability.
- When a female staff member complains about comments male staff are making about her appearance, they say she is "asking for it" because of how she dresses.
- A male manager touches a female staff members' buttocks when he passes her at work.
  A male staff member tells a female staff member he will get her a raise if she sends him naked photographs of herself.

Individual signed commitment (to be translated in a language understood by the person signing):

I, _____, acknowledge that sexual exploitation and abuse (SEA) and sexual harassment, are prohibited. As an *(employee/contractor)* of *(contracted agency / sub-contracted agency)* in (*country)*, I acknowledge that SEA and SH activities on the work site, the work site surroundings, at workers' camps, or the surrounding community constitute a violation of this *Code of Conduct*. I understand SEA and SH activities are grounds for sanctions, penalties or potential termination of employment. Prosecution of those who commit SEA and SH may be pursued if appropriate.
I agree that while working on the project I will:

- Treat all persons, including children (persons under the age of 18), with respect regardless of sex, race, color, language, religion, political or other opinion, national, ethnic or social origin, gender identity, sexual orientation, property, disability, birth or other status.
- Commit to creating an environment which prevents SEA and SH and promotes this code of conduct. In particular, I will seek to support the systems which maintain this environment.
- **Not** participate in SEA and SH as defined by this *Code of Conduct* and as defined under *(country)* law (*and other local law, where applicable).*

- **Not** use language or behavior towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
- **Not** participate in sexual contact or activity with anyone below the age of 18. Mistaken belief regarding the age of a child is not a defense. Consent from the child is also not a defense. I will not participate in actions intended to build a relationship with a minor that will lead to sexual activity.
- **Not** solicit**/**engage in sexual favors in exchange for anything as described above.
- Unless there is the full consent by all parties involved, recognizing that a child is unable to give consent and a child is anyone under the age of 18, I will not have sexual interactions with members of the surrounding communities. This includes relationships involving the withholding or promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex—such sexual activity is considered "non-consensual" under this Code.

I commit to:

- Adhere to the provisions of this code of conduct both on and off the project site.
- Attend and actively partake in training courses related to preventing SEA and SH as requested by my employer.

If I am aware of or suspect SEA and SH, at the project site or surrounding community, I understand that I am encouraged to report it to the Grievance Reporting Mechanism (GRM) or to my manager. The safety, consent, and consequences for the person who has suffered the abuse will be part of my consideration when reporting. I understand that I will be expected to maintain confidentiality on any matters related to the incident to protect the privacy and security of all those involved.

Sanctions: I understand that if I breach this Individual Code of Conduct, my employer will take disciplinary action which could include:

- Informal warning or formal warning
- Additional training
- Loss of salary
- Suspension of employment (with or without payment of salary)
- Termination of employment
- Report to the police or other authorities as warranted

I understand that it is my responsibility to adhere to this code of conduct. That I will avoid actions or behaviors that could be construed as SEA and SH. Any such actions will be a breach this Individual Code of Conduct. I acknowledge that I have read the Individual Code of Conduct, do agree to comply with the standards contained in this document, and understand my roles and responsibilities to prevent and potentially report SEA and SHA issues. I understand that any action inconsistent with this Individual Code of Conduct or failure to act mandated by this Individual Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Signature: _____
Printed Name: _____

Title: _____

Date: _____

Appendix II

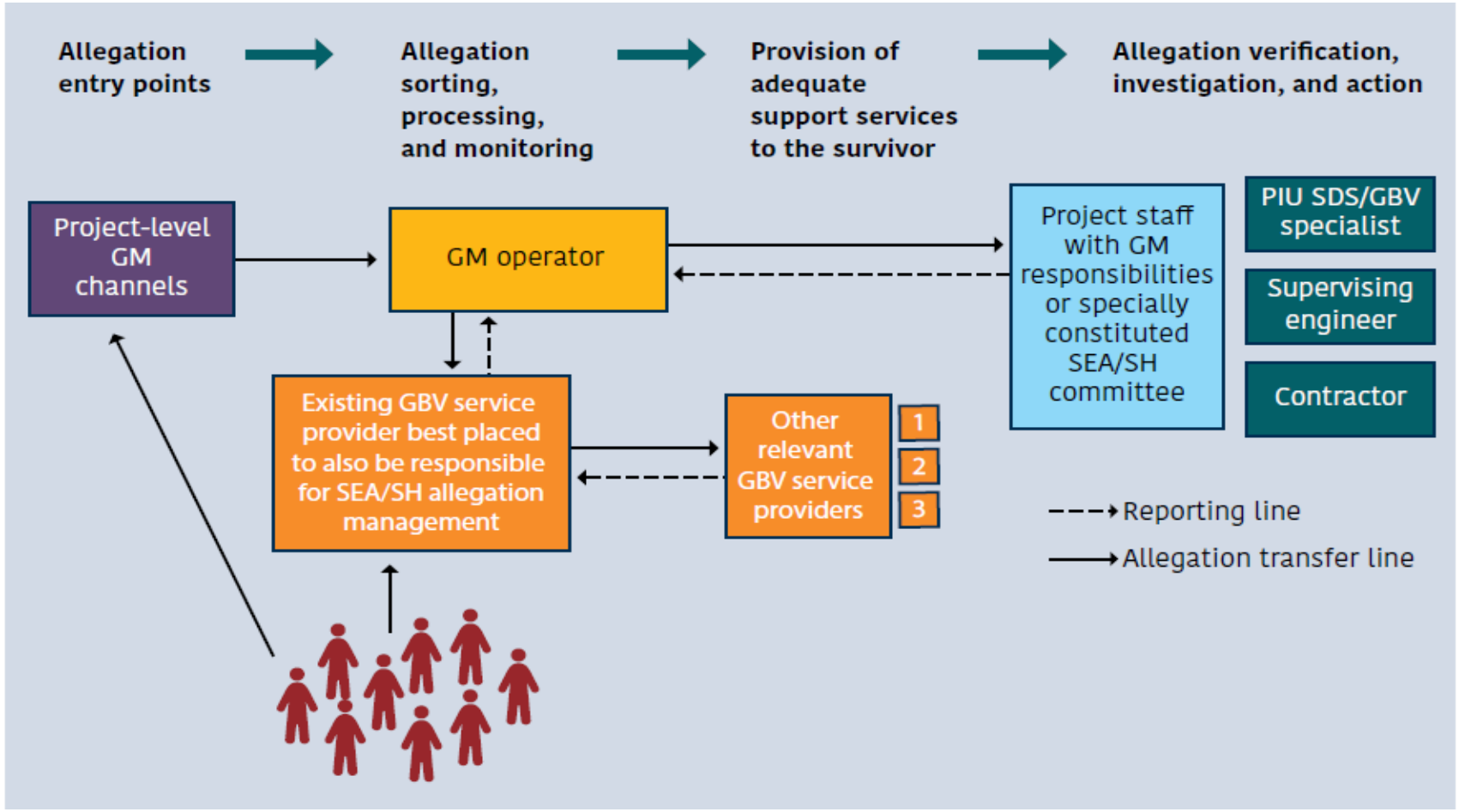
GBV service providers functioning in Bangladesh during COVID-1935

a. **Helplines** • National Helpline Centre for Violence against Women and Children: **10921;** • Legal Aid Helpline: **16430** • Marie Stopes Bangladesh: **08000222333**; • Acid Survivors Foundation (ASF): **+8801713010461**; • Bangladesh Legal Aid and Services Trust (BLAST): **+8801715-220 220;** • Ain o Salish Kendra (ASK): **+8801724415677;** • Rights Jessore: **+8801977182023;**	b. **Immediate rescue information** • OCC (Medical): **109** • OCC(Judicial) a. Faridpur: +8801711248085; b. Sylhet: +8801716128370; c. Barishal: +8801715635866; d. Rajshahi: +8801718620310; e. Chattogram: +8801819941106; f. Bagerhat: +8801911100177;
c. **Psycho-social counseling** • Marie Stopes Bangladesh: **02-58152538;** • Acid Survivors Foundation (ASF): +**8801713010461;** • Ministry of Women and Children Affairs (focused on COVID-19 Psychosocial Counselling): • **National:** **12.00-3.00:** +8801715297944, **3:00-6.00:** +8801727209070 **6.00-9.00:** +8801914317856	**Regional** **9.00-12.00:** • **Dhaka, Dhaka Medical College Hospital (DMCH):** +8801780839944, • **Barishal, Sher e Bangla Medical College and Hospital (SBMCH):** +8801913566477, • **Chattogram, Chattogram Medical College and Hospital (CMCH):** +8801676095159, • **Rangpur, Rangpur Medical College and Hospital (RpMCH):** +8801777337089 **12.00-3.00:** • **Rangpur, Rangpur Medical College and Hospital (RpMCH):** +8801919137331, • **Khulna, Khulna Medical College and Hospital (KMCH):** +8801723545731 **3.00-6.00:** • **Rajshahi, Medical College and Hospital (RMCH):** +8801515621317, • **Dhaka, Dhaka Medical College and Hospital (DMCH):** +8801675620992, • **Cox's Bazar Medical College and Hospital (CoxMCH):** +8801847461880 **6.00-9.00:** • **Sylhet, Sylhet Osmani Medical College and Hospital (SOMCH):** +8801766356094, • **Chattogram, Chattogram Medical College and Hospital (CMCH):**+8801761362020, • **Faridpur, Faridpur Medical College and Hospital (FMCH):** +8801673719894; • **Aparajita Jessore:** +8801761222222-4
d. **Shelters** • Judicial OCC • Faridpur: +**8801711248085;** Sylhet: **+8801716128370;** Barishal: **+8801715635866;** Rajshahi: **+8801718620310;** Chattogram: **+8801819941106;** Bagerhat: **+8801911100177;** • Dhaka Ahsania Mission (shelter with transport) (880-2) 58155869, 9127943, 9123402, 9123420;	e. **Legal Counseling** • Bangladesh Legal Aid and Services Trust (BLAST): **+8801715-220 220;** • Ain o Salish Kendra (ASK): **+8801714-025069;** • Organization for Women's Development in Bangladesh (OWDEB) – Chattogram (Providing service to Ward 4,5,6 now): **+8801711 – 171060** • Aparajita Jessore: **+8801761222222-4**

[35]This GBV service providers list is constantly being updated, in context of COVID-19 and sourced from the WB.

Appendix III

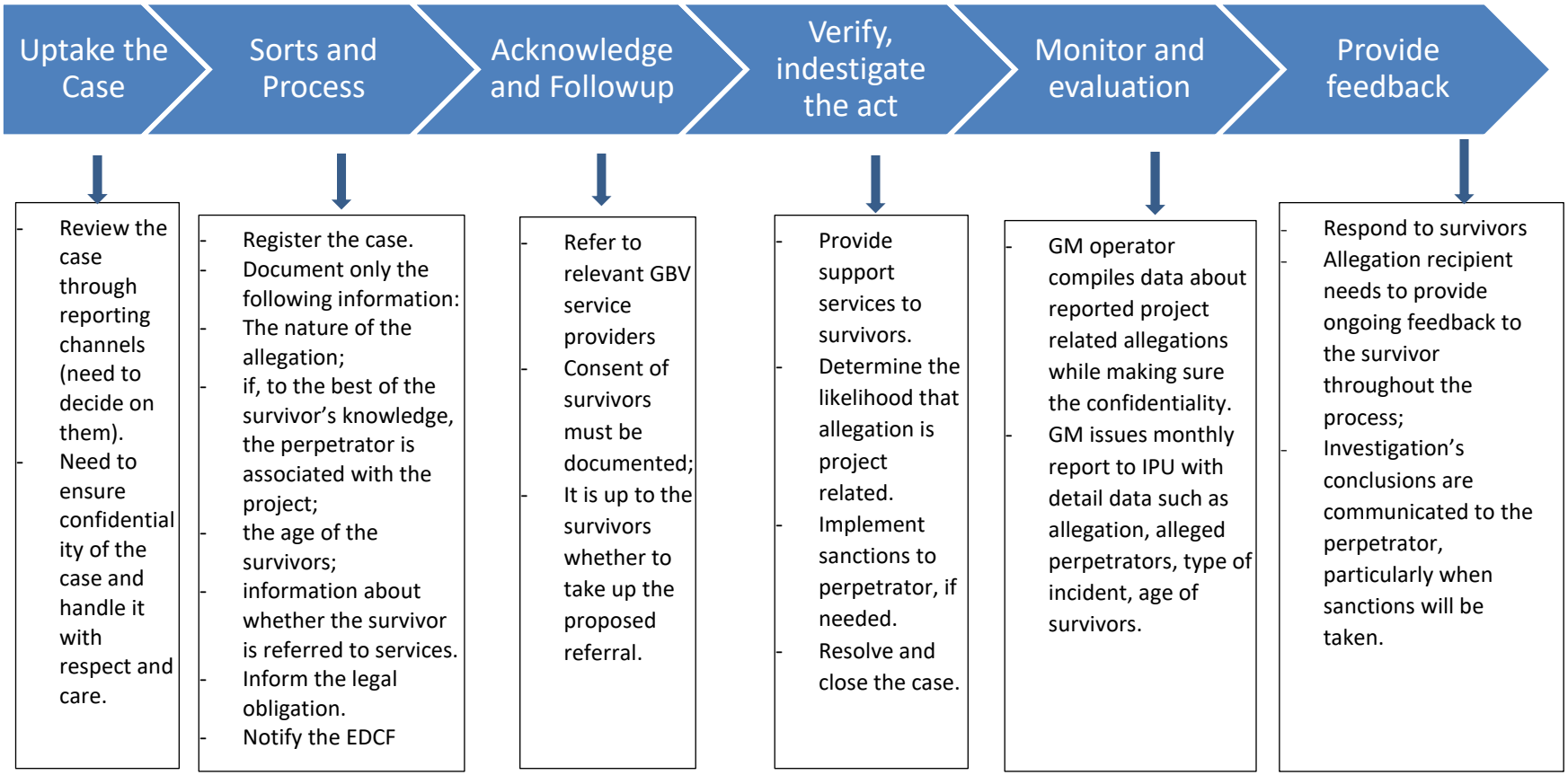
Project Grievance Mechanism to address SEA/SH Allegations[36] (this model will be further tailored to the project needs)



[36] http://documents1.worldbank.org/curated/en/399881538336159607/pdf/Environment-and-Social-Framework-ESF-Good-Practice-Note-on-Gender-based-Violence-English.pdf

Appendix IV

Operating Procedures and Response Protocol for SEA/SH Allegations[37]



[37] Same as 18

Annex-XV: Chance Find Procedures for Protection of Cultural Property

Chance Find Procedures for Protection of Cultural Property
(Ref: The World Bank Operational Manual, 1999 OP4.11)

Works could impact sites of social, sacred, religious, or heritage value. "Chance find" procedures would apply when those sites are identified during the design phase or during the actual construction period and the related activity will not be eligible for financing under the project.

1. Cultural property include monuments, structures, works of art, or sites of significance points of view, and are defined as sites and structures having archaeological, historical, architectural, or religious significance, and natural sites with cultural values. This includes cemeteries, graveyards and graves.

2. The list of negative subproject attributes which would make a subproject ineligible for support includes any activity that would adversely impact cultural property.

3. In the event of finding of finding properties of cultural value during construction, the following procedures for identification, protection from theft, and treatment of discovered artifacts should be followed and included in standard bidding documents.

(a) Stop the construction activities in the area of the chance find;
(b) Delineate the discovered site or area;
(c) Secure the site to prevent any damage or loss of removable objects.
(d) Notify the supervisory Engineer who in turn will notify the responsible local authorities;
(e) Responsible local authorities and the relevant Ministry would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures.
(f) Decisions on how to handle the finding shall be taken by the responsible authorities and the relevant Ministry. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance), conservation, restoration and salvage.
(g) Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the relevant Ministry.
(h) Construction work could resume only after permission is given from the responsible local authorities and the relevant Ministry concerning safeguard of the heritage.

4. These procedures must be referred to as standard provisions in construction contracts. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered are observed.

5. Relevant findings will be recorded in World Bank Supervision Reports and Implementation Completion Reports will assess the overall effectiveness of the project's cultural property mitigation, management, and activities, as appropriate.

Annex-XVI: Fire Management Plan

1.1 Purpose

The action plan is for use in the event of a fire incident, if any at the proposed project. The primary objectives of plan are to save lives, prevent injuries and eliminate or minimize damage to property during the construction transmission line.

1.2 Responsibilities

Phases	Staff	Responsibility	Monitoring Frequency
Construction Phase	Project Director	Overall responsibility	Weekly and monthly
	Fire Marshal	Responsible for implementation and monitoring	Daily (During work)
	Contractor/ Employees	Compliance with PD's/Power Grid's directions as per tender documents	
Operation Phase	Executive Engineer/Asst. Engineer / Sub-Asst. Engineer	Overall responsibility during operation phase for substations and transmission lines	Schedule routine as per Power Grid policy

1.3 General Principle of Fire-Fighting

(a) The safeguarding of life and safety of personnel shall take precedence overall other considerations when determining the actions to be taken in case of fire;
(b) The key to successful firefighting is to take action quickly to suppress, extinguish, or control the fire before it can become established or spread further;
(c) A fire requires three elements in order to start and to be sustained
- Heat
- Oxygen (Air)
- Fuel

These elements form the triangle of fire. If any one of these elements is removed the fire will be extinguished.

(d) All firefighting efforts should be based on the triangle of fire and should aim at eliminating one or more of the three essential elements.

1.4 Fire Preparedness and Planning

1) The project personnel must be prepared to respond to a fire at all times regardless of operating status:
   (a) The Contractor shall ensure that all fire-fighting equipment is maintained in a constant state of readiness and is available to personnel
   (b) It is the responsibility of the contractor and every supervisor to ensure that the employees under their supervision know how exit the project activity in a fire emergency. An ordinary evacuation depends on both adequate warning and employee awareness of the proper procedures. State of readiness by conducting weekly fire drills
   (c) The Contractor shall establish an emergency organization consisting of a selected number of employees, organized and trained, to deal effectively with fires, explosions, and similar occurrences
   (d) The Contractor shall ensure that procedures and check lists are maintained and kept current for after-hours notification of key personnel when the facility is operating at less than normal complement or shutdown

(e) Proposed change in facility layout, materials, operation and construction shall be reviewed by unit safety and fire prevent personnel as early in the planning stage as possible to establish necessary fire prevention and control measures

2) The fire marshal shall inspect the project activity daily to ensure that all fire- fighting equipment is in place and available for use, as well as to identify any potential fire hazards
   (a) Emergency exits and roots leading to them shall be clearly identified by signs
   (b) Current standard on construction, dimensions, lighting and number of exits required by safety codes shall apply in designating exits
3) A program of fire-fight training shall be established by the fire marshal under the direction of the Contractor. This program shall ensure that all personnel are familiar with:
   (a) The fire-fighting equipment at the project site
   (b) Fire- fighting techniques
   (c) The fire emergency preparedness plan.
4) The project fire-fighting plan shall be posted at various strategic locations throughout the project areas, including in the control room. This plan shall include a floor plan drawn to indicate the emergency exits, the procedure for sounding an alarm and evacuation instructions
5) If possible, the safety committee shall arrange for key emergency instruction and telephone numbers from plan to be highlight in the project's internal directory
6) A set of master keys providing access to all doors will be maintained in a special fire locker within the control room
7) Interface with local fire department
   (a) Contractor/Power Grid management through the fire marshal, shall establish an interface with local fire department and shall establish an action plan for action plan for use in case the local fire department is called to respond to emergency
   (b) The action plan shall:
   (c) Establish a protocol for responding to an emergency call from the project site
   (d) Define the types of firefighting equipment to be used at the project site
   (e) Ensure that the fire department has access to the facility
   (f) Determine who will be in overall command of fire-fighting efforts.
   (g) Clearly establish actions to be taken by the fire department in response to different types of fire and different types of fire and different sections for example, oil storage tank fires, electricity fires and lubricant store fire etc.
8) The fire marshal shall ask the fire department to become familiar with the project and to participate in firefighting training conducted at the project sites including substation and transmission sensitive areas especially reserve forest.
9) The Contractor shall also ensure that the fire department can connect directly to the project site fire-fighting system without on-the-spot modifications.
10) Special fire-fighting procedures are to be posted at fixed firefighting operating stations such as the control room CO_2 flooding station, the separator room and so on.
11) Training
   (a) Fire awareness training shall be given to all project personnel as a part of new employee orientation;
   (b) Fire- fighting training and qualification examinations will be given to all project operating staff and to maintenance staff. Selected personnel will be required to attend advanced fire-fighting course;
   (c) Specialized training shall be provided to persons with responsibilities for maintenance of fire- fighting equipment, related systems and supplies;
   (d) The fire marshal must attend advance fire-fighting course and demonstrate a complete understanding of the project procedures and fire- fighting system;
   (e) The fire marshal shall coordinate with the local fire department and shall arrange for joint fire- fighting training at the project site.

12) Fire Drills
    (a) Each location shall establish an evacuation procedure to be followed in fire drills and emergencies
    (b) Each location shall have an alarm system or other suitable means to alert the occupants to the need for evacuation
    (c) The Contractor shall conduct weekly fire drills to:
        - Demonstrate the operational readiness or fire-fighting equipment;
        - During each drill, the fire pump and at least one fire hose should be operated for a minimum of ten minutes;
        - The fire hose used in weekly drill should be rotated.

Personnel Response to a fire alarm (Drill or emergency)

- Take whatever immediate steps are necessary and feasible to minimize any hazard in leaving the working area unattended.
- Do not use elevators for evacuation purposes.
- Do not reenter facilities until the "All clear" signal sounds or clear verbal instructions to reenter are given by responsible authority.

Supervisor Response to a fire alarm (Drill or emergency)

- Direct the evacuation of your area and account for personnel.
- Advice the responding authority of the situation and warn of potentially hazardous conditions.

If a fire Occurs

- In all cases, immediately raise the alarm by operating local fire alarm buttons
- Assess the situation to determine if the fire can be extinguished easily. If so attempt to fight the fire using available equipment
- If the fire is large or has the potential to become large:
  - If possible, isolate the air supply and/or the fuel supply to the fire. This may include shutting down vent fans, closing ventilators and closing fuel supply valves;
  - Stop any operating equipment. Shut down engines adjacent to the fire;
  - Bear in mind that shutting down the project activity completely will cause a black out and may make fire-fighting difficult;
  - Attack the fire using the appropriate equipment. Be aware of potential electrical shock hazards when using water to fight a fire

13) In all cases, the shift supervisor shall initiate a call to the local fire department and notify others according to the fire emergency notification and response lists in attachment.
14) If the fire is too large or cannot be readily extinguished by actions of one person, a firefighting team should be assembled under the direction of the person designated to be in charge. Based on the individual circumstances the approach will be some appropriate combination and sequence of the following:
    (a) Contain the fire. Use hoses or the means to restrict the fire to as small an area as is practically possible. If necessary, use boundary cooling.
    (b) Isolate the fuel supply by closing all supply valves to the equipment or area.
    (c) Isolate or minimize the air supply to the fire by closing vents and dampers and shutting down vent's fans.
    (d) Attack the fire using appropriate means.
15) After a fire
    (a) Post a fire watch for at least 30 minutes after any fire. In the case of larger fires, a longer fire watch may be necessary.
    (b) The operations supervisor or maintenance supervisor shall prepare an incident report. The Contractor shall distribute copies of the incident report for any fire at the project site to the owner and to the PD, with a copy retained on file.

(c) The Contractor shall hold a debriefing to review the action taken during the fire and to emphasize “lessons learned”. Any recommendations for changes in this procedure or in the project fire- fighting plan, as deemed appropriate, should be made to the safety committee.

16) Forest Fires

If underlying growth is left unchecked, or slash from routine maintenance is left to accumulate within right-of-way boundaries, sufficient fuel can accumulate that may promote forest fires. Recommended measures to prevent and control risk of forest fire include:

(a) Monitoring right-of-way vegetation according to fire risk;
(b) Removing blowdown and other high-hazard fuel accumulations;
(c) Time thinning, slashing, and other maintenance activities to avoid forest fire seasons; Disposal of maintenance slash by truck or controlled burning
(d) Controlled burning should adhere to applicable burning regulations, fire suppression equipment requirements, and typically must be monitored by a fire watcher;
(e) Planting and managing fire resistant species (e.g., hardwoods) within, and adjacent to, rights-of-way;
(f) Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow fire-fighting access.

1.5 Records

(a) All records are to be maintained for three years.
(b) Superseded copies of the procedure are to be retained on file for three years

Annex-XVII: Tree Plantation Plan

1. Introduction

The total forest area of Bangladesh is 2.6 million hectares, which is nearly 17.4% of the total land area of the country (FD, 2016). A large number of trees is being felling due to significant infrastructure development of the country. In addition, laying of high-voltage power transmission lines by Power Grid requires to fell a good number of trees as part of Right-of-Way (RoW) clearing and maintenance over its construction and commissioning period. These felling trees are generally part of village forests and road side plantation forest of Bangladesh. The privately owned village forests, also known as homestead forests totalling an area of 0.27 million hectares (Hammermaster, 1981) are scattered throughout the country. Almost all the village area (2.86 million hectares) is covered by trees of varying density and only a very small area has no tree cover at all (NFA, 2007). Although meagre in size, an estimated 70% of timber, 90% of firewood, 48% of sawn and veneer logs, and almost 90% of bamboo requirements are met from homestead forests (Douglas, 1982). Almost 50% of the area of Bangladesh has some kind of tree cover (NFA, 2007). More than 30% of the cultivated land has low percentage of tree cover (NFA, 2007). Considering the enrichment of village forests, it is important to commence a programme of replantation by locally available species in a suitable place by Power Grid. Hence, a tree plantation plan is required to prepare for high-voltage power lines project of Power Grid.

2. Component of the project

The Madunaghat-Moheshkhali 765kV transmission line project primarily involves the construction of a 765kV transmission line, the extension of existing substations (400kV Bay Extension), and potentially new substation construction. The line itself will likely use high-capacity conductors like the Hexa Bundle ACSR Cardinal. The project also includes feasibility studies, power sector assessments, and environmental impact assessments. Major components of the project are:

(a) 765kV Double Circuit Line:

The core component is the high-voltage transmission line itself comprises of 95.5-km with 272 nos. of tower, designed to carry a large volume of electricity over a significant distance.

(b) Conductors:

The project will likely use high-capacity conductors like the Hexa Bundle ACSR Cardinal, known for its ability to handle high voltage and current.

3. Status of trees to be felled

As per ESIA and RP Report, installation of the transmission lines will affect a number of standing trees of different varieties along the RoW which have to be removed to pave the way for the construction work of the transmission lines. The standing trees which are grown directly under the proposed conductors and falling within an estimated area of a clearing width 90m of the respective RoWs will be removed. The total number of trees to be removed is estimated at 8,921 which include 21,178 timber trees, 8144 fruit-bearing trees, 10071 bamboo trees and 86 medicinal plants. Table below presents a summary of the trees that will be affected by the construction of transmission lines.

Table 1: Trees Affected by the Transmission Lines and Replantation Ratio

Name of trees	Size			Total	Replantation Ratio (1:3)
	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)		
(A) Fruits					
Mango	384	674	660	1718	5154
Tetul/Tamarind	0	0	4	4	12
Jam/Syzygium cumini	0	0	3	3	9
Jackfruit	127	273	295	695	2085
Banana	79	830	1429	2338	7014
Guava	0	0	101	101	303
Coconut	457	694	500	1651	4953
Battle leaf	315	458	638	1411	4233
Palm tree	36	50	29	115	345
Boroi/Ziziphus zizyphus	0	8	4	12	36
Khejur/Date palm	14	13	69	96	288
Sub-Total (A)	**1412**	**3000**	**3732**	**8144**	24432
(B) Timber					
Eucalyptus	745	595	589	1929	5787
Raintree	2554	2425	1312	6291	18873
Keora	0	4	10	14	42
Akashi/Acacia auriculiformis	2263	2941	2836	8040	24120
Mahogany	1322	1376	1048	3746	11238
Segun/Teak Tree	83	375	65	523	1569
Koroi/Lebbeck	39	55	12	106	318
Babla/Gum arabic tree	20	16	0	36	108
Belgium Tree	129	222	122	473	1419
Hijol Tree/Barringtonia acutangula	0	0	6	6	18
Shimul/Cottontrees	11	3	0	14	42
Sub-Total (B)	7166	8012	6000	21178	63534
(C) Medicinial					
Nim/Azadirachta indica	0	0	10	10	30
Arjun/Terminalia arjuna	21	22	27	70	210
Ficus/Fig Tree/Dumur	0	6	0	6	18
Sub-Total (C)	21	28	37	86	258
(D) Bamboo	4,149	4,252	1,670	10,071	30213
Total (A+B+C+D)	**12,748**	**15,292**	**11,439**	**39,479**	**118437**

Source: ESIA and RP Report; IIFC Tree Counting Survey 2025

4. Scope of Tree Plantation

Significant impact of the project is the loss of a total of 39479 trees comprising 21178 timber trees, 8144 fruit-bearing trees, 10071 bamboo trees and 86 medicinal plants with an average of 413 trees per kilometre. PIU and Contractor shall replant trees against the felled at 1:3 basis with total of 1,18,437.

5. Forest Plantation

A forest plantation is defined as “a forest crop or stand raised artificially, either by sowing or planting” (Ford-Robertson 1971 in Evans 1992). In the literature, “afforestation”, “reforestation” or “forestation” are used to distinguish new planted forests. The term “afforestation” is used in describing forests established artificially on land that previously did not carry forest for at least 50 years (Evans, 1992; Pancel, 1993a). For example, when man establishes a new forest on grassland

or sand dunes, such afforestation is clearly artificial and can be termed a plantation (Evans, 1992). "Reforestation" is used when forests are established artificially on land which has carried forest within the previous 50 years, involving the replacement of the previous crop by an essentially different one (Evans, 1992; Pancel, 1993a). Sometimes, the term "forestation" is used for both "afforestation" and "reforestation" (Pancel 1993a, Wadsworth 1997).

Other terms used to characterise tree planting within existing forests are "inter-planting" or "under-planting". Trees are planted in existing forests either for "enrichment" (inter-planting), which is the filling in of natural gaps in forest regeneration, or as "under-planting", the planting of young trees or the sowing of tree seeds, usually spaced systematically under most or all of an existing forest (Ford-Robertson, 1971 and Wadsworth 1997). Based on the form of enrichment or the distribution of trees within the forest, the inter/under-planting methods are called "gap planting", "line planting" and "group planting".

In general, forestry plantation establishment is broadly divided into three management phases: seed collection and handling; nursery practices and plantation establishment; and management. This manual includes guidelines related to the entire range of planting activities from species selection for the site to tree felling. The initial plantation establishment phase is divided into the following activities: species selection, site preparation and planting operation. The plantation management phase includes silvicultural activities as follows: protection, tending (weeding and fertilising), pruning, thinning, felling, and regeneration/replanting. The sequence of these activities is shown Table 2.

Table 2: Sequence of forest plantation decisions and operations

Usual Silvicultural operation	Main decisions	Product
Obtain seeds	Species? Provenance?	Not applicable
Produce planting stock	Season? Containers? Size?	Seedlings Transplants
Site preparation	Intensity?	Not applicable
Planting	Spacing? Fertiliser	Young trees
Tending	Frequency? Methods?	Saplings
Low pruning	Need? Partial?	Small poles
Thinning	Timing? Intensity?	Large poles
High pruning	Need? Height?	Large poles
Felling	When?	Mature trees
Regeneration/Replanting	Changes in species or culture?	Second crop

Source: Evans 1992, Wadsworth 1997

6. Why Plant Forest Trees

The direct benefits of forest plantations on the value of the land are forest products such as saw timber, fuelwood, charcoal, poles, food products, fodder for livestock, medicinal products, and shade for agricultural crops. The objectives and desired end products of the forest plantation will influence selection and application of establishment and management activities. Plantation activities and financial investment will vary depending on the objectives and the type of plantation to be established (Table 3):

- large-scale industrial forest plantation (industrial forestry)

- large-scale non-industrial forest plantation (environmental forestry)
- small-scale village/community forest plantation (social forestry) and agroforestry systems

Table 3: End-products and forest plantation systems and methods

End products	Plantation systems	Planting methods
Timber	Large-scale industrial plantation	Block planting
	Small-scale community plantation	Block planting, Enrichment planting
Fuelwood / charcoal	Large-scale industrial plantation	Block planting/Coppice
	Small-scale community plantation	Block planting/Coppice
Posts / boundary	Agroforestry system	Trees planted individually or in line
Food	Agroforestry system	Trees planted individually or in line
Fodder	Agroforestry system	Trees planted individually or in line
Medicinal products	Agroforestry system	Trees planted individually or in line
Shade	Agroforestry system	Trees planted individually or in line
Land reclamation	Large/small-scale non-industrial	Block planting/Nitrogen fixing
	plantation	species
Aesthetics/Biodiversity	Large/small-scale non-industrial plantation	Enrichment planting

The block planting method is a full planting used where there is no existing forest. Enrichment planting (line conversion planting, gap planting, under-planting) is a method to improve an existing secondary forest. The last planting method called “trees planted individually or in line” includes trees planted in pastures, boundary planting, live fences, and line planting between agriculture crops (taungya or intercropping).

From an ecological point of view, the reconstruction of a vegetation cover through forest plantation restores the productivity of the land in terms of reduction of air pollution, regulation of water quality and regime, control of potential soil erosion, improvement of soil fertility and creation of habitat for wildlife (Table 3). The socio -economic effects are enhancement of the beauty of the landscape, creation of an environment beneficial to the health and increase in the value of the land.

Table 4: Ecologic effects of forest plantation activities

Ecological parameter	Large-scale industrial forest plantation	Large-scale non-industrial forest plantation	Small-scale village/community forest plantation	Agroforestry systems
Climate	Positive effects comparable with those of natural forests Very positive effects compared with degraded sites		Improvement of the microclimate Only locally effective; in combination with terracing good chance to rehabilitate small catchments	Tree lines serve as windbreaks As trees are planted in steps and in strips along the contour line, sustainable reduction of runoff and erosion is achieved
Water balance and erosion control	Increased runoff and soil erosion during establishment/young plants phase Stabilisation (at complete area coverage) Use of heavy machinery promotes soil compaction, runoff, and erosion	Large-scale terracing as site preparation quickly controls runoff and erosion		
	Forest roads built for forest plantation establishment often enhance erosion			
Soil fertility	Mechanical removal of the vegetation cover in combination with ploughing and partial removal of organic soil matter is more disadvantageous for plants than burning the vegetation Planting of fast-growing species with short rotations favours depletion of soil nutrients	Reduction of runoff and erosion creates conditions for enrichment with organic matter and nutrients	Small-scale positive effects could be achieved provided that erosion is stopped and nutrients are released to the soils by the organic matter	Positive effects prevail because often nitrogen-fixing species are used, negative effects possible through root and light competition
	Pine monoculture could enhance soil acidity		Shade protects the humus layer; therefore the destruction of the soil structure is counter-balanced	
Species diversity	The establishment of monocultures is accompanied by a reduction of species diversity		Species diversity of agriculture areas is improved through tree groups, tree strips and small-scale village and community woodlots	
		Forest plantation establishment on degraded sites and the establishment of mixed forests increase species diversity		

Source: Zech *et al*. 1999 *in* Pancel 1993a.

7. Where to Plant Trees

First, the availability of land for forest planting on public or private lands must be known and second, the quality of the available land must be known to ascertain if it is appropriate to the objectives of the planned forest plantation. It is notorious that with all land capability classification systems, the classes of poor land, i.e., those with shallow soils and steep slopes, are earmarked for forestry production. This is because the main objective of most land capability classification systems is to map agricultural potential (of the land). However, the best soils for agricultural crops are also the best for industrial forest plantations.

Some foresters accept the fact that large-scale development of plantation forestry, especially on degraded lands, seems essential and inevitable in many tropical and subtropical countries (Brown et al. 1997), particularly those with high population densities where the available good land for agricultural crops is limited and the forest product needs are high.

7.1 Available lands

In Bangladesh, land available for forest plantations is mainly publicly owned where the existing land use/cover types are abandoned. Protected Areas contains about 618253.49 hectares of forest land and represents 4.19% area of the country. The map of Bangladesh shows the location of protected areas. There are different IUCN categories of Protected Areas in Bangladesh. They are described as follows. However, in social forestry, about 79,298-hectare woodlot plantation; 10,626 hectares of agroforestry plantations; 6,647 kilometres of strip plantations have been raised under the social forestry program of Forest Department.

Wildlife Sanctuary: means an area closed to hunting, shooting, or trapping of wild animals and declared as such under Article 23 by the government as undisturbed breeding ground primarily for the protection of wildlife inclusive of all-natural resources such as vegetation soil and water (paragraph) (p) of Article 2).

Special Biodiversity Area: means specialized forest areas to consider for the conservation and development of biodiversity. For example, Ratargul Swamp forest of Sylhet.

Vulture Safe Zone: means areas considered for conservation and reproduction of critically endangered white-rumped Vulture (Gyps bengalensis).

National Park: means comparatively large areas of outstanding scenic and natural beauty with the primary object of protection and preservation of scenery, flora and fauna in the natural state to which access for public recreation and education and research may be allowed (paragraph) (p) of Article 2).

Eco- Park: means an area of natural ecological habitat of flora and fauna with outstanding scenic beauties which is managed for providing recreational facilities for visitors and which is declared as such through official gazette notification under section 19 of the Act.

Botanical garden: means an area where different native and exotic plan species are conserved or managed for education, research and conservation and improvement of source of genepool introducing from another habitat and which is declared as such through official gazette notification under section 19 of this Act.

Safari Park: means an area where indigenous and exotic wild animal species are protected in an approximation of a natural environment for increasing the population and grazing openly and which is declared as such through official gazette notification under section 19.

> *Bangladesh Forest Department is implementing a project titled "Climate Resilient Ecosystems and Livelihoods (CREL)" under the Ministry of Environment and Forests for better management of Protected areas.*

There remain huge fallow lands and wastelands along the sides of roads, highways, railways, embankments, homesteads, farm houses and farm boundaries, pond sides, lake and riversides, etc.

These lands are needed to be brought under production systems (Hossain, 2006). Again, crop land 'ails' (bunds) as well as farm and homestead boundaries have to be used under specialized plantation systems to reduce friction and /or negative effects on others' land (Hossain, 1994, 1996). Bangladesh has about 4500 km of roads and highways, 16000 km of district council roads, 105000 km of thana and union parishad roads, 2900 km of railroads, 56000 km of river and coastal embankments, and about 2 million big and small ponds with prominent high banks. Specialized agroforests can be established there (Amin et al., 1996).

7.2 Appropriate climate

Bangladesh is divided in 30-agro-ecological zones which are used as the basis to select the agricultural crops which will produce the maximum yield for any given zone. The area is under tropical monsoon climate where rainfall is heavy, humidity and temperature are also high during April to September and low rainfall associated with low temperature during October to March. The winter season is dry and cool, and receives only 2% of the total rainfall mostly as occasional drizzles between November to February. Bangladesh tries to reforest its barren land, but there are some areas where trees are still being cut down. The government inaugurates the tree plantation season in June every year, and it continues till September.

7.3 Appropriate soils

The potential area for reforestation is discussed above for planning purposes at the national and watershed management unit levels (1:100 000 mapping scale). A detailed assessment of the soil quality of the site to be planted, if possible, at 1:10 000 mapping scale, should be carried out before starting the planting lay-out. The selection of the appropriate forest land use allocation, such as industrial forest plantation, forest plantation for soil protection, or agroforestry, is mainly governed by the slope and the effective soil depth (Table 5).

After climate, determination of slope and effective soil depth is second step in the process to select the species to be planted. Measurements of the slope with a clinometer and the soil depth using a soil auger are simple to carry out in the field.

Table 5: General guidelines for forest land use allocation

Soil Depth	Gentle to Moderate Sloping	Slope Strongly Sloping to Moderate Steep	Steep to Very Steep
	(1)	(2)	(3)
Deep (D) [> 100 cm]	**[< 15^0 [< 27%]**	**[15^0- 30^0] [27% - 58%]**	**[>30^0] [> 58%]**
	FI(P), C	FI(P), C	FS, FP, AF
Moderately Deep (M) [50 – 100 cm]	FI(P), C	FI(P), AF, C	FS, FP, AF
Shallow (S) [20 – 50 cm]	FI, AF, C	FI, AF, PA	FP
Very Shallow (V) [< 20 cm]	FS, AF, PA	FS, FP, AF	FP

Potential Land Uses:

FI(P): Forest for industrial production, including intensive site preparation and plantation establishment; possible mechanisation.

FI: Forest for industrial production (e.g, selective cutting, enrichment planting, seeding and coppicing); possible mechanisation, but normally excluding intensive site preparation and plantation establishment.

FS: Selection forest for environmental protection and limited wood extraction; selective logging only, no clear cutting, no road construction, no mechanised site preparation, no mechanised ground skidding.

FP: Protection forest for watershed management, ecosystem protection, and/or recreation; no road construction, no timber extraction.

AF: Agroforestry: trees or shrubs grown in association with herbaceous plans under an approved system involving soil conservation measures

PA: Pastures

- Cultivable land

Note:

In forest reserves, forest management areas, parks or protected areas:

- Where the existing forest cover is Closed Broadleaf Forest, Mesic and Dry Limestone or Mangrove Forest, use will be restricted to FP.

- Where the existing forest cover is Modified Forest (Closed Broadleaf, Mesic and Dry Limestone or Mangrove), land use will be retained as forest (ie, FP, FS, FI or FI(P).
- Where land is already under cultivation, pasture or agroforestry use, such uses may be permitted as specified in the table if warranted by local social, economic and environmental circumstances.

Soil texture, drainage and acidity (pH) can easily be estimated using a sample collected with a soil auger in the field before planting activities begin. The texture of soil, using particles <2 mm (about the size of a grain of rice), is estimated with the finger assessment method described in the Table 7.

Table 7: Assessment procedure for soil texture

Texture Class	Definition
Sand	Loose and single-grained. Individual grains can be seen and felt. Squeezed in the hand when dry, it will fall apart when pressure is released. Squeezed when moist it will form a cast which will crumble when touched.
Sandy loam	Contains enough silt and clay to make it somewhat coherent. Sand grains are readily seen and felt. Squeezed when dry the cast will readily fall apart. Squeezed when moist the cast will bear careful handling without breaking.
loam	Mellow, with a somewhat gritty feel, yet fairly smooth and plastic when moist. Squeezed when dry, the cast will not break if handled carefully. When moist a cast can be handled freely without breaking.
Silt loam	When dry it may appear cloddy but the lumps are easily broken. When pulverised it feels soft and floury. When wet the soil puddles. Casts formed of either dry or moist soil can be readily handled without breaking. When moistened soil is squeezed between thumb and finger it will not “ribbon”, but will form flat “pastry flakes”.
Clay loam	When dry it forms hard lumps or clods. When moist it can be squeezed to form a thin ribbon, which will break readily, barely sustaining its own weight. When moist the soil is plastic and will form a cast that will take much handling.
Clay	Forms very hard aggregates when dry. When wet it is plastic and sticky. Moist clay can be pinched out between thumb and finger to form a long flexible ribbon. Note that some clays are friable and lack plasticity in all moisture conditions.

Source: Armson, K.A. 1977. Forest soils: properties and processes. University of Toronto Press, Toronto, 390 p.

The drainage class (or moisture class) is a global expression of the effective drainage and a summary of the drainage conditions for the soils in a given area (surface drainage+soil permeability+internal soil drainage). The procedure to assess soil drainage is shown in Table 8.

Soil acidity can be determined in the field with a simple pH Kit using the acidity classes presented in Table 9.

In addition, the use of the existing soil maps at the 1:50 000 scales and the soil technical sheets from the Rural Physical Planning Division (Soil Laboratory) can be very useful tools for determining the physical and chemical soil characteristics of the site to be planted.

For the establishment of large-scale industrial plantations, it is recommended that soil samples be collected and sent to the Rural Physical Planning Division (Soil Laboratory) for the following soil analysis: texture, organic carbon, acidity (pH), cationic exchange capacity (CEC), nitrogen (N), phosphorus (P) and potassium (K).

Table 8: Assessment procedure for soil drainage

Drainage Class	Definition
Excessively drained (E)	Coarse-textured soils (or some thin soils in steep slope), only saturated during and just after heavy rain. Surplus water is removed very rapidly, no mottling. Any water table is well below the solum.
Well drained (W)	Soil is rarely saturated in any horizon within 100 cm. Mottling is usually absented throughout the profile.
Moderately well drained (M)	Some part of the soil in the upper 100 cm is saturated for short periods in year or after heavy rain. Colours typical of well drained soils on similar materials are usually dominant but may be slightly lower in chroma, especially on ped faces and faint to distinct ochreous or grey mottling may occur below 50 cm.
Imperfectly drained (I)	Some part of the soil in the upper 50 cm is saturated for several months but not most of the year. Subsurface horizon colours are commonly lower in chroma than those of well-drained soils on similar materials. Greyish or ochreous mottling is usually distinct by 50 cm and may be prominent below this depth. There is rarely any greying in the upper 20 cm
Poorly drained (P)	The soil is saturated for at least half the year in the upper 50 cm but the upper 20 cm is unsaturated during most of the year. The profiles normally show strong greying. A horizon is usually darker and/or greyer than those of well drained soils on similar materials and contain rusty mottles. Grey colours are prominent on ped faces in fissured clayey soils or in the matrix of weakly structured soils.
Very poorly drained (V)	Some part of the soil is saturated at less than 20 cm for at least half the year. Some part of the soil within the upper 50 cm is permanently saturated. The profiles usually have peaty or humose surface horizons and the subsurface horizon colours have low (near neutral) chroma and bluish hues.

Adapted from: McRae, S.G. 1988. Practical pedology. Studying soils in the field. Elis Horwood Ltd., Chichester, 253 p

Table 9: Definition of soil acidity (pH) classes

pH	Reaction
< 4.0	Extremely Acid
4.5	Very Strongly Acid
5.0	Strongly Acid
5.5	Medium Acid
6.0	Slightly Acid
6.5	Very Slightly Acid
7.0	Neutral
7.5	Slightly Alkaline
8.0 +	Alkaline

7.4 Plantation success/failure

The failure of a forest plantation is mainly linked to two important causes: (1) early mortality due to the poor species selection for the site to be planted; and, (2) weed encroachment and discontinued maintenance (Francis 1998). Landowners can successfully establish trees and plantations virtually anywhere in Jamaica by using the best species, the proper site preparation and planting techniques and the good timing for maintenance and silvicultural activities for the site to be planted.

8. Which Tree Species to Plant

In many cases, species selection directly determines the success of the plantation. Whether selecting species for a large -scale industrial plantation or a small-scale multipurpose tree plantation, a set of criteria is applied in various combinations. The criteria are determined by the purpose of the forest plantation, i.e, industrial or domestic uses, environmental protection, requirements of the local population, etc. and species are selected which are best suited to the site, in terms of climate and soil. In Table 10, selection criteria are grouped according to the main forest plantation systems.

Table 10: Criteria for species selection by forest plantation systems

Large-scale industrial forest plantation	Large-scale non-industrial forest plantation	Small-scale village/ community forest plantation	Agroforestry systems
Yield over 10-15 m^3/ha/yr Easy propagation Clonal propagation Marketing Valuable timber Suitable for monocultures Resistance to pests Fire/wind resistance Auto-tolerant Ease of pruning Good wood properties Availability of proven seeds Site-specific	Intensive root system Good survival and growth Suitable for marginal lands Undemanding Multiple uses Good natural regeneration Easy propagation Coppicing Soil improvement Robust against browsing Site-specific	Easy propagation Coppicing Multiple uses Fast growth Short rotation High acceptance Site-specific	Multiple uses N_2-fixation Deep rooting Coppicing Fast growth Light crowns High acceptance Site-specific

Source: Evans 1992, Pancel 1993b.

Table 11: Recommended species for different plantations of Bangladesh

Plantation Type	Type of Species	
	Local Name	Scientific Name
Mangrove Afforestation	Keora	*Sonneratia apetala*
	Baen	*Avicennia officinalis*
	Moricha Baen	*Avicennia marina*
	Sada Baen	*Avicennia alba*
	Gewa	*Excoecaria agallocha*
Mound Plantation	Babla	*Acacia senegal*
	Babla	*Acacia nilotica*
	Jhaw	*Casuarina equisitifolia*
	Koroj	*Pongamia pinnata*
	Katbadam	*Terminalia catappa*
	Shingra	*Cynometra ramiflora*
	Puti jam	*Eugenia spp.*
Jhaw Plantation (Casuarina)	Jhaw	*Casuaria spp.*
Golpata Plantation (Nipa)	Golpata	*Nipa frunticans*
Enrichment Plantation	Gewa	*Excoecaria agallocha*
	Sundri	*Heritiera fomes*
	Kakra	*Bruguiera gymmnorrhiza*
	Pusur	*Xylocarpus mekongenesis*
Core Zone Plantation	Koroi	*Albizia procera*
	Boilam	*Anisoptera glabra*
	Chickrashi	*Chickrasia tabularis*
	Gamar	*Gmelina arborea*
	Jarul	*Lagerstroemia parviflora*
	Bakain	*Meila azadirachta*

Plantation Type	Type of Species	
	Local Name	Scientific Name
	Neem	*Melia indica*
	Amloki	*Phyllanthus embilica*
	Arjun	*Terminalia arjuna*
	Bohera	*Terminalia bellirica*
	Horitoki	*Terminalia chebula*
Buffer Zone Plantation	Koroi	*Albizia procera*
	Raj koroi	*Albizia richerdiana*
	Boilam	*Anisoptera glabra*
	Chickrashi	*Chickrasia tabularis*
	Kadam	*Anthocephalus kadamba*
	Gamar	*Gmelina arborea*
	Jarul	*Lagerstroemia parviflora*
	Bakain	*Meila azadirachta*
	Neem	*Melia indica*
	Amloki	*Phyllanthus embilica*
	Arjun	*Terminalia arjuna*
	Bohera	*Terminalia bellirica*
	Horitoki	*Terminalia chebula*
	Mahogany	*Swietenia macrophylla*
	Jam	*Syzygium cumini*
	Tatul	*Tamarindus indica*
	Amra	*Spondias mangifera*
	Katbadam	*Terminalia catappa*
Non-mangrove (buffer) Plantation	Koroi	*Albizia procera*
	Raj koroi	*Albizia richerdiana*
	Boilam	*Anisoptera glabra*
	Chickrashi	*Chickrasia tabularis*
	Kadam	*Anthocephalus kadamba*
	Gamar	*Gmelina arborea*
	Jarul	*Lagerstroemia parviflora*
	Bakain	*Meila azadirachta*
	Neem	*Melia indica*
	Amloki	*Phyllanthus embilica*
	Arjun	*Terminalia arjuna*
	Bohera	*Terminalia bellirica*
	Horitoki	*Terminalia chebula*
	Mahogany	*Swietenia macrophylla*
	Jam	*Syzygium cumini*
	Tatul	*Tamarindus indica*
	Amra	*Spondias mangifera*
	Katbadam	*Terminalia catappa*
Strip Plantation	Babla	Acacia nilotica
	Koroi	*Albizia procera*
	Raj koroi	*Albizia richerdiana*
	Kadam	*Anthocephalus kadamba*
	Jack Fruit	*Artocarpus heterophyllus*
	Chickrashi	*Chickrasia tabularis*
	Epilipil	*Leucaena leucocephala*
	Gamar	*Gmelina arborea*
	Jarul	*Lagerstroemia parviflora*
	Bakain	*Meila azadirachta*
	Neem	*Melia indica*

Plantation Type	Type of Species	
	Local Name	Scientific Name
	Amloki	*Phyllanthus embilica*
	Arjun	*Terminalia arjuna*
	Bohera	*Terminalia bellirica*
	Horitoki	*Terminalia chebula*
	Mahogany	*Swietenia macrophylla*
	Jam	*Syzygium cumini*
	Tatul	*Tamarindus indica*
	Amra	*Spondias mangifera*
	Katbadam	*Terminalia catappa*
	Raintree	*Samanea saman*
	Guava	*Psidium guava*
	Natai	*Pithecellobium dulce*

SL	Local Name of Trees	Scientific Name of Trees	Type of Trees
1.	Akashmoni	(*Acacia auriculiformis*)	Non-Fruits
2.	Amra	(*Spondias mombin*)	Fruits trees
3.	Arjun	(*Terminalia arjuna*)	Medicinal
4.	Banyan Tree	(*Ficus benghalensis*)	Non-Fruits
5.	Betel Nut	(*Areca palm*)	Fruits trees
6.	Blackberry	*(Syzygium cumini)*	Fruits trees
7.	Chalta	(*Dillenia indica*)	Fruits trees
8.	Chambol	(*Artocarpus chama Buch-Ham*)	Non-Fruits
9.	Chestnut	(*Castanea*)	Fruits trees
10.	Coconut	(*Cocos nucifera*)	Fruits trees
11.	Date	(*Phoenix dactylifera*)	Fruits trees
12.	Deuya	(*Phaleria macrocarpa*)	Fruits trees
13.	Devdaru	(*Polyalthia longifolia*)	Non-Fruits
14.	Ipilipil	(*Intsia bijuga*)	Non-Fruits
15.	Fir tree	(*Abies grandis)*	Non-Fruits
16.	Gab	(*Psidium guajava)*	Fruits trees
17.	Jack Fruit	(*Artocarpus heterophyllus*)	Fruits trees
18.	Jarul	(*Lagerstroemia speciosa*)	Non-Fruits
19.	Jujube	(*Ziziphus jujuba*)	Fruits trees
20.	Koroi	(*Albizia procera*)	Non-Fruits
21.	Trot/Kodom	(*Anthocephalus chinensis*)	Non-Fruits
22.	Krisnachura	(*Delonix regia*)	Non-Fruits
23.	Latai		Non-Fruits
24.	Mango	(*Mangifera indica*)	Fruits trees
25.	Margosa	(*Azadirachta indica*)	Medicinal
26.	Mehoguni	(*Swietenia macrophylla*)	Non-Fruits
27.	Myrobalan/ Amloki	(*Phyllanthus emblica*)	Medicinal
28.	Olive	(*Olea europaea*)	Fruits trees
29.	Palm Tree	*(Borassus flabellifer)*	Fruits trees
30.	Pitha Bora		Non-Fruits
31.	Rain Tree	(*Samanea saman*)	Non-Fruits
32.	Sajina	(*Moringa oleifera)*	Fruits trees
33.	Shal	*(Shorea robusta)*	Non-Fruits
34.	Shimul	(*Bombax ceiba*)	Non-Fruits
35.	Shisu	(*Dalbergia sissoo*)	Non-Fruits
36.	Tamarind	(*Tamarindus indica*)	Fruits trees
37.	Tectona	(*Tectona grandis)*	Non-Fruits

SL	Local Name of Trees	Scientific Name of Trees	Type of Trees
38.	Trot/ Kodom	(*Anthocephalus chinensis*)	Non-Fruits
39.	Eucalyptus	(*Eucalyptus globulus)*	Non-Fruits
40.	Wood		Non-Fruits
41.	Wood Apple	(*Limonia acidissima*)	Fruits trees

9. How to Establish Forest Plantation

The establishment of a forest plantation includes three stages:

- lay-out
- site preparation; and
- planting operation

Activities for each stage normally decrease in number and time required (investment) from large-scale forest plantations, enrichment planting to intercropping tree planting. For example, intercropping tree planting or agroforestry systems do not generally require thinning and fertilising operations.

9.1 Lay-out

For large-scale forest plantations, planning the plantation lay-out is complex as it must include the exact location and shape of the forest plantation; road network plan; location of waterways for fire-fighting purposes; subdivision into sub- units (compartments) with open lines between for fire breaks and access; spacing; marking; and mapping. For small-scale village/community forest plantations, lay-out planning consists of four activities. Table 12 provides guidelines on how to lay-out a forest plantation.

- spacing decision
- area survey and marking operation
- establishment of firebreak line around the forest plantation as boundary protection line, and
- mapping the location of the plantation

Table 12: Guidelines for tree plantation lay-out

Activity	Methodology
Area survey/ marking boundaries	Instruments: Compass (or GPS) and distance tape
	Annual planting area (ha) = Total area of the planting project (ha) / rotation (yr)
	Permanent marking clearly visible for all corners and intersection points
Firebreak line establishment	Where there are no existing roads, paths or watercourses within the forest plantation
	Permanent line with no flammable vegetation or use fire resistant species (green break)
	Width of firebreak according to surrounding vegetation height (cleaning of 2-10 m)
Tree spacing	Spacing 1-2 m: Fuelwood, maximise yield, short rotation, no small size limit
	Spacing 2.5-4.5 m: Sawn timber, large log size 30 cm+ in DBH, long rotation, regular thinning
	Squared or rectangular spacing on flat land; triangular spacing on sloping land
Marking planting lines and pits	On slopes <15 degrees, establish base line (1 or more) parallel to a convenient road or track
	Mark the location of the start of the planting lines along the base line with poles
	Use compass and rope marked with fixed intervals to trace the planting line, at right angles to the base line
	Mark the planting pits with sticks/pegs along the marked rope
	In steep terrain, use a simple level (or A frame) to mark planting pits along contour lines
Mapping	Scale 1:50 000: General planning of the location of forest plantation areas

	Scale 1:10 000: Activities planning for forest plantation or area >10 ha
	General planning of location for forest plantation of area <10 ha
	Scale 1:5 000/1:2 500: Activities planning for forest plantation of area <10 ha

Source: Samek 1974, FIDCO 1980b, Evans 1992, Pancel 1993a.

The decision on tree spacing is the most important one in the establishment of forest plantations because it is correlated to the success of the forest plantation regarding maintenance, stand stability, quality of wood and investment. Spacing is variable depending on the species and final product. Three types of spacing are frequently used: squared, rectangular and triangular. The calculation of the number of seedlings for these spacing types is explained in Table 13 below and illustrated in Figure 1.

Table 13: Calculation of number of seedlings according to spacing type

Spacing type	Formula[1]	Example	
		Spacing	No. of seedlings
Squared	10,000 / (RxP)	4 m x 4 m	625
Rectangular	10,000 / (RxP)	2 m x 8 m	625
Triangular[2]	10,000 / (RxP)	4.30 m x 3.72 m	625

[1]R = distance between tree; P = distance between line.
[2]Triangle with 3 equal sides (R), P = height of the triangle (R x 0.866)

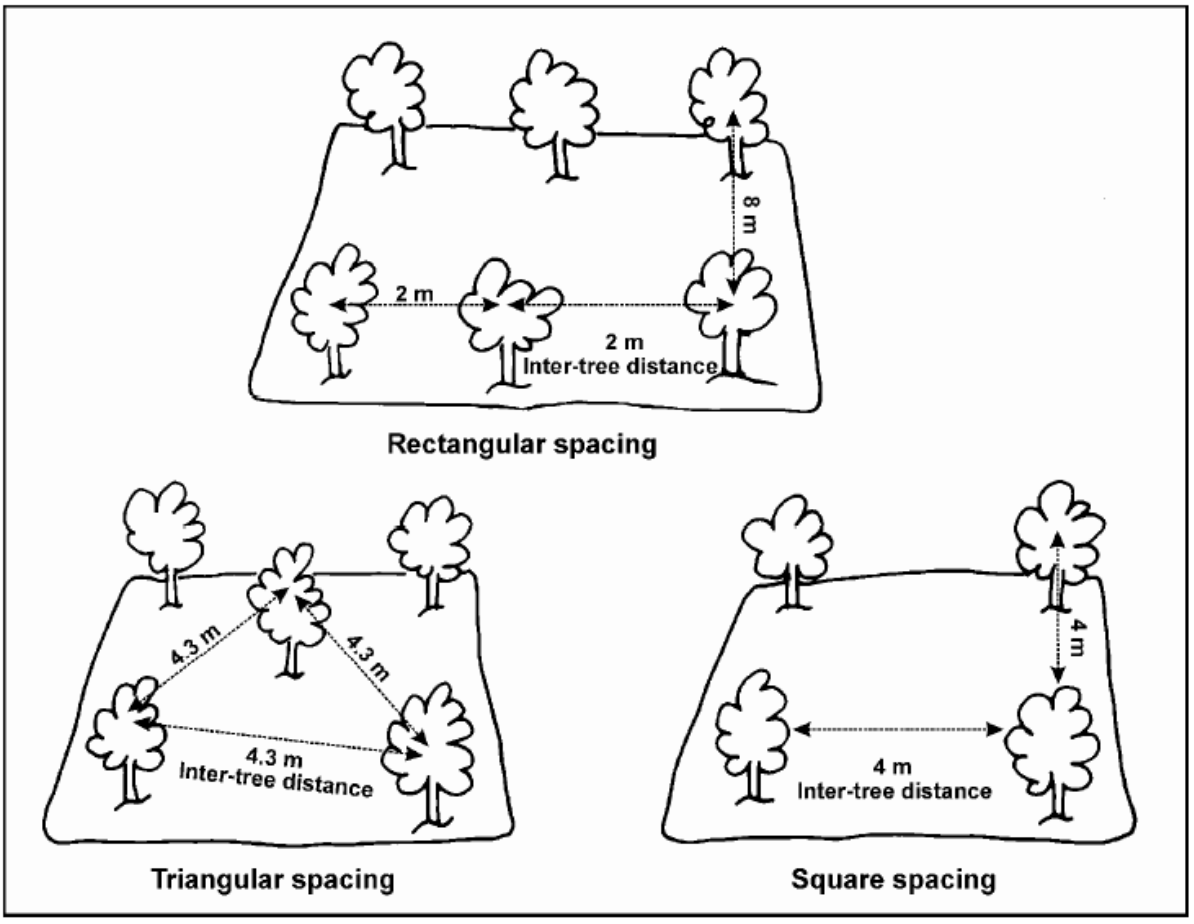


Figure 1: Frequently used types of tree spacing

Table 14: Silviculture of different types of plantations

Mangrove plantation	Mound Planation (non-mangrove)
1. Nursery: 40′×4′ bed, Tk. 1.5/seedling, 5000 seedlings for planting of 4444/ha 2. Planting 4444 seedling/ha (1.5m×1.5m spacing) 3. Community watching (1st year 6 months and 2nd year 12 months) 4. Maintenance (VF 2nd year 40%=1800 seedling/ha) 5. Beating up 40% and 3 weeding 6. Maintenance (VF 3rd year 20%=900 seedling/ha) 7. Beating up 20% and 2 weeding	1. Nursery: 7′′×5′′ bag, Tk. 5.75/seedling, raising 1760 seedlings for planting of 1600/ha 2. Planting 1600 seedling/ha (1.5m×1.5m spacing) 3. Maintenance (VF 1st year 10%=160 seedling/ha) 4. Beating up 10% and 3 weeding 5. Maintenance (VF 2nd year 10%=160 seedling/ha) 6. Beating up 10% and 2 weeding
Dyke Plantation (non-mangrove)	**Jhaw Plantation**
1. Nursery: 7′′×5′′ bag, Tk. 5.75/seedling, raising 495 seedlings for planting of 450/ha (9 Dyke×50 seedling, 30 coconuts, 400 fruits and 20 tree/ha 2. Plantation: 450 seedlings in 9 dyke/ha (9×50) (30 coconuts, 400 fruits and 20 tree)	1. Nursery: 7′′×5′′ bag, Tk. 5.75/seedling, raising 2750 seedlings for planting of 2500/ha 2. Planting 2500 seedling/ha (2m×2m spacing) 3. Maintenance (VF 1st year 10%=250 seedling/ha) 4. Beating up 10% and 3 weeding 5. Maintenance (VF 2nd year 10%=250 seedling/ha) 6. Beating up 10% and 2 weeding and pruning
Golpata Plantation	**Enrichment Plantation (mangrove)**
1. Nursery: 40′×4′ bed, Tk. 10/seedling, 1100 seedlings/km for planting of 1000/km 2. Plantation: 1000 seedling/km 3. Watcher and boat hire, planting 0 year (save seedling from fishing push net) 4. Maintenance (VF 1st year 10%=100 seedling/km) 5. Beating up 10% and 2 weeding 6. 2nd year maintenance: weeding and clearing	1. Nursery: 16′′×9′′ bag, Tk. 1.5/seedling, raising 315 seedlings for planting of 300/ha 2. Planting 300 seedling/ha (1.5m×1.5m spacing) 3. 1st year maintenance Climber cutting including transportation
Core Zone Plantation	**Buffer Zone and Buffer Zone Non-Mangrove Plantation**
1. Nursery: 10′′×6′′ bag, Tk. 6.75/seedling, raising 2750 seedlings for planting of 2500/ha 2. Planting 2500 seedling/ha (2m×2m spacing) 3. Maintenance (VF 1st year 10%=250 seedling/ha) 4. Beating up 10% and 3 weeding 5. 2nd year maintenance 2 weeding and pruning	1. Nursery: 7′′×5′′ bag, Tk. 5.75/seedling, raising 2750 seedlings for planting of 2500/ha 2. Planting 2500 seedling/ha (2m×2m spacing) 3. Maintenance (VF 1st year 10%=250 seedling/ha) 4. Beating up 10% and 3 weeding 5. 2nd year maintenance 2 weeding and pruning
Strip Plantation	
1. Nursery: 7′′×5′′ bag, Tk. 5.75/seedling, raising 1100 seedlings for planting of 1000/km 2. Planting 1000 seedling/km 3. Watcher including cleaning @Tk. 6000/km/month 4. 1st year maintenance, raising 200 seedling/km (participant will do the beating up) 5. Stack and shoothly-200 no. @ Tk. 3.0	

9.2 Site preparation

The extent of preparation needed for the planting site depends on four factors:

- purpose of plantation
- species to be planted
- existing vegetative cover, and
- soil conditions.

Site preparation comprises two main field activities: removal of the existing vegetation to reduce and/or eliminate competition and ground preparation to improve water retention and provide optimal soil conditions for the plantation's initial phase. Four methods can be used for vegetation clearance: manual, mechanical, by burning or use of weedicides. For ground preparation after vegetation has been cleared, different methods also exist, such as pioneer ploughing, subsoiling, pre-planting harrowing, planting pits and terracing.

Site preparation for a small-scale community plantation or agroforestry planting is less costly than for large-scale industrial forest plantations which requires the use of heavy equipment. A "minimum" amount of work to prepare the site for receiving the seedlings is essential because time and money have already been spent to collect and prepare the seeds and to raise the seedlings in nursery. In addition, the degree of site preparation needed directly reflects the species' ability to compete for light, moisture, and nutrients on the site in question. For example, most eucalyptus species require a completely weed-free site for rapid early growth, while many pine species (including Pinus caribaea) are tolerant of grass competition.

Clearing of natural "primary" forest or old secondary forest simply for tree plantations is today generally considered to be unacceptable on grounds of conservation and risk of erosion. Careful management of secondary forest can render it productive as any plantation. Heavy equipment used in land clearing and preparation causes major disturbances to the soil such as compaction, erosion, etc., and can be used only where there are no site restrictions (i.e, sloping terrain, rockiness, logging debris, other material on a site). Also, vegetation removal by slash-burning may induce rapid alteration in soil properties; the ash layer following burning is rich in nutrients (exchangeable bases) which are often washed down after the first rain.

Table 15 presents different options for manual clearing depending on the competing or existing vegetation, as well as some special ground preparation techniques. It is worth noting that even where mechanical methods using heavy equipment are feasible or less costly than manual methods, the latter (utilising light equipment) are more desirable in terms of a wider distribution of the employment benefits of plantation establishment.

Table 15: Guidelines for preparation of planting site

Activity	Methodology
Removal of competing vegetation	
Open areas, grassland, abandoned pasture	Each planting spot is cleared individually
	Cleared area: one square meter or a circle of 1 meter radius
	Use a machete to cut high Gramineae and a hoe to cut grasses, including roots
	Clean, collect and put the cut material outside the cleared area
Areas with Shrubs (2-3 m height)	Clear a strip 2 meters wide following a pre-determined spacing between strips
	Cut the vegetation within the strip using a machete or axe 10 cm from the soil surface
	Clear and clean each planting spot within the strip as described above
Areas of secondary	Clear a strip in an east-west direction at least 8-10 meters wide, and equidistance between strip center of 10-25 meters

Activity	Methodology
forest	Mark and cut trees with market value for timber and/or fuelwood using an axe or chain saw
	Clear completely a central line about 1 metre wide within the strip
	On both sides of the central line, remove the bush layer, smaller trees and climbers
	Reduce competition from overhead shade from the big trees within the strip
Special ground preparation	
Steep land	Stabilize the site and reduce erosion by the establishment of mini-terraces (terracettes or mini-convertible terraces or hillside ditches)
	Use an agroforestry system; mixed multi-storey tree and crop combinations
Sand dunes	Use physical barriers of wood or other material to slow sand movement and build up a level surface
	Follow by planting nitrogen-fixing shrubs or trees species with crown densities near the ground
Barren areas, Mine reclamation areas	Before planting trees, establish a leguminous (native herbaceous) ground cover to restore the surface soil
	Dig planting pits, refill with loose soil mixed with organic matter
Swampy sites, waterlogged areas	Prepare drainage system; outer and receiving ditches, drainage ditches and drains system
	Make mounds or ridges for planting trees

Source: FIDCO 1980b, Wadsworth 1997, Ruiz 2002

9.3 Planting technique

The first variable influencing planting is timing. Throughout the tropics the occurrence of the rainy season usually determines the planting time. Evapotranspiration stress at planting is one of the main causes of initial death. To minimise planting stress, seedlings should be planted when the soil moisture level has returned to field capacity, i.e., after approximately 100 mm of steady rain has fallen; during cloudy days; and using well-watered seedlings (Evans 1992).

In Bangladesh, planting should be done during the short rainy season (April, May, June) and long rainy season (September, October, November). There is no restriction about the planting time during cloudy days but the best time is before noon on sunny days.

Two types of planting material are commonly used: bare rooted plants, including stumps, and container plants most commonly grown in plastic bags. The field planting methods for these two types of seedlings are described in Table 16. Figures 2 and 3 illustrates the correct planting technique and position of the seedling in the planting pit respectively. Occasionally, other types of planting methods and materials are used such as direct sowing, seedlings from natural regeneration and cuttings or vegetative propagation method.

If the planting is done during the rainy season, watering is not necessary. However, the forest plantation manager should plan for watering in case no rain falls in the first week after planting. The addition of fertiliser at planting is based on soil analyses, but it is essential on infertile sites where the purpose of the plantation is to improve poor soils or to rehabilitate mined bauxite lands. A quality control exercise should be carried out to evaluate the performance of the plantation in order to make the necessary adjustments to the planting method and for planning the replanting (beating up) in the following planting season.

Table 16: Guidelines for planting technique

Activity	Methodology
Planting method for bare root seedlings	Dig a small (20-25 cm deep) planting pit or open up a slit with a hoe or spade or mattock Seedlings are inserted up to the root collar level with the ground, using one hand Soil is carefully filled back with the other hand and pressed with the foot around the seedling
Planting method for container grown seedlings	Dig a small (slightly bigger than the container) planting pit with a hoe or spade or mattock Remove the container and position the seedling in the pit with the root collar level with ground Fill back with soil and firm with the foot around the seedling
Soil additives	Fertilizer applications should be based on prior soil analyses Infertile sites usually require addition of NPK (nitrogen, phosphorus, potassium) fertilizer Mix fertilizer with small amount of soil and place the mixture in the bottom of the planting hole In dry areas, it is advantageous to mulch the soil surface near the freshly planted seedlings
Watering	Rarely necessary if planting done during the rainy season In dry areas, or if no rain has fallen within 1 week of planting, watering is necessary to maintain an acceptable survival rate of seedlings
Quality control	Essential to identify most efficient techniques as well as causes of non-performance of plantation Quality control measures include: planting depth of seedlings; seedling root contact with surrounding soil (no empty spaces); firmness of seedlings; and seedling root position in the planting hole (roots not crowded together)

Source: Evans 1992, Pancel 1993a, Ruiz 2002.

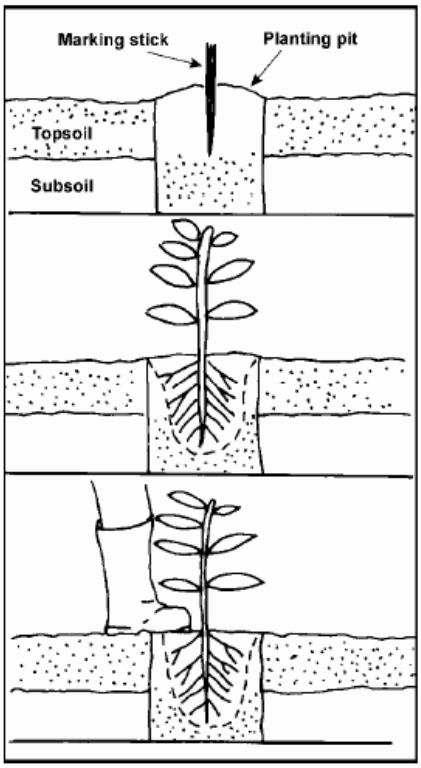


Figure 2: Method to plant a tree seedling

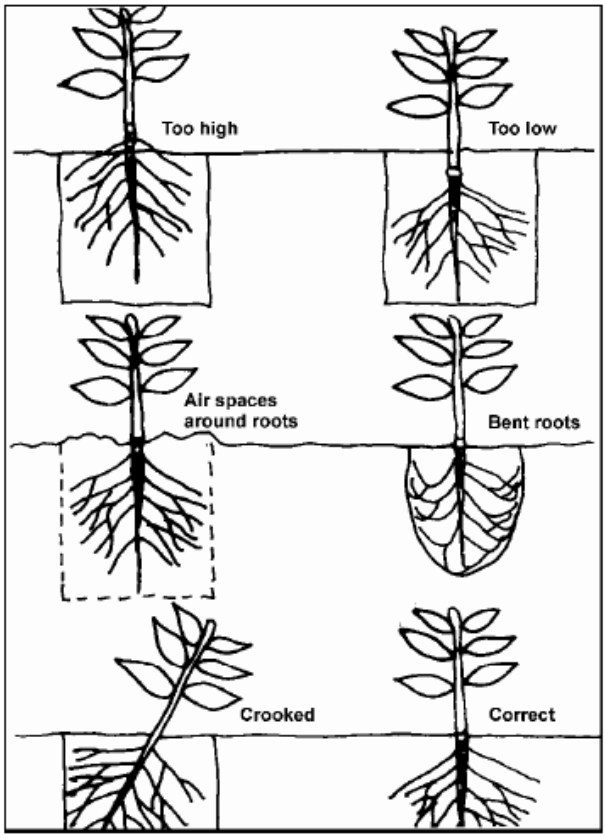


Figure 3: Correct position of the seedling and seedling roots in planting hole

10. Monitoring and Manage of Plantations

Here, the term "monitoring/manage" includes all silvicultural activities between the establishment of the plantation and the replanting or regeneration after felling/harvesting. Management activities such as fire protection and guarding; replanting (beating up); weeding; pruning; thinning; and regeneration by new planting or coppice are generally applicable to solid block plantings (pure or mixed). Trees planted individually and enrichment planting, either as line planting or underplanting need variable management treatments which sometimes require no thinning or pruning.

Fire protection and fertilisation activities were discussed earlier in the sections pertaining to planting lay-out and technique. A general schedule of the other silvicultural operations for an even-aged plantation is shown in Table 17 to assist in planning management activities based on the plantation's stage of development.

Table 17: Development stages and silvicultural operations in even-aged forest plantation

Age class	Time characteristic	Management operation
Young growth	From the start of plantation establishment until crown closure of plantation	Weeding
		Replanting (beating up)
Young stand	From the start of crown closure until the dominant trees have reached a DBH of 15 cm	Low pruning
		Systematic pruning
Pole wood	Mean DBH of the dominant trees is between 15 and 20 cm	High pruning
		Selective thinning
Young timber	Mean DBH of the dominant trees is over 20 cm	Selective thinning

Source: Pancel 1993a.

10.1 Maintenance

The first maintenance activity for a successful plantation is the protection and guarding of the planted area from fire, animal damage by grazing/browsing and human trespass for cultivation/theft of trees. It is always necessary to clean all firebreaks on an annual basis. Guarding the plantation is an on-going job. Local people and the local forest management administration (LFMA) should play a key role in preventing, reporting and controlling these kinds of problems, both on private and public lands. If fire is a serious problem in the area, the LFMA should be equipped and trained to fight fire.

The second maintenance activity is weeding. Weeding requirements vary with the site, the tree species, as well as the existing weed species. In wet areas, herbaceous growth tends to smother even fast-growing trees and in dry areas, the weed plants compete with trees for scarce water. Annual weeding requirements will be high if the spacing between planted seedlings is large enough to allow sufficient light to penetrate and facilitate the rapid growth of weed plants.

If the initial seedling survival rate is too low, the most important rule is to carry out replanting (beating up) within the first year of plantation establishment, i.e., the following planting season, to ensure minimum variation of plantation ages. Replanting represents an added cost, therefore relatively high losses can be acceptable, provided the dead seedlings are evenly distributed. Table 18 presents the general guidelines which should be applied for the maintenance of forest plantation.

Table 18: Guidelines for maintenance of forest plantation

Activity	Methodology
Fire protection and guarding	Clean the firebreak established around the plantation in December and July, at the beginning of the long and short dry season Protect against fire, human encroachment and theft and animal browsing
Weeding	Cut grasses, Gramineae or shrubs using recurved hoe, machete or axe

	Cleaning: 1 m or more each side of the tree until tree height >2 m; for trees with height >2 m, remove only shade overhead and climbers (where 25%+ infested trees) Frequency: first year (twice); second and third year (once/year) until tree height >2 m Timing: after the rainy seasons, December to March and/or July to August
Replanting (Beating up)	For reliable estimation of survival rate, select randomly to cover the range of planting conditions Sample rows with fixed number (30) of trees in each and mark trees in order to keep the age difference low (1 year) Assessment should be done at the end of each planting season and the gaps filled the following season Failed patches large enough to allow serious weed invasion usually merit replanting; evenly distributed seedling losses as high as 50% could be accepted, since less thinning will be needed later

Source: FIDCO 1980b (for Caribbean pine), Evans 1992, Wadsworth 1997, Ruiz 2002.

10.2 Pruning

Pruning is a silvicultural prescription of removing branches in order to improve tree form or wood quality. This activity is planned only for timber production and almost exclusively for conifer plantations. If the spacing is appropriate, hardwood species normally tend to self-prune.

To improve wood quality and to allow trees to grow a long period, pruning must be done early. Early pruning or "low pruning" is done mainly to permit easy access to the plantation for thinning and is carried out on all trees. The second pruning takes place at the same time as thinning (often the second thinning) and is carried out when selection of the most promising trees takes place. This pruning is called "high pruning" because higher branches, up to 5-7 metres, are removed which will maximise timber quality for final harvesting. Table 19 presents the general guidelines to carry out a correct pruning and Figure 4 shows the method to prune a tree.

Table 19: Guidelines for pruning of forest plantation

Activity	Methodology
Low pruning	Where low branches are persistent (this will depend on species and spacing) Purpose: create easy access for thinning operations, produce knot-free timber, provide fodder, leaf mulch, fuelwood, etc. Remove branches for all trees as soon as this can be done, up to 2 m above the ground without exceeding half of total tree height Removal of branches is done with pruning scissors or a curved pruning saw mounted on a long pole Avoid the use of a machete or axe because it is difficult to make a clean cut If no thinning is planned, low pruning may not be necessary
High pruning	The most promising trees selected for final harvest are pruned, approximately 200 trees/ha, and is usually done at same time as thinning Pruning height is usually less than half of total tree height, approximately 5-7 m The pruning is done with curved pruning saw mounted on an extendable pole (4-5 m) Avoid the use of a machete or axe with ladder because it is difficult to make a clean cut Pruned branches should be removed from the base of tree to reduce fire risk

Source: Evans 1992, Wadsworth 1997, Ruiz 2002.

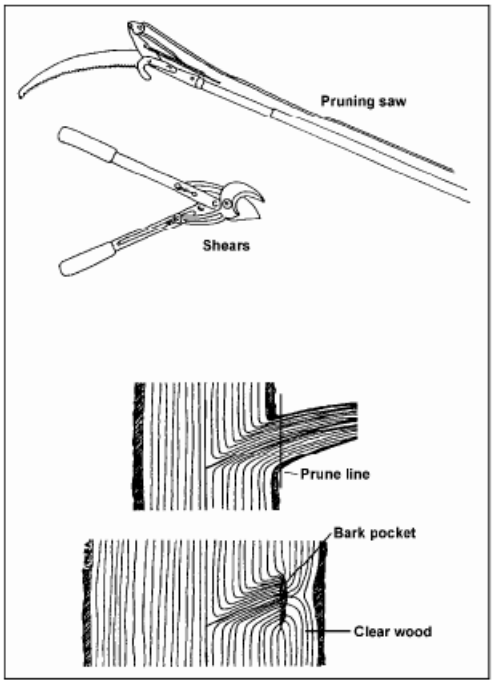


Figure 4: Method to prune a tree

Table 20: Tree Plantation and Maintenance Timeline

Sl	Activities	Pre-Monsoon			Monsoon				Post Monsoon		Winter		
		Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1	Tree Inventory										■	■	
2	Site Selection	■											■
3	Species Selection	■											
4	Contact with Nursery	■	■										
5	Sapling Procurement			■	■		■						
6	Plantation Work				■	■	■	■					
7	Monitoring				■	■	■	■	■	■	■	■	■
8	Maintenance	■	■	■	■	■	■	■	■	■			

11. Recommendations

1) Sapling species will be replanted by same felled species based on availability of such species in the local nursery.
2) EPC Contractor will plant saplings into the vacant space of above locations and look after the sapling at least 6-months after the plantation.
3) Space of replantation will be at least 1-meter distance from sapling to sapling for timber species and 5-meter distance for fruit species.
4) Engage institutions/people during the planation and take a verbal commitment that they will nursing the trees.
5) No saplings will be distributed by EPC but they will plant physically by their own responsibility.
6) EPC Contractor will maintain a proper log book or registrar of planation and take proof of plantation from institutions or people/persons.
7) Maintain necessary documentation of the planation for at least 6 month including mortality and fatality rate.

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Annex-XVIII: Occupational Health and Safety Plan

1.1. Purpose and Scope

The occupational health, safety management plan is a systematic process of identifying the impact of existing, new or substantially related to health, safety and/or the environment. The proposed plan aims to achieve the following objectives:

- Identification of hazards, associated risks and control measures for each activity;
- Define responsibilities to ensure effective implementation of health and safety (H&S) risk control measures;
- Mitigate potential impacts of project related activities that may affect the health, safety and security of workers and communities within the Project area;
- Maintain healthy workforce and labor pool with safe and healthy working environment;
- Reduce human injury and damage to property and environment in case of emergency;
- Contribute to the improved health and wellbeing of the local community in the Project area.

The plan is applicable to all employees, direct as well as contracted workers/ laborers employed on the project site. It shall be applicable both construction and operation phases of the project. The responsibility of implementing and modifying the plan if necessary, lines with the company.

1.2. Terms and Definition

Confined Space: "Confined Space" means a compartment small size and limited access which by its small size and confined nature can readily create or aggravate a hazardous exposure.

Emergency: An unforeseen occurrence, a sudden and urgent occasion for action.

Fire Watch: Workers assigned as fire watch are the first line of defense in protecting other workers and property from harm during hot work.

First Aider: A person who has received training and who holds a current first aid certificate from an organization or employer whose training and qualification for first aiders are approved by the authority.

Hazard: A source, situation or act with a potential for harm in terms of:

- Ill health
- Damage to property, plant etc.
- Production losses or increased liabilities

Hazardous Substance: The term "hazardous substance" means a substance which by reason of being explosive, flammable, poisonous corrosive, oxidizing, irritant or otherwise harmful is likely to cause injury.

Hot Work: The term "hot work" means riveting, welding, burning or other fire or spark producing operations.

1.3. Applicable Standards and Legislation

The standards applicable to the proposed project have been enumerated below:

- IFC Performance Standard 3: Resource Efficiency and Pollution Prevention
- IFC Environmental, Health, and Safety General Guidelines
- Bangladesh Labor Act, 2006 (as amendment through July 22, 2013)
- Bangladesh Factories Act, 1965

Contractor shall ensure that all conditions, pertaining to health, hygiene, safety and welfare are met in accordance with the below acts-

Table 1: Requirements under Bangladesh Labor Act, 2006 and Bangladesh Factories Act, 1965

Health and Safety Aspect	Requirement
Air emissions and ambient air quality	IFC Environmental, Health, and Safety General Guidelines • This guideline applies to facilities or projects that generate emissions to air at any stage of the project life-cycle. It complements the industry-specific emissions guidance presented in the Industry Sector Environmental, Health, and Safety (EHS) Guidelines by providing information about common techniques for emissions management that may be applied to a range of industry sectors. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts. It is also intended to provide additional information on approaches to emissions management in projects located in areas of poor air quality, where it may be necessary to establish project-specific emissions standards. • Emissions of air pollutants can occur from a wide variety of activities during the construction, operation, and decommissioning phases of a project. These activities can be categorized based on the spatial characteristic of the source including point sources, such as combustion, materials storage, or other industry sector specific processes. Where possible, facilities and projects should avoid, minimize, and control adverse impacts to human health, safety, and the environment from emissions to air. Where this is not possible, the generation and release of emissions of any type should be managed through a combination of: — Energy use efficiency — Process modification — Selection of fuels or other materials, the processing of which may result in less polluting emissions Application of emissions control techniques • The selected prevention and control techniques may include one or more methods of treatment depending on: — Regulatory requirements — Significance of the source — Location of the emitting facility relative to other sources — Location of sensitive receptors — Existing ambient air quality, and potential for degradation of the air shed from a proposed project — Technical feasibility and cost effectiveness of the available options for prevention, control, and release of emissions
Greenhouse gases	IFC Performance Standard 3: Resource Efficiency and Pollution Prevention, IFC Environmental, Health, and Safety General Guidelines • The client will consider alternatives and implement technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project. The client will quantify direct emissions from the facilities owned or controlled within the physical project boundary, as well as indirect emissions associated with the off-site production of energy used by the project. Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognized methodologies and good practice • Recommendations for reduction and control of greenhouse gases include: — Carbon financing; — Enhancement of energy efficiency; — Protection and enhancement of sinks and reservoirs of green house gases; — Promotion of sustainable forms of agriculture and forestry; — Promotion, development and increased use of renewable forms of energy; — Carbon capture and storage technologies;

Health and Safety Aspect	Requirement
	— Limitation and / or reduction of methane emissions through recovery and use in waste management, as well as in the production, transport and distribution of energy (coal, oil, and gas).
Ventilation and temperature	Chapter-V of Bangladesh Labor Act, 2006 and Section-14, Chapter III of Factories Act, 1965, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention • Effective and suitable provisions shall be made in every factory for securing and maintaining in every work-room adequate ventilation by the circulation of fresh air. • Such temperatures as will secure to workers therein reasonable conditions of comfort and which will prevent injury to health. • The walls and roof shall be of such material and so designed that such temperature shall not be exceeded but be kept as low as practicable. • Where the nature of the work carried on in the factory involves, or is likely to involve, the production of excessively high temperature, such adequate measures as are practicable, shall be taken to protect the workers there from by separating the process which produces such temperature from the work-room by insulating the hot parts or by other effective means. • If it appears to the Government that in any factory or class or description of factories excessively high temperature can be reduced by such methods as white-washing, spraying or insulating and screening outside walls or roofs or windows or by raising the level of the roof, or by insulating the roof either by an air space and double roof or by the use of insulating roofing materials, or by other methods, it may prescribe such of those or other methods to be adopted in the factory. • Sufficient fresh air should be supplied for indoor and confined work spaces. Heating, ventilation and air conditioning (HVAC) and industrial evaporative cooling systems should be equipped, maintained and operated so as to prevent growth and spreading of disease agents. • Exposure to hot or cold working conditions in indoor or outdoor environments can result temperature stress-related injury or death. Use of personal protective equipment (PPE) to protect against other occupational hazards can accentuate and aggravate heat-related illnesses. Extreme temperatures in permanent work environments should be avoided through implementation of engineering controls and ventilation. Where this is not possible, such as during short-term outdoor work, temperature-related stress management procedures should be implemented which include: — Monitoring weather forecasts for outdoor work to provide advance warning of extreme weather and scheduling work accordingly. — Adjustment of work and rest periods according to temperature stress management procedures provided by ACGIH67, depending on the temperature and workloads. — Providing temporary shelters to protect against the elements during working activities or for use as rest areas. — Use of protective clothing. — Providing easy access to adequate hydration such as drinking water or electrolyte drinks, and avoiding consumption of alcoholic beverages.
Artificial humidification	Chapter-V of Bangladesh Labor Act, 2006 and Section-16, Chapter III of Factories Act, 1965 • If the humidity of air is artificially increased in any establishment, the water used for the purpose shall be taken from a public water supply system or other source of drinking water, or shall be effectively purified before it is so used. • If it appears to the Inspector that the water used for such purpose is not effectively purified as required under sub-section (1), he may serve on the employer an order in writing specifying the measures which in his opinion should be adopted, and requiring them to be carried out before a specified date.

Health and Safety Aspect	Requirement
Dust and fume	Chapter-V of Bangladesh Labor Act, 2006 and Section-15, Chapter III of Factories Act, 1965, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention • In every factory in which, by reason of the manufacturing process carried on, there is given off any dust or fumes or other impurity of such a nature and to such an extent as is likely to be injurious or offensive to the workers employed therein, effective measures shall be taken to prevent its accumulation in any work- room and its inhalation by workers, and if any exhaust appliance is necessary for this purpose, it shall be applied as near as possible to the point of origin of the dust, fumes or other impurity, and such point shall be enclosed so far as is possible. • In any factory no stationary internal combustion engine shall be operated unless the exhaust is conducted into open air, and no internal combustion engine shall be operated in any room unless effective measures have been taken to prevent such accumulation of fumes there from as are likely to be injurious to the workers employed in the work-room. • Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone). Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements. • Use of dust control methods, such as covers, water suppression, or increased moisture content for open materials storage piles, or controls, including air extraction and treatment through a bag house or cyclone for material handling sources, such as conveyors and bins. Oil and oil by-products are not a recommended method to control road dust. • PPE, such as dusk masks, should be used where dust levels are excessive.
Energy conservation	IFC Environmental, Health, and Safety General Guidelines This guideline applies to facilities or projects that consume energy in process heating and cooling; process and auxiliary systems, such as motors, pumps, and fans; compressed air systems and heating, ventilation and air conditioning systems (HVAC); and lighting systems. It complements the industry specific emissions guidance presented in the Industry Sector Environmental, Health, and Safety (EHS) Guidelines by providing information about common techniques for energy conservation that may be applied to a range of industry sectors. Energy management at the facility level should be viewed in the context of overall consumption patterns, including those associated with production processes and supporting utilities, as well as overall impacts associated with emissions from power sources. The sections provide guidance on energy management with a focus on common utility systems often representing technical and financially feasible opportunities for improvement in energy conservation. However, operations should also evaluate energy conservation opportunities arising from manufacturing process modifications.
Wastewater and ambient water quality	IFC Environmental, Health, and Safety General Guidelines • This guideline applies to projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or storm water to the environment. These guidelines are also applicable to industrial discharges to sanitary sewers that discharge to the environment without any treatment. Process Waste water may include contaminated wastewater from utility operations, storm water, and sanitary sewage. It provides information on common techniques for wastewater management, water conservation, and reuse that can be applied to a wide range of industry sectors. This guideline is meant to be complemented by the industry-specific effluent guidelines presented in the Industry Sector Environmental, Health, and Safety (EHS) Guidelines. Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or storm water should incorporate the necessary precautions to avoid, minimize, and

Health and Safety Aspect	Requirement
	control adverse impacts to human health, safety, or the environment. In the context of their overall ESHS management system, facilities should: — Understand the quality, quantity, frequency and sources of liquid effluents in its installations. This includes knowledge about the locations, routes and integrity of internal drainage systems and discharge points — Plan and implement the segregation of liquid effluents principally along industrial, utility, sanitary, and storm water categories, in order to limit the volume of water requiring specialized treatment. Characteristics of individual streams may also be used for source segregation. — Identify opportunities to prevent or reduce wastewater pollution through such measures as recycle/reuse within their facility, input substitution, or process modification (e.g., change of technology or operating conditions/modes) — Assess compliance of their wastewater discharges with the applicable: (i) discharge standard (if the wastewater is discharged to a surface water or sewer), and (ii) water quality standard for a specific reuse (e.g., if the wastewater is reused for irrigation). • Additionally, the generation and discharge of wastewater of any type should be managed through a combination of: — Water use efficiency to reduce the amount of wastewater generation — Process modification, including waste minimization, and reducing the use of hazardous materials to reduce the load of pollutants requiring treatment — If needed, application of wastewater treatment techniques to further reduce the load of contaminants prior to discharge, taking into consideration potential impacts of cross-media transfer of contaminants during treatment (e.g., from water to air or land) • When wastewater treatment is required prior to discharge, the level of treatment should be based on: — Whether wastewater is being discharged to a sanitary sewer system, or to surface waters — National and local standards as reflected in permit requirements and sewer system capacity to convey and treat wastewater if discharge is to sanitary sewer — Assimilative capacity of the receiving water for the load of contaminant being discharged wastewater if discharge is to surface water — Intended use of the receiving water body (e.g., as a source of drinking water, recreation, irrigation, navigation, or other) — Presence of sensitive receptors (e.g., endangered species) or habitats — Good International Industry Practice (GIIP) for the relevant industry sector
Drinking water	Chapter-V of Bangladesh Labor Act, 2006 and Section-19, Chapter III of Factories Act, 1965, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention 1. In every factory effective arrangement shall be made to provide and maintain at a suitable point conveniently situated for all workers employed therein, a sufficient supply of wholesome drinking water. 2. All such points shall be legibly marked "Drinking Water" in Bangla 3. In every factory wherein more than two hundred and fifty workers are ordinarily employed, provision shall be made for cooling the drinking water during the hot weather by effective means and for distribution thereof. 4. Where dehydration occurs in the body of workers due to work near machineries creating excessive heat, the workers shall be provided with oral re-hydration therapy. 5. Drinking water sources, whether public or private, should at all times be protected so that they meet or exceed applicable national acceptability standards or in their absence the current edition of WHO Guidelines for Drinking-Water Quality.

Health and Safety Aspect	Requirement
	6. Where the project includes the delivery of water to the community or to users of facility infrastructure (such as hotel hosts and hospital patients), where water may be used for drinking, cooking, washing, and bathing, water quality should comply with national acceptability standards or in their absence the current edition of with WHO Drinking Water Guidelines. Water quality for more sensitive well-being-related demands such as water used in health care facilities or food production may require more stringent, industry-specific guidelines or standards, as applicable. Any dependency factors associated with the delivery of water to the local community should be planned for and managed to ensure the sustainability of the water supply by involving the community in its management to minimize the dependency in the long-term.
Water consumption and conservation	IFC Performance Standard 3: Resource Efficiency and Pollution Prevention, IFC Environmental, Health, and Safety General Guidelines • When the project is a potentially significant consumer of water, in addition to applying the resource efficiency requirements of this Performance Standard, the client shall adopt measures that avoid or reduce water usage so that the project's water consumption does not have significant adverse impacts on others. These measures include, but are not limited to, the use of additional technically feasible water conservation measures within the client's operations, the use of alternative water supplies, water consumption offsets to reduce total demand for water resources to within the available supply, and evaluation of alternative project locations. • In general guild line, water conservation programs should be implemented commensurate with the magnitude and cost of water use. These programs should promote the continuous reduction in water consumption and achieve savings in the water pumping, treatment and disposal costs. Water conservation measures may include water monitoring/management techniques; process and cooling/heating water recycling, reuse, and other techniques; and sanitary water conservation techniques. General recommendations include: — Storm/Rainwater harvesting and use. — Zero discharge design/Use of treated waste water to be included in project design processes. — Use of localized recirculation systems in plant/facility/shops (as opposed to centralized recirculation system), with provision only for makeup water. — Uses of dry process technologies e.g., dry quenching. — Process water system pressure management. — Project design to have measures for adequate water collection, spill control and leakage control system.
Resource efficiency	IFC Performance Standard 3: Resource Efficiency and Pollution Prevention The client will implement technically and financially feasible and cost effective5 measures for improving efficiency in its consumption of energy, water, as well as other resources and material inputs, with a focus on areas that are considered core business activities. Such measures will integrate the principles of cleaner production into product design and production processes with the objective of conserving raw materials, energy, and water. Where benchmarking data are available, the client will make a comparison to establish the relative level of efficiency.
Hazardous materials management	IFC Performance Standard 3: Resource Efficiency and Pollution Prevention, IFC Environmental, Health, and Safety General Guidelines • Hazardous materials are sometimes used as raw material or produced as product by the project. The client will avoid or, when avoidance is not possible, minimize and control the release of hazardous materials. In this context, the production, transportation, handling, storage, and use of hazardous materials for project activities should be assessed. The client will consider less hazardous substitutes where hazardous materials are intended to be used in manufacturing processes or other operations. The client will avoid the manufacture, trade, and use of chemicals and hazardous materials

Health and Safety Aspect	Requirement
	subject to international bans or phase-outs due to their high toxicity to living organisms, environmental persistence, potential for bioaccumulation, or potential for depletion of the ozone layer. • General guidelines apply to projects that use, store, or handle any quantity of hazardous materials (Hazmats), defined as materials that represent a risk to human health, property, or the environment due to their physical or chemical characteristics. Hazmats can be classified according to the hazard as explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; radioactive material; and corrosive substances. When a hazardous material is no longer usable for its original purpose and is intended for disposal, but still has hazardous properties, it is considered a hazardous waste. This section is divided into two main subsections: — General Hazardous Materials Management: Guidance applicable to all projects or facilities that handle or store any quantity of hazardous materials. — Management of Major Hazards: Additional guidance for projects or facilities that store or handle hazardous materials at, or above, threshold quantities, and thus require special treatment to prevent accidents such as fire, explosions, leaks or spills, and to prepare and respond to emergencies. • The overall objective of hazardous materials management is to avoid or, when avoidance is not feasible, minimize uncontrolled releases of hazardous materials or accidents (including explosion and fire) during their production, handling, storage and use. This objective can be achieved by: — Establishing hazardous materials management priorities based on hazard analysis of risky operations identified through Social and Environmental Assessment. — Where practicable, avoiding or minimizing the use of hazardous materials. — Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion. — Using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard. — Implementing management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures.
Waste management, disposal of wastes and effluents	Chapter-V of Bangladesh Labor Act, 2006 and Section-13, Chapter III of Factories Act, 1965, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention • Effective arrangements shall be made in every factory for the disposal of wastes and effluents due to the manufacturing process carried on therein. • The client will avoid the generation of hazardous and non-hazardous waste materials. Where waste generation cannot be avoided, the client will reduce the generation of waste, and recover and reuse waste in a manner that is safe for human health and the environment. Where waste cannot be recovered or reused, the client will treat, destroy, or dispose of it in an environmentally sound manner that includes the appropriate control of emissions and residues resulting from the handling and processing of the waste material. If the generated waste is considered hazardous, the client will adopt GIIP alternatives for its environmentally sound disposal while adhering to the limitations applicable to its trans boundary movement. When hazardous waste disposal is conducted by third parties, the client will use contractors that are reputable and legitimate enterprises licensed by the relevant government regulatory agencies and obtain chain of custody documentation to the final destination. The client should ascertain whether licensed disposal sites are being operated to acceptable standards and where they are, the client will use these sites. Where this is not the case, clients should reduce waste sent to such sites and consider alternative disposal options, including the possibility of developing their own recovery or disposal facilities at the project site.

Health and Safety Aspect	Requirement
	• If waste materials are still generated after the implementation of feasible waste prevention, reduction, reuse, recovery and recycling measures, waste materials should be treated and disposed of and all measures should be taken to avoid potential impacts to human health and the environment. Selected management approaches should be consistent with the characteristics of the waste and local regulations, and may include one or more of the following: — On-site or off-site biological, chemical, or physical treatment of the waste material to render it nonhazardous prior to final disposal. — Treatment or disposal at permitted facilities specially designed to receive the waste. Examples include: composting operations for organic non-hazardous, wastes; properly designed, permitted and operated landfills or incinerators designed for the respective type of waste; or other methods known to be effective in the safe, final disposal of waste materials such as bioremediation. • In addition to the implementation of waste prevention strategies, the total amount of waste may be significantly reduced through the implementation of recycling plans, which should consider the following elements: — Evaluation of waste production processes and identification of potentially recyclable materials. — Identification and recycling of products that can be reintroduced into the manufacturing process or industry activity at the site. — Investigation of external markets for recycling by other industrial processing operations located in the neighborhood or region of the facility (e.g., waste exchange). — Establishing recycling objectives and formal tracking of waste generation and recycling rates. — Providing training and incentives to employees in order to meet objectives.
Pesticide Use and Management	IFC Performance Standard 3: Resource Efficiency and Pollution Prevention, IFC Environmental, Health, and Safety General Guidelines The client will, where appropriate, formulate and implement an integrated pest management (IPM) and/or integrated vector management (IVM) approach targeting economically significant pest infestations and disease vectors of public health significance. The client's IPM and IVM program will integrate coordinated use of pest and environmental information along with available pest control methods, including cultural practices, biological, genetic, and, as a last resort, chemical means to prevent economically significant pest damage and/or disease transmission to humans and animals.
Cleanliness	Chapter-V of Bangladesh Labor Act, 2006 and Section-12, Chapter III of Factories Act, 1965, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention • Every factory shall be kept clean and free from effluvia arising from any drain privy or other nuisance. • Accumulation of dirt and refuge shall be moved daily by sweeping or by any other effective method from the floors and benches of workrooms and from staircases and passages and disposed of in a suitable manner • The floor of every workroom shall be cleaned at least once in every week by washing, using disinfectant where necessary or by some other effective method. • Where the floor is liable to become wet in the course of any manufacturing process to such extent as is capable of being drained, effective means of drainage shall be provided and maintained. • All inside walls and partitions, all ceilings or tops of rooms and walls, sides and tops of passages and staircases shall- — Where they are painted or varnished, be repainted or re-varnished at least once in every three years;

Health and Safety Aspect	Requirement
	— Where they are painted or varnished and have smooth impervious surfaces, be cleaned at least once in every fourteenth month, by such methods as may be prescribed; — In any other case, be kept white- washed or color-washed and the white-washing or color-washing shall be carried out at least once in every fourteen months. • The dates on which the processes required by clause (d) are carried out shall be entered in the prescribed register. • Where there is potential for exposure to substances poisonous by ingestion, suitable arrangements are to be made for provision of clean eating areas where workers are not exposed to the hazardous or noxious substances.
Latrines and urinals	Chapter-V of Bangladesh Labor Act, 2006 and Section-20, Chapter III of Factories Act, 1965, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention In every factory - • Sufficient latrines and urinals of prescribed types shall be provided conveniently situated and accessible to workers at all times while they are in the factory; • Such latrines and urinals shall be provided separately for male and female workers; • Such latrines and urinals shall be adequately lighted and ventilated • All such latrines and urinals shall be maintained in a clean and sanitary condition at all times with suitable detergents or disinfectants • Toilet facilities should also be provided with adequate supplies of hot and cold running water, soap, and hand drying devices.
Dustbin and spittoon	Chapter-V of Bangladesh Labor Act, 2006 and Section-21, Chapter III of Factories Act, 1965, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention • In every factory there shall be provided, at convenient places, a sufficient number of dustbins and spittoons which shall be maintained in a clean and hygienic condition. • No person shall through any dirt and spit within the premises of a factory except in the dustbin and spittoon provided for the purpose. • A notice containing this provision and the penalty for its violation shall be prominently displayed at suitable places in the premises. • Waste is stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills. Examples include sufficient space between incompatibles or physical separation such as walls or containment curbs in closed containers away from direct sunlight, wind and rain.
Contaminated Land	IFC Environmental, Health, and Safety General Guidelines This section provides a summary of management approaches for land contamination due to anthropogenic releases of hazardous materials, wastes, or oil, including naturally occurring substances. Releases of these materials may be the result of historic or current site activities, including, but not limited to, accidents during their handling and storage, or due to their poor management or disposal.
Noise management	IFC Environmental, Health, and Safety General Guidelines This section addresses impacts of noise beyond the property boundary of the facilities. Noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception. The preferred method for controlling noise from stationary sources is to implement noise control measures at source.

Health and Safety Aspect	Requirement
Lighting	Chapter-V of Bangladesh Labor Act, 2006 and Section-18, Chapter III of Factories Act, 1965, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention • In every part of a factory where workers are working or passing, there shall be provided and maintained sufficient and suitable lighting, natural or artificial, or both. • In every factory all glazed windows and skylights used for the lighting of the work-room shall be kept clean on both the outer and inner surfaces and free from obstruction as far as possible. • In every factory effective provision shall so far as is practicable, be made for the prevention of – — Glare either directly from any source of light or by reflection from a smooth or polished surface, and — The formation of shadows to such an extent as to cause eye strain or risk of accident to any worker. • Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down, evacuation, etc.
Overcrowding	Chapter-V of Bangladesh Labor Act, 2006 and Section-17, Chapter III of Factories Act, 1965,IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention • No work-room in any factory shall be overcrowded to the extent that it is injurious to the health of the workers employed therein. • Without prejudice to the generality of the provisions of sub-section (1), there shall be provided for every worker employed in a work-room at least 9.5 cubic meter of space in the establishment • Explanation - For the purpose of this sub-section no account shall be taken of a space which is more than 4.25 meter above the level of the floor of the room. • If the Chief Inspector by order in writing so requires, there shall be posted in each work-room of a factory a notice specifying the maximum number of workers who may, in compliance with the provisions of this section, be employed in the room. • The Chief Inspector may, by order in writing exempt, subject to the conditions as he may think fit to impose, any work- room from the provisions of this section if he is satisfied that compliance therewith in respect of such room is not necessary for the purpose of health of the workers employed therein.
Occupational Health and Safety	IFC Environmental, Health, and Safety General Guidelines • Employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. This section provides guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. Although the focus is placed on the operational phase of projects, much of the guidance also applies to construction and decommissioning activities. Companies should hire contractors that have the technical capability to manage the occupational health and safety issues of their employees, extending the application of the hazard management activities through formal procurement agreements. Preventive and protective measures should be introduced according to the following order of priority: — Eliminating the hazard by removing the activity from the work process. Examples include substitution with less hazardous chemicals, using different manufacturing processes, etc. — Controlling the hazard at its source through use of engineering controls. Examples include local exhaust ventilation, isolation rooms, machine guarding, acoustic insulating, etc. — Minimizing the hazard through design of safe work systems and administrative or institutional control measures. Examples include job rotation, training safe

Health and Safety Aspect	Requirement
	work procedures, lock-out and tag-out, workplace monitoring, limiting exposure or work duration, etc. — Providing appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE. • The application of prevention and control measures to occupational hazards should be based on comprehensive job Environmental, Health, and Safety (EHS) Guidelines GENERAL EHS GUIDELINES: OCCUPATIONAL HEALTH AND SAFETY, APRIL 30, 2007 61, WORLD BANK GROUP safety or job hazard analyses. The results of these analyses should be prioritized as part of an action plan based on the likelihood and severity of the consequence of exposure to the identified hazards. The major subsections under this heading are: — General Facility Design and Operation — Communication and Training — Physical Hazards — Chemical Hazards — Biological Hazards — Radiological Hazards — Personal Protective Equipment (PPE) — Special Hazard Environments — Monitoring
Safety of machinery	Chapter-VI of Bangladesh Labor Act, 2006, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention • It appears to an Inspector that the use of any building or any part of a building or any part of the ways, machinery or plant in the establishment involves imminent danger to human life or safety, he may serve on the employer of the establishment an order in writing prohibiting its use until it has been properly repaired or altered. • Injury or death can occur from being trapped, entangled, or struck by machinery parts due to unexpected starting of equipment or unobvious movement during operations. Recommended protective measures include: — Designing machines to eliminate trap hazards and ensuring that extremities are kept out of harm's way under normal operating conditions. Examples of proper design considerations include two-hand operated machines to prevent amputations or the availability of emergency stops dedicated to the machine and placed in strategic locations. Where a machine or equipment has an exposed moving part or exposed pinch point that may endanger the safety of any worker, the machine or equipment should be equipped with, and protected by, a guard or other device that prevents access to the moving part or pinch point. Guards should be designed and installed in conformance with appropriate machine safety standards. — Turning off, disconnecting, isolating, and de-energizing (Locked Out and Tagged Out) machinery with exposed or guarded moving parts, or in which energy can be stored (e.g., compressed air, electrical components) during servicing or maintenance, in conformance with a standard such as CSAZ460 Lockout or equivalent ISO or ANSI standard.
Precaution in case of fire	Chapter-VI of Bangladesh Labor Act, 2006 and Section-6, Chapter IV of Factories Act, 1965, IFC Environmental, Health, and Safety General Guidelines, IFC Performance Standard 3: Resource Efficiency and Pollution Prevention • Every establishment shall be provided with at least one alternative connection stairway at each floor and such means of escape in case of fire. • If it appears to the inspector that any establishment is not provided with the means of escape prescribed under sub-section (1) he may serve on the employer of the

Health and Safety Aspect	Requirement
	establishment an order in writing specifying the measures which in his opinion should be adopted before a date specified in the order. • In every establishment the door affording exit from any room shall not be locked or fastened so that they can be easily and immediately open from inside while any person is within the room and all such doors, unless they are of the sliding type, shall be constructed to open outwards, or where the door is between two rooms, in the direction of the nearest exit from the building and no such door shall be locked or obstructed while work is being carried on in the room. • In every establishment every window, or other exit affording means of escape in case of fire other than the means of exit in ordinary use, shall be distinctively marked in Bangla and in red letters of adequate size or by some other effective and clearly understood sign. • In every establishment every window, door or other exit affording means of escape in case of fire to every person employed therein. • A free passage-way giving access to each means of escape in case of fire shall be maintained for the use of the workers in every room of the establishment. • In every establishment wherein more than ten workers are ordinarily employed in any place above the ground floor, or explosive or highly inflammable materials are used, or stored, effective measures shall be taken to ensure that all workers are familiar with the means of escape in case of fire and have been adequately trained in the routine to be followed in such case. • In factories wherein fifty or more workers and employees are employed, shall arrange at least once in a year a mock fire-fighting and the employer shall maintain a book of records in these regards. • Where the flammable material is mainly comprised of dust, providing electrical grounding, spark detection, and, if needed, quenching systems. • Equipping facilities with fire detectors, alarm systems, and fire-fighting equipment. The equipment should be maintained in good working order and be readily accessible. It should be adequate for the dimensions and use of the premises, equipment installed, physical and chemical properties of substances present, and the maximum number of people present. • Provision of manual firefighting equipment that is easily accessible and simple to use. • Fire and emergency alarm systems that are both audible and visible.
Fencing of machinery	Chapter-VI of Bangladesh Labor Act, 2006 and Section-23, Chapter IV of Factories Act, 1965 • In every establishment the following shall be securely fenced by the safeguards of substantial construction — Every moving part of a prime mover, and every fly wheel connected to a prime mover; — The head-race and tail race of every water wheel and water turbine; — Any part of a stock-bar which projects beyond the head stock of a lathe; — Every part of an electric generator, - a motor or rotary converter; — Every part of transmission machinery; and — Every dangerous part of any machinery. • Every set screw, bolt and key on any revolving shaft, spindle wheel or pinion all spur, worm and other toothed or friction gearing in motion with which any worker would otherwise be liable to come into contact shall be securely fenced to prevent such contact.
Work on or near machinery in motion	Chapter-VI of Bangladesh Labor Act, 2006 and Section-24, Chapter IV of Factories Act, 1965 • Where, in any establishment, it becomes necessary to examine any part of machinery referred to in section 61 while the machinery is in motion, or as a result of such examination to carry out any mounting or shipping of belts, lubrication or other

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	adjusting operation while the machinery is in motion, such examination or operation shall be made or carried out only by a specially trained male worker wearing tight-fitting clothing whose name has been recorded in the register prescribed in this behalf, and while he is so engaged such worker shall not handle a belt at a moving pulley unless the belt is less than six inches in a width and unless the belt joint is either laced or flush with the belt. • The Government may, by notification in the official Gazette, prohibit any specified establishment, the cleaning, lubricating, adjusting by any person of specified part of machinery when those parts are in motion.
Striking gear and devices for cutting off power	Chapter-VI of Bangladesh Labor Act, 2006 and Section-26, Chapter IV of Factories Act, 1965 In every establishment- • Suitable striking gear and other efficient mechanical appliance shall be provided and maintained and used to move driving belts to and from fast and loose pulleys which from part of the transmission machinery, and such gear or appliances shall be so constructed as to prevent the belt from cropping back on the first pulleys. • Driving belt when not in use shall not be allowed to rest upon hafting in motion. • In every establishment suitable device for cutting off power in emergencies from running. • Machinery shall be provided and maintained in every work-room.
Self-acting machines	Chapter-VI of Bangladesh Labor Act, 2006 and Section-34, Chapter IV of Factories Act, 1965 No traversing part of a self-acting machine in any factory and no material carried thereon shall, if the space over which it runs is a space over which any person is liable to pass whether in the course of his employment or otherwise, be allowed to run on its outward or inward traverse within a distance or eighteen inches from any fixed structure which is not part of the machine.
Cranes and other lifting machinery	Chapter-VI of Bangladesh Labor Act, 2006 and Section-30, Chapter IV of Factories Act, 1965 • The working gear, whether fixed or moveable, ropes, chains and anchoring or fixing appliances shall be- — Of good construction, sound material and adequate strength. — Properly maintained. — Thoroughly examined by a competent person at least once in every period of twelve months and a register shall be kept containing the prescribed particulars of every such examination. • No such machinery shall be loaded beyond the working load shall be plainly marked thereon. • While any person is employed or working on or near the wheel-tract of a traveling crane in any place, where he would be likely to be struck by the crane, effective measures shall be taken to ensure that the crane does not approach within 6 meters of that place.
Hoists and lifts	Chapter-VI of Bangladesh Labor Act, 2006 and Section-31, Chapter IV of Factories Act, 1965 • Every hoist and lift shall be- — Of good mechanical construction, sound material and adequate strength; — Properly maintained and shall be thoroughly examined by a competent person at least once in every period of six months, and a register shall be kept containing the prescribed particulars of every examination; • Every hoist way and lift way shall be sufficiently protected by an enclosure fitted with gates and the hoist or lift and every such enclosure shall be so constructed as to prevent any person or thing from being trapped between any part of the hoist or lift and any fixed structure or moving part.

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	• The maximum safe working load shall be plainly marked on every hoist or lift and no load greater than such load shall be carried thereon. • The cage of every hoist or lift used for carrying persons shall be fitted with a gate on each side from which access is afforded to a landing. • The following additional requirements shall apply to hoists and lifts used for carrying persons and installed or reconstructed in a factory after the commencement of this Act, namely: — Where the cage is supported by rope or chain, there shall be at least two ropes or chains separately connected with the cage and balance weight, and each rope or chain with its attachments shall be capable of carrying the whole weight of the cage together with its maximum load. — Efficient devices shall be provided and maintained capable of supporting the cage together with its maximum load in the event of breakage of the ropes and chains. — An efficient automatic device shall be provided and maintained to prevent the cage from over running.
Pressure plant	Chapter-VI of Bangladesh Labor Act, 2006 and Section-33, Chapter IV of Factories Act, 1965 If any factory or any part of the plant or machinery used in manufacturing process is operated at a pressure above the atmospheric pressure, effective measures shall be taken to ensure that the safe working pressure of such part is not exceeded.
Floors, stairs and means of access	Chapter-VI of Bangladesh Labor Act, 2006 and Section-34, Chapter IV of Factories Act, 1965 In every factory • All floors, stairs, passages and gangways shall be of sound construction and be properly maintained and where it is necessary to ensure their safety, steps, stairs, passages and gangways shall be provided with substantial handrails; and • There shall, in so far as reasonably practicable, be provided and maintained safe means of access to every place at which any person is, at any time, required to work.
Pits, sumps and openings	Chapter-VI of Bangladesh Labor Act, 2006 and Section-24, Chapter IV of Factories Act, 1965 In every factory, every fixed vessel, sump, tank, pit or opening in the ground or in a floor which by reason of its depth, situation, construction or contents is or may be a source of danger, shall be either securely covered or securely fenced.
Excessive weights	Chapter-VI of Bangladesh Labor Act, 2006 and Section-36, Chapter IV of Factories Act, 1965 No person shall be employed in any establishment to lift, carry or move any load so heavy as to be likely to cause him injury.
Protection of eyes	Chapter-VI of Bangladesh Labor Act, 2006 and Section-37, Chapter IV of Factories Act, 1965 Effective screens of suitable goggles shall be provided for the protection of persons employed on, or in the immediate vicinity of a process which involves: • Risk of injury to the eyes from particles or fragments thrown off in the course of the process, or • Risk to the eyes by reason of exposure to excessive light or heat.
Precautions against dangerous fumes	Chapter-VI of Bangladesh Labor Act, 2006 and Section-41, Chapter IV of Factories Act, 1965 • In any establishment no person shall enter or be permitted to enter any chamber, tank, vat pit, flue or other confined space in which dangerous fumes are likely to be present to such an extent as to involve risks of persons being overcome thereby, unless it is provided with a manhole of such size, as may be prescribed or other effective means of egress. • No portable electric light of a voltage of exceeding twenty-four volts shall be permitted in any establishment for use inside any confined space and where fumes are likely to be permitted to be used in such confined space.

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	• No person in any establishment shall enter or be permitted to enter any such confined space until all practicable means have been taken to remove any fumes which may be present and to prevent any ingress of fume and unless either- — A certificate in writing has been given by a competent person, based on a test carried out by himself, that the space is from dangerous fumes and fit for persons to enter, or — The worker is wearing a suitable breathing apparatus and a belt securely attached to a rope the free end of which is held by a person standing outside the confined space. • Suitable breathing apparatus, reviving apparatus, belts and ropes shall in every establishment, be kept ready for instant use beside any such confined space. As aforesaid which any person as entered and all such apparatus shall be periodically examined and certified by a component person to be fit for use, and a sufficient number of persons employed in every establishment shall be trained and practiced in the use of all such apparatus and the method of restoring respiration. • No person shall be permitted to enter into any establishment, any boiler, furnace, flue chamber, tank, pipe or other confined space for the purpose of working or making any examination therein until it is sufficiently cooled by ventilation or otherwise to be safe for persons to enter.
Explosive or inflammable gas, dust, etc.	Chapter-VI of Bangladesh Labor Act, 2006 and Section-42, Chapter IV of Factories Act, 1965 • Where, in any establishment or manufacturing process produce dust gas or fume or vapor of such character and to such extent as to be likely to explode on ignition, all practicable measures shall be taken to prevent any such explosion by — Effective enclosure of the plant or machinery used in the process; — Removal or prevention of the accumulation of such dust, gas, fume or vapour; — Exclusion or effective enclosure of all possible sources of ignition. • Where in any establishment the plant or machinery used in a process is not so constructed as to withstand the probable pressure which such an explosion as aforesaid would produce, all practicable measures shall be taken to restrict the spread and effects of the explosion by the provision in the plant or machinery of chokes. • Where any part of the plant or machinery in an establishment contains any explosive or inflammable gas or vapour under pressure greater than atmospheric pressure, that part shall not be opened except in accordance with the following provisions, namely- — Before fastening of any joint of any pipe connected with the part of the fastening of the cover of any opening into the part is loosened, any flow of the gas or vapour into the part or any such pipe shall be effectively stopped by a stop-valve or other means; — Before any such fastening or as aforesaid is removed, all practicable measures shall be taken to reduce pressure of the gas or vapour in the part or pipe to atmospheric pressure; — Where any such fastening as aforesaid, has been loosened or removed, effective measures shall be taken to prevent any explosive or inflammable gas or vapour from entering the part or pipe until the fastening is secured and securely replaced; — Provided that the provisions of this sub-section shall not apply in the case of plant or machinery installed in the open air. • No plant, tank or vessel which contains or has contained any explosive or inflammable substance shall be subjected in any establishment to any welding, brazing, soldering or cutting operation which involves the application of heat unless adequate measures have been first taken to remove such substance and any fumes arising there to render such substance shall be allowed to enter such plant, tank or vessel after any

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	such operation until the metal has cooled sufficiently to prevent any risk of igniting the substance.
Dangerous operations	Chapter-VII of Bangladesh Labor Act, 2006 and Section-87, Chapter IX of Factories Act, 1965 Where the Government is satisfied that any operation carried on in a factory exposes any person employed in it to serious risk of bodily injury, poisoning or disease, it may make rules applicable to such factory or class of factories in which such operation is carried on - — Specifying the operation and declaring it to be hazardous; — Prohibiting or restricting the employment of women, adolescents or children in the operation; — Providing for the periodical medical examination of persons employed in the operation and prohibiting the employment of persons not certified as fit for such employment; — Providing for the protection of all persons employed in the operation or in the vicinity of the places where it is carried on; and use of any specified materials or processes in connection with the operation; — Notice specifying use and precautions regarding use of any coercive chemicals
Notice to be given of accidents	Chapter-VII of Bangladesh Labor Act, 2006 and Section-88, Chapter IX of Factories Act, 1965 • If any accident occurs in the factory causing loss of life or bodily injury, or an accidental explosion, ignition, outbreak of fire or irruption of water or fumes occurs, the employer shall give notice of the occurrence to the Inspector within following two) working days. • Where an accident mentioned in sub-section (1) causes bodily injury resulting in the compulsory absence from work of the person injured for a period exceeding forty-eight hours, it shall be entered in a register prescribed by rules. • A copy of the entries in the register referred to in sub-section (2) within fifteen days following the 30th day of June and the 31st day of December in each year to the Chief Inspector.
Notice of certain dangerous occurrences	Chapter-VII of Bangladesh Labor Act, 2006 and Section-89, Chapter IX of Factories Act, 1965 Where in a factory, any dangerous occurrence of a nature prescribed by rules occurs, whether causing any bodily injury or not, the employer shall inform the Inspector by notice within the following three working days.
Notice of certain diseases	Chapter-VII of Bangladesh Labor Act, 2006 and Section-90, Chapter IX of Factories Act, 1965 • Where in a factory any worker contacts any disease specified in the Second Schedule, the employer or the concerned worker or any person specified by him in this behalf shall send notice thereof to the Inspector in such prescribed form and within such time as may be prescribed by rules. • If any registered medical practitioner attends on a person who is, or has been employed in a factory and who is, or is believed by such medical practitioner to be suffering from any disease specified in the Schedule, the medical practitioner shall, without delay, send a report in writing to the Chief Inspector stating - — The name and full postal address of the patient; — The disease from which he believes the patient to be suffering; — The name and address of the factory in which the patient is or was last employed • The Government may add to or subtract from the Schedule any disease by notification in the official Gazette

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Power of direct enquiry into cases of accident or disease	Chapter-VII of Bangladesh Labor Act, 2006 and Section-91, Chapter IX of Factories Act, 1965 • When any accidental explosion, ignition, outbreak of fire or irruption of water or any other accident occurs in a factory, or when any disease specified in the Second Schedule has been or suspected to have been contracted in any factory , the Government if it is of opinion that a formal enquiry into the causes of, and the circumstances attending, the accident or disease ought to be held may appoint a competent person to hold such enquiry, and may appoint any person possessing legal or special knowledge to act as an assessor in holding the enquiry. • The person appointed to hold an enquiry under this section shall have all the powers of a Civil Court under the Code of Civil Procedure, 1908, for the purposes of enforcing the attendance of witnesses and compelling the production of documents and material objects, and every person required by the person making the enquiry to furnish any information shall be deemed to be legally bound so to do within the meaning of section 176 of the Penal Code. • Any person holding an enquiry under this section may exercise such of the powers of an Inspector under this Act, as he may think it is necessary or expedient to exercise, for the purposes of the enquiry. • The person holding the enquiry shall make a report to the Government stating the causes of the accident and the circumstances adding any observation which he or any of the assessors, may think fit to make. • The Government may cause such report to be published at such time and in such manner as may think fit.
Power to take samples	Chapter-VII of Bangladesh Labor Act, 2006 and Section-92, Chapter IX of Factories Act, 1965 • An Inspector may, at any time during the normal working hours, informing the employer of a factory, take in the manner hereinafter provided, a sufficient sample of any substance used or intended to be used in the factory such use being in the opinion of the Inspector in contravention of the provisions of this Act or the rules, or is likely to cause bodily injury or injury to the health of, workers in factory. • Where any Inspector takes such sample, he shall, in the presence of the employer, unless he willfully absents himself, divide the sample into three portions and effectively seal and suitably mark them and shall permit the employer to add his own seal and mark thereon. • The employer shall, if the Inspector so requires, provide the appliances for dividing and sealing and marking the sample taken. • The Inspector shall forthwith give one portion of the sample to the employer, send the second portion to a Government analyst and report thereon, and retain the third portion for production to the Court, before which proceedings if any are instituted in respect of the substance. • Any report, purporting to be a report under the hand of any government analyst upon any substance submitted to him for analysis and report under this section, may be used as evidence in any proceedings instituted in respect of the substance.
Washing facilities	Chapter-VIII of Bangladesh Labor Act, 2006 and Section-43, Chapter V of Factories Act, 1965 • In every factory - — Adequate and suitable facilities for washing and bathing shall be and maintained for the use of the workers therein; — Separate and adequately screened facilities shall be provided for the use of male and female workers; and — Such facilities shall be conveniently accessible and shall be kept clean. • The Government may, in respect of any factory or class or description of factories, prescribed standards of adequate and suitable facilities for washing.

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First-aid appliances	Chapter-VIII of Bangladesh Labor Act, 2006 and Section-44, Chapter V of Factories Act, 1965 • There shall, in every factory be provided and maintained, so as to be readily accessible during all working hours, first aid boxes and cupboards equipped with the contents prescribed by rules; • The number of such boxes and cupboards shall not be less than one for every one hundred and fifty workers ordinarily employed in the factory; • Every first aid box and cupboard shall be kept in charge of a responsible person who is trained in first-aid treatment and who shall always be available during the working hours of the factory; • A notice shall be affixed in every work-room stating the name of the person in charge of the first-aid box or cupboard provided in respect of that room and such person shall wear a badge so as to facilitate identification; • In every factory wherein five hundred or more workers are employed, there shall be provided and maintained an ambulance room or dispensary of the prescribed size containing the prescribed equipment or similar facilities, in the charge of such medical and nursing staff as may be prescribed.
Canteens	Chapter-VIII of Bangladesh Labor Act, 2006 and Section-45, Chapter V of Factories Act, 1965 • In every factory wherein more than one hundred workers are ordinarily employed, there shall be provided adequate number of canteens for the use of the workers. • The government may make rules providing for- — The standards in respect of construction, accommodation, furniture and other equipment of the canteen; — The constitution of a managing committee for the canteen and representation of the workers in the management of the canteen; and • The managing committee to be formed under the rules shall determine the foodstuff to be served in the canteen, and the charges therefor.
Shelters	Chapter-VIII of Bangladesh Labor Act, 2006 and Section-46, Chapter V of Factories Act, 1965 • In every factory wherein more than fifty workers are ordinarily employed, adequate and suitable shelters or rest rooms, and a suitable lunch room with provision for drinking water where workers can eat meals brought by them, shall be provided and maintained for the use of the workers: Provided that any canteen maintained in accordance with the provisions of section 92 shall be regarded as part of the requirements of this sub-section: Provided further that where a lunch room exists no workers shall eat any food in the work room. • The shelters, rest rooms or lunch rooms provided under sub-section (1) shall be sufficiently lighted and ventilated and shall be maintained in a cool and clean condition. • In every factory where more than twenty-five female workers are employed, separate shelter rooms are to be maintained and in factory where less than twenty five female workers are employed, separate and adequate spaces with screen shall be provided.
Rooms for children	Chapter-VIII of Bangladesh Labor Act, 2006 and Section-47, Chapter V of Factories Act, 1965 • In every factory, where forty or more female workers are ordinarily employed, there shall be provided and maintained a suitable room or rooms for the use of children under the age of 6 six years of such women. • Such room shall be provided adequate accommodation, adequately lighted and ventilated and maintained in clean and sanitary condition, and shall be under the charge of woman trained or experienced in the care of children and infants.

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	• Such rooms shall be conveniently accessible to the mothers of the children, accommodated therein and, so far as is reasonably practicable, they shall not be situated in close proximity to any part of the factory where obnoxious fumes, dust or odors are given off, or where excessively noisy works are carried on. • Such rooms shall be solidly constructed, and all walls and roofs shall be of suitable heat resisting materials, and shall be water-proof. • The height of such rooms shall not be less than three hundred and sixty centimeters from the floor to the lowest part of the roof, and there shall be not less than six hundred sq. centimeters of the floor area for each child to be accommodated. • Suitable and effective provisions shall be made in every part of each such rooms for securing and maintaining adequate ventilation by the circulation of fresh air. • Such rooms shall be adequately furnished and equipped in particular, there shall be one suitable cot or cradle with necessary bedding for each child, and at least one chair or equivalent seating accommodation for the use of each mother while she is feeding or attending to her child, and a sufficient supply of suitable toys for the older children. • A suitable fenced and shady open air play-ground shall be provided for the older children. • Provided that the Chief Inspector may, by order in writing, exempt any factory from compliance with this sub-rule, if he is satisfied that there is not sufficient space available for the provision of such a playground.
Community health and safety	IFC Environmental, Health, and Safety General Guidelines This section complements the guidance provided in the preceding environmental and occupational health and safety sections, specifically addressing some aspects of project activities taking place outside of the traditional project boundaries, but nonetheless related to the project operations, as may be applicable on a project basis. These issues may arise at any stage of a project lifecycle and can have an impact beyond the life of the project. The major subsections under this heading are: — Water Quality and Availability — Structural Safety of Project Infrastructure — Life and Fire Safety (L&FS) — Traffic Safety — Transport of Hazardous Materials — Disease Prevention — Emergency Preparedness and Response
Construction and decommissioning	IFC Environmental, Health, and Safety General Guidelines This section provides additional, specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities. Cross referencing is made to various other sections of the General EHS Guidelines of IFC.

1.4. Roles and Responsibilities

The following section provides a brief description of the duties of various people:

Manager- Occupational Health & Safety (OHS)

- Provide leadership in the implementation of all safety initiatives during the entire phase;
- Responsible for the physical security and for maintaining a safe working environment at all times in the tower site;
- Ensure that the appropriate safety equipment is available and that emergency entry and egress is maintained and is unimpeded by working materials and tools;
- Responsible for instructing the hirer on general matters of Contractor and security and for appraising the employees of the company's health and safety policy;

- Supervise the entire safe working practices and care of the environment;
- Liaison with Workplace Safety Officer, Site Doctor/First Aider as required and provide technical advice or other assistance where necessary;
- Organize health and safety training for employees when necessary;
- Liaison with the construction teams, HSE department and sub-contractors on relevant HSE issues;
- Regularly maintain and review the record relevant to the OHS Plan (Incident/accident, injury and illness reporting, Incident/accident investigations, minutes of committee meetings, all updates or changes to the OSH Plan and periodic evaluation reports on the outcome of the OHS Plan).

Chief Safety Officer (CSO)

- Ensure that all employees and sub-contractors are following their responsibilities under the plan;
- Promote safe conduct of work in the City Seed Crushing Industries (Unit-2) Ltd.;
- Review the audit findings and close out reports;
- Liaison with the workplace safety and health officer (WSHO) of the Contractor on safety and health matters;
- Participate in HSE promotional activities, for example HSE committee meeting, training inspection and audit on project site;

Workplace Safety and Health Officer (WSHO)

The duties of the Workplace Safety Officer shall include the following:

- Ensure that the operations at the facility are in compliance with EHS requirements at all times;
- Conduct HS&E audits on regular basis and advice management for necessary action;
- Maintain first aid facilities and personnel protective equipment as demanded by the nature of the work/material safety data sheets;
- Investigate of all type of accidents and report to the Chief Safety Officer;
- Provide training to the workers and ensure that they are issued with adequate instructions and creating awareness of safe work practice among them;
- Carry out job safety analysis to determine “Hazards of the operations/activity and facilitate suitable solutions;
- Liaison with members of EHS on a regular basis to ensure that all local/state/federal health & safety requirements are met; and
- Participate in the preparation of all safety instructions, procedures and activities.

Safety Supervisor (SS)

- Issuance of Hot/Cold Work/ Confined Space permits for all non-routine works;
- Inspect of all work place, promotion of the safe conduct of work, hazard identification techniques and communication of corrective measures to manager (OHS)
- Carry tools box talks daily before beginning any work;
- Report defects in equipment; and
- Ensure workers participate in relevant safety activities

Site Doctor & First Aider

- Initial emergency response resuscitation and stabilization of critically ill or injured personnel
- Diagnosis and treatment of non-emergency medical conditions;
- Management and administration of medical services, supplies, nurse activities and patient records;

- Implementation of site health plans and preventive medicine activities including first training of employees; and
- Undertake regular health and hygiene inspections

Employees/Workmen:

- Use the correct tools and equipment for the job; use safety equipment and protective equipment/clothing supplied, e.g., Safety helmets, shoes, harness, goggles etc.; and
- Report all defects in equipment to the supervisor.

1.5. Hazard Identification, Risk Assessment and Risk Control

Identification of hazard, risk assessment and risk control measure must be part of a company's management system to fully ensure that all systems, procedures and processes of protection are in place for all employees. It is important for organization to consult with all employees and external emergency services to establish a risk management programme which includes the following-

Formation of a Risk Management Team

The team should be led by the Chief Safety Officer and comprise Workplace Safety Officer, Manager (OHS), persons from relevant departments with appropriate knowledge and experience. The duties and responsibilities of the team members should be clearly defined.

Hazard Identification

The identification process should also include consideration of:

- The way work is organized, managed and carried out including any changes that has occurred;
- Investigate injuries, illnesses, incidents to determine the underlying hazards, their causes, and safety and health program shortcomings;
- Determine the severity and likelihood of incidents that could result for each hazard identified, and use this information to prioritize corrective actions;
- The design of workplaces, work processes, materials and equipment;
- The purchasing of goods and services;
- The inspection, maintenance, testing, repair and replacement of equipment.

Risk Assessment

Based on the level of risk all identified hazard should be evaluated and assessed and should be constructed a list that include the required measures for controlling the risk of each hazards.

Prevention and Control Measure

The protective and preventive measures should be implemented to minimize or eliminate safety and health risks of the workers by priority basis-

- Where elimination is not possible, have to eliminate the hazard/risk
- Substitute the hazard/risk by replacing it with something that does not produce a hazard
- Control the hazard/risk at source through the use of engineering controls or organizational measures
- Minimize the hazard/risk by the design of safe work systems which include administrative control measures;
- Where residual hazards/risk cannot be controlled by collective measures, the employer should provide for appropriate personal protective equipment including gloves, Nomex/Uniform, respirators, hard hats, safety glasses, high-visibility clothing, and safety footwear and should be taken implement measures to ensure its use and maintenance. The

preventive and protective measures should be documented and approved by the relevant management.

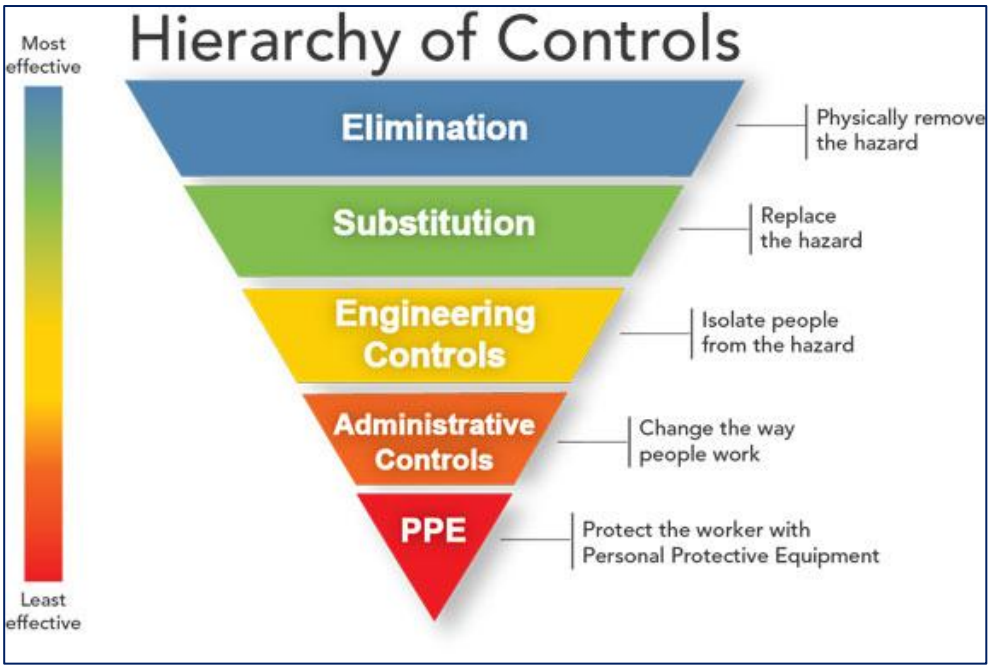

Figure 1: Identify and evaluate options for controlling hazards, using a "hierarchy of controls"

1.6. Training

Chief Safety Officer should ensure that every person is aware of the SHE risks associated with the work being carried out at the workplace and is trained and competent in the relevant work practices and maintained procedures.

The Management should establish procedures to identify training needs and provide adequate safety training for all levels of employees including contractors. The safety training should provide management staff with the knowledge and skills necessary for organizing and managing occupational safety and health programmes; team leaders with leadership skills and knowledge to lead, implement and apply occupational safety and health activities; and workers with the knowledge, skills and right attitudes to enable them to work safely without harming them, or others, health and the environment.

Types of SHE Training

Mandatory Training

Mandatory training is a requirement for all staff on first arrival at the site. It is necessary for them who holds the first managerial role with SHE responsibility for others and on appointment to the Director/Senior Managerial role. Manager (OHS), CSO, WSHO, SS, Workers, and Contractors etc. should cover the mandatory requirements.

Job or Hazard Specific training

Consideration of specific hazards arising from the work the line management can be identified and recorded the training need through the Safety, Health and Environment (SHE) department.

SHE Orientation and Awareness

Contractor should conduct safety and health orientation courses for new employees as well as direct and indirect (contract) workers.

Skill Training

Workers should also be given training in the skills appropriate to their work so as to improve their individual performance in their respective fields.

SHE Training Programme

There should be an in-house training programme for SHE related training which shall be implemented by Workplace Safety Supervisor on a regular basis for apprising the project staffs and workers about management of H&S risks entailed in the project activities. These are generic training programmes. Contractor may customize the programmes and/or undertake additional training programmes pertaining to project activities as identified necessary.

Table 2: Proposed Training Modules

SN	Training Name	Frequency	Description	Responsibility
1.	Induction Training on Health and Safety; They should cover the Company 1. SHE policy; 2. Hazards and risks associated with operation and workplace; 3. Control measure to be taken to eliminate or minimize SHE risks, including safe working systems and procedures; use of personal protective equipment; action to be carried out during emergency; 4. Emergency response procedures, such as firefighting, extinguisher use and evacuation procedure	-	All Company Staffs and contractors at the time of joining/engagement	Workplace Safety Supervisor
2.	Tool Box Training or pre-task briefings, highlighting hazards and the method of dealing with them	Daily	Held at each work location by foreman of contractor to discuss day's activities and specific hazards	Contractor Supervisor
3.	Foreman Safety Training	Fortnightly	Review Safety Performance for week and discuss the safety for upcoming operations	Contractor Supervisor
4.	Mass Training	Monthly	Presentation of significant safety issues	Workplace Safety Supervisor
5.	Special Job Hazard Training including Entry into Confined Space and Other Hazardous Environment	Half Yearly	Training about safety measures to be incorporated related to specific jobs	Workplace Safety Supervisor
6.	Safety Bulletins	Weekly	Specific issues visible through jobsite for constant awareness	Workplace Safety Supervisor
7.	Fire Safety	Half Yearly	Presentation of fire safety measures	Workplace Safety Supervisor
8.	Emergency Response	Half Yearly	For emergency preparedness	Workplace Safety Supervisor
9.	First Aid	Half Yearly	For emergency preparedness	Site Doctor

SN	Training Name	Frequency	Description	Responsibility
10.	Use of Personal Protective Equipment	Half Yearly	For workplace safety	Workplace Safety Supervisor, Contractor, Supervisor

1.7. Documentation and Record Keeping

Manager (OHS) should maintain documented procedures for the identification, maintenance and disposition of OHS records (hazards, assessment and control of risks) of the ongoing activities. OHS records shall be stored and maintained in such a way that they are readily retrievable and protected against damage, deterioration or loss. Their retention times shall be established and recorded. Such documents are as following-

- SHE policy;
- Hazard identification records;
- Risk register;
- Legal register;
- License, certificates, permits;
- Control methods including process control and machine design, safe work procedures, in-house work rules;
- Design drawings;
- Organization structure;
- SHE groups meeting records;
- Training records;
- Drill reports;
- Inspection and audit reports;
- Medical and health surveillance records

Communication and Provision of Information

Contractor should communicate and inform any persons affected by the risk about:

- The nature of the risks involved; and
- The control measures or safe work procedures to be taken to address the risks involved

Review

The risk assessment should be reviewed and revised:

- At least once in every 6 months; and
- Upon the occurrence of any injuries to any person as a result of exposure to a hazard in the workplace; or where there is a significant change in work practices or procedures.

1.8. Safe Work Practices

In the Contractor area many hazards can generate which should be identified and eliminated or minimized to an acceptable level in order to achieve a safe and healthy work environment. Contractor should to establish safe work practice for workers including but not limited to the following:

1.8.1. Fitness for Duty

Fitness for duty incorporates (but is not limited to) the promotion of physical, mental and emotional health. At the time of engagement, Contractor employees should to undergo a medical assessment to ensure they are medically fit to perform their role.

Health Surveillance

Management must ensure that health assessments are carried out in respect of all personnel who engage in specific tasks with the potential for occupational exposure, if:

- An identifiable disease or other adverse effect on the health of the employee may be related to the exposure;
- There is a reasonable likelihood that the disease or adverse effect may occur under the particular conditions of work; and
- There are recognized techniques for detecting indications of the disease or adverse effect.

Alcohol and Drugs

All personnel are required to undergo a pre-employment drug and alcohol test prior to commencing work with Contractor. Personnel must not commence work if they are not fit for duty or if they are impaired by alcohol, illicit drugs or medication.

Fatigue Management

Fatigue may arise from hours and patterns of work and activities although it is also influenced by factors outside of work, such as family responsibilities, stress, lifestyle, personal health etc., the management of fatigue is a shared responsibility between Management and the individual. General Hazard Prevention

Contractor should to prevent the following hazards-

Working Alone

Where Personnel are required to work alone, the activities and conditions shall be risk assessed and a safe system of work should be developed.

Manual Handling

Where a manual handling task is required, by doing a risk assessment appropriate controls should be implemented and organized manual handling training as appropriate. Management must ensure suitable powered mechanical equipment and lifting aids are provided to enable personnel to avoid heavy manual tasks.

Ergonomics

All personnel must consider ergonomics when designing or arranging workstations, products and systems so that they fit the personnel who use them. Management should be ensured that where ergonomic hazards are identified and pose a threat to personal safety, a risk assessment is completed by a competent person. Special consideration should be given to ergonomics in confined spaces, awkward or difficult to access spaces, using heavy or awkward tools and equipment, and using repetitive or high force actions.

Hygiene and Sanitation

Contractor should be supplied suitable facilities for personnel including:

- Toilet facilities within a reasonable distance from each workspace;
- Sanitation and hygiene facilities that are properly maintained;
- Eating places that are dry, clean, well ventilated and have adequate seating, tables, hand washing and waste disposal facilities; and
- Potable water supplies available to all personnel.

Occupational Hygiene

Contractor must ensure commitment to monitoring and reporting of occupational health hazards and hazardous occupational environments, and implement controls to reduce risk in accordance with all applicable regulations and, wherever practicable, with regard to accepted best practices. Ongoing assessments should be conducted and, as required, controls implemented for the following occupational health hazards:

- Airborne contaminants such as metal dusts, respirable silica and asbestos fibers;
- Occupational noise exposure.

Risk assessment, evaluation and control of occupational hazards should be undertaken in consideration of the following broad hazard categories:

- Chemical hazards – such as fumes and vapours;
- Physical hazards – those related to heat, cold, noise, vibration, ionizing radiation, ultra-violet light and workplace lighting;
- Biological hazards – including mosquito borne viruses, potable water contaminants and other water borne hazards such as legionella; and
- Ergonomic hazards – including manual handling hazards.

The anticipation, recognition, evaluation, communication and control of occupational health hazards underpin to protect personnel from occupational related injury, illness and impairment.

Hazardous Substances

Management must be ensured the safe control of hazardous substances and reduce the level of exposure to personnel, property and the environment. A risk assessment with health surveillance should be required to monitor the health of personnel who are at significant risk of exposure to hazardous substances.

Smoking

Management must be provided a safe working environment by reducing the effects of Environmental Tobacco Smoke (ETS) to all personnel. Smoking is only permitted in designated smoking areas identified with sign post. The designated areas must be:

- Located outdoors;
- In well ventilated areas with no possibility that the redundant smoke will contaminate indoor areas;
- Located (where possible) away from pedestrian traffic areas and where personnel may be required to work; and
- Provided with cigarette butt bins to control litter and reduce potential fire risk.

Heat Stress

Contractor should be undertaken all necessary measures and precautions to ensure that employees do not suffer harm to their health from the adverse effects of extreme heat or cold. If conditions in any workplace are, or are likely to be, hot and humid, Safety Supervisor must ensure that:

- All employees are provided with instruction on measures to be taken to avoid any harmful effects from those conditions;
- Appropriate workplace environmental controls such as ventilation, and monitoring are implemented; and
- If appropriate, a program for monitoring the health of employees in the workplace is implemented.

Lightning

Contractor should be managed the risks associated with personnel being exposed to lightning. Workplace Safety Supervisor must continually monitor the surrounds for changes to weather

conditions, and factor the difficulty of seeing conditions change or hearing thunder in a busy operational environment. Personnel must be prepared to respond to lightning immediately should an alert be received, thunder heard, or lightning observed.

Personal Protective Equipment (PPE)

Contractor should be ensured that all personnel and visitors wear or use personal protective clothing or equipment provided if it is necessary to protect them from harm. All personnel should be used personal protective clothing and equipment where a sign is displayed to do so or as identified by risk assessment. Primarily, PPEs are required for the following protection-

- Head protection (Safety helmets)
- Foot protection (Safety footwear, gumboot etc.)
- Body protection (High visibility clothing, apron etc.)
- Personal protection (Full body harness, rope grap fall arrester etc.)
- Eye protection (Goggles, welder glasses etc.)
- Hand protection (Gloves, finger coats etc.)
- Respiratory protection (Nose mask, Self-Contained Breathing Apparatus (SCBAs) etc.)
- Hearing protection (Ear plugs, ear muffs etc.)

First Aid

- All premises must be provided with adequate first aid facilities with a full-time qualified doctor and at least two trained first aiders during working hours;
- All employer must provide or ensure that there is appropriate and adequate equipment are rendered in the circumstances for enabling first aid to his employees if they are injured or become ill at work.

Hand Tools

Where personnel are required to use hand tools in the course of their job, the tools should be inspected before use. Certain damaged hand tools are prohibited from been used on tower sites, refer to the Prohibited Tools Register for further information.

Safety Signs

Contractor should be ensured that the sufficient Safety Signs are posted in workplaces and travel ways to prevent incidents, identify hazards, indicate the location of safety and fire protection equipment, and provide guidance and instruction in emergency procedures. Safety Signs must be sited in that place from where they can be readily seen and maintained in a clean and readable condition.

Fall Prevention

Contractor should be ensured that all personnel undertaking activities where there is a risk of a person falling from one level to another do so in a controlled manner to reduce the risk of personal injury. Specific regulations set out certain mandatory methods that are required to control the risk such as fall prevention systems, edge protection, and protection of holes and openings.

Working On, Over, In or Near Water

Management should be managed the risk of drowning when personnel are required to work on, over, in or near water.

1.8.2. Task Specific Hazard Prevention

High Risk Work

Management should be identified High Risk Work, and implemented a procedure or risk assessment specific to that task to ensure hierarchical controls are in place to eliminate, prevent or control the

risk to as low as reasonably practicable (ALARP). At a time, the authority should be ensured that personnel performing High Risk Work requiring a High-Risk Work License, do hold a current license in that particular class, and are competent in that particular High-Risk Work.

Electrical Work

The measures suggested above for electrical work includes-

- Qualified electrical supervisors must be appointed to carry out the duties;
- An electrical log book must be kept at each operational site to record plans, work carried out and other relevant information;
- Electrical equipment must be provided with full current isolating devices capable of being secured in the isolating position wherever practicable. Where such features are not practicable, a risk assessment shall be conducted to establish suitable alternative controls, and outcomes communicated to impacted personnel.

Confined Space

Cutting, burning and welding often take in confined spaces. Regular checking and gas free space should be taken into consideration to permit the work. The supervisor should to make the arrangements for working in a confined space including but not limited to-

- A confined space permit to work procedure should be established that allows work to be carried out in the confined space without risk to the health and safety of workers;
- A supervisor should accompany the worker. It shall be ensured that the supervisor has been provided adequate training;
- Establishing the testing of the atmosphere prior to entry where identified in the risk assessment and ongoing monitoring of the atmosphere whilst work in the confined space is being carried out;
- Ensuring good ventilation in the confined space to prevent stale air and ensure the air quality remains breathable;
- Removing any residues that may be present in the confined space which may give rise to risk or increase the risk to those working in the confined space;
- Isolating the confined space from any gasses, liquids or other flowing materials that may enter the confined space. This isolation should be in the form of a lock-off and isolation permit in order to prevent any accidental flow into the confined space;
- Ensuring that safe access and egress are provided into and out of the confined space. Where multiple accesses are required to a confined space a tally must be kept of the names of the workers in the confined space for emergency purposes;
- Ensuring that where there is excessive temperature in the confined space, the working shift is reduced and frequent breaks are provided. Arrangements must also be made to ensure that workers are do not become dehydrated whilst working is excessive temperatures;
- Establishing an emergency procedure to deal with the rescue or recovery of any workers who become injured or endangered in the confined space.

All personnel required to enter a confined space will undergo confined space entry training. Personnel who have not taken this training are prohibited from entering a confined space. For any activity at confined space, the permit to work shall need to be obtained from the supervisor.

Hot Work

Hot work presents an increased risk of the fire and explosion hazards because it is most often performed in confined and enclosed spaces. These operations include riveting, welding, burning, grinding or use of powder actuated tools or similar fire or spark producing operations. Before beginning hot work, the following task must be performed-

- The permit to work must demonstrate that the appropriate precautions have been taken to ensure the area is free of gas, flammable sludge or film adhering to surfaces, and that no other structure or operation is at risk from the cutting, burning or welding. There should be a person available at the fire watchman to raise the alarm in the event of the fire and apply immediate fire frightening measures.

Protection against Fire

Check that there is no flammable material, gas or dry woodwork which could catch fire; and that surfaces which have been in contract with hydrocarbons or toxic substance are completely clean.

Driving Safety

Management must ensure that Personnel permitted to drive either a vehicle in controlled areas or a vehicle on public roads, hold a current driving license and comply with the relevant road rules for that class of vehicle. All Personnel driving vehicles on land must obey all traffic directions; drive to conditions, and in accordance with relevant Traffic Management Plans.

1.9. Emergency Management

The authority should be maintained on site emergency preparedness and response plan to protect employees in case of emergency are as following but not limited to-

- Ensure emergency response resources are kept ready and in healthy condition;
- Training on Emergency Action Plans are taken place during new employee orientation, when changes occur in the action plans, and periodically as coordinated by the Safety and Health Manager;
- Regular mock drill is conducted to evaluate the effectiveness of emergency response;
- Keep emergency system/equipment such as fire extinguisher, emergency lighting, fire suppression and detection system in working;
- Emergency alert system like sirens, announcement etc. system should to be available and kept healthy.

1.10. Measurement and Evaluation

1.10.1. Systematic Monitoring

OSH Performance

Contractor should be established and reviewed OSH Performance indicators on an annual basis. These performance indicators are monitored and communicated to personnel through regular meeting forums and in writing.

Internal OSH Audit

Internal health and safety audits should be conducted annually. Audit evidence is documented and findings recorded in the Health & Safety Audit Report Form.

OSHMS (Occupational Safety &Health Management System) Audit

Contractor has to be established implemented and maintained an audit program and procedure for periodic OSHMS audits. Audits need to be carried out by a competent person, in order to determine whether the OSHMS:

- Is in line with the Power Grid OSH Policy; and
- Meets the objectives and targets for continual OSH improvement.

1.10.2. Workplace Monitoring

Workplace Inspections

Management must ensure that each work area is inspection regularly to ensure the work area is safe. Workplace Inspections must be undertaken to identify and rectify hazards, communicate hazard types and controls put in place, monitor the effectiveness of controls and identify means of reducing risks to ALARP.

1.11. System and Process Improvement

Preventative and Corrective Actions

Management should be monitored and measured on a regular basis the key characteristics of the operation and activities that can cause illness and injury.

Continual Improvement

Management regularly should be reviewed and continually improved the OSH performance.

1.12. Process Owner

The Occupational Health and Safety Manager should be responsible to implement this plan.

Annex-XIX: Community Health and Safety Plan

A. Likelihood and Consequence

Hazards and Risk Assessment Codes (HRACs) require assigning values for likelihood or probability of an outcome occurring and the consequence or severity of a potential outcome. Based on these assigned values, a matrix is used to place the specific hazard within a specific location of the matrix. This location can then be used to determine an HRAC number for that hazard activity. The Likelihood or probability Code is considered numerical (1 through 5). These are presented in Table 1.

Table 1: Likelihood ratings

Likelihood	Definition
Almost certain (5)	It will happen again and soon – recurring event (e.g., daily or weekly).
Likely (4)	It will reoccur, but not as an everyday event.
Moderate (3)	It may occur from time to time in the project.
Unlikely (2)	It is not expected to happen again in the foreseeable future.
Rare (1)	Unlikely that it is not expected to happen again in the project.

Next is the Consequence or severity Code, varies from 1 to 5 and is presented in Table 2.

Table 2: Consequence ratings

Consequence	Definition
Insignificant (1)	Injury or illness that resulted in first aid treatment or minimal effects that required no medical treatment and the worker continued to work.
Minor (2)	Injury or ill health where the worker/person affected is absent or unfit to perform work (i.e., loss work time).
Moderate (3)	Injury or ill health related including bone fractures, a burn or penetrating injury to the eye, any injury or acute illness resulting in unconsciousness, requiring resuscitation or requiring admittance to hospital.
Major (4)	Single fatality or disability (e.g., amputations, loss of sight) resulted from work-related or community-related caused by the impact of the project
Catastrophic (5)	Multiple fatalities resulted from work-related or community-related caused by the impact of the project.

B. Risk Level

The hazard risks level is presented in Table 3. This matrix helps OHS team to prioritize workplace hazards by identifying them as low, Moderate, High and Extreme.

Table 3: Risk Level

Risk Level	Definition	Legend
Low	Will involve the relevant supervisor to review the circumstances of the event and try to learn any lessons which will prevent future occurrences.	Low
Moderate	Will involve an investigation by the relevant supervisor or line manager into the circumstances and determine the immediate, underlying and root causes of the adverse event, to try to prevent a recurrence and to learn any general lessons.	Moderate
High	Will involve a more detailed investigation by site manager/ supervisor/safety officer and look for the immediate causes, the underlying causes and the root causes by using available incident analysis methodologies	High
Extreme	Will involve a team-based investigation, comprising site manager, supervisors, safety officer, worker representatives and external consultants/ specialists (if required). It will look at the immediate causes, the underlying causes and the root causes by using available incident analysis methodologies	Extreme

a. Risk Ranking

Those hazards identified as extreme will require the most stringent controls available as well as immediate attention. They may even demand that such activities be cancelled from the Project. Specific workplace controls can be applied so that the associated hazards are more effectively controlled and therefore, result in a revised assessment category to a more acceptable level. Using the Risk Ranking Table (4) provided below, this has been used to assess the incident and risk rank to one of the four risk categories below:

Table 4: Risk Ranking Table

Consequence s Likelihood	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Almost Certain (5)	Low	Moderate	Extreme	Extreme	Extreme
Likely (4)	Low	Moderate	High	Extreme	Extreme
Moderate (3)	Low	Moderate	High	Extreme	Extreme
Unlikely (2)	Low	Low	Moderate	High	Extreme
Rare (1)	Low	Low	Moderate	High	High

Source: "Incident Reporting and Investigation Guidelines" of South Asia Region published on 22nd June, 2022 by World Bank

Table 5: Summary of the Community Health and Safety Impacts and Risk

Hazards	Reasons	Risk Ranking			Control Measures	Evaluation after measures			Responsibility
		Likelihood	Consequence.	Risk		Likelihood	Consequence	Risk	
Disruption of power supply	Implementation of power extension work may have restrained the power supply to the community.	4	4	Extreme	• Community people should be notified before the work commenced • Authority should announce among the respective community on the previous day about the power disruption if require.	4	2	Moderate	Contractor
Bribery	Contractor or project personnel may tempt the community people to provide power connection in exchange of money	3	3	High	• Power Grid should make aware the Community people about this hazard • Public consultation meeting can be arranged to disseminate the right information about the power connection • Train and aware the project related staff about the punishment of bribery	2	1	Low	Contractor
Vulnerable health services	Breaches of medical ethics, including the potential for direct and indirect discrimination of, and violence against, affected persons, specific communities and subpopulations	3	2	Moderate	Collaborate with local governments and communities to develop or share in third party health data collection and reporting. Contractor will set clear expectations and protocols for the management of medical data to prevent access to, and disclosure of medical data to, non-medical personnel.	2	1	Low	Contractor
	Lack of continued services, especially to the most vulnerable communities	2	2	Low	The health services program will use environmental, social, economic and health data to continually track and evaluate the changing vulnerability of communities within the area of influence so that action can be focused on the most vulnerable communities at any given time.	2	1	Low	Contractor
	Stress on the public healthcare services	4	2	Moderate	The Contractor will engage sufficient number of registered medical doctor and establish health center for its workforces and work with local	2	1	Low	Contractor
					Government to identify any necessary follow-up actions if health status is negatively affected by the Project in areas of influence. Possible actions may include supporting provision of affordable health services, including mobile health outreach clinics within the areas of influence.				
					• Medical screening and proof of vaccination are needed prior to the employment • The Contractor conduct induction training or workshop for all workforce and introduce the basics of these diseases, how they transmit and the preventive measures against them. • Contractor can organize vaccination program in the camp for the non-vaccinated workforce				

Hazards	Reasons	Risk Ranking			Control Measures	Evaluation after measures			Responsibility
		Likelihood	Consequence.	Risk		Likelihood	Consequence	Risk	
Spread of Communicable Disease (Tuberculosis (TB), COVID-19)	Increased workforce (Local and migrated) and crowded accommodation camp may spread these diseases to the community	4	4	Extreme	• Any positive cases should be dealt diligently and treated in designated hospital. After emergency care treatment should be continued at worker's home with the family to maintain isolation, the Contractor will bear the cost of treatment.	2	2	Low	Contractor
	COVID-19 and other similar infections can spread by the project workers to the community	4	4	Extreme	Follow all precautions listed above. Working site and labor camp should strictly maintain COVID- 19 protocol, if the cases are widespread. Follow all COVID-19 protocol (washing hands, wear mask, maintain 6 feet distance etc.)	3	2	Moderate	Contractor
Vector-borne diseases	Stagnant water and poor sanitation conditions can spread vector-borne diseases Increased burden of disease in workforce, results in	5	4	Extreme	The Contractor will develop program to limit bodies of stagnant water, spray insecticides, develop support in nearby communities, and	2	2	Low	Contractor
Malaria Chikungunya Dengue Lymphatic filariasis	increased demand on Project health services and reduce productivity.				• Create community awareness. • The Contractor will encourage good sanitation practices, and the use of mosquito nets throughout the area of influence. Provide information for training of workers in Chikungunya and Dengue awareness so they can take knowledge back to communities. • Develop educational materials regarding vector- borne disease transmission to the communities • Evaluate supporting the community health authorities with lymphatic filariasis eradication programs to ensure adequate coverage of target areas with community directed treatment programs				
Increased incidence of water related disease and food-borne illness	There are potential linkages between health and health impact pathways (e.g., number of bodies of stagnant water, number of people with access to improved sanitation facilities), which is crucial for water related disease and food-borne illness.	3	3	High	• Support the development of improved sanitation and improved water facilities. • Organize focus group discussions with local government, existing communities and in- migrants to help knowledge exchange and establish common expectations for sanitary conditions in the areas of influence. • Disseminate information on the linkages between improved water sources, sanitation conditions and human health, and on good hygiene practices, will promote use of the improved facilities and minimize the increased incidence of water related disease and food- borne illness in the areas of influence.	2	2	Low	Contractor
Vaccine preventable diseases Measles Mumps	• Potential increase in outbreaks in the community related to population influx or the introduction of personnel who are not immunized	3	3	High	Ensure and implement pre-employment medical checkup for the workforce	2	2	Low	Contractor
	• Increased burden of disease in community				Implement infectious disease outbreak management program for				

Hazards	Reasons	Risk Ranking			Control Measures	Evaluation after measures			Responsibility
		Likelihood	Consequence.	Risk		Likelihood	Consequence	Risk	
Rubella Chicken pox Pneumonia Influenza Typhoid	will Increase the demand on local community health services	3	2	Moderate	workers to reduce potential outbreaks to the local communities	2	1	Low	Contractor
	• Diminished quality of health care and treatment for local communities as existing, limited capacity is overwhelmed	3	2	Moderate	• Require active vaccinations program to workforce as necessary if possible • Develop educational materials regarding communicable diseases transmission to the communities	2	2	Low	Contractor
Sexually transmitted diseases and substance use	• The influx of people may bring communicable diseases to the project area, including sexually transmitted diseases (STDs), or the incoming workers may be exposed to diseases to which they have low resistance. • Workers with health concerns relating to substance abuse, mental issues or STDs may not wish to visit the project's medical facility and instead go anonymously to local medical providers, thereby placing	3	3	High	• Establish the construction camps at a distance away from the local community, if possible. If this is not possible due to densely populated project area, strict protocols and restriction should be imposed for interaction with local communities in order to prevent such type of STDs from labor influx. • Camp area should be well protected where the access of the local outsider will be strictly prohibited. • Engagement of skilled trainers to raise	2	2	Low	Contractor
	further stress on local resources.				• Awareness and provide trainings among project workers about the STDs risks, consequences, prevention, positive behavioral approach to the community etc. It may also be important to raise awareness of the risks among community members and local health authorities and inform them about available grievance mechanisms. • Arrange and support local organizations and/or government initiatives on community STDs education, prevention, and treatment programs.				
Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH)	• Large influx of workers, particularly in dense populated communities, may increase the likelihood of exploitive and coercive sexual relations with community members, particularly minors in exchange for goods or money. • Close proximity without appropriate supervisory and preventative measures may increase the risk of sexual exploitation by project workers of female domestic workers and vendors • Community girls and women may be	4	3	High	• Workers Code of Conduct (CoC) that will be used in the project will include provisions for addressing SEA and SH risks and also the prohibitions against any illegal sexual activity with anyone • Establish workers' camps separated from local communities with strict protocols for interaction with local communities in order to avoid project impacts from labor influx. • Extensive training for Awareness raising strategy which describes how workers and local communities will be sensitized to SEA and SH risks, and the worker's responsibilities under the CoC	3	2	Moderate	Contractor

Hazards	Reasons	Risk Ranking			Control Measures	Evaluation after measures			Responsibility
		Likelihood	Consequence.	Risk		Likelihood	Consequence	Risk	
	tempted by the project staff to get a good job in exchange of sexual relationship.								
Emergency events and lack of preparedne ss and response	Internal and external emergencies may occur which require preparedness by the project authorities and a response procedure commensurate to the level of emergency situation	3	4	High	• Develop an emergency preparedness and response plan (EPRP) to contain emergencies at the project site level • The Contractor will work with local • authorities to coordinate with the national emergency response network in the areas of influence and to ensure implementation of the project specific emergencies and make arrangements with external emergency services (Fire, ambulance, etc.), if the resources available with the Contractor is not sufficient to contain the emergency. • Conduct capacity building and train local communities as needed to make sure the communities know what to do during an emergency.	2	2	Low	Contractor
Use of security forces (e.g., police, Ansar, or private security personnel)	Project will engage security forces to ensure human security of project-affected communities and project workers and assets. There are potential risks that could arise from the use or presence of security personnel to protect the project or related aspects of the use of security personnel	3	3	High	• Adoption/compliance with the World Bank Group's Good Practice Notes on Assessing and Managing the Risks and Impacts of the Use of Security Personnel and a project/contract specific Code of Conduct for the security personnel. • The Contractor will carry out a continuous risk assessment of the security arrangements in place, monitor its security personnel, and identify any necessary corrective or preventive actions for continuing security operations. • Security will be provided in a manner that does not jeopardize the community's safety and security, or the client's relationship with the community. • Security arrangements will follow the • principle of proportionality, respect for human rights, and good international practice	2	2	Low	Contractor
Lack of awareness on health and safety	Awareness on Community Health and Disease Prevention may arise from the interaction of project workers with local communities	4	3	High	• Community health and disease prevention awareness campaigns will be applied consistently throughout the Project duration and will include awareness of: • Linkages between improved water sources, sanitation conditions • Common water related disease and food borne illness • Good hygiene practices	3	2	Moderate	Contractor

Hazards	Reasons	Risk Ranking			Control Measures	Evaluation after measures			Responsibility
		Likelihood	Consequence.	Risk		Likelihood	Consequence	Risk	
Traffic and road accident	• Lack of Traffic and Road Safety Awareness • Use of the community road • Careless driving and goods deployment to the project site through the crowded area.	4	4	Extreme	• Engage community consultations and monitoring and management plans to prevent potential negative impacts resulting from poor traffic and road safety culture. • Ensure continuous monitoring of traffic and pedestrian Interface in the project area. • Promote traffic safety awareness in communities in the Direct Area of Influence and along the transportation route. • Driving by the side of schools and colleges should be avoided. If can ‘t be avoided speed limit should be maintained in these roads.	2	3	Moderate	Contractor
Manageme nt and safety of hazardous materials	Improper Hazardous Materials Management and lack of Safety Awareness	2	3	Moderate	• Ensure hazardous materials management safety communications to communities‘ close proximity of the project to deter workers, their families and others from • collecting, reusing, recycling or reselling Project • waste (e.g.; diesel, cement concrete etc.). • Communications will include examples of hazardous materials used in Project construction, operation and rehabilitation, the risks to human health, and appropriate methods of use and disposal.	2	2	Low	Contractor
Behavioral segmentatio n of the Security personnel	Misuse of Security Personnel	3	3	High	• Engage with communities about the project's impacts on community safety and security, create awareness concerning the Code of Conduct commitment and project grievance mechanism, as outlined in the ESIA • Ensure that Security staff coordinate regularly with other departments, such as Community Relations and Human Resources. • Community Relations Officer of the Contractor will share information with communities about security arrangements, the Contractor‘s security policies, and the expected conduct of security personnel. • Arrange dialogue with communities about security issues to identify potential risks and local concerns, and can serve as an early warning system.	1	2	Low	Contractor
	Lack of Positive Lifestyles concept	3	2	Moderate	• Encourage culturally appropriate positive lifestyle choices in an effort to: • Establish good financial management choices with the compensation payment.	2	2	Low	Contractor

Hazards	Reasons	Risk Ranking			Control Measures	Evaluation after measures			Responsibility
		Likelihood	Consequence.	Risk		Likelihood	Consequence	Risk	
					• Deter an increase in alcohol use,				
					• substance abuse and tobacco use. • Avoid violence against women, including sexual harassment, sexual exploitation and abuse. • Avoid ethnic- or religious- based violence. • Conduct awareness campaigns within the workplace and at religious institutions (e.g., mosque), local governments, schools, and health clinics.				
Poor quality Manageme nt Systems to maintain safety of Services	The Construction may pose safety risks on community health and safety, for example, risks associated with: a) Infrastructure construction and heavy equipment movement, such as, struck by moving vehicle. b) Trench construction hazard, such as land sliding, buried, slip, trip and falling communities people due to careless management. c) Water and sanitation services, such as contaminated water or spread of disease. d) Electricity supply, which may result in electric shock from electrical cabinets or cables. e) Service providers, which may use their service for the purpose of financial, sexual, or other exploitation, particularly of vulnerable groups such as women, children, and the elderly.	4	4	Extreme	• The Contractor will establish and implement appropriate quality management systems to anticipate and minimize risks and impacts. • The Contractor will apply hierarchy of controls, such as, eliminate/ substitute, and engineering control of hazards and if hazards are low risk, then introduce administrative controls and as a final resort provide appropriate personal protective equipment.	2	3	Moderate	Contractor
Potential Risks and Impacts on Ecosystem Services	The project's direct impacts on ecosystem services may result in adverse health and safety risks to and impacts on affected communities.	2	3	Moderate	• Contractor will identify the project's potential risks and impacts on ecosystem services that may be exacerbated by climate change. • Adverse impacts will be avoided, and if they are unavoidable, the Contractor will implement appropriate mitigation measures.	2	2	Low	Contractor

C. Community Health and Safety Management Framework

Traffic Management Including Accident

Traffic, particularly the movement of heavy vehicles and other equipment carrier during peak hours in the construction phase of a project may cause road traffic in the highly populated area which may face the deterioration of standard living condition of those localities. School or college going students may face an unfavorable environment for their study and attending into their classes. Fatal injuries even death may be happened due to traffic congestion and unsafe driving of the project vehicles and other public transportations. Project authorities should plan to reduce such type of risks (e.g., by re-routing traffic, adjusting the timing of traffic movements and training staff and/or contractors) and work collaboratively with the Project Affected Communities to develop an appropriate Traffic Management Plan.

Accidental risks during overhead line installation and maintenance

Contractor and Power Grid should be cautious while the overhead line maintenance and installation works will be performed in a densely populated area. Hanging equipment, ladder, crane, work at height etc. may pose different types of risks including fatal, minor and near miss accidents and incidents. Near miss incidents should be recorded for the future awareness. Proper protective equipment, working schedule and demarcation of the working site can reduce the hazard significantly.

Health Services Program

The health services program will enhance and monitor effective change in access to health, and any linkage to health status in general and in terms of the area of influence and specific communities and sub-populations (e.g., women, girls, children, in-migrants, visible minorities) within the project area. The health services program will use environmental, social, economic and health data to continually track and evaluate the changing vulnerability of communities within the area of influence so that action can be focused on the most vulnerable communities at any given time.

The Contractor will work with local government to identify any necessary follow-up actions if health status is negatively affected by the Project in the areas of influence. Possible follow up actions may include supporting provision of affordable health services, including mobile health outreach clinics within the areas of influence.

Disease Prevention Program

The Disease Prevention Program will focus on methods to reduce of community exposure of water related disease. The program will be delivered through the active mitigation measures (e.g., limiting bodies of stagnant water) and community awareness. The program will be informed by health monitoring e.g., dengue exposure.

Chikungunya and Dengue

Chikungunya, dengue and other vector borne disease reduction campaigns will be applied consistently throughout the Project period and will include awareness of linkages between stagnant water and dengue, including through poor sanitation conditions. Open water sources are created and/or enlarged, as a result of construction activities and storage of plant, materials and equipment, with the potential for increased mosquito breeding sites. Increased burden of disease in workforce, results in increased demand on Project health services and reduce productivity.

Perform a baseline entomological study to define the most predominant vector species in the Project area, as well as determining the susceptibility of mosquitoes to the different classes of insecticides. The Contractor will encourage good sanitation practices, and the use of mosquito nets throughout the area

of influence. The Contractor will support development of local knowledge and on the exposure pathways and determinants of exposure in vulnerable communities. The Health Services Program will inform the Disease Prevention Program of the most vulnerable communities (with highest dengue incidence) for prioritized action. Provide information for training of workers in Chikungunya and Dengue awareness so they can take knowledge back to communities. Actions and lessons learned in the areas of influence will regularly inform Occupational Health and Safety training.

Sanitation and Water Supply

The Contractor will support the development of improved sanitation and improved water facilities. Existing drinking water supply must be monitored by the contractor so that the over-use of water by the project workers and project interventions will not make scarcity of the drinking water for the local community. Through stakeholder engagement, the Contractor will encourage people to construct, adopt and properly use improved sanitation and water facilities. Focus groups with local government, existing communities and in-migrants may be implemented to help knowledge exchange and establish common expectations for sanitary conditions in the areas of influence.

The facilitation and dissemination of information on the linkages between improved water sources, sanitation conditions and human health, and on good hygiene practices, will promote use of the improved facilities and minimize the increased incidence of water related disease and food-borne illness in the areas of influence.

On-going monitoring of health and health impact pathways (e.g., number of bodies of stagnant water, number of people with access to improved sanitation facilities) will be implemented by the Contractor with regular feedback to those affected.

Sexually Transmitted Diseases

Stakeholder engagement activities will include culturally specific and gender specific awareness education about incidence of sexually transmitted diseases in the areas of influence, information on pathways of exposure, and any local evidence to aid acceptance of this information and dispel current myths about causes of HIV/AIDS. The Contractor will assist communities in developing education materials such as those using anecdotal epidemiology that would aid increasing acceptance of evidence- based research and facts regarding HIV/AIDS.

Subcontractor Integrity Program

The Contractor will be clear about its expectations of subcontractors during all phases. The Contractor will continually monitor and evaluate companies' performance, including performing spot checks on- site, to ensure that the expected level of safety culture is being adhered to. The subcontractor integrity program will be far reaching and include, but not be limited to the performance regarding the following:

- General traffic safety;
- Hazardous materials management;
- Community health and safety;
- Occupational health and safety; and
- Adherence to construction standards stated in the general and specific conditions of the main contract.

Emergency Preparedness and Response Planning

The Contractor will develop an emergency preparedness and response plan (EPRP) to combat emergencies. The Contractor will work with local authorities to strengthen the national emergency response network in the areas of influence and to ensure implementation of the project specific emergencies and make arrangements with external emergency services (e.g., Fire-fighting, ambulance, etc.), if the resources available with the Contractor is not sufficient to contain the emergency If an external emergency arises not due to the Project but something where

collaboration from the Contractor is needed for both human resources and emergency equipment, contractor can extend collaboration to work with local authorities and communities. The Contractor will develop procedures in the EPRP on actions that need to be taken, when an external emergency event is triggered. The Emergency Response Plan prepared by the contractor will cover both project-specific and emergencies in the communities. The Contractor will conduct capacity building and train local communities as needed to make sure the communities know what to do during an emergency. The Contractor will work with local authorities to make sure they are aware of it and if needed strengthen the emergency response network to be able to coordinate with the Project.

The following aspects of the Emergency Preparedness and Response Plan will be jointly addressed by the Contractor, the community and government representatives:

- Definition of information and notification chain(s) within government/regulatory agencies (who needs to be informed, who has which responsibility and access to/control over resources), following notification of the authorities by the Contractor that an emergency situation has occurred;
- Evacuation procedures for the local affected population;
- Awareness of operations and their risks and preparedness to respond (e.g., sufficient capacity of beds in local hospital);
- Preparedness of state/community emergency response teams (fire brigade) and awareness of risks and potential emergency scenarios, availability of PPE adequate for specific risks such as respirators, full-body harness etc.;
- Knowledge of site plan by ambulance teams (fastest access to critical points such as embankment, explosive storage);
- Training requirements of key people (police, hospitals and local health centers) and alignment of their training plans with the Contractor training plans;
- Commitment to coordinated emergency drills between the Contractor and police, fire fighters, national disaster management authority, etc., and aligned plans for drills; and
- Nomination of community representatives in the preparation of the external plan, and in the planning of and participation in, drills.
- Designated coordinator for EPRP implementation and
- Measures for restoration and cleanup of the environment following any major accident.

D. Community Health and Safety Awareness Program

Awareness on Community Health and Disease Prevention

Where an assessment identifies risks, for example communicable diseases, which may arise from the interaction of project workers with local communities, the EIA for the project will describe such risks and measures to address them. Such measures can include, more generally, the use of skilled trainers to raise awareness among project workers of the risks, expected behaviours, and consequences of violations, communicated through training, and publicized codes of conduct. It is also important to raise awareness of the risks among community members and local health authorities and inform them about available grievance mechanisms. In addition, the Contractor will create awareness of linkages between stagnant water and dengue, including through poor sanitation conditions in the communities' close proximity to the Project. Provide information for training of community representatives in Chikungunya and Dengue awareness so they can take the knowledge back to their respective communities. Community health and disease prevention awareness campaigns will be applied consistently throughout the Project duration and will include awareness of:

- Linkages between improved water sources, sanitation conditions and human health;

- Common water related disease and food borne illness rates in the areas of influence;
- Good hygiene practices;
- Benefits to properly using the improved facilities; and
- Evidence of improvement in target communities to encourage adoption in other communities.

Traffic and Road Safety Awareness

Stakeholder engagement activities, a good communication strategy, as well as monitoring and management plans will help the Contractor prevent potential negative impacts resulting from a poor in- country safety culture. These actions include the following:

- Clear expectations regarding road safety culture, road safety behavior and road safety training, provided to workers and contractors;
- On-going monitoring of traffic and Pedestrian Interface in the project area (e.g., near misses, reports from communities, reports from project traffic) with regular feedback to those affected; and
- Knowledge transfer to workers and affected communities regarding road user awareness with advice on strategies for interacting with project traffic.

In addition, the Contractor will promote traffic safety awareness in communities in the Direct Area of Influence and along the transportation route.

Waste and Hazardous Materials Management and Safety Awareness

The Contractor will provide hazardous materials management safety communications to communities in the areas of influence to deter workers, their families and others from collecting, reusing, recycling or reselling Project waste. Communications will include examples of hazardous materials used in Project construction, operation and rehabilitation, the risks to human health, and appropriate methods of use and disposal. Solid waste as well as the electrical waste collection process and offsite disposal system should be outlined and demarcated accordingly after discussion with the local stakeholder of nearby community. Proper and effective drainage system should be developed before starting of civil and mechanical construction and waste must be collected in a sump for treatment.

Use of Security Personnel

The Contractor will engage with communities about the project's impacts on community safety and security, create awareness concerning the Code of Conduct commitment and project grievance mechanism and disclosure of the project possible outcome including the impacts through the public consultation meeting.

The Contractor will avoid internal operational silos by ensuring that their Security staff coordinate regularly with other departments, such as Community Relations and Human Resources. Through its Community Relations function, the Contractor will share information with communities about security arrangements, the Contractor's security policies, and the expected conduct of security personnel. Dialogue with communities about security issues can also help the Contractor to identify potential risks and local concerns, and can serve as an early warning system.

Community members will be informed through the awareness program, where to go with complaints about the conduct of security personnel. Can they lodge such complaints through the company's general community grievance mechanism or is there one specifically for security concerns- or even an alternative complaint mechanism (for example, as part of the local justice system)? The Contractor will maintain a clear process and communicate it. The awareness will also provide information on the community members' ability to make complaints without fear of intimidation or reprisal.

Gender considerations are also important, as women often have different experiences and interactions with security personnel. for example, the potential for sexual harassment or sexual violence against women can increase from an expanded presence of private or public security

forces in a project area. The Contractor should consider to consult and create awareness separately for the women group, which may offer important perspectives and may help the Contractor to identify a fuller range of potential risks and community concerns. At the same time, security personnel's awareness of and respect for culturally specific gender issues may help the local population accept their presence. The Contractor might consider to recruit female security guards to improve cultural acceptance and reducing tensions, particularly in situations where there are frequent interactions between guards and women from the community.

Positive Lifestyles Program

Through the Community Development Plan, the Contractor will encourage culturally appropriate positive lifestyle choices in an effort to:

- Establish good financial management choices;
- Deter an increase in alcohol use, substance abuse and tobacco use;
- Avoid violence against women, including sexual violence;
- Avoid ethnic- or religious- based violence;
- Adopt good hygiene practices and sanitation; and
- Reduce the potential for STDs.

Awareness campaigns may be conducted within the workplace and at religious institutions, local governments, schools, and health clinics.

SEA/SH awareness program

Apart from the reasons of this hazard indicated in the Risk matrix, other examples of Sexual Exploitation & Abuse (SEA)/Sexual Harassment (SH) need to be considered but are not limited to:

- A project worker tells women in the community that he can get them jobs related to the work site (cooking and cleaning) in exchange for sex
- A worker that is connecting electricity input to households says that he can connect women headed households to the grid in exchange for sex.
- A project worker gets drunk after being paid and rapes a local woman.
- A project worker denies passage of a woman through the site that he is working on unless she performs a sexual favor.
- A manager tells a woman applying for a job that he will only hire her if she has sex with him.
- Male staff comment on female staffs' appearances (both positive and negative) and sexual desirability.
- When a female staff member complains about comments male staff are making about her appearance, they say she is "asking for it because of how she dresses.
- A male staff may touch female staff members' buttocks whether in project or in community when she passes her destination.
- School or college girls might get seduced or tempted by the project staff by offering gifts or other financial benefits

To protect and prevent community SEA/SH Strengthen community engagement and awareness-raising is essential. Critical awareness activities need to be conducted which will include training and awareness- raising sessions with women, girls, boys and men in communities of concern as well as with other stakeholders (including implementing and operational partners, government officials, civil society organizations, and companies in the private sector). To prevent SEA effectively, all staff and project workers must make sure that project Persons of Concern (PoC) are aware of their rights and entitlements. On the other hand, PoC from contractor and project management side should know that they are entitled to assistance that they should never be expected to provide any form of sexual favour, and that demands for such favours are strictly prohibited. Community and project victims should also know how and where to report SEA

incidents safely and confidentially when they occur. As part of prevention, trainings and information campaigns should be put in place for all project personnel and PoC. Training and information campaigns may include the distribution of information sheets, posters and videos, or community meetings, focus group discussions, etc.

Beside that the project will include a general Code of Conduct (CoC) as well as a Labor Code of Conduct, covering the Gender-Based Violence (GBV)/SEA/SH related risks for the contractors, sub-contractors, and laborers who will be employed under the project.

Other Measures to Manage CHS Risks

Safety of Services by maintaining quality Management Systems

The Contractor will establish and implement appropriate quality management systems to anticipate and minimize risks and impacts. Projects may provide many kinds of services to communities, such as those relating to education and health, social security and social protection, transport, and utilities, such as electricity and gas, water and sanitation, and waste disposal. Management systems that address the safety of such services are important because without adequate protection measures the provision of such services can present dangers for communities. Such systems address the community health and safety risks posed by project services, for example, risks associated with:

- Infrastructure construction and heavy equipment movement, such as, struck by moving vehicle;
- Erection of steel pole for the overhead electricity distribution may cause the minor to fatal injuries.
- Slip, trip and fall injuries due to wet road and uncovered excavated trench.
- Waste disposal, such as toxicity, waste dump collapse, or air pollution;
- Quarries or excavation works, such as rock falls or hazardous equipment;
- Water and sanitation services, such as contaminated water or spread of disease;
- Electricity supply, which may result in electric shock from electrical cabinets or cables;
- Service providers, which may use their service for the purpose of financial, sexual, or other exploitation, particularly of vulnerable groups such as women, children, and the elderly.

In such circumstances, the Contractor will apply hierarchy of controls, such as, eliminate/substitute, and engineering control of hazards and if hazards are low risk, then introduce administrative controls and as a final resort provide appropriate personal protective equipment.

Potential Risks and Impacts on Ecosystem Services

The project's direct impacts on ecosystem services may result in adverse health and safety risks to and impacts on affected communities. Where appropriate and feasible, the Contractor will identify the project's potential risks and impacts on ecosystem services that may be exacerbated by the project interventions. Adverse impacts will be avoided, and if they are unavoidable, the Contractor will implement appropriate mitigation measures. Ecosystem services are the benefits that people derive from ecosystems. The provisioning services that ecosystems provide include the products people obtain from the ecosystems, such as food, freshwater, timbers, fibres, and medicinal plants. Regulating services of ecosystems are the benefits people obtain from the regulation of ecosystem processes, such as surface water purification, carbon storage and sequestration, climate regulation, and protection from natural hazards.

Training and Competency

The Contractor will ensure that personnel responsible for the execution of tasks and requirements in this Plan are competent based on education, training, and experience. Training to be provided to workers who may be exposed to hazards (health, safety or security) associated with Project

activities. The training and increase in Project worker awareness associated with health, hygiene and sanitation, communicable disease, sexually transmitted infection (STI) and HIV/AIDS education campaigns are a key component in minimizing health risks to the community posed by activities of the Project. Training will include, but not be limited to:

- Voluntary Principles for Security and Human Rights training for all Project security guards and security management, including the appropriate use of force and protection of human rights;
- STI and HIV/AIDS prevention and awareness training for all workforces;
- Driver training to improve driver and vehicle safety, as well as systems for monitoring and enforcement;
- Road and traffic safety awareness for school children and the community leaders;
- Sanitation and nutrition awareness and education for all workforces, with a focus on messages which can be taken home to families to encourage good sanitation and nutrition practices in rural settings;
- Respiratory illness and infectious disease management, including TB;
- Vector-borne disease awareness including Chikungunya and Dengue;
- Speed restrictions in populated areas, safe driving in rural areas, safe driving in dusty environments, defensive driving and basic first aid;
- Guidance for all workforces with potential occupational exposures and prevention to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2);
- Benefits of vaccinations and disease prevention; and
- Adverse impacts of Drug and Alcohol usage.

Monitoring and Maintenance

Confidentiality Requirements

The Contractor will ensure health data are handled to an international standard of medical ethics. Health data is confidential to the individual and health professionals only. the Contractor will assure that data is stripped of all personal identifiers before dissemination to other (non-medical) company employees or external bodies, reducing the potential for any internal or external discrimination of employees or community members. Sample size and relative risk of personal identification will need to be taken into account before combined health data is published internally and externally. The Contractor understands that confidentiality of health data overrides any need to demonstrate vulnerability in a population, sub- population or individual.

Annex-XX: Climate Change Assessment

Climate Vulnerability Assessment

Climate Change (CC) is one of the significant factors considered in the Environmental/Ecological Assessment. Climate change assessment (CCA) is done for the current assessment process with the objective to provide assurance that climate change implications are being appropriately considered in the design of the proposed project. The specific objectives are to:

- Support the project authority manage or reduce the potential risk posed by the impacts of climate change to the project and contribute to climate change action;
- Provide project managers of the co-financiers with information that will assist their broader climate change action; and
- Help decision makers to address climate change implications in a risk management context.

The current assessment is conducted climate change related investigation based on globally and nationally published climate change prediction reports focusing particularly on the variability of rainfall intensity, temperature changes, sea level rise. These variables are directly related to the functionality and durability of the proposed project.

To conduct the assessment literature review has been conducted available from different national climate change relevant agencies, such as Department of Disaster Management (DDM), Department of Environment (DoE) and Bangladesh Meteorological Department (BMD). International and National Climate Change Communication reports, especially the 5th Intergovernmental Panel on Climate Change (IPCC) Assessment report has been reviewed for relevant major sources of information for impact and vulnerability projection on global and regional temperature, sea level rise, rainfall fluctuation and their impacts on proposed infrastructures. This climate change projection information will help in making the proposed project climate resilient.

A climate vulnerability assessment for 765kV power transmission line project in Bangladesh is crucial given the country's susceptibility to climate change impacts, including sea-level rise, extreme weather events, and changing precipitation patterns. Such an assessment involves evaluating the potential risks and vulnerabilities associated with climate change and developing strategies to mitigate these risks. Chattogram and Cox's Bazar are highly vulnerable to climate change due to their low-lying coastal locations, increased exposure to cyclones and storm surges, and riverine flooding. Specific vulnerabilities include coastal erosion from sea-level rise in Cox's Bazar, widespread flooding in low-lying areas of both districts, and landslides in the hilly regions of Chattogram due to erratic rainfall. Other significant threats involve water scarcity during dry periods, increased salinity intrusion, damage to infrastructure, and threats to livelihoods. However, there is no climate vulnerability in these locations due to the proposed project intervention. Project based climate vulnerability assessment and adaptation measures are taken as important considerations during project preparation. Climate vulnerability assessment for the proposed project is given in the following table:

Table 1: Possible Climatic hazard for the proposed project

SL	Possible Climate Hazard	Exposure of distribution network	Preventative measures	Vulnerability
1.	Cyclone Hit and Storm Charge Inundation	• 65.5 km power transmission line in coastal storm charge area.	• Rigorous site selection to avoid flood-prone areas and water bodies, robust foundation design using deep piles or ground improvement for weak soils, durable materials like low-porosity concrete and masonry, and structural designs that allow for strong wind and storm surge resistance, such as reinforced	Low to Moderate

SL	Possible Climate Hazard	Exposure of distribution network	Preventative measures	Vulnerability
			concrete frames on raised platforms or sturdy earth mounds.	
2.	Coastal Flooding	• Transmission Tower Areas	• Formation Ground Level (FGL) will be kept adequately above the Highest Flood Level (HFL)	Low
3.	Salinity Intrusion	30-km	• Corrosion-resistant materials and coatings for towers and components, designing foundations to withstand soil conditions, elevating towers to protect against storm surges and flooding, routing lines away from highly vulnerable areas like mangrove forests, and considering a combination of nature-based and engineered solutions for erosion and surge protection.	
4.	Erosion	6 sets river crossing tower	Contractor constructed the river crossing tower in the stable location of the river to avoid the erosion.	Low
5.	Lightening	Transmission Line	Adequate grounding will be done	Very low
6.	Extreme heat	Transmission Line	Use of higher sized conductor.	Very low
7.	Extreme cold	N/A	-	-
8.	Drought	N/A	-	-
9.	Heavy Rainfall	Transmission Line	• Conducting detailed site surveys to assess terrain and landslide risk, designing foundations to withstand water pressure and erosion, securing scaffolding and equipment to prevent falling in high winds and rain, implementing strict safety protocols for workers in elevated positions, and ensuring all towers are properly earthed	Low to moderate

Climate Change Impact Considerations

The impacts consideration assessed the hydro-meteorological parameters that are directly and indirectly exposed to climate change phenomenon for facilitating the detail design and environmental impact assessment process. Projecting the impact of global climate change on any infrastructure/related natural resources requires representation of climate processes on a variety of spatial scales, from global down to local level. In this regard, under the current scope of works, neither any climatic models nor any hydro-dynamic simulation was newly conducted; rather raw data available from different existing climate and hydro-metric observations and regional projections from different sources were used. The assessment provides some recommendation/potential solutions/mitigation for climate resilient structures based on the findings of the literature review.

a) *Climate Projections: Temperature*

The IPCC 5th assessment report (AR5) indicates that the global mean temperatures will continue to rise over the 21st century if greenhouse gas (GHG) emissions continue unabated. Global surface temperature change for the end of the 21st century is likely to exceed 2.5°C relative to 1986 to 2005 for all RCP (Representative Concentration Pathway) scenarios except RCP2.6, and warming will continue beyond 2100 under all RCP scenarios except RCP2.6. Table 2 shows the projected change in global mean surface air temperature.

Table 2: Projected Change in Global Mean Surface Temperature (Likely Range)

Time Period (Base Year 1986 to 2005)	Temperature (°C)			
	RCP 2.6	RCP 4.5	RCP 6.0	RCP 8.5
2046-2065	0.4 to 1.6	0.9 to 2.0	0.8 to 1.8	1.4 to 2.6
2081-2100	0.3 to 1.7	1.1 to 2.6	1.4 to 3.1	2.6 to 4.8

On the other hand, for South Asia the report projections indicate that, compared to the average in the 20th century, average annual temperatures could rise by more than 2°C over land in most of South Asia by the mid-21st century and exceed 3°C, up to more than 6°C over high latitudes, by the late 21st century under a high-emissions scenario (RCP8.5); while under a low-emissions scenario (RCP 2.6) average temperatures could rise by less than 2°C in the 21st century, except at higher latitudes, which could be up to 3°C warmer.

Even though, IPCC assessment report does not provide any country level projections, under the Comprehensive Disaster Management Programme (CDMP II) of Department of Disaster Management (Ministry of Disaster Management & Relief) acclimate model PRECIS (Providing Regional Climates for Impacts Studies) is used to get climate change scenario for Bangladesh. Table 3 shows the projected temperature change for Bangladesh under CC scenario.

Table 3: Projected Temperature Change for Bangladesh under CC Scenario

Time Period	Temperature (°C)		
	Annual	Monsoon (Jun-Sep)	Winter (Dec-Feb)
(Base Year 1961-1990, Mean)	24.6	31.83	16.2
2071-2100	4.34	3.43	5.37
2011-2041	1.49	1.50	1.80

b) *Climate Projections: Precipitation*

AR5 reports that, in the long term, global precipitation will increase with increased global mean surface temperature. Global mean precipitation will increase at a rate per degree Celsius smaller than that of atmospheric water vapor. It will likely increase by 1 to 3% / °C for scenarios other than RCP2.6, for RCP2.6 the range increase will be 0.5 to 4% / °C at the end of the 21st century.

In the South Asian region AR5 projections indicate that under a high-emissions scenario more rainfall will be very likely at higher latitudes by the mid-21stcentury and over southern areas of the late 21st century. Under a low-emissions scenario, more rainfall at higher latitudes is likely by mid-century but no likely substantial changes in rainfall patterns at low latitudes. More frequent and heavy rainfall days are projected over parts of South Asia (IPCC, 2007).

Analysis of past trend of rainfall by (CDMP II, 2013) study reveals that all-Bangladesh annual normal rainfall has not changed much in Bangladesh. For a period of 30 years (1980- 2009), the annual normal rainfall is found to be 2,306 mm, such rainfalls were 2,298 and 2,314 mm during 1960-1989 and 1970-1999, respectively. On the other hand, Bangladesh normal rainfalls in different seasons show some mixed trend. Pre-monsoon (March-May) and post- monsoonal (October-November) normal rainfalls have increased and the monsoonal (June- September) normal rainfall has decreased over the three time periods (1960-89, 1970-99 & 1980-2009). The winter (December-February) normal rainfall has increased in the last two periods compared to the first period. The change in projected precipitation for Bangladesh, as found by PRECIS run (CDMP II report) is presented in the following Table 4.

Table 4: Projected Precipitation Change for Bangladesh under CC Scenario

Time Period	Precipitation (mm/day)		
	Annual	Monsoon (Jun-Sep)	Winter (Dec-Feb)
(Base Year 1961-1990, Mean)	3.5	7.24	0.59
2071-2100	0.90	1.43	0.03
2011-2041	0.64	1.40	-0.05

c) *Climate Projections: Sea Level Rise*

AR5 predicted, it is very likely that the rate of global mean sea level rise during the 21st century will exceed the rate observed during 1971–2010 for all Representative Concentration Pathway (RCP) scenarios due to increases in ocean warming and loss of mass from glaciers and ice sheets Table 5.

Table 5: Global Mean Sea Level Rise (Values Shown as Median and Likely Range)

Time Period (Base Year 1986-2005)	Sea Level Rise (m)			
	RCP 2.6	RCP 4.5	RCP 6.0	RCP 8.5
2020	0.08 [0.06 to 0.10]	0.08 [0.06 to 0.10]	0.08 [0.06 to 0.10]	0.08 [0.06 to 0.11]
2050	0.22 [0.16 to 0.28]	0.23 [0.17 to 0.29]	0.22 [0.16 to 0.28]	0.25 [0.19 to 0.32]
2080	0.35 [0.24 to 0.48]	0.41 [0.28 to 0.54]	0.40 [0.28 to 0.53]	0.50 [0.37 to 0.67]
2100	0.44 [0.28 to 0.61]	0.53 [0.36 to 0.71]	0.55 [0.38 to 0.73]	0.74 [0.53 to 0.98]

It is very likely that in the 21st century and beyond, sea level change will have a strong regional pattern, with some places experiencing significant deviations of local and regional sea level change from the global mean change. However, no local level SLR data could be found for Bangladesh based on the AR5 by the current assessment. The potential impact of SLR on the infrastructures of the proposed project described in the following section based on available literature.

Potential Climate Impact of the Project

To assess potential climate impacts of the proposed project region we have used a web-based tool name 'ThinkHazard14' to analyzes and presents the likelihood of various natural hazards like earthquakes, floods, landslides, cyclones, and droughts. The tool incorporates data on how climate change might alter the frequency and intensity of natural hazards in the future. This tool has classified the hazard into four categories: High, Medium, Low, Very Low.

Table 6: Types of hazards and their magnitude

Type of Hazard	Rajshahi	Rangpur
River Flood	High	High
Urban Flood	High	High
Coastal Flood	High	High
Cyclone	High	Medium
Extreme Heat	High	High
Wildfire	High	High
Earthquake	Medium	Medium
Water Scarcity	Very Low	Medium
Landslide	Very Low	Low

(a) Extreme Heat

In Chattogram region extreme heat hazard is classified as high based on modeled heat information currently available to this tool. This means that prolonged exposure to extreme heat, resulting in

heat stress, is expected to occur at least once in the next five years. According to the most recent assessment report of the Intergovernmental panel on Climate Change (IPCC, 2013), continued emissions of greenhouse gases will cause further warming, and it is virtually certain that there will be more frequent hot temperature extremes over most land areas during the next five years.

(b) Coastal Flooding

In Chattogram region river flood hazard is classified as high based on modeled flood information currently available to this tool. This means that potentially damaging and life- threatening river floods are expected to occur at least once in the next 10 years. Model projections are inconsistent in their estimates of changes in rainfall. The present hazard level may increase in the future due to the effect of climate change. It would be prudent to design projects in this area to be robust to river flood hazard in the long-term.

(c) Cyclone and Storm Charge

Cyclones are a frequent and damaging occurrence in the Chattogram and Cox's Bazar regions of Bangladesh, causing heavy rainfall, strong winds, flooding, landslides, and significant infrastructure damage. Recent events include Cyclone Hamoon (October 2023) and Cyclone Remal (May 2024), which led to widespread destruction, power outages, and displacement of communities, with the Rohingya refugee camps in Cox's Bazar also severely impacted. The hilly terrain of Cox's Bazar makes it particularly vulnerable to landslides and flash floods during heavy rains.

In Chattogram region, cyclone (also known as hurricane or typhoon) hazard is classified as high according to the information that is currently available. This means that there is more than a 20% chance of potentially damaging wind speeds in your project area in the next 10 years and in Rangpur region hazard is classified as medium according to the information that is currently available.

(d) Salinity Intrusion

Salinity intrusion is a significant climate change impact affecting Cox's Bazar and other coastal areas of Bangladesh, with Chattogram also experiencing increasing salinity. Rising sea levels and increased storm surges are forcing saltwater into coastal aquifers and soils, contaminating freshwater for drinking and making agricultural land unproductive. This intrusion has adverse effects on health, agriculture, and the ecosystem, driving potential human migration from affected districts like Chattogram and Cox's Bazar.

Climate Change Impact of 765kV Transmission Line

765kV transmission lines in Bangladesh would primarily impact climate change through land use, greenhouse gas (GHG) emissions from construction and equipment, and system efficiency. Conversely, the new infrastructure aims to address climate change by improving grid efficiency and supporting imported power, though this depends on the source of the imported energy.

A. Impacts contributing to climate change

(a) Habitat loss and reduced carbon storage

Deforestation: The construction of high-voltage transmission lines requires clearing extensive corridors, or "rights-of-way," through forests, wetlands, and agricultural land. This would reduce Bangladesh's natural carbon sinks, as forests absorb carbon dioxide from the atmosphere. Given Bangladesh's high population density, these clearings can be substantial.

Increased emissions: The destruction of forested areas releases stored carbon dioxide into the atmosphere. The heavy machinery and transportation needed for construction and ongoing maintenance also directly emit greenhouse gases.

(b) Greenhouse gas emissions from equipment

Sulfur hexafluoride (SF6) leaks: High-voltage equipment like circuit breakers and switches often uses SF6 as an electrical insulator. SF6 is a potent greenhouse gas, and any leaks from aging or damaged equipment would contribute to atmospheric warming.

Manufacturing emissions: Producing the necessary steel for towers and other components involves significant GHG emissions, a factor that increases with higher voltage classes.
Potential for greater reliance on fossil fuels.

Dependence on imported energy: Proposed ultra-high voltage (UHV) lines in Bangladesh, such as the 765kV line from Moheshkhali to Dhaka, are designed to evacuate large amounts of power from coastal power plants that primarily rely on imported fossil fuels like Liquefied Natural Gas (LNG). While this addresses immediate energy needs, it increases Bangladesh's dependency on fossil fuels, counteracting its climate mitigation goals.

Regional power trade: The 765kV line could also support cross-border power imports from other countries, including hydropower from India. The overall climate impact depends on the specific energy mix of the exporting nation.

B. Mitigating climate change impacts

(a) Improved grid efficiency

Reduced line losses: A key advantage of ultra-high voltage (UHV) lines is their ability to transmit electricity with significantly less energy loss over long distances compared to lower-voltage lines. This improved efficiency means that less power has to be generated to meet the same demand, leading to overall lower emissions.

Enhanced reliability: By building a robust transmission corridor, Bangladesh can improve the reliability of its grid, which reduces the need for backup fossil fuel generation during power failures.

(b) Potential for renewable energy integration

Renewable energy corridors: A strong, high-capacity grid is essential for integrating renewable energy sources, which are often located far from demand centers. For example, some UHV corridors are built as "Green Energy Corridors" to transport renewable energy. A 765kV line could potentially serve this purpose in the future, supporting large-scale renewable projects.

C. Policy and planning considerations

To balance Bangladesh's rapid energy demand with climate change concerns, projects like the 765kV line need to consider the following:
Source of power: The most critical factor is the origin of the electricity being transmitted. The line's impact will be significantly more positive if it primarily serves renewable energy plants rather than fossil fuel-based ones.

EIA guidelines: Bangladesh has environmental clearance procedures that require Environmental Impact Assessments (EIAs). To minimize local ecological damage, these assessments must be robust, transparent, and strictly followed.

Comprehensive mitigation: Mitigation strategies should include avoiding sensitive ecological areas, implementing biodiversity protection measures like bird diverters, and using advanced construction techniques to minimize land disturbance.

Annex-XXI: Biodiversity Management Plan

1. INTRODUCTION

1.1 Background and Purpose

Power Grid intends to construct 765kV transmission line with a project titled "Madunaghat – Moheshkhali 765kV Transmission Line". A total of 95.5-km transmission line comprises of 272 towers. The Project involves several key activities during construction and operations which have the potential to impact upon biodiversity. These include:

- Clearing of vegetation and fauna habitat;
- Planned and/or unplanned fire;
- Collisions between fauna and traffic;
- Storage and use of potentially hazardous substances;
- Introduction and/or spread of weeds (covered in the Weed Management Plan); and
- Increase in population size of native and/or non-native predators.

The Biodiversity Management Plan (BMP) has been developed to provide a clear and concise outline of the actions and methods required to mitigate likely impacts on biodiversity including:

- Procedures to be adopted during vegetation clearing during tower footing, erection and stringing, including wildlife rescue procedures;
- Weed and feral animal management; and
- Mitigation of potential impacts on rare, threatened species.

The BMP forms part of the Environmental Management Plan for the Project and is considered to be a working document. It will be updated by appointing the ESCMC and EPC Contractors before actual implementation of the project. This BMP has been prepared on the basis of biodiversity information obtained from the ESIA study.

1.2 Objectives

The objective of this BMP is to reduce the impact of the Project activities on biodiversity at and surrounding the Project through:

- Identifying the key biodiversity issues that require control measures;
- Developing strategies to manage impacts on biodiversity and implementing those strategies;
- Assigning responsibilities for impact monitoring and management;
- Providing sufficient information to assist with auditing the implementation of the BMP; and
- Establishing a biodiversity monitoring program and management measures.

1.3 Associated Management Plans

Biodiversity management refers specifically to flora (vegetation, excluding weeds) and fauna (wildlife, including native and non-native animals). In addition to this BMP, the management of biodiversity is addressed in several other sub-management plans including:

- Air and Dust Management Plan;
- Erosion and Sediment Control Plan;
- Fire Management Plan;
- Weed Management Plan;
- Waste Management Plan.

1.4 Legislation, Guidelines and Recovery and Abatement Plans

Acts, guidelines and Plans relating to the management of flora and fauna within and around the study area include:

Table 1: Acts and guidelines relating to BMP

SN	Related Applicable Legislation/ Policy	Responsible Agency
1.	**National Environmental Policy, 2018** This policy has been formulated based on the National Environmental Policy 1992 aimed to achieve Sustainable Development Goals (SDGs). The main consideration of this policy is to ensure sustainable development reducing the dependency of human on nature resources. A total of 19 sectors has been considered in this policy including environment, water, agriculture, water resources development, forest & wildlife, fisheries etc.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Department of Environment (DOE), Bangladesh
2.	**Bangladesh Environmental Court Act, 2010** Bangladesh Environment Court Act, 2010 has been enacted to resolve the disputes and establishing justice over environmental and social damage raised due to any development activities. This act allows government to take necessary legal action against any parties who creates environmental hazards/ damage to environmentally sensitive areas as well as human society. According to this act, government can take legal actions if any environmental problem occurs due to project interventions.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh
3.	**Ecologically Critical Areas (ECAs) Management Rules, 2016** The Rules provide different committee systems for the management of ECAs from the national to village level. The Rules at first provide for the establishment of a National Committee consisting of a Chairperson5 and 19 other members including academics and 2 NGO activists. The Department of Environment (DoE) provides the secretarial assistance to the National Committee. The Rules then describe responsibilities and functions of the National Committee. The National Committee plays a pivotal role in the management of ECAs. In recommending a site, the National Committee will consider existing natural conditions and biodiversity, forests, wildlife, protected areas, wetlands etc. and causes for ecological degradation, possible threats, and preventive measures for this. The Committee will also take into account livelihoods, religious and social culture of local inhabitants, and the presence of archaeological sites. The National Committee will also make recommendations regarding the generation of alternative livelihoods for the people dependent on an ECA.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Department of Environment (DoE)
4.	**National 3R Strategy for Waste Management, 2010** The 3R strategy sets the goal of waste reduction, reuse and recycling and minimizing waste disposal in open dumps, rivers, flood plains and landfills by 2015 and promotes recycling of waste through mandatory segregation of waste at source as well as creates a market for recycled products and provides incentives for recycling of wastes. It recognizes waste as a resource and advocates for segregation of waste at source, encourages emission reducing technology through private sector investment and tapping the potential of CDM provisions, promotes “polluters pay” principle as well as cleaner production and Environmental Management System (EMS), and supports the participation of the informal sectors who are engaged in the recycling of various materials.	Department of Environment (DoE)
5.	**The Forest Act (1927) (Amendment, 2000, 2018)** This Act was enacted to control trespass, illegal resources extraction from forests and to provide a framework for the forestry revenue collection system. It is the main legislative context for forestry protection and	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh

SN	Related Applicable Legislation/ Policy	Responsible Agency
	management in Bangladesh. The Act allows for the notification of forest reserves in which the government, through the Forest Department, regulates the felling, extraction and transport of forestry produce in Bangladesh.	Bangladesh Forest Department
6.	**Bangladesh Wildlife (Conservation & Security) Act, 2012 (previously known as Bangladesh Wildlife (Preservation) Order, 1973; amended as Bangladesh Wildlife (Preservation) Act 1974)** This Order aims to protect and conserve wildlife in Bangladesh. Wildlife preservation, conservation and management fall within the jurisdiction of the Forestry Department. The previous Wildlife (Preservation) Order, 1973 & Wildlife (Preservation) (Amendment) Act, 1974 have been revamped to Wildlife (Conservation & Security) Act of 2012. The Act has adopted new types of protected areas for conservation and protection of wildlife resources, created avenue for community conserved areas and also community-based management of protected areas. This Act protects 1,307 species of plants and animals under four schedules that mandates imprisonment and fines for wildlife poaching, capturing, trapping, and trading. Bangladesh Wildlife (Preservation) Order (1973) and Act (1974) regulates the hunting, killing, capture, trade and export of wildlife and wildlife products. It designates a list of protected species and game animals. Protection of wildlife is provided with lists of species within four schedules of the Order: • First Schedule - The Schedule -1 (823) represents Protected Animal (Amphibians-14, reptiles-96, birds-578, mammals-110, fishes-25) of Bangladesh which are open to shooting and may be hunted on a special hunting permit (though since 1988 no hunting permits have been issued by the Government). • Second Schedule – Schedule-2 (424) also represents Protected Animal (Amphibians-18, reptiles-58, birds-44, mammals-3, fishes-27, phylum cnidaria – class anthozoa (coral)-32, molluscs – shells and snails-137, arthropods –crustacea (crabs and lobster)-22, insect (butterflies and moths)-59, Insect – beetles-24 those species that are not to be hunted, killed or captured and CITES Specification; • Third Schedule – Schedule -3 (6) represents Vermin-6Protected animals; and • Fourth Schedule - Schedule -4 (54) represents Protected Plants-41 and Orchid-13. In addition to these, the Government of Bangladesh has declared 14 protected areas and is considering declaring more. Further, the Government of Bangladesh has recently declared seven areas as Ecologically Critical Areas under the Environmental Conservation Act (1995). These are Hakaluki Haor, Sonadia Island, St. Martin's Island, and Teknaf Peninsula (including the Cox's Bazar Sea Beach but not the buffer zones), Tanguar haor, Marjat baor and outside of Sundarbans Reserved Forest for a distance of 10 km.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Bangladesh Forest Department
7.	**Bangladesh Biodiversity Act, 2017** The Act is to ensure conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of benefits arising out of the utilization of genetic resources. This Act regulates the biodiversity conservation and sustainable use of its resources, biota and the fair and equitable share of the benefits derived from their use of and other matters. The Act focuses biodiversity and related activities undertaken and transfer restrictions, approved and rejected applications; functions of the National and Technical Committees	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh

SN	Related Applicable Legislation/ Policy	Responsible Agency
	on Biological Diversity; Biodiversity management teams, associations and sustainable uses.	Bangladesh Forest Department
8.	**National Biodiversity Strategy and Action Plan (NBSAP), 2016 – 2021** National Biodiversity Strategy and Action Plan is the basic instrument for implementing the Convention on Biological Diversity (CBD) at the national level. The plan has been prepared in order to fulfill the commitment of Bangladesh towards implementing the three objectives of Convention on Biological Diversity: conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of benefits arising out of the utilization of genetic resources. The first generation NBSAP developed in 2004 took into consideration of the issues of implementation of 2010 biodiversity targets. The updated NBSAP has been prepared in line with CBD strategic planning 2011-2020 (Aichi Biodiversity Targets), and implementation of 20 national targets, etc.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Department of Environment (DoE)
9.	**Protected Area Management Rules 2017** The rules aided by the Wildlife (Conservation and Security) Act, 2012 further stabilized the co-management approaches in the country whereby peoples' engagement and benefits are ensured. This rule guides how to manage PA and institutionalize all of the structure by involving the local government and local community. Guideline clearly delineate the roles and responsibilities, including managing ecosystem services, biodiversity conservation, project planning and budget, awareness raising activities of different committee and forum to manage and maintain the protected areas.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Bangladesh Forest Department
10.	**Intended Nationally Determined Contributions, 2015 UNFCCC** INDC sets out a number of mitigation actions that will help limit the country's GHG emissions. The INDC of Bangladesh consists of the following elements: *Mitigation contribution:* • An unconditional contribution to reduce GHG emissions by 5% from Business as Usual (BAU) levels by 2030 in the power, transport and industry sectors, based on existing resources. • A conditional 15% reduction in GHG emissions from BAU levels by 2030 in the power, transport, and industry sectors, subject to appropriate international support in the form of finance, investment, technology development and transfer, and capacity building. • A number of further mitigation actions in other sectors which it intends to achieve subject to the provision of additional international resources. *Adaptation component:* • An outline of what Bangladesh has already done on adaptation and what the next steps are, including the long-term vision for adaptation in Bangladesh and synergies with mitigation measures. *INDC implementation:* • Proposals for governance and coordination of INDC implementation and an outline of key next steps. Support for INDC implementation: • A qualitative description of Bangladesh's support needs and an outline of plans to further quantify this, along with some examples of indicative costs of taking action on mitigation and adaptation.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh
11.	**Noise Pollution (Control) Rules, 2006** According to Environmental Protection Act, 1995, the government formulated the noise pollution Rules & Regulation in 2006. This regulation recommends to keep the sound level 50dB at the quieter area from 6am until 9pm and at night 40dB, similarly, at residential area on the day of 55dB and at night 45dB, a mixed area, 60dB at day time and at night 50dB, a	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh

SN	Related Applicable Legislation/ Policy	Responsible Agency
	commercial area on the day of 70dB and at night 60dB and the industrial areas of the day 75dB and at night 70dB.	
12.	Bangladesh Water Act, 2013, and Bangladesh Water Rules, 2018 Bangladesh Water Rules, 2018 have been formulated under the Bangladesh Water Act, 2013. The key features of the Act and Rules are: • A National Water Resources Council (NWRC) to be established for implementing the provisions of the Act • A National Water Policy shall be adopted by the Council addressing the following issues: i. Purpose and sectors of water use ii. Affordability of water users iii. Actual cost of water abstraction and distribution iv. Financial ability and backwardness of water users of any group thereof v. Water demand and supply vi. Any other issues considered relevant by GoB • An Executive Committee of the Council shall be established or ensuring efficient performance of the Council. • The GoB can declare certain areas as Water Stress Areas for the protection of water sources or aquifers. • Water zone demarcation (industrial, agricultural, brackish water aquaculture and hatchery water zones) through gazette notification and issuance of protection order for efficient water management in such zones • Declaration of flood control zone and its management. • Restriction on abstraction of total water from any water source.	Water Resource Planning Organization (WARPO)
13.	**Ground Water Management Ordinance, 1985** As per the provisions as per schedule 5 of this act, no tube well shall be installed in any place without a license granted by the Union Parishad. Also, no application shall be entertained by the Union Parishad unless it is accompanied by such fee as may be prescribed under the requirements of this ordinance.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh
14.	**The National Fisheries Policy, 1999** The objectives of the fisheries policy are: • Enhancement of the fisheries production; • Poverty alleviation through creation of self-employment and improvement of socio-economic conditions of the fishermen; • Fulfilling the demand for animal protein; • Achieve economic growth through earning foreign currency by exporting fish and fisheries products; and • Maintain ecological balance, conserve biodiversity, ensure public health and provide recreational facilities. The policy broadly aims at fisheries development, regulation of aquaculture, biodiversity conservation and formulation of laws to ban the disposal of any untreated industrial effluents into the water bodies.	Ministry of Fisheries and Livestock (MoFL) Department of Fisheries (DoF)
15.	**Protection and Conservation of Fish Act, 1950 as amended through February 16, 1995** This Act was promulgated for conservation of fish in Bangladesh and their protection against indiscriminate fishing, poisoning due to industrial effluent disposal into the water, oil spills, etc.	Ministry of Environment, Forests and Climate Change (MoEFCC), Bangladesh Department of Fisheries (DoF)
16.	**National River Conservation Commission Act, 2013**	Ministry of Shipping

SN	Related Applicable Legislation/ Policy	Responsible Agency
	An Act to establish a Commission for preventing illegal occupation of rivers, pollution of water and environment, pollution of rivers caused by industrial factories, illegal constructions and various irregularities and ensuring multidimensional use of rivers for socio-economic development including restoration of the normal flow of rivers, proper maintenance thereof and making them navigable.	
17.	**Embankment and Drainage Act, 1952** The Act consolidates the laws relating to embankments and drainage providing 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 or other damage by water. The specific Sections and Articles relevant to the RMIP are mentioned below. • Section 4 (1) of the Act states that the embankment, water-course, and tow-path, earth, pathways, gates, berms and hedges of the embankments shall vest in the Government of the Authority (BWDB). • Section 56 (1) states that, person will be subject to penalty (500 taka or imprisonment… if he erects, or causes of willfully permits to be erected, any new embankment, or any existing embankment, or obstructs of diverts, or causes or willfully permits to be obstructed or diverted, any water course. • Section 15 allows for the engineer (engineer in charge of Divisional level BWDB) for constructing new embankment or enlarging, lengthening or repairing existing embankments. • The other sections of the Act give powers and access to the Government or Authority or Engineers to commence necessary Project activities, for land acquisition (through the Deputy Commissioner), and site clearing activities including removal of trees or houses (if necessary).	Ministry of Water Resources
18.	**Fire Prevention and Extinction Rules, 1961; Fire Prevention and Extinction Act, 2003 and Rules, 2014** The Fire Prevention and Extinction Act 2003 is supplemented by the Fire Prevention and Extinction Rules 2014 which enumerates that owner of the building shall have to apply for occupancy certificate of the building at the end of the construction (Rule 22). These enable the authority to inspect the building, to examine whether the owner met all the requirements of the building code for the public safety or not.	Bangladesh Fire Service and Civil Defense
19.	**Antiquities Act, 1968 and Antiquities Preservation Rules, 1986** These legislations govern 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	Ministry of Cultural Affairs

2. EXISTING CONDITIONS

The proposed power transmission line (258.90-km) and substation sites (8 nos.) are traverse over different landforms as well as different ecosystems such as agricultural land, settlements, saltpans, floodplains, canals, rivers, etc.

2.1 Ecological Survey

A rapid ecological baseline survey was undertaken in the study area to evaluate the ecological status of the area and to identify species of concern as per Red Data Book. The assessment was carried out by IIFC from March 2025 to June, 2025.

This baseline ecological assessment was conducted within and outside areas of Project site:

i. to enlist the faunal species with their national and/or international status,
ii. to enlist the floral species with their national and/or international status,
iii. to enlist keystone, rare & threatened floral and faunal species,
iv. to investigate the distribution & abundance of floral and faunal species, etc.

Generally, floral and faunal species diversity fluctuates seasonally due to the environmental reasons. Seasonal survey, spanning over a year, could provide detailed information on the existing ecological aspects of Project site and adjacent areas.

However, an ecological field survey team visited the Project site and adjacent areas to collect first-hand data on the existing floral and faunal species. The assessment was conducted primarily at daytime but continued to night time to some extent. Aural and visual search was the main survey method for ornithological study. Herpeto-faunal and mammalian study was done through visual search and also through discussion with local people and literature review. Information on fish and fisheries was collected through field study, interviewing local aged people as well as local fish market survey.

Rapid field survey and discussion with local people was the main method for floral survey. Crustacean and Molluscan diversity was assessed through checking of stock of fish & invertebrate in the boat, direct field observation within / beside the waterbodies as well as local fish market survey. Therefore, informal interviews with local people were also conducted as a part of this baseline study to learn about seasonal ecological aspects of Project site and adjacent areas. The collected data was thereafter cross-checked through literature review.

2.2 Bio-ecological Zone

IUCN, the World conservation Union, Bangladesh has divided the whole country into 25 Bio-ecological Zones in context of biological diversity, physical geography and other parameters. The proposed lines and substation locations fall inside two of these Bio-ecological zones. In which, major portion of the transmission line fall over the zone namely Coastal Islands (8a), Offshore Islands (8b) and Chattogram and the CHTs (9a) which are presented below in Table 2.

Table 2: Bio-ecological Zones of the study area

Name of Transmission Line	Length (Km)	Bio-ecological Zone	Major Ecological Features
Madunaghat – Moheshkhali 765kV	95.5	Coastal Islands	Agriculture land, Salt Land, Road, Pond, Homesteads, River, etc.
		Offshore Islands	
		Chattogram Hills and the CHTs	

Source: NWRD, 2011 and IIFC Field Survey, 2024-25

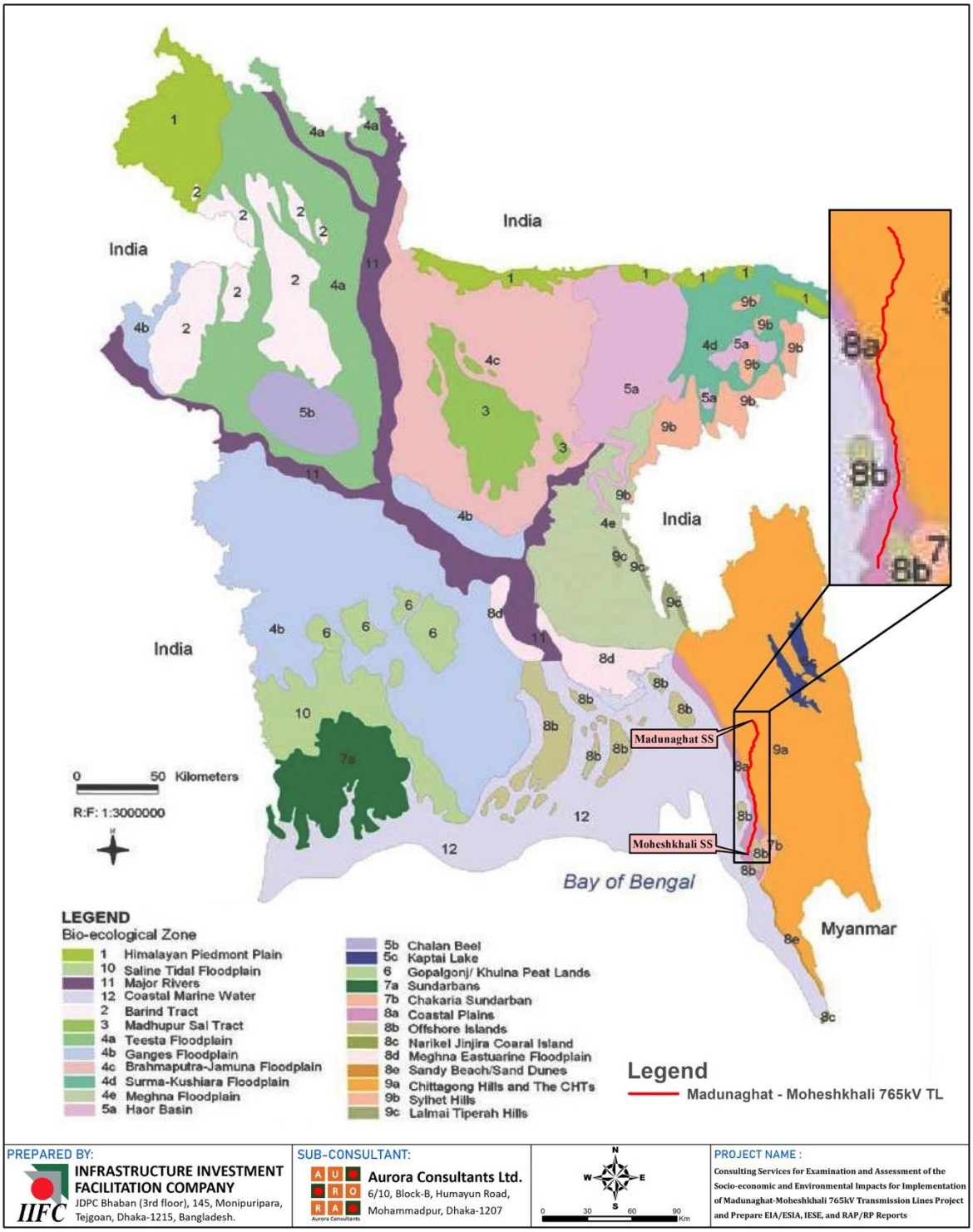

Figure 1: Bio-ecological zones in the study area

The Project will require removal of trees of various sizes and species. Tree inventory survey found varieties of trees on both private and Government land. Different species of trees are divided into three categories by height viz., big (> 10 m height), medium (5-10 m height) and small (< 5 m height). Due to the construction of 95.5 km of transmission line and considering a 90-meter Right of Way (RoW), various types of trees will be affected. These include 8,144 fruit-bearing trees, 21,178 timber trees, 86 medicinal plants, and 10,071 bamboo clumps. However, the survey identified that a total of 39,479 trees will be directly affected by the transmission line alignment.

Table 3: Total number of affected trees by type and number

Name of trees	Size			Total
	Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
(A) Fruits				
Mango	384	674	660	1718
Tetul/Tamarind	0	0	4	4
Jam/Syzygium cumini	0	0	3	3
Jackfruit	127	273	295	695
Banana	79	830	1429	2338
Guava	0	0	101	101
Coconut	457	694	500	1651
Battle leaf	315	458	638	1411
Palm tree	36	50	29	115
Boroi/Ziziphus zizyphus	0	8	4	12
Khejur/Date palm	14	13	69	96
Sub-Total (A)	1412	3000	3732	8144
(B) Timber				
Eucalyptus	745	595	589	1929
Raintree	2554	2425	1312	6291
Keora	0	4	10	14
Akashi/Acacia auriculiformis	2263	2941	2836	8040
Mahogany	1322	1376	1048	3746
Segun/Teak Tree	83	375	65	523
Koroi/Lebbeck	39	55	12	106
Babla/Gum arabic tree	20	16	0	36
Belgium Tree	129	222	122	473
Hijol Tree/Barringtonia acutangula	0	0	6	6
Shimul/Cottontrees	11	3	0	14
Sub-Total (B)	7166	8012	6000	21178
(C) Medicinial				
Nim/Azadirachta indica	0	0	10	10
Arjun/Terminalia arjuna	21	22	27	70
Ficus/Fig Tree/Dumur	0	6	0	6
Sub-Total (C)	21	28	37	86
(D) Bamboo	4,149	4,252	1,670	10,071
Total (A+B+C+D)	12,748	15,292	11,439	39,479

Source: *Tree Inventory Survey, 2025*

2.1.1 Ecosystem Diversity

Right-of-Way (RoW) of the proposed transmission lines (considered 90m for tree survey) predominantly comprises of paddy field/floodplains, saltpan, homesteads, forests, rivers, canals in order of significance. Table 4 shows crossing on transmission lines with their ecological diversity and area is presented below:

Table 4: Ecological diversity of tower area of transmission lines

Ecological Diversity	Amount of Affected Land (Acre)
Agriculture	31.27
Pond/water body	0.69
Fallow land	3.27
Homestead Garden	1.18
Salt Field	7.06
Total	**43.47**

Source: NWRD, 2011 and Field Survey, 2025,

Overall ecosystems diversity of the study area comprises of mostly cultivated economic tall plants with undergrowth wild flora. As homesteads are located comparatively in higher elevation than other landforms except hills area, so settlement/homesteads ground possesses mainly terrestrial ecological components.

Floral Diversity in the Project Area and its Surroundings

Terrestrial flora exists within the peripheral side of Project site, and most of them are planted for aesthetic and commercial purposes. Adjacent areas of Project site have remarkable number of mixed planted which are native and exotic terrestrial flora. Most of the floras are planted and have economical value to the present human society. Generally, the terrestrial floral makes a complex ecosystem in which local fauna has direct relationship through their ecological niche.

(B) Aquatic Flora

The plant species usually submerged or partially submerged/floating in the water recorded from the study area are mosquito ferns *(Azollasp),* kachuripana *(Telanthera philoxeroides),* topa pana *(Pistiastratiotes lemna spirodela),* khudipana *(Lemna paucicastata),* paniphal *(Trapa bispinosa),* tropical white morning-glory *(Ipomea alba),* esthwaite waterweed *(Hydrilla verticillata), taro (Calocasia esculenta),* globe yellowcress *(Rorippa indica),* procumbent yellow-sorrel *(Oxalis corniculata),* four-leaf clover *(Marselia spp),* lamb's quarters *(Chenopodium album),* goose weed *(Sphenoclea zeylanica)* and hornworts *(Ceratophyllumsp),* white water-lily *(Nymphaea nouchali),* red water-lily *(Nymphaea rubra).*

None of the species observed are of conservational significance.

(C) Terrestrial Flora

a) Grassland

A total 17 species belonging to 14 genera of 10 families were recorded from the study area listed in Table 5. Four (4) species of grasses were identified among them Barajavani *(Fimbristylis milliacea)* and Mutha *(Fuirena ciliaris)* were found most commonly occurring. Herbs were represented by 5 species dominated by Kapalphutki *(Cardiospermum halicacabum),* Jhaljamani *(Cocculus hirsutus),* Marmarialata *(Cissus repens)* and Banorkalai *(Atylosia scrabaeoides)* list of grassland flora of the study area.

Table 5: Distribution of Grassland Floral Species in the Study area

SN	Scientific name	Family	Local Name	Local Status	IUCN Status	Habit
1.	*Coccinia grandis*	Cucurbitaceae	Telakucha	C	LC	Wild
2.	*Ampelocissus latifolia*	Vitaceae	Angurlata	C	LC	Wild
3.	*Atylosia scrabaeoides*	Fabaceae	Banorkalai	C	LC	Wild
4.	*Canavalia gladiate*	Fabaceae	Mousim, Makhansim	C	LC	Cultivated
5.	*Cardiospermum halicacabum*	Sapindaceae	Kapalphutki	C	LC	Wild
6.	*Centrosema pubescens*	Fabaceae	Gandhya Sim	C	LC	Wild
7.	*Cissus repens*	Vitaceae	Marmarialata	C	LC	Wild
8.	*Cocculus hirsutus.*	Menispermaceae	Doipata, Jhaljamani	C	LC	Wild
9.	*Dioscorea belophylla*	Fabaceae	Sora Alu	C	LC	Wild
10.	*Ichnocarpus frutescens*	Apocynaceae	Dudhilata	C	LC	Cultivated
11.	*Ipomoea aquatica*	Convolvulaceae	Panikalmi	C	LC	Wild
12.	*Ricinus communis*	Euphorbiacreae	Venna, Reri	C	LC	Wild
13.	*Xanthosoma sagittifolium*	Araceae	Dud Kachu	VC	LC	Wild
14.	*Senna tora.*	Caesalpiniaceae	Kalkasunda	C	LC	Wild

SN	Scientific name	Family	Local Name	Local Status	IUCN Status	Habit
15.	*Fimbristylis dichotoma subsp podocarpa Koyama*	Cyperaceae	Nirbishi	C	LC	Wild
16.	*Fimbristylis milliacea*	Cyperaceae	Barajavani	C	LC	Wild
17.	*Fuirena ciliaris*	Cyperaceae	Mutha	C	LC	Wild

Note: Local status: VC=Very Common, C=Common; IUCN status: LC=Least Concerns

b) Common Plant of the Study Area

A total of 53 species, 48 genera belongs to 31 families were represented by terrestrial flora. Mahagoni *(Swietenia mahagoni)* tree species is endangered as per classification. The groves that surround the village homesteads, represent various types of commonly planted trees. These are mango *(Mangifera indica),* jackfruit *(Artocarpus heterophyllus),* kalojam *(Syzygium cumini),* betelnut pulm *(Areca catechu),* coconut palm *(Cocos nucifera),* guava *(Psidium guajava),* jambura *(Citrus decumana),* mandar *(Erythrina veriegata),* kadam *(Anthocephalus cadamba),* sheel koroi *(Albizzia procera),* sajna *(Moringa obifera),* dalim *(Punica granatum),* palash *(Butea monosperna,)* etc. Common way side trees are tetul *(Tamaraindus indica),* neem *(Azadirachta indica),* hijol *(Barringtonia acutangula),* banyan *(Ficus bengalensis),* ashatha *(Ficus religlosa),* raintree *(Samania saman),* pitraj *(Aphanamixls polystachia),* shimul *(Bobbax ceiba),* krishnachura *(Delonix regia),* debdaru *(Polyalathia longifolia),* etc. The terrestrial floras have been divided into three terrestrial floral habit viz. tree, herb and shrub. A list of terrestrial floral species as noted during the survey undertaken by Aurora Consultants has been provided in Table 6.

Table 6: Distribution of Common Plant Species in the Study Area

SN	Scientific Name	Family	Local Name	Habit	Local Status	IUCN Status	Type
1.	*Polyalthia longifolia*	Annonaceae	Debdaru	T	S	LC	Cultivated
2.	*Gmelina arborea L.*	Verbenaceae	Gamari	T	S	LC	Cultivated
3.	*Eucalyptus citriodora Hook*	Myrtaceae	Eucalyptus	T	S	LC	Cultivated
4.	*Erythrina ovalifolia Roxb.*	Caesalpiniaceae	Mander, Patiyamander	T	S	LC	Wild
5.	*Dillenia indica L.*	Dilleniaceae	Chalta	T	S	LC	Wild
6.	*Areca catechu L.*	Mimosaceae	Supari, Gua	T	S	LC	Cultivated
7.	*Hibiscus rosa-sinensis*	Malvaceae	Joba	S	S	LC	Cultivated
8.	*Cestrum nocturnum L.*	Solanaceae	Hasnahena	S	S	LC	Cultivated
9.	*Corchorus aestuans L.*	Tiliaceae	Banpat	H	S	LC	Wild
10.	*Mimusops elengi*	Sapotaceae	Bakul	T	R	LC	Cultivated
11.	*Delonix regia*	Caesalpiniaceae	Krisnochura	T	R	LC	Cultivated
12.	*Lawsonia inermis*	Lythraceae	Mehede	S	R	LC	Cultivated
13.	*Gardenia coronaria*	Rubiaceae	Gandhyaraj	S	R	LC	Cultivated
14.	*Paederia foetida*	Rubiaceae	Gandhyabhaduli	C	R	LC	Cultivated
15.	*Ziziphus Mauritian*	Rhamnaceae	Kul, Boroi	T	C	LC	Cultivated
16.	*Terminalia arjuna*	Combretaceae	Arjun	T	C	LC	Cultivated
17.	*Tamarindus indica.*	Caesalpiniaceae	Tetul	T	C	LC	Cultivated
18.	*Syzygium cumini (L.) Skeels*	Myrtaceae	Jam	T	C	LC	Cultivated
19.	*Coccinia grandis*	Cucurbitaceae	Telakucha	C	C	LC	Wild
20.	*Lablab purpureus*	Fabaceae	Shim	C	C	LC	Cultivated

SN	Scientific Name	Family	Local Name	Habit	Local Status	IUCN Status	Type
21.	*Lageneria siceraria*	Cucurbitaceae	Kadu	C	C	LC	Cultivated
22.	*Alocasia indica*	Araceae	Mankachu	H	C	LC	Wild
23.	*Colocasia esculenta*	Araceae	Bankachu	H	C	LC	Wild
24.	*Cynodon dactylon*	Poaceae	Durba	H	C	LC	Wild
25.	*Musa paradisica*	Mussaceae	Kachkola	H	C	LC	Cultivated
26.	*Carica papaya*	Caricaceae	Pape	S	C	LC	Cultivated
27.	*Sesbania canabina*	Fabaceae	Dhoincha	S	C	LC	Cultivated
28.	*Phyllanthus acidus*	Euphorbiaceae	Arboroi	ST	C	LC	Cultivated
29.	*Psidium guajava*	Myrtaceae	Peyara	ST	C	LC	Cultivated
30.	*Aegle marmelos*	Rutaceae	Bel	T	C	LC	Cultivated
31.	*Albizia procera*	Mimosaceae	Silkoroi	T	C	LC	Cultivated
32.	*Annona squamosa*	Annonaceae	Ata	T	C	LC	Cultivated
33.	*Aphanamixis polystachya*	Meliaceae	Roina	T	C	LC	Wild
34.	*Artocarpus heterophyllus*	Moraceae	Kathal	T	C	LC	Cultivated
35.	*Azadirachta indica*	Meliaceae	Neem	T	C	LC	Cultivated
36.	*Bambusa balcooa*	Poaceae	Barakbans	T	C	LC	Cultivated
37.	*Barringtonia acutangula*	Lecythidaceae	Hijal	T	C	LC	Cultivated
38.	*Bombax ceiba*	Bombaceae	Shimul Tula	T	C	LC	Wild
39.	*Borassus flabellifer*	Palmae	Tal	T	C	LC	Wild
40.	*Citrus grandis*	Rutaceae	Jambura	T	C	LC	Cultivated
41.	*Cocos nucifera*	Arecaceae	Narikel	T	C	LC	Cultivated
42.	*Feronia lemonia*	Rutaceae	Kadbel	T	C	LC	Cultivated
43.	*Litchi chinensis*	Sapindaceae	Lichu	T	C	LC	Cultivated
44.	*Litsea monopetala*	Lauraceae	Menda	T	C	LC	Wild
45.	*Moringa oleifera.*	Moringaceae	Sajna	T	C	LC	Wild
46.	*Neolamarckia cadamba.*	Rubiaceae	Kadam	T	C	LC	Wild
47.	*Phoenix sylvestris.*	Arecaceae	Khejur	T	C	LC	Cultivated
48.	*Phyllanthus embelica.*	Euphorbiaceae	Amloki	T	C	LC	Cultivated
49.	*Samanea saman.*	Mimosaceae	Rain Tree, Meghsirish	T	C	LC	Cultivated
50.	*Streblus asper*	Moraceae	Sheora	T	C	LC	Wild
51.	*Switenia mahogani*	Meliaceae	Mahogani	T	C	LC	Cultivated
52.	*Acacia nilotica*	Fabaceae	Acasia	T	C	LC	Wild
53.	*Casia siamea*	Fabaceae	Cassia tree	T	C	LC	Wild

Note:
Habit: T=Tree, S=Shrub, H=Herb, C=Cultivable
Local status: S=Sporadic, C=Common, R=Rare,
IUCN status: LC=Least Concerns

c) Agricultural Land

Mono-cropping agricultural pattern of paddy is pre-dominant in the area. Extensive areas throughout the flood plain are occupied by broad ridges on which rather yellowish, friable, silt loams and silty clay loams predominate. Some of those have dark grey top soils. Top soils are acid when dry, but slightly alkaline when flooded; subsoils are moderately alkaline, but non-calcareous. In the southern half of Narayanganj district there are extensive deep basins which have dark grey compact clays with moderately alkaline subsoils usually overlying a yellowish, more loamy substratum. Flooding depths are mainly less than 5 feet in the east but increases to 10 feet in west.

Moisture is retained well in the dry season except where the soils overlie sand at a shallow depth, as frequently happen in the northern half of Narayanganj district. Where they are deep, these are excellent soils, producing good crops of jute, aus, transplanted and broadcast aman as well as rabi crops in some areas. On the highest platforms, banana, betel leaf, sugarcane and vegetables are major crops, together with aus, jute and transplanted aman. On lower platforms the latter are major crops in the monsoon season and vegetables in the dry season.

Among rice crops boro covers the largest area followed by aman and aus. Other crops include wheat, potato, pulses, sweet potato, spices, cheena, kaun, etc.

It is envisaged that agricultural land would not be falling within Project site.

Implication

The Plant site is devoid of any vegetation cover as it was first established in 1987. The Project will not require any sand filling, and clearance of vegetation as part of pre-construction activities. During operation phase of the Project the impact on ecology of the area will be mainly because of the generation of bit NO_x by the Plant. Other potential impacts and its mitigation measures due to construction activities on the ecological resources of the study area are discussed in following Section of the Report.

2.1.2 Aquatic Survey

Aquatic survey of different River and ponds was carried out to appraise and enlist the present status of Phytoplankton, Zooplanktons, Insect fauna, Molluscs and Fish species found in and around the proposed Project site. The approach to the Aquatic survey involved collecting, processing, and analyzing Aquatic organisms to determine the health of the biological community.

a) Macro-invertebrate Fauna

Macro-invertebrate surveys were conducted on December, 2021. Macro invertebrate species such as water spiders *(Argyroneta aquatic),* Common Apple snail *(Pila globosa),* Disk Snail *(Macrochlamys sequax),* River Snail *(Bellamya begalensis),* Brotia Snail *(Brotia costula),* Lymneid Snail *(Lymnaea luteola),* Fresh water Mussels species such as *(Lamellidens corrianus), (Lamellidens marginalis), (Lamellidens jenkinsianus)* were observed in the study area.

None of the species observed are of conservational significance.

b) Aquatic Fauna (Fish)

In order to get secondary information as well as various literatures review found some data information on the specific floodplain of the Project area. The Karnaphuli and Sangu River is interconnected with Bay of Bengal. Fish species are generally found more during rainy season compared to dry due to contamination of water as discussed earlier. However, 31 species of 25 genera belonging to 17 families are reported from the pond and river. Among of them 4 species are in endangered and 2 species are vulnerable and 3 are near threatened according to the Red list of IUCN (2015, Vol.3).

Table 7: Distribution of Fish Species in the Study Area

SN	Local name	Common name	Scientific name	Family	IUCN Status
1.	Koi	Climbing perch	*Anabus testudines*	Anabantidae	LC
2.	Chela	Large Razorbelly Minnow	*Salmophasia bacaila*	Cyprinidae	LC
3.	Katol	Catla	*Catla catla*	Cyprinidae	LC

SN	Local name	Common name	Scientific name	Family	IUCN Status
4.	Boal	Freshwater Shark	*Wallago attu*	Siluridae	VU
5.	Rui	Ruhu	*Labeo rohita*	Cyprinidae	LC
6.	Tengra	Striped Dwarf Catfish	*Mystus vittaus*	Bagridae	LC
7.	Shing	Stinging Catfish	*Heteropneustes fossilis*	Heteropneustidae	LC
8.	Shol	Snakehead Murre	*Channa striatas*	Channidae	LC
9.	Taki	Spotted Snakehead	*Channa punctata*	Channidae	LC
10.	Bele	Bele	*Glossogobius giuris*	Gobiidae	LC
11.	Kakila	Silver Needle Fish	*Xenentodon cancila*	Belonidae	LC
12.	Mola	Mola Carplet	*Amblypharyngodon mola*	Cyprinidae	LC
13.	Chela	Large Razorbelly Minnow	*Salmophasia bacaila*	Cyprinidae	LC
14.	Bata	Bata Labeo	*Labeo bata*	Cyprinidae	LC
15.	Jat Punti	Spotfn Swamp Barb	*Puntius sophore*	Cyprinidae	LC
16.	Khailsha	Banded Gouram	*Trichogaster fasciata*	Osphronemidae	LC
17.	Gulsha	Bleeker's Mystus	*Mystus bleekeri*	Bagridae	LC
18.	Tengra	Striped Dwarf Catfsh	*Mystus vittatus*	Bagridae	LC
19.	Magur	Walking Catfsh	*Clarias batrachus*	Clariidae	LC
20.	Bacha	Batchwa Vacha	*Eutropiichthys vacha*	Schilbeidae	LC
21.	Potka	Ocellated Pufferfsh	*Tetraodon cutcutia*	Tetraodontidae	LC
22.	Choto Tengra	Tengara Catfsh	*Mystus tengara*	Bagridae	LC
23.	Mrigal	Mrigal Carp	*Cirrhinus cirrhosus*	Cyprinidae	NT
24.	Tatkini	Reba	*Cirrhinus reba*	Cyprinidae	NT
25.	Silver carp	Silver carp	*Hypophthalmichthys molitrix*	Cyprinidae	NT
26.	Grass carp	Grass carp	*Ctenopharyngodon idella*	Cyprinidae	DD
27.	Olive barb	Sar punti	*Systomus sarana*	Cyprinidae	LC

Data source: Study team using IUCN classification System
IUCN Status Code: EN - Endangered, VU - Vulnerable, LC - Least Concern, DD- Data Deficient, NT-Near Threatened

c) Terrestrial Fauna

Mammals

Nine species of terrestrial mammals belonging to the 8 genera of 6 families were recorded to occur in wild in the Project. Golden Jackal *(Canis aureus),* Bengal Fox *(Vulpes bengalensis)* and Indian Gray Mongoose *(Herpestes edwardsii)* were seen in the study area. Jungle Cat *(Felis chaus)* was reported to be seen by locals during field consultations in agricultural and homestead plantation areas. None of the species are reported to be listed in RED category of IUCN 2015 V2. However, Indian Gray Mongoose *(Herpestes edwardsii),* Jungle Cat *(Felis chaus)* and Asian House Shrew *(Suncus murinus)* are reported to be listed in Bangladesh Wildlife Prevention Order, 1973 as Schedule-III which protects them from hunting, killing and capturing.

Table 8: Distribution of Mammals found in the Study Area

SN	Local Name	Common Name	Scientific Name	Family	IUCN Status
1.	Khet-indur	Lesser Bandicoot Rat	Bandicota bengalensis	Muridae	LC
2.	Dhari Indur	Large Bandicoot Rat	Bandicota indica	Muridae	LC
3.	Nengti Indur	House Mouse	Mus musculus	Muridae	LC
4.	Chucho	House Shrew	Suncus murinus	Soricidae	LC
5.	Chamchika	Indian Pipistrelle	Pipistrellus coromandra	Vespertilionidae	LC
6.	Boro Beji	Common Mongoose	Herpestes edwardsii	Herpestidae	LC
7.	Khek Shial	Bengal Fox	Vulpes bengalensis	Canidae	VU
8.	Ban Biral	Jungle Cat	Felis chaus	Felidae	NT

SN	Local Name	Common Name	Scientific Name	Family	IUCN Status
9.	Pati Shial	Golden Jackal	Canis aureus	Canidae	LC

Data source: Study team using IUCN classification System
IUCN Status Code: EN - Endangered, VU - Vulnerable, LC - Least Concern, NT-Near Threatened

Avifauna

A total of 43 species belonging to 37 genera of 27 families were observed to be in the study area during field survey by ecology team. These species are present in variety of habitats from grassland, homestead plantation, agriculture plantation and aquatic habitat. The list of species is included in in the following table. Out of these 43 species, Red Vented Bulbul *(Pycnonotus cafer),* Black Drongo *(Dicrurus macrocercus),* Oriental Magpie Robin *(Copsychus saularis),* Spotted Dove *(Streptopelia chinensis),* Black Kite *(Milvus migrans),* Large Billed Crow *(Corvus macrorhynchos),* Rufous Treepie *(Dendrocitta vagabunda),* Indian Roller *(Coracias benghalensis),* Common Hoopee *(Upupa epops),* Black Rumped Flameback *(Dinopium benghalense),* White Throated Kingfisher *(Halcyon smyrnensis),* Pied Kingfisher *(Ceryle rudis),* Fulvus breasted Woodpecker *(Dendrocopos macei),* Shikra *(Accipiter badius),* White Wagtail *(Motacilla flava),* Red Wattled Lapwing *(Vanellus indicus),* Asian Koel *(Eudynamys scolopacea),* Rock Pigeon *(Columbam livia),* Common Myna *(Acridotheres tristis),* Jungle Myna *(Acridotheres grandis)* and Green Bee eater *(Merops orientalis)* are reported to be listed in Bangladesh Wildlife Prevention Order, 1973 as Schedule-III which protects them from hunting, killing and capture.

The proposed Project site has many harbors species such as Red vented bulbul, Red Watted Lapwing, Black Kite, Black Drongo, Rock Pigeon, Long–tailed Shrike and Common Myna. These species are common in the area and sufficient habitats are available within area once the construction and operation activities are commenced. None of the species were listed as threatened as per IUCN classification. There are no migratory birds and/or Important Bird Area (IBA) in the study area.

Table 9: Distribution of Birds in the Study Area

SN	Local name	Common name	Scientific name	Family	IUCN status
1.	Bangla Kaththokra	Lesser Goldenback	*Dinopium benghalense*	Alcedinidae	LC
2.	Shobuj Tia	Rose-ringed Parakeet	*Psittacula krameri*	Psittacidae	LC
3.	Halde Pakhi	Black-hooded Oriole	*Oriolus xanthornus*	Oriolidae	LC
4.	Kala Fingey	Black Drongo	*Dicrurus macrocercus*	Dicruridae	LC
5.	Pati Kak	House Crow	*Corvus splendens*	Corvidae	LC
6.	Dar Kak	Jungle Crow	*Corvus levaillanti*	Corvidae	LC
7.	Bangla Bulbul	Red-vented Bulbu	*Pycnonotus cafe*	Pycnonotidae	LC
8.	Pati Tuntuni	Common Tailorbird	*Orthotomus sutorius*	Sylviidae	LC
9.	Dhani Futki	Paddyfeld Warbler	*Acrocephalus agricola*	Sylviidae	LC
10.	Gobrey Shalik	Pied Myna	*Sturnus contra*	Sturnidae	LC
11.	Jhuti Shalik	Jungle Myna	*Acridotheres fuscus*	Sturnidae	LC
12.	Bhat Shalik	Common Myna	*Acridotheres tristis*	Sturnidae	LC
13.	Doel	Oriental Magpie Robin	*Copsychus saularis*	Muscicapidae	LC
14.	Chorui	House Sparrow	*Passer domesticus*	Passeridae	LC
15.	Gecho Chorui	Tree Sparrow	*Passer montanus*	Passeridae	LC
16.	Dhani Tulika	Paddyfeld Pipit	*Anthus rufulus*	Motacillidae	LC
17.	Tila Ghughu	Eastern Spotted Dove	*Spilopelia chinensis*	Columbidae	LC
18.	Nilmatha Hash	Mallard	*Anas platyrhynchos*	Anatidae	LC

SN	Local name	Common name	Scientific name	Family	IUCN status
19.	Metey Rajhash,	Greylag goose	*Anser anser*	Anatidae	NT
20.	Himaloee Kaththokra	Himalayan Flameback	*Dinopium shorii*	Picidae	DD
21.	Bada Satarey	Marsh Babble	*Pellorneum palustre*	Timaliidae	DD
22.	Holdebook Chotok	Yellow breasted Bunting	*Emberiza aureola*	Emberizidae	VU
23.	Dhub Boga	Little Egret	*Egretta garzetta*	Ardeidae	LC
24.	Boro Pankouri	Great Cormorant	*Phalacrocorax carbo*	Phalacrocoracidae	LC
25.	Desi Pankouri	Indian Cormoran	*Phalacrocorax fuscicollis*	Ardeidae	LC
26.	Chhoto pankouri	Little Cormorant	*Microcarbo niger*	Phalacrocoracidae	LC
27.	Lal pa Dhenga	Black-winged Stilt	*Himantopus himantopus*	Recurvirostridae	LC
28.	Proshanto Sonajiria	Pacifc Golden Plover	*Pluvialis fulva*	Charadriidae	LC
29.	Utturey Titi	Northern Lapwing	*Vanellus vanellus*	Charadriidae	LC
30.	Pati Batan	Common Sandpiper	*Actitis hypoleucos*	Scolopacidae	LC
31.	Bon Batan	Wood Sandpiper	*Tringa glareola*	Scolopacidae	LC
32.	Khoiramatha Gangchil	Brown-headed Gull	*Larus brunnicephalus*	Laridae	LC
33.	Choto Panchi	Little Tern	*Sterna albifrons*	Laridae	LC
34.	Katua Chil	Black-winged Kite	*Elanus caeruleus*	Accipitridae	LC
35.	Teela Eagle	Crested Serpent Eagle	*Spilornis cheela*	Accipitridae	LC
36.	Pati Shikre	Shikra	*Accipiter badius*	Accipitridae	LC
37.	Bhubon Chil	Black Kite	*Milvus migrans*	Accipitridae	LC
38.	Shobuj Shuichora	Green Bee-eater	*Merops orientalis*	Meropidae	LC
39.	Nilkan Machranga	Blue-eared Kingfsher	*Alcedo meninting*	Alcedinidae	LC
40.	Chhoto Maachranga	Common Kingfsher	*Alcedo atthis*	Alcedinidae	LC
41.	Lal Machranga	Ruddy Kingfshe	*Halcyon coromanda*	Alcedinidae	LC
42.	Meghou Machranga	Stork-billed Kingfsher	*Pelargopsis capensis*	Halcyonida	LC
43.	Dholagola Maachranga	White-throated Kingfsher	*Halcyon smyrnensis*	Halcyonidae	LC

Data source: Study team using IUCN classification System
IUCN Status Code: VU - Vulnerable, LC - Least Concern, DD- Data Deficient, NT-Near Threatened

Herpeto-Fauna

Nineteen (19) species belonging to 17 genera of 14 families are reported from the area. Out of these House Lizard *(Hemidactylus flaviviridis),* Indian Rat Snake *(Ptyas mucosa)* and Checkered Keelback *(Xenochropis piscator)* were observed by ecology team. Rests of the reptilian fauna were reported to be observed by locals during field consultations in the villages of Project area. Among the 9, Bengal Monitor *(Varanus benghalensis*) and Spotted Flapshell Turtle *(Lissemys punctata)* are reported to be listed in Bangladesh Wildlife Prevention Order,1973 as Schedule-III which protects them from hunting, killing and capturing.

Table 10: Distribution of Herpeto Fauna in the Study Area

SN	Local name	Common name	Scientific name	Family	IUCN Status
1.	Dhora Shap	Checkered Keelback	*Xenochrophis piscator*	Natricidae	LC
2.	Shangkhini	Banded Krait	*Bungarus fasciatus*	Elapidae	LC
3.	Paina Shap	Common Smooth- scaled Water Snake	*Enhydris enhydris*	Homalopsidae	LC
4.	Baro Dumukha Shap	Diard's Blindsnake	*Argyrophis diardii*	Typhlopidae	LC
5.	Laodoga Shap	Vine Snake	*Ahaetulla nasuta*	Colubridae	LC
6.	Darash Shap	Indian Rat Snake	*Ptyas mucosa*	Colubridae	LC
7.	Gui shap	Bengal Monitor	*Varanusbengalensis*	Varanidae	NT
8.	Sona gui	Yellow Monitor	*Varanusflavescens*	Varanidae	NT
9.	Roktochosa	Common Garden Lizard	*Calotes versicolor*	Agamidae	LC
10.	Tiktiki	House Lizard	*Hemidactylus flaviviridis*	Gekkonidae	LC
11.		Roofed Turtle	*Pangshuratecta*	Geoemydida	LC
12.	Shundhi Kasim	Spotted Flapshell Turtle	*Lissemyspunctata*	Trionychidae	LC
13.	Tokkhak	Tokay Gecko	*Gekko gecko*	Gekkonidae	LC
14.	Dhum Kachchim	Brown Soft shell Turtle	*Nilssoniahurum*	Trionychidae	LC
15.	Sona Bang	Indian Bullfrog	*Hoplobatrachus tigerinus*	Dicroglossidae	LC
16.	Sobuj Dhani Bang	Two-striped Grass Frog	*Hylarana taipehensis*	Ranidae	LC
17.	Shobuj Bang	Green Frog	*Euphlyctishexadactylus*	Dicroglossidae	LC
18.	Kuno Bang	Asian Common Toad	*Duttaphrynus melanostictus*	Bufonidae	LC
19.	Kotkoti Bang	Skipper Frog	*Euphlyctis cyanophlyctis*	Dicroglossidae	LC

Data source: Study team using IUCN classification System
IUCN Status Code: LC - Least Concern, DD- Data Deficient, NT-Near Threatened

2.3 Ecologically Important Sites

Protected Area (PA)

An area of land and/or ocean especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means is referred to as "Protected Area (PA)". Such an area is predominantly a natural area established and manage (d in perpetuity, through legal or customary regimes, primarily to conserve their natural resources. No PA exists at or near the TLs.

National Park (NP)

A National Park (NP) is a reserve land, usually declared and owned by a national government, protected from most human development activities and pollution. No NP exists at or near the TLs.

Game Reserve (GR)

A Game Reserve (GR) is an area of land set aside for maintenance of wildlife for tourism or hunting purposes. No GR exists at or near the TLs.

Wildlife Sanctuary (WS)

A Wildlife Sanctuary (WS) is an area that assures the natural conditions necessary to protect nationally significant species, groups of species, biotic communities, or physical aspects of the environment where these require specific human manipulation for their perpetuation. No WS exists at or near the TLs. However, Chunati WS is located about 2-3 km east from the TLs.

3. Biodiversity Management

3.1 Approach

The general approach for management of biodiversity before, during and after Project construction and operations is as follows:

- **Key Activities, Risks and Impacts:** A summary of the key activities being undertaken during the management period. The potential environmental impacts and residual risk levels are identified for each environmental aspect.
- **Objective:** The guiding environmental management objective(s) and activities that apply to the element.
- **Mitigation Measures:** The procedures to be employed to ensure that the relevant objectives are met.
- **Trigger, Action, Response Plan (TARP)**. The actions to be implemented in the case of non- compliance. This includes strategies of remediation and the person(s) responsible for the actions.

3.2 Key Activities, Risks and Impacts

The key activities and potential impacts to biodiversity are provided in Table 11. The residual risk level identified is the risk remaining once management and mitigation measures are implemented. The risk matrix is provided in Appendix-3.

Table 11: Key Activities, Risk and Impact

Activities	Potential Environmental Impact		Residual Risk		
			Consequence	Likelihood	Risk
Clearing of habitat	• Killing/injuring fauna; • Displacement of fauna; • Disruption to nesting/roosting/ foraging habitats and/or behaviour; • Reduction of area of fauna habitat available; • Habitat fragmentation and edge effects; • Creation of barriers to movement; • Creation of corridors and conduits for detrimental species' movement or invasion (e.g., predators accessing new areas); • Increase in dust; • Erosion and sedimentation resulting from disturbed soils; • Degradation of surface water quality due to erosion of soils and landforms; • Increased weed establishment; and • Increased use of the area by non-native predators, by creation of access tracks into new areas.	Potentially all species in all habitats	Insignificant	Unlikely	Low
Dust-generating activities (e.g., habitat clearing, drilling, excavation, haulage and movement of vehicles, handling of materials)	• Dust deposition on vegetation leading to sub-optimal foraging; and • Dust deposition/sedimentation in waterways leading to degradation of surface water quality	Potentially all species in all habitats	Insignificant	Rare	Low
Activities generating noise and vibration (e.g., habitat clearing, drilling, excavation, haulage and movement of vehicles, handling of materials)	• Displacement of fauna; and • Disruption to nesting/roosting/foraging behaviour.	Potentially all species in all habitats	Insignificant	Rare	Low
Use of temporary lighting	• Local displacement of fauna (i.e., fauna move away from lit areas); • Attraction of and enhanced mortality of	Potentially all species in all habitats	Insignificant	Rare	Low

Activities	Potential Environmental Impact		Residual Risk		
			Consequence	Likelihood	Risk
	insects; • Increased susceptibility of fauna to predation; • Disruption to nesting/roosting behaviour; • Disorientation of nocturnal birds and bats; • Alteration of bird calling behaviour; • Attraction, disorientation and altered breeding behaviour of amphibians; and • Altered activity rhythms (e.g., small mammals).				
Activities that could start an unplanned wildfire	• Killing/injuring fauna; • Displacement of fauna; • Disruption to nesting/roosting/foraging habitats and/or behaviour; • Reduction of area of fauna habitat locally and/or regionally; • Habitat fragmentation; • Subsequent erosion and sedimentation resulting from loss of vegetation; and • Degradation of surface water quality due to erosion of soils and landforms.	All species in all habitats	Moderate	Unlikely	Medium
Habitat rehabilitation	• Inappropriate rehabilitation could lead to the introduction and/or spread of weeds, leading to: • Local decline in habitat quality; • Displacement of fauna from habitats as habitat quality deteriorates; • Invasion of fauna species that are attracted to the weed species (e.g., cattle grass); and • Changes in fuel load, resulting in changes to fire frequency and intensity.	Potentially all species in all habitats.	Minor	Unlikely	Low
Refuse/garbage management and storage	• Inappropriate/inadequate refuse/garbage management could lead to increases in populations of vermin leading to: • Increases in the local populations of predators leading to increased predation pressure on native fauna; and • Increased competition with aggressive and	Potentially all species in all habitats	Moderate	Unlikely	Medium

Activities	Potential Environmental Impact		Residual Risk		
			Consequence	Likelihood	Risk
	dominating vermin				
Construction of Transmission Lines and Substations	• Habitat fragmentation; • Creation of barriers to movement; • Creation of corridors and conduits for detrimental species' movement or invasion (e.g., predators accessing new areas); • Erosion and sedimentation resulting from disturbed soils; • Alteration to surface water flows; • Contamination of surface water bodies; • Degradation of surface water quality due to erosion of soils and landforms; and • Increased weed establishment.	All species, but to a minor degree.	Insignificant	Unlikely	Low
Storage of contaminated water (e.g., tailings)	• Poisoning of fauna from drinking contaminated water, leading to: • Killing/harming fauna; • Disruption of breeding success; and • Knock-on effects, by attracting predators/scavengers to ill/dead fauna.	All species, but to a minor degree.	Insignificant	Rare	Low
Activities impacting on the water table or surface water	• Lowering or contamination of the water table, leading to: • Decline in availability of riparian vegetation resulting in loss of habitat for riparian species; • Shorter inundation period in waterbodies; • Impacts on vegetation that rely on groundwater or surface water flows, leading to reduction in available fauna habitat; • Contamination of ephemeral waterways resulting in impacts on ecosystem health; • Unnatural inundation of fauna habitats; • Progressive water table drawdown from unsustainable groundwater extraction rates from the Southern Basins Bore field; and	Potentially all species, but to a minor degree.	Insignificant	Rare	Low
	Alteration of surface water flows, leading to:				
	• Increased erosion and sedimentation; • Detrimental changes in turbidity; • Detrimental changes in water chemistry;				

Activities	Potential Environmental Impact		Residual Risk		
			Consequence	Likelihood	Risk
	• Altered hydrology and hydroperiod; and • Contamination of surface water sources.				
Haulage and movement of vehicles	• Injury and death from collisions with vehicles; • Subsequent breeding failure caused by death of naïve young fauna, or adult fauna that have dependent offspring; • Potential spills of chemicals or pollutants, including toxic contaminants; and • Dust and Noise.	Vehicle movements	Minor	Unlikely	Low

3.3 Objective

Biodiversity management objectives have been established and are detailed in Table 12.

Table 12: Biodiversity Management Objectives

Objective	Target	Indicator
Establish and maintain awareness and importance of protecting biodiversity across the Project.	All onsite personnel (including Contractors) to undertake site induction which will include a summary of the Project biodiversity.	Percentage of personnel who completed the site induction.
Minimize the extents of vegetation clearance and undertake in accordance with the Ground Disturbance Permit system.	Zero incidents of clearing outside Project footprint and approved borrow pit locations.	Number of incidents of clearing outside of approved clearance areas.
Minimize injury or death to native fauna from Project activities.	All vehicles to adhere to establish Project speed limits. Zero incidents of native fauna injury or death from Project activities. Implement system for the management of injured and dead fauna.	Number of incidents involving native fauna injury or death from Project activities. Management of injured and dead wildlife system in place.
Implement Pest Monitoring Plan	No change in the feral population and no more than a 50% increase in the dingo population.	Percentage increase in population sizes
Undertake population Monitoring for threatened species habitats.	Below moderate change for habitats threatened species.	Percent decrease in population sizes.

3.4 Mitigation Measures

Mitigation measures have been developed to minimize potential impacts associated with biodiversity. The mitigation measures, appropriate timing and assignment of responsibilities are provided in Table 13.

Table 13: Mitigation Measures

Sl No.	Mitigation Measures	Purpose/Objective	Timing	Responsibility
General – for all activities at all times				
1.	Site induction will include the following components for biodiversity management: Summary of biodiversity at the Project including ecologically sensitive areas and threatened fauna; Identification of potential impacts to biodiversity from the Project activities; Requirement to enter and exit site through recognized vehicle access points, and to travel around site using existing/approved roads and tracks only; Requirement for speed restrictions across the Project; and No work to be undertaken without an approved Ground Disturbance Permit.	Raise awareness of threats to biodiversity; Educate personnel on ways to avoid impacts; and Educate personnel on procedure to follow in the event of vehicle injuring or killing fauna.	Prior to work commencing	ESCMC/EPC Contractor
2.	No work undertaken within 200 m of the Great Desert Skink warren recorded within the Borefield.	Avoid known habitat for EPBC listed reptile.	At all times	ESCMC/EPC Contractor
3.	Implement all aspects of the Environmental Management Plan including the following sub-plans: Air and Dust Management Plan; Erosion and Sediment Control Plan; Fire Management Plan; Weed/Vegetation Management Plan;	-	At all times	ESCMC/EPC Contractor
4.	Seal/cover open holes, pits, trenches (e.g., monitoring bores, production wells, exploration bores) when not manned to prevent ground-dwelling fauna from falling in.	Reduce impacts on fauna.	At all times	ESCMC/EPC Contractor
Clearing of vegetation				
5.	Prior to clearing a Ground Disturbance Permit is required to be issued by the HSEC Manager (Appendix B).	Obtain authorization.	Prior to clearing	ESCMC/EPC Contractor
6.	Use previously disturbed areas before clearing vegetation from undisturbed areas.	Minimize new clearing of habitat.	At all times	ESCMC/EPC Contractor
7.	Minimize ground disturbance at all locations and specifically at/near riparian zones.	Minimize dust, erosion, sedimentation, habitat loss.	At all times	ESCMC/EPC Contractor
8.	Maximum clearing easements for haul roads and access roads will be complied with.	Minimize habitat loss.	Road construction	ESCMC/EPC Contractor

Sl No.	Mitigation Measures	Purpose/Objective	Timing	Responsibility
9.	Consider applying a cool, well-managed fuel-reduction burn to all habitats to be cleared (but not beyond), to encourage fauna to flee prior to clearing. The specifics of fuel-reduction burn to be determined in consultation with relevant stakeholders prior to fire being lit.	Reduce impacts on fauna.	Prior to clearing	ESCMC/EPC Contractor
10.	Qualified ecologist will be present during clearing of the Bore field where mulgara burrows have been mapped, to capture/translocate animals unable to escape.	Move fauna from harm's way.	During clearing	ESCMC/EPC Contractor
11.	Clearly mark areas of land to be cleared and areas to be retained (No-Go areas), so that impacts do not extend any further than necessary into important habitat.	Minimize habitat loss.	Prior to clearing during all phases of project	ESCMC/EPC Contractor
12.	If possible, plan to clear vegetation progressively and incrementally as needed, rather than through large-scale clearing in advance.	Reduce impacts on fauna.	Design phase, prior to clearing	ESCMC/EPC Contractor
13.	Rehabilitate/stabilize cleared land progressively as activities are completed (which forms part of the Closure and Rehabilitation Plan).	Reduce impacts of dust.	As activities are completed	ESCMC/EPC Contractor
Noise				
14.	Where possible, high-impact noise (e.g., blasting) will be limited to daylight hours.	Reduce impacts on nocturnal fauna.	At all times	ESCMC/EPC Contractor
Light				
15.	Implement a light reduction strategy during the detailed design phase including: Limit artificial light to areas where it is essential; Turn off lights when not required; Avoid the flood of light into natural habitats and limit the escape of light into surrounding areas of fauna habitat (i.e., using shields/deflectors); Ensure that artificial lighting is not directed upwards or laterally (i.e., should be directed towards the ground); Use lower (i.e., closer to the ground) rather than higher lighting installations; Use lower wavelengths of light wherever possible i.e., red/yellow lights;	Reduce impacts on nocturnal fauna.	At all times	ESCMC/EPC Contractor

Sl No.	Mitigation Measures	Purpose/Objective	Timing	Responsibility
	Use light intensities that are as low as possible without reducing safety or efficiency; and Avoid painting large structures bright or reflective colors and minimize use of bright or reflective construction materials and finishes for large structures.			
Unplanned Wildfire				
16.	Carefully plan and identify where high-risk activities can take place.	Minimize risk of wildfire.	As required	ESCMC/EPC Contractor
17.	Maintain adequate fire breaks around high-risk areas/activities.	Minimize risk of wildfire.	At all times	ESCMC/EPC Contractor
18.	Implement active fire management, using localized cool-season control burns within 100 m of construction activities and roads to reduce fuel loads.	Minimize risk of wildfire.	As required	ESCMC/EPC Contractor
Pest animals				
19.	As part of the Waste Management Plan, implement sound waste (garbage) management to limit invasion/colonization by Black Rat (Rattus rattus).	Minimize potential impacts of vermin and pest predators.	At all times	ESCMC/EPC Contractor
20.	General site wastes will be managed to prevent/reduce interaction with fauna. Waste management includes: Regular burning of the landfill; Fencing installed surrounding the landfill to restrict interaction with fauna;	Avoid population increase in pest predators.	At all times	ESCMC/EPC Contractor
21.	Waste storage outside of the landfill is to be situated in bins with lids secured; Waste oils and/or hazardous substances will be kept in sealed containers and/or covered; and All domestic waste outside the landfill/waste-storage facility is to be stored in vermin-proof bins with lids secured.			ESCMC/EPC Contractor
22.	Implement a Pest Monitoring Plan to monitor feral cat and fox populations to determine if control measures are required.	Minimize potential impacts of pest predators	Timing and frequency to be determined by results of pest- animal monitoring	ESCMC/EPC Contractor
Surface and Groundwater				
23.	Reduce attractiveness (to wildlife) of the Residue Storage Facility	Minimize impacts on fauna.	Design, construction and operational phases	ESCMC/EPC Contractor

Sl No.	Mitigation Measures	Purpose/Objective	Timing	Responsibility
24.	Fence off tailings storage facilities to prevent ground-based fauna from accessing the water.	Minimize impacts on fauna.	Construction	ESCMC/EPC Contractor
Haulage and Vehicle Movement				
25.	Ensure that all vehicles travel on these designated roads, and not on secondary or short-cut roads/tracks.	Minimize impacts on fauna.	Design, construction and operational phases	ESCMC/EPC Contractor
26.	Implement and enforce speed restriction controls for all roads across the entire study site.	Minimize impacts on fauna.	Construction and operational phases	ESCMC/EPC Contractor
27.	Implement slower speed limits for all vehicles moving at night in sensitive habitat areas, to reduce the likelihood of roadkill.	Minimize impacts on fauna	Construction and operational phases	ESCMC/EPC Contractor
28.	Upgrade high-use areas to be safer for vehicles and fauna (e.g., no blind curves, wider shrub-free verges).	Minimize impacts on fauna.	Design and construction phases	ESCMC/EPC Contractor
29. 30.	If injured fauna is encountered, assess the situation and potential requirement to euthanize. If dead animals are found on/beside roads, the Environmental Officer is to be notified immediately to remove the carcass a minimum of 20 m into adjacent land.	Minimize impacts on fauna.	Construction and Operation	ESCMC/EPC Contractor
Inspection and Monitoring				
31.	Threatened species monitoring program	Determine Projects impact on threatened species.	Quarterly/Semi-Annually	ESCMC/EPC Contractor
32.	Pest Monitoring Plan including monitoring pest species population and determine if additional measures are required.	Determine Projects impact on pest species.	Quarterly/Semi-Annually	ESCMC/EPC Contractor
33.	Fauna Sighting and Fatality Register to be maintained		As required	ESCMC/EPC Contractor

4. Trigger, Action and Response Plan

The Trigger, Action and Response Plan (TARP) outlines remedial actions and responses to the situation. The TARP is provided in Table 14.

Table 14: Trigger, Action and Response Plan

Responsibility	Situation Normal	Level 1	Level 2
General	Site activities are being managed in accordance with mitigation measures and no incidents have occurred.	Areas of vegetation to be cleared will be outside of Project boundary / existing disturbance.	Vegetation cleared outside of approved boundary.
Site Personnel	Comply with: Site Induction requirements. Vehicle and Equipment Hygiene Procedures. Ground Disturbance Permit Procedures.		Stop work and inform the Environmental Officer of additional disturbance.
ESCMC (Environmental Officer)	Undertake walkovers / inspection of work areas.	Assess requirement to clear outside of Project boundary. Areas to be cleared outside of existing disturbance will be flagged to prevent over clearing. Ensure top soil and seed bank are reserved to facilitate rehabilitating the area. Survey additional disturbance. Ensure sufficient erosion and sediment control measures are used.	Provide guidance on rehabilitation of additional disturbance. Survey additional disturbance. Ensure sufficient erosion and sediment control measures are used. Undertake investigation into disturbance incident.
ESCMC (Area Managers)	Ensure the Biodiversity Management Plan is being implemented by all Site Personnel.		Assess the ground disturbance incident and undertaken relevant corrective measures.
	Fauna observed and behaving normally.	Native fauna observed in the area of the landfill, construction and/or operational activities.	Native fauna injured or killed due to Project activities.
EPC Contractor	Continue to operate diligently in accordance with site induction flora and fauna components.	Encourage or wait for native fauna to vacate construction areas. Report sighting to the Environment Officer.	Report to Area Supervisor. If fauna is killed, remove from road at least 20 m into adjacent bush land.
EPC (Environmental Officer)	-	Enter sighting into Fauna Sighting and	If fauna is injured, assess the situation and potential requirement to euthanize.

Responsibility	Situation Normal	Level 1	Level 2
		Fatality Register (Appendix A).	If fauna is killed, remove from road at least 20 m into adjacent land. Record incident in Fauna Sighting and Incident Register (Annex-1). Determine if species is a threatened species and if the death activates additional contingency measures. Record death within Fauna Sighting and Fatality Register (Annex-2) or record as an environmental incident in the case of a threatened species death.
EPC (Area Managers)	Ensure the Biodiversity Management Plan is being implemented by all Site Personnel.	Assist the Environmental Officer in addressing potential installation of contingency measures.	

5. Monitoring and Threat Abatement Program

5.1 Purpose and Approach

Monitoring programs will be established in ways that allow baseline information to be compared against subsequent repeat surveys. If monitoring indicates that the current mitigation efforts are inadequate then revised or increased mitigation measures will be implemented to protect biodiversity.

5.2 Assessment Criteria

Monitoring of threatened species and management of pest species population density within the Project area will be undertaken at regular intervals as detailed in below tables. The data will be utilized to determine if the population has increased, decreased or remained unchanged and can be assessed against historical data to indicate trends.

Triggers and responses will be determined by predicted 'levels of acceptable change'. The accepted levels of change are determined by known species characteristics and for this program include three scenarios as follows:

- Known to Fluctuate
  - If a species/community is known to fluctuate broadly in numbers or activity patterns, then a higher level of change (as determined through monitoring) is acceptable, because that level of change may simply reflect natural fluctuations
- Generally Consistent
  - If a species/community is known to remain consistent in numbers or activity patterns, then a lower level of change is acceptable, because any change at all may indicate that the project is having an effect.
- Unknown
  - If the populations or activity levels of a species/community are not understood adequately to determine the natural levels of variability, then the less known about the dynamics of a species/community, the smaller the level of change that should be accepted until more can be learned.

With the understanding of species characteristics, levels of acceptable change have been developed for each monitoring and management plan. A summary of acceptable levels of changes and associated definitions are provided in Table 15.

Table 15: Levels of Acceptable Change

Acceptable level of change	When to apply
No increase	When the species/community being investigated is known to have naturally very small variation in population size or activity patterns. Thus, detection of any deleterious change (as found through monitoring) suggests that the project may be having an effect.
Small change	When the species/community being investigated is known to have naturally small variation in population size or activity patterns. Thus, detection of small deleterious change (as found through monitoring) suggests that the project may be having an effect.
Moderate change	When the species/community being investigated is known to have naturally moderate variation in population size or activity patterns. Thus, small changes (as found through monitoring) may simply reflect natural variation, and more substantial changes would need to be detected to suggest that the project may be having an effect.
Large change	When the species/community being investigated is known to have naturally high variation in population size or activity patterns (e.g., boom-bust or irruptive species). Thus, even

	moderate changes (as found through monitoring) may simply reflect natural variation, and large consistent long-term changes would need to be detected to suggest that the project may be having an effect.

5.3 Management Plans

Monitoring plans have been established to determine if mitigation measures at the Project are sufficient. The plans include:

- Pest Monitoring Plan
- Register

Table 16: Pest Monitoring Plan

Program		Pest Monitoring Plan
Objective		Establish baseline and subsequent comparative data on population sizes of feral predators and dingoes to inform control program.
Survey Effort	Survey	Establish baseline data by undertaking a motion-sensing camera survey prior to construction, using site occupancy as the measure of predator populations. Cameras to be deployed for a minimum of 28 nights.
	Operation	Establish 30 baited camera stations that can be repeatedly used including:
	Timing	Annual (during operation)
	Personnel	Qualified ecologists.
Trigger Points	All Flora and Fauna	Acceptable level of change: No increase Any increase in population size is likely to be detrimental to biodiversity. Action required if >10% increase in numbers of individuals detected across two surveys.
		Acceptable level of change: Moderate change Native predators and their presence are likely to limit the population size of other predators. Therefore, dingo presence and increase in population is acceptable. However, over-abundance of dingoes is likely to be detrimental to threatened species. Action required if >50% increase in abundance across two surveys.
Contingency		Implement or increase predator control program as required. Increase fauna control efforts, through trapping, poisoning, shooting. Make sure predator control method does not result in the unintentional capture or death of threatened fauna species.

Table 17: Register

Program		Register
Objective		Provide additional information on feral predator and pest animal populations, in conjunction with monitoring program.
Method	Survey	Predator and pest-animal sightings are to be recorded in the Fauna Sighting and fatality Register (Appendix A) to be established and maintained. Input will be opportunistic, however all personnel will be encouraged to report all sightings of (including colour and identifying markings, if possible) native fauna
	Timing	Continually.
	Personnel	All personnel.

Trigger Points	All Flora and Fauna	Acceptable level of change: No increase Any increase in population size is likely to be detrimental to biodiversity. Additional mitigation action required if the Fauna Sighting and fatality Register (Annex-1) indicates an increase in sightings in a particular area (e.g., more often per week, larger numbers per night, more individuals in an area). Action required if >10% increase in numbers of individuals detected across a six-month period.
		Acceptable level of change: n/a Fauna Sighting and fatality Register not to be used to guide response actions for dingoes.
Contingency		Implement or increase predator and pest-animal control program as required (e.g., if there is a notable increase in sightings of non-native predators in the study area). Increase faunal control efforts, through trapping, poisoning, shooting, in Consultation with Forest Department, Ecologist, ESU. Make sure predator/pest control method does not result in the unintentional capture or death of threatened fauna species.

Table 18: Threatened Species Monitoring

Program		Threatened Species Monitoring
Objective		Assess the potential impact from the Project on threatened species through: Documenting the persistence of the local hilly-wallaby population; Understanding changes in habitat use near the mine site; Evaluating the effectiveness of predator control measures; and Evaluating the effectiveness of vehicle movement restrictions.
Method	Survey	Aerial and motion camera surveys.
	Locations	Marginally marshy or flat habitat, hilly outcrops near the project site and in surrounding hilly areas (landscape context).
	Timing	Annual
	Personnel	Qualified Ecologist
Trigger Points		Acceptable level of change: moderate change an additional mitigation action required if: • Predator monitoring shows that numbers of predators in the study area over the year preceding 12 months increased or increased greatly; or
		• Wildfire in cropping or vegetation areas during the preceding 12 months are detected in nearby hilly areas.
Contingency		Mitigation measures include: • Increase native fauna control efforts (trapping, poisoning, shooting) if predator numbers have increased; • Broaden fire breaks in high-risk areas to prevent future fires, if fire may have been responsible, and • Reduce vehicle speeds or access in high-risk areas if roadkill may have been the cause.

Table 19: Threatened Species Monitoring

Program		Threatened species monitoring – Sandplain Habitats
Objective		To document the persistence of known threatened species in the vicinity of the mine, and to evaluate the effectiveness of predator control measures.
Method	Survey	Motion-sensing camera surveys within known threatened species habitat including two cameras at known warrens. Transect surveys searching for warrens within known threatened species habitat. Camera surveys will comprise five 400m camera transects, each comprising 5 cameras at 100m intervals and be left in situ for 28 nights during construction season.
	Locations	Sandplain Habitat.
	Timing	Annual.
	Personnel	Qualified ecologists.
Trigger Points		Acceptable level of change: small change Additional mitigation action required if: >20% decrease in numbers of native fauna and in the preceding year an incident of roadkill is recorded; Predator monitoring shows that numbers of predators in the study area over the preceding 12 months increased or increased greatly; or Wildfire in the sandplain habitat during the preceding 12 months are detected.
Contingency		Mitigation measures include: Increase faunal control efforts (trapping, poisoning, shooting) if predator numbers have increased; Broaden fire breaks in high-risk areas to prevent future fires, if fire may have been responsible, and Reduce vehicle speeds or access in high-risk areas if roadkill may have been the cause.

Annex-1: Fauna Sighting and Fatality Register

Date (--/--/--)	Time ( )	Animal (Type / Name)	Number	Condition (Sighting, Injured, Dead)	Conservation Status (Native, Migratory, Feral, Introduced, Threatened, Unknown)	Location (Reference to infrastructure or Haul Road chainage)	Interaction Details (Summary of interaction including how fauna was injured or killed by Project activities and measures taken)

Annex-2: Works Summary

ESCMC/EPC Contractors to provide clearance dates and summary of any issues/recommendations for future disturbances.

Ground Disturbance			
Start		Finnish	
Date		Date	
Time		Time	
Summary of Disturbance Conditions encountered, animals observed or translocated and weed status.			
Survey Data Extents of disturbance and location.			

Annex-3: Risk Matrix

Table-1: Consequence Description

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Air	Air quality	No measurable air quality impacts or exceedance of air quality standards.	Local short term and approaching exceedance of air quality standards.	Local minor long term, or widespread minor short term or exceedance of air quality standards.	Widespread (regional) major short-term exceedance of air quality standards.	Regional long-term change in air quality or exceedance of air quality standards.
Air	Noise	Applicable standards / guidelines met at all sensitive receptors at all times.	Isolated and temporary increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.	Short term, local increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.	Long term, local increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.	Long term, regional increase in noise levels exceeding relevant noise standards / guidelines at a sensitive receptor.
Biodiversity	Listed Flora Species	Minor local habitat modification and/or lifecycle disruption for a listed species.	Moderate local habitat modification and/or lifecycle disruption for a listed species.	Substantial local habitat modification and/or lifecycle disruption for a listed species.	Moderate regional and/or lifecycle disruption for a listed species.	Substantial habitat and/or lifecycle modification regional disruption for a listed species.
Biodiversity	Listed Threatened Fauna Species	No loss of individuals of listed fauna species.	Minor local decrease in size of population(s) of listed fauna species.	Moderate local decrease in size of population(s) of listed fauna species.	Substantial local decrease in size of population(s) of listed fauna species.	Moderate or substantial regional decrease in size of population(s) of listed fauna species.
Biodiversity	General flora and fauna	Insignificant or imperceptible effects.	Local short-term decrease in abundance of some species with no lasting effects on local Population.	Local long-term decrease in abundance of some species resulting in some change to Community structure.	Regional decrease in abundance of some species resulting in some changes to Community structure.	Regional loss of numerous species resulting in the dominance of only a Few species.
Historic and cultural heritage	Aboriginal and Cultural heritage	Minor repairable damage to more common	Moderate or repairable damage or infringement to	Considerable damage or infringement to	Major damage or infringement to sensitive structures	Irreparable and permanent damage to sensitive

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
		Structures or sites. No disturbance of historic and/ or cultural heritage sites.	sensitive structures or sites of cultural significance or sacred value.	sensitive structures or sites of cultural significance or sacred value.	or sites of cultural Significance or sacred value.	structures or sites of cultural Significance or sacred value.
Category of Impact Human health and safety	Aspect Safety	Insignificant Low level short term subjective inconvenience or symptoms. Typically, a first aid and no medical treatment.	Minor Reversible / minor injuries requiring medical treatment, but does not lead to restricted duties. Typically, a medical treatment.	Moderate Reversible injury or moderate irreversible damage or impairment to one or more persons. Typically, a lost time injury.	Major Single fatality and/or Single fatality and/or severe irreversible damage or severe impairment to one or more persons.	Catastrophic Multiple fatalities or permanent damage to multiple people.
Human health and safety	Health	Reversible health effects of little concern, requiring first aid treatment at most.	Reversible health effects of concern that would typically result in medical treatment.	Severe, reversible health effects of concern that would typically result in a lost time illness.	Single fatality or irreversible health effects or disabling illness.	Multiple fatalities or serious disabling illness to multiple people.
Radiation	Occupational exposure	<1 mSv/y Measurable increase in radiation dose with outcomes below public dose limit.	<5 mSv/y Measurable increase in radiation dose with outcomes remaining below dose constraints.	>5 mSv/y and <20 mSv/y Measurable increase in radiation dose with outcomes between dose constraint and dose limit (averaged over five years).	>20 mSv/y and <50 mSv/y Measurable increase in radiation dose with outcomes between dose limit (averaged over five years) and maximum annual dose	>50 mSv/y Measurable increase in radiation dose with outcomes greater than the maximum annual dose.
Radiation	Public exposure	No change from background.	<0.3 mSv/y	>0.3 mSv/y and <1 mSv/y Measurable increase in radiation dose with outcomes between	>1 mSv/y and <5 mSv/y Measurable increase in radiation dose with outcomes between dose limit	>5 mSv/y

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
				dose constraint and dose limit (averaged over five years) for public.	(averaged over five years) and maximum annual dose for public.	
		Dose not discernible above natural background.	Measurable increase in radiation dose with outcomes below public dose constraint.			Measurable increase in radiation dose with outcomes greater than the maximum annual dose for public.
Radiation	Environmental impact	ERICA RQ < 0.1	ERICA RQ >0.1 and <1.0	ERICA RQ >1.0 plus justification	ERICA RQ >1.0 and no justification	ERICA RQ > 10.0
Category of Impact Socio-economic	Aspect Community	Insignificant Local, small-scale, easily reversible change on social characteristics or values of the communities of interest or communities can easily adapt or cope with change.	Minor Short-term recoverable changes to social characteristics and values of the communities of interest or community has substantial capacity to adapt and cope with change.	Moderate Medium-term recoverable changes to social characteristics and values of the communities of interest or community has some capacity to adapt and cope with change.	Major Long-term recoverable changes to social characteristics and values of the communities of interest or community has limited capacity to adapt and cope with change	Catastrophic Irreversible changes to social characteristics and values of the communities of interest or community has no capacity to adapt and cope with change.
Socio-economic	Visual and landscape	Almost imperceptible or no visual change from sensitive receptors or places of cultural and natural value. No loss of / or change to features or characteristics of the landscape.	Minor visual change from sensitive receptors or places of cultural and natural value. Minor loss or alteration to key landscape characteristics, or introduction of elements that may be visible but not uncharacteristic.	Moderate visual change from sensitive receptors and places of cultural and natural value. Discernible changes in the landscape due to partial loss or change to characteristics of the landscape.	Significant visual change from sensitive receptors and places of cultural and natural value. Discernible change which is out of scale with the landscape, at odds with landform and will leave an adverse impact.	Catastrophic visual change from sensitive receptors and places of cultural and natural value. A substantial change to the landscape due to total loss of elements or characteristics, causing the landscape to be permanently changed and its quality diminished.

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Transport	Traffic and transport operations and conditions	Negligible adverse impact on traffic and transport conditions. No perceptible deterioration of road integrity.	Detectable adverse changes in traffic and transport condition (decrease in Level of Service) at one or two locations at any one point in time during the construction period or at a single location during operations. Seasonal, local deterioration of road integrity.	Detectable adverse change in traffic and transport conditions (decrease in Level of Service) at multiple locations. Short term, local deterioration of road integrity.	Traffic and transport congestion and delays exceed acceptable levels at deterioration of road integrity.	Traffic and transport congestion and delays severely restrict the safe operation and efficiency of the transport network. Long term, regional deterioration of road integrity.
Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Transport	Road safety	No increase in vehicle incidents along relevant haulage routes above historical baseline trend	An increase in vehicle incidents along relevant haulage routes of five per cent above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of ten per cent above historical baseline trend.	An increase in vehicle incidents along relevant haulage routes of twenty per cent above historical baseline trend	An increase in vehicle incidents along relevant haulage routes of greater than twenty per cent above historical baseline trend.
Water	Surface water	Minimal contamination or change with no significant loss of quality.	Local minor short-term reduction or change in water quality. Local contamination or change that can be immediately remediated.	Local minor long term or widespread minor short term or local major short-term reduction or change in water quality. Local contamination or change that can be remediated in long term.	Widespread (regional) major short-term reduction or change in water quality. Local contamination or change that cannot be remediated in long term. Widespread contamination or change that can be remediated.	Regional long-term reduction or change in water quality. Widespread contamination or change that cannot be immediately remediated.
Water	Groundwater	Negligible change	Changes to	Changes to	Groundwater	Widespread

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
		to groundwater regime, quality and availability.	groundwater regime, quality and availability but no significant implications.	groundwater regime, quality and availability with minor groundwater implications for a localized area.	regime, quality or availability significantly compromised.	groundwater resource depletion contamination or, subsidence.

Table-2: Likelihood Description

Likelihood	Rare	Unlikely	Moderate	Likely	Almost Certain
Description	The event may occur only in exceptional circumstances. This event is not expected to occur except under exceptional circumstances	The event could occur but is improbable. This event could occur up to once	The event could occur but not expected. This event could occur up to once every 10 projects of this nature.	The event will probably occur in most circumstances. This event could occur up to once during a project of this nature.	The event is expected to occur in most circumstances. This event could occur at least once during a project of this nature.
Chance of Occurring (%)	0 - 1%	2 - 10%	11 - 50%	51 - 90%	> 91%

Table-3: Risk Matrix

		Consequence				
		Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Likelihood	**Almost Certain**	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	High	Extreme
	Possible	Low	Medium	Medium	High	High
	Unlikely	Low	Low	Medium	Medium	High
	Rare	Low	Low	Low	Medium	Medium

Annex-XXII: Environmental Testing Report

1st Round (Pre-Monsoon) Testing Report

Mitra S. K. Bangladesh (Pvt.) Ltd.

MSK TESTING • INSPECTION

House # 02, 5th Floor, Road # 32,
Dhanmondi, Dhaka - 1209
Bangladesh.

T : +88 02 5815 3195, +88 01973 167 777
E : mskdhaka@mitrask.com
W : www.mitrask.com

Results of Ambient Air Quality

Job/Certificate Number	:	MSKGL/ED/2024-25/0031
Name of the Industry	:	765kV Transmission Line Project of Power Grid Bangladesh PLC
Address of the Industry	:	Chattogram, Coxs-bazar
Description of Sample	:	Ambient Air Quality
Sample Collection Date	:	27.02.25-02.03.25
Reporting Date	:	8th April 2025

Description of Results:

Sample Locations	GPS Locations	Measured Concentration of Ambient Air Quality Parameters					
		PM10 (µg/m³)	PM2.5 (µg/m³)	SO_2 (µg/m³)	NOx (µg/m³)	CO (µg/m³)	O_3 (µg/m³)
AAQ-1 (Gerila Para)	22°27'00.3" N 91°55'49.2" E	49.28	26.2	<6.0	18.42	0.95	20
AAQ-2 (Boro Thakur Para)	22°26'58.8" N 91°56'07.7" E	41.42	22.4	<6.0	15.26	0.88	<20
AAQ-3 (Brahman Ghat)	21°40'14.3" N 91°55'12.7" E	39.64	21.6	<6.0	14.52	0.80	<20
AAQ-4 (Dokkhin Rawjan)	22°25'31.1" N 91°56'40.8" E	48.30	25.8	<6.0	16.82	0.92	<20
Duration (hours)		24 (hrs)				8 (hrs)	
Bangladesh Standard (Air Quality Standard 2022, ECR 2023)		150	65	80	80	5	100
WHO Air Quality Standard, 2005		150	75	125	-	NF*	160

Abbreviation: Coarse Particulate Matter (PM10), Fine Particulate Matter (PM2.5), Oxide of Nitrogen (NO_2 as Nox), Sulphur Di-Oxide (SO_2), Carbon Mono-Oxide (CO), Ozone (O_3) Detection Limit of test (<).

Monitoring By: Md. Shahinur Ishlam (Environmental Executive) and Md. Anamul Haq Rubal (Field Sampler)

Sampler Details: Respirable Dust Sampler (RDS) (Model- APM 860) and Fine Dust Sampler (FDS) (Model APM 154)

Note: Wind direction during monitoring was SE to N Direction

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House # 02, 5th Floor, Road # 32,
Dhanmondi, Dhaka - 1209
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T : +88 02 5815 3195, +88 01973 167 777
E : mskdhaka@mitrask.com
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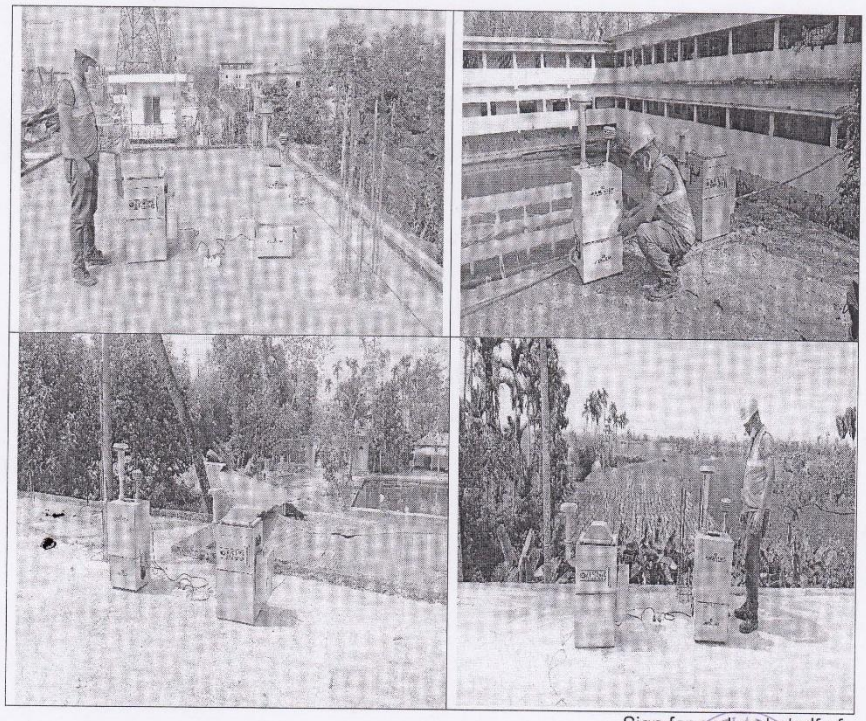
Test Report No: MSKGL/ED/2024-25/0031 **Date:** 8th April,2025 **Page: 1 of 1**



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E : mskdhaka@mitrask.com
W : www.mitrask.com

Results of Noise Quality

Job/Certificate Number	:	MSKGL/ED/2024-25/0032
Name of the Industry	:	765kV Transmission Line Project of Power Grid Bangladesh PLC
Address of the Industry	:	Chattogram, Coxs-bazar
Description of Sample	:	Ambient Noise Quality
Sample Collection Date	:	27.02.25-01.03.25
Reporting Date	:	8th April, 2025

Description of Results:

Location	ANQ-1 (Gerila Para)	ANQ-2 (Boro Thakur Para)	ANQ-3 (Brahman Ghat)	ANQ-4 (Dokkhin Raujan)
Latitude/ Longitude (Deg., Min., Sec.)	22°27'00.3" N 91°55'49.2" E	22°26'58.8" N 91°56'07.7" E	21°40'14.3" N 91°55'12.7" E	22°25'31.1" N 91°56'40.8" E
Leq dB (A)-6.00 am	37.2	39.5	38.9	39.7
Leq dB (A)-7.00 am	38.5	42.5	41.5	40.7
Leq dB (A)-8.00 am	39.6	40.7	40.5	41.7
Leq dB (A)-9.00 am	39.2	42.3	41.9	41.9
Leq dB (A)-10.00 am	39.4	43.4	41.7	41.4
Leq dB (A)-11.00 am	39.1	43.0	42.9	41.9
Leq dB (A)-12.00 pm	39.1	43.4	41.9	42.5
Leq dB (A)-13.00 pm	38.9	42.8	42.7	42.6
Leq dB (A)-14.00 pm	39.2	43.3	42.2	42.9
Leq dB (A)-15.00 pm	46.3	43.1	43.6	42.3
Leq dB (A)-16.00 pm	46.4	46.6	43.0	43.1
Leq dB (A)-17.00 pm	46.5	45.7	42.1	42.0
Leq dB (A)-18.00 pm	43.0	43.0	44.9	42.5
Leq dB (A)-19.00 pm	42.5	43.5	45.4	43.2
Leq dB (A)-20.00 pm	42.0	43.0	46.8	43.0
Leq dB (A)-21.00 pm	39.9	40.9	43.8	41.1
Leq dB (A)-22.00 pm	37.4	40.7	40.1	39.2
Leq dB (A)-23.00 am	36.1	39.8	38.4	39.3
Leq dB (A)-24.00 am	36.3	39.1	37.6	37.7
Leq dB (A)-1.00 am	36.7	38.1	37.6	36.4
Leq dB (A)-2.00 am	35.5	38.5	38.0	37.9
Leq dB (A)-3.00 am	35.6	39.7	38.5	39.4
Leq dB (A)-4.00 am	35.5	39.5	39.1	39.2
Leq dB (A)-5.00 am	35.0	37.5	38.9	37.0
Leq dB (A)-Day	**42.2**	**43.2**	**43.1**	**42.1**
Leq dB (A)-Night	**36.1**	**39.2**	**38.6**	**38.4**
Leq dB (A)-Max	**46.5**	**46.6**	**46.8**	**43.2**
Leq dB (A)-Min	**35.0**	**37.5**	**37.6**	**36.4**

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House # 02, 5th Floor, Road # 32,
Dhanmondi, Dhaka - 1209
Bangladesh.

T : +88 02 5815 3195, +88 01973 167 777
E : mskdhaka@mitrask.com
W : www.mitrask.com

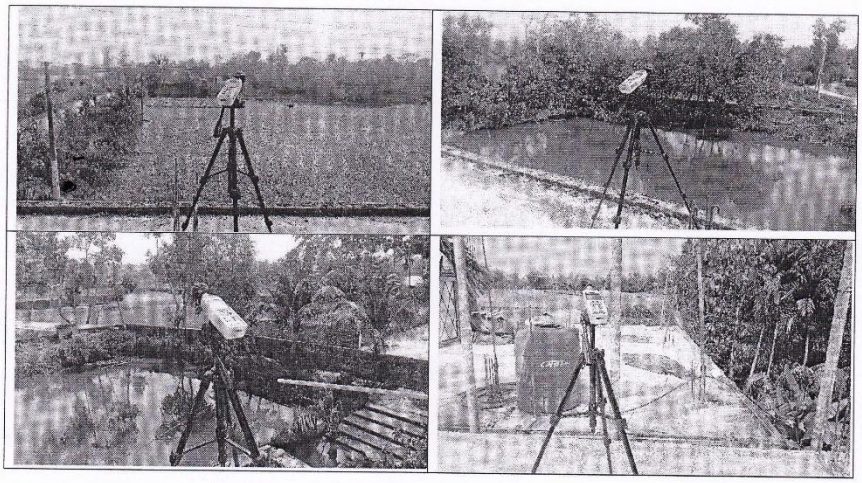
Test Report No: MSKGL/ED/2024-25/0032 **Date:** 8th April,2025 **Page:** 1 of 1

Noise Pollution (Control) Rules 2006 of Environment Conservation Rules 2023		
Monitoring Schedule	**Day**	**Night**
Silent area	50	40
Residential area	55	45
Mixed area	60	50
Commercial Area	70	60
Industrial area	75	70
World Bank/IFC Standard, 2005		
Residential; Institutional; Educational	55	45
Industrial	70	70

Monitoring By: Md. Shahinur Ishlam (Environmental Executive) and Md. Anamul Haq Rubal (Field Sampler)

Sampler Details: LUTRON, SL-4033SD-Q681649 & LUTRON, SL-4033SD-Q688018

Note: Wind direction during monitoring was SE to N Direction.



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Bangladesh.

T : +88 02 5815 3195, +88 01973 167 777
E : mskdhaka@mitrask.com
W : www.mitrask.com

Test Report No: MSKGL/ED/2024-25/0033 **Date:** 8th April,2025 **Page: 1 of 3**

SAMPLE DRAWN AND TESTED BY MITRA S.K. BANGLADESH (PVT.) LTD.

Environmental Parameter Testing for the ESIA of 765kV Transmission Line Project of Power Grid Bangladesh PLC

THE FOLLOWING SAMPLE WAS COLLECTED BY THE MSK:

SAMPLE DESCRIPTION	:	SURFACE WATER QUALITY SWQ-1, Karnafuli River GPS: 22°25'31.1" N, 91°56'40.8" E
PRODUCT TYPE	:	WATER
SAMPLE CONDITION	:	WATER IN ONE PLASTIC BOTTLE & ONE GLASS BOTTLE
RECEIVED SAMPLE QUANTITY	:	2.0L
SAMPLE COLLECTION DATE	:	27 February 2025

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MITRA S.K. BANGLADESH (PVT.) LTD.

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Test Report No: MSKGL/ED/2024-25/0033 **Date:** 8th April,2025 **Page: 1 of 2**

Test Results:

Test Parameters	Unit	Result	ECR -2023	Test Method
Arsenic(as As)	mg/l	<0.003	0.003	APHA (24th Edition)3114 C :2023
Cadmium (as Cd)	mg/l	<0.005	0.005	APHA (24th Edition)3120 B :2023
Chemical Oxygen Demand	mg/l	18	5	APHA 24th Edition, 2023 5220B
Chromium as Cr	mg/l	<0.1	0.1	APHA (24th Edition)3120 B :2023
Cyanide (as CN)	mg/l	<0.001	0.0014	APHA 24th Edition, 2023 4500 CN- F
Dissolved Oxygen	mg/l	6.2	≥4	IS 3025 (Part 38)
Lead (as Pb)	mg/l	<0.05	-	APHA (24th Edition)3120 B :2023
Mercury (as Hg)	mg/l	<0.0001	0.0001	TPM/MSK/INST/170
Nitrate (as NO3)	mg/l	4.3	1.0	APHA (24th Edition), 4500 NO3-E
Oil and Grease	mg/l	<5.0	5	APHA (24th Edition), 5520B
Phenolic Compounds	mg/l	<0.05	0.05	APHA (24th Edition), 5530C (Chloroform Extraction)
Phosphate (as PO4)	mg/l	0.16	0.1	APHA (24th Edition), 4500 P-D
Total Suspended Solid	mg/l	252	-	APHA 24th Edition, 2023 2540D
pH value	None	7.71	6.5-9.0	APHA 24th Edition, 2023 4500-H+B
Faecal coliform	MPN/100ml	17	-	Standard methods for the examination of water & waste water, 24th edtn, 9221E, 2023
Total coliform count	MPN/100ml	49	-	Standard methods for the examination of water & waste water, 23rd edtn,2017 9221 B

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E : mskdhaka@mitrask.com
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Test Report No: MSKGL/ED/2024-25/0034 **Date:** 8th April,2025 **Page: 1 of 3**

SAMPLE DRAWN AND TESTED BY MITRA S.K. BANGLADESH (PVT.) LTD.

Environmental Parameter Testing for the ESIA of 765kV Transmission Line Project of Power Grid Bangladesh PLC

THE FOLLOWING SAMPLE WAS COLLECTED BY THE MSK:

SAMPLE DESCRIPTION	:	SURFACE WATER QUALITY SWQ-2, Matamuhuri GPS: 22°10'24.8"N, 91°54'59.0"E
PRODUCT TYPE	:	WATER
SAMPLE CONDITION	:	WATER IN ONE PLASTIC BOTTLE & ONE GLASS BOTTLE
RECEIVED SAMPLE QUANTITY	:	2.0L
SAMPLE COLLECTION DATE	:	28 February 2025

Sign for and on behalf of
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House # 02, 5th Floor, Road # 32,
Dhanmondi, Dhaka - 1209
Bangladesh.

T : +88 02 5815 3195, +88 01973 167 777
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Test Report No: MSKGL/ED/2024-25/0034 **Date:** 8th April,2025 **Page: 1 of 2**

Test Results:

Test Parameters	Unit	Result	ECR -2023	Test Method
Arsenic(as As)	mg/l	<0.003	0.003	APHA (24th Edition)3114 C :2023
Cadmium (as Cd)	mg/l	<0.005	0.005	APHA (24th Edition)3120 B :2023
Chemical Oxygen Demand	mg/l	32	5	APHA 24th Edition, 2023 5220B
Chromium as Cr	mg/l	<0.1	0.1	APHA (24th Edition)3120 B :2023
Cyanide (as CN)	mg/l	<0.001	0.0014	APHA 24th Edition, 2023 4500 CN- F
Dissolved Oxygen	mg/l	6.4	≥4	IS 3025 (Part 38)
Lead (as Pb)	mg/l	<0.05	-	APHA (24th Edition)3120 B :2023
Mercury (as Hg)	mg/l	<0.0001	0.0001	TPM/MSK/INST/170
Nitrate (as NO3)	mg/l	1.7	1.0	APHA (24th Edition), 4500 NO3-E
Oil and Grease	mg/l	<5.0	5	APHA (24th Edition), 5520B
Phenolic Compounds	mg/l	<0.05	0.05	APHA (24th Edition), 5530C (Chloroform Extraction)
Phosphate (as PO4)	mg/l	0.17	0.1	APHA (24th Edition), 4500 P-D
Total Suspended Solid	mg/l	110	-	APHA 24th Edition, 2023 2540D
pH value	None	7.69	6.5-9.0	APHA 24th Edition, 2023 4500-H+B
Faecal coliform	MPN/100ml	<1.8	-	Standard methods for the examination of water & waste water, 24th edtn, 9221E, 2023
Total coliform count	MPN/100ml	4.5	-	Standard methods for the examination of water & waste water, 23rd edtn,2017 9221 B

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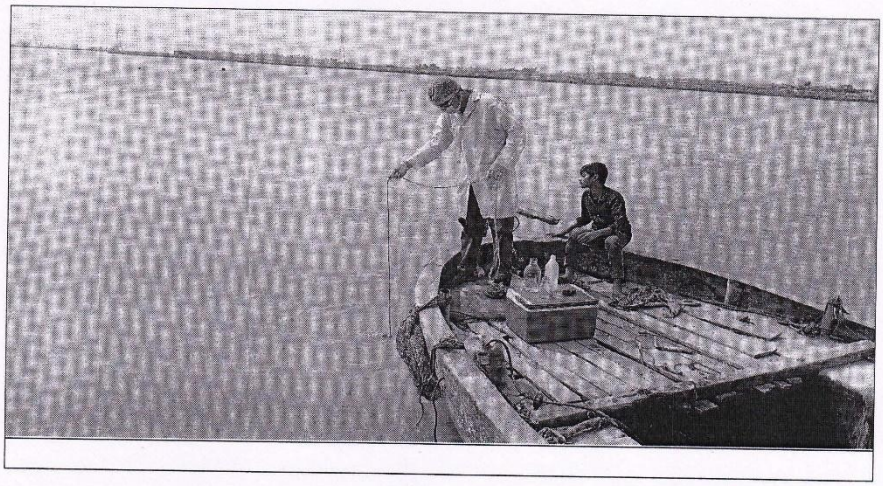
Test Report No: MSKGL/ED/2024-25/0034 **Date:** 8th April,2025 **Page: 1 of 3**



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Test Report No: **MSKGL/ED/2024-25/0035** **Date:** **8th April,2025** **Page: 1 of 3**

SAMPLE DRAWN AND TESTED BY MITRA S.K. BANGLADESH (PVT.) LTD.

Environmental Parameter Testing for the ESIA of 765kV Transmission Line Project of Power Grid Bangladesh PLC

THE FOLLOWING SAMPLE WAS COLLECTED BY THE MSK:

SAMPLE DESCRIPTION	:	SURFACE WATER QUALITY SWQ-3, Sangu River GPS: 21°45'14.9"N, 91°56'22.1"E
PRODUCT TYPE	:	WATER
SAMPLE CONDITION	:	WATER IN ONE PLASTIC BOTTLE & ONE GLASS BOTTLE
RECEIVED SAMPLE QUANTITY	:	2.0L
SAMPLE COLLECTION DATE	:	1 March 2025

Sign for and on behalf of
MITRA S.K. BANGLADESH (PVT.) LTD.

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Dhanmondi, Dhaka - 1209
Bangladesh.

T : +88 02 5815 3195, +88 01973 167 777
E : mskdhaka@mitrask.com
W : www.mitrask.com

Test Report No: MSKGL/ED/2024-25/0035 **Date:** 8th April,2025 **Page: 1 of 2**

Test Results:

Test Parameters	Unit	Result	ECR -2023	Test Method
Arsenic(as As)	mg/l	<0.003	0.003	APHA (24th Edition)3114 C :2023
Cadmium (as Cd)	mg/l	<0.005	0.005	APHA (24th Edition)3120 B :2023
Chemical Oxygen Demand	mg/l	<4.0	5	APHA 24th Edition, 2023 5220B
Chromium as Cr	mg/l	<0.1	0.1	APHA (24th Edition)3120 B :2023
Cyanide (as CN)	mg/l	<0.001	0.0014	APHA 24th Edition, 2023 4500 CN- F
Dissolved Oxygen	mg/l	6.1	≥4	IS 3025 (Part 38)
Lead (as Pb)	mg/l	<0.05	-	APHA (24th Edition)3120 B :2023
Mercury (as Hg)	mg/l	<0.0001	0.0001	TPM/MSK/INST/170
Nitrate (as NO3)	mg/l	3.3	1.0	APHA (24th Edition), 4500 NO3-E
Oil and Grease	mg/l	<5.0	5	APHA (24th Edition), 5520B
Phenolic Compounds	mg/l	<0.05	0.05	APHA (24th Edition), 5530C (Chloroform Extraction)
Phosphate (as PO4)	mg/l	0.18	0.1	APHA (24th Edition), 4500 P-D
Total Suspended Solid	mg/l	44.2	-	APHA 24th Edition, 2023 2540D
pH value	None	7.60	6.5-9.0	APHA 24th Edition, 2023 4500-H+B
Faecal coliform	MPN/100ml	<1.8	-	Standard methods for the examination of water & waste water, 24th edtn, 9221E, 2023
Total coliform count	MPN/100ml	17	-	Standard methods for the examination of water & waste water, 23rd edtn,2017 9221 B

Sign for and on behalf of
MITRA S.K. BANGLADESH (PVT.) LTD.

S.K. BANGLADESH (PVT.) LTD. DHAKA

Authorized Signatory

Registered Office : 19 Green Road, Kalabagan, Dhaka-1205, Bangladesh.

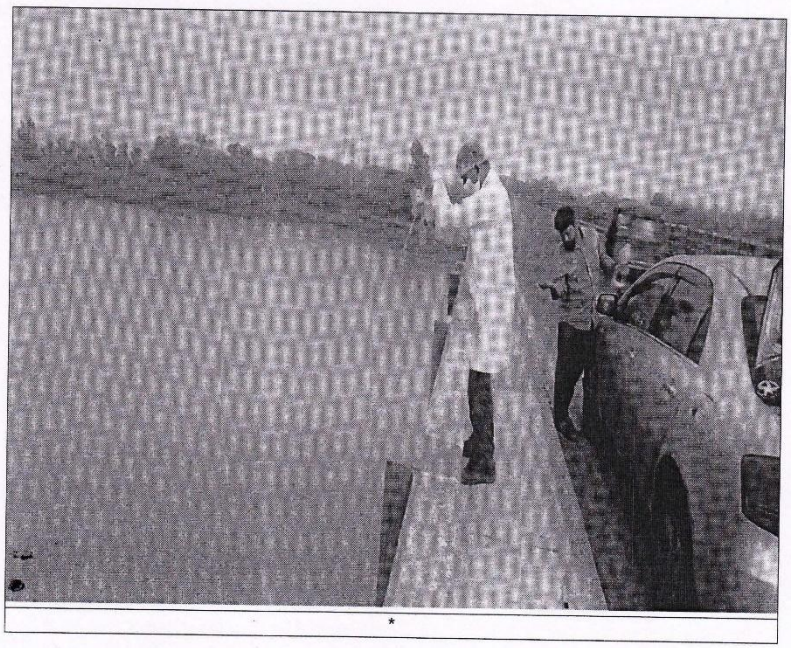
Mitra S. K. Bangladesh (Pvt.) Ltd.

MSK TESTING • INSPECTION

House # 02, 5th Floor, Road # 32,
Dhanmondi, Dhaka - 1209
Bangladesh.

T : +88 02 5815 3195, +88 01973 167 777
E : mskdhaka@mitrask.com
W : www.mitrask.com

Test Report No: MSKGL/ED/2024-25/0035 **Date:** 8th April,2025 **Page: 1 of 3**



Sign for and on behalf of
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DHAKA

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House # 02, 5th Floor, Road # 32,
Dhanmondi, Dhaka - 1209
Bangladesh.
T : +88 02 5815 3195, +88 01973 167 777
E : mskdhaka@mitrask.com
W : www.mitrask.com

MSK TESTING • INSPECTION

Test Report No: MSKGL/ED/2024-25/0036 **Date:** 8th April,2025 **Page: 1 of 3**

SAMPLE DRAWN AND TESTED BY MITRA S.K. BANGLADESH (PVT.) LTD.

Environmental Parameter Testing for the ESIA of 765kV Transmission Line Project of Power Grid Bangladesh PLC

THE FOLLOWING SAMPLE WAS COLLECTED BY THE MSK:

SAMPLE DESCRIPTION	:	SURFACE WATER QUALITY SWQ-4, Fashiakhali Canal GPS: 21°39'30.1"N, 91°54'59.0"E
PRODUCT TYPE	:	WATER
SAMPLE CONDITION	:	WATER IN ONE PLASTIC BOTTLE & ONE GLASS BOTTLE
RECEIVED SAMPLE QUANTITY	:	2.0L
SAMPLE COLLECTION DATE	:	2 March 2025

Sign for and on behalf of
MITRA S.K. BANGLADESH (PVT.) LTD.

MITRA S.K. BANGLADESH (PVT.) LTD. DHAKA

Authorized Signatory

Registered Office : 19 Green Road, Kalabagan, Dhaka-1205, Bangladesh.

Mitra S. K. Bangladesh (Pvt.) Ltd.

MSK TESTING • INSPECTION

House # 02, 5th Floor, Road # 32,
Dhanmondi, Dhaka - 1209
Bangladesh.

T : +88 02 5815 3195, +88 01973 167 777
E : mskdhaka@mitrask.com
W : www.mitrask.com

Test Report No: MSKGL/ED/2024-25/0036 **Date:** 8th April,2025 **Page: 1 of 2**

Test Results:

Test Parameters	Unit	Result	ECR -2023	Test Method
Arsenic(as As)	mg/l	<0.003	0.003	APHA (24th Edition)3114 C :2023
Cadmium (as Cd)	mg/l	<0.005	0.005	APHA (24th Edition)3120 B :2023
Chemical Oxygen Demand	mg/l	10	5	APHA 24th Edition, 2023 5220B
Chromium as Cr	mg/l	<0.01	0.1	APHA (24th Edition)3120 B :2023
Cyanide (as CN)	mg/l	<0.001	0.0014	APHA 24th Edition, 2023 4500 CN- F
Dissolved Oxygen	mg/l	6.3	≥4	IS 3025 (Part 38)
Lead (as Pb)	mg/l	<0.05	-	APHA (24th Edition)3120 B :2023
Mercury (as Hg)	mg/l	<0.0001	0.0001	TPM/MSK/INST/170
Nitrate (as NO3)	mg/l	2.3	1.0	APHA (24th Edition), 4500 NO3-E
Oil and Grease	mg/l	<5.0	5	APHA (24th Edition), 5520B
Phenolic Compounds	mg/l	<0.1	0.05	APHA (24th Edition), 5530C (Chloroform Extraction)
Phosphate (as PO4)	mg/l	0.15	0.1	APHA (24th Edition), 4500 P-D
Total Suspended Solid	mg/l	40.2	-	APHA 24th Edition, 2023 2540D
pH value	None	7.68	6.5-9.0	APHA 24th Edition, 2023 4500-H+B
Faecal coliform	MPN/100ml	<1.8	-	Standard methods for the examination of water & waste water, 24th edtn, 9221E, 2023
Total coliform count	MPN/100ml	11	-	Standard methods for the examination of water & waste water, 23rd edtn,2017 9221 B

Sign for and on behalf of
MITRA S.K. BANGLADESH (PVT.) LTD.

DHAKA

Authorized Signatory

Mitra S. K. Bangladesh (Pvt.) Ltd.

MSK TESTING • INSPECTION

House # 02, 5th Floor, Road # 32,
Dhanmondi, Dhaka - 1209
Bangladesh.

T : +88 02 5815 3195, +88 01973 167 777
E : mskdhaka@mitrask.com
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Test Report No: MSKGL/ED/2024-25/0036 **Date:** 8th April,2025 **Page: 1 of 3**

Sign for and on behalf of
MITRA S.K. BANGLADESH (PVT.) LTD.

DHAKA

Authorized Signatory

Quality And Accreditation Institute

Centre for International Accreditation

(formerly Centre for Laboratory Accreditation)

Certificate of Accreditation

Mitra S. K. Private Limited

Building No. P-48, Udayan Industrial Estate, 3, Pagladanga Road,
Kolkata - 700015, West Bengal, India

has been assessed and accredited in accordance with the Standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing and Calibration Laboratories"
In the field of

Testing

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued compliance to the above standard & any other requirements specified by QAI.

MARK OF SUSTAINED QUALITY — QAI — ACCREDITED

QAI/CIA/TL/2024/0094

Valid from: **31 December 2024**

Valid until: **30 December 2026**

Dr. Bhupendra Kumar Rana
Chief Executive Officer

Prof. Vikram Kumar
Chair, CIA

User is advised to verify the current scope of accreditation by visiting our website: www.qai.org.in

2nd Round (Monsoon) Testing Report

EnviroCare International Ltd.
A house of Inspection, Testing, Assessment & Consultancy

Ref: ECIL/2025/21-08/AAQM

Test Results of Ambient Air Quality Analysis

Name of Project	**: Implementation of Madunaghat—Moheshkhali 765kV Transmission Lines Project**
Description of Sample	: Ambient Air Quality (AAQ)
Sample Collector	: EnviroCare Technical Team
Monitoring Date	: 20.07.2025-25.07.2025
Date of Analysis	: 26.07.2025-04.08.2025
Reporting Date	: 06.08.2025

SN	Monitoring Locations	Concentration of different parameters in ambient air							
		SO_x	NO_x	O_3	CO	NH3	$PM_{2.5}$	PM_{10}	Pb
1	AAQM-1 (Nunachori Paschimpara, (Moheshkhali, Cox's Bazar) 21°39'28.03"N 91°54'55.41"E	8.51	8.74	5.56	1.36	55.40	12.73	31.03	BDL
2	AAQM-2 (Afjali para, Yunus Khali Road) 21°42'21.46"N 91°55'21.86"E	7.06	13.33	6.47	1.74	78.68	17.23	37.20	BDL
3	AAQM-3 (Jaliakhali, Pekua, Cox's Bazar) 21°48'26.76"N 91°57'0.91"E	16.28	23.60	9.10	1.61	94.93	21.45	44.76	BDL
4	AAQM-4 (9 no. word, Shekherkhil, Laljibon, Bashkhali, Chattogram) 21°55'7.09"N 91°57'2.53"E	9.05	13.53	4.27	1.05	59.49	14.18	32.55	BDL
5	AAQM-5 (Maizpara, 9 no. Shilcock, Bashkhali, Chattogram) 21°58'31.01"N 91°56'38.08"E	13.63	18.01	6.47	1.21	29.72	23.73	46.47	BDL
6	AAQM-6 (Moddhomanik Pathan, 4 no. Word, Bashkhali, Chattogram) 22° 3'12.91"N 91°55'15.94"E	15.49	20.57	5.39	1.28	88.19	16.36	34.65	BDL
7	AAQM-7 (Uttar Boilgaon, 2 no. Sadanpur, Bashkhali, Chattogram) 22° 8'23.46"N 91°54'29.06"E	7.05	10.12	7.64	1.61	67.57	12.12	22.89	BDL
8	AAQM-08 (Bilpur, Dumuria, Anowara, Chattogram) 22°13'18.19"N 91°55'14.68"E	9.63	22.42	6.09	1.61	92.82	21.22	34.42	BDL
9	AAQM-09 (6 no. Word, Poschim Perula, Borolia, Pothia, Chattogram) 22°17'55.11"N 91°56'35.53"E	6.14	7.96	4.21	0.96	34.40	12.73	23.15	BDL
10	AAQM-10 (In front of Tajpark, Collegepara, Kanungopara, Boalkhali, Chattogram) 22°22'48.15"N	10.49	18.57	4.39	1.28	63.19	18.36	33.65	BDL

EnviroCare International Ltd.
A house of Inspection, Testing, Assessment & Consultancy

SN	Monitoring Locations	Concentration of different parameters in ambient air							
		SO_x	NO_x	O_3	CO	NH3	$PM_{2.5}$	PM_{10}	Pb
	91°58'9.32"E								
11	AAQM-11 (Kuipara, Baguan, Rawjan, Chattogram) 22°25'35.44"N 91°57'15.22"E	12.37	16.60	8.22	1.38	77.64	17.07	35.55	BDL
12	AAQM-12 (Goschi Area, Rawjan, Chattogram) 22°27'5.76"N 91°56'6.08"E	9.05	11.12	6.64	1.61	54.57	11.12	22.89	BDL
Unit		µg/m³	µg/m³	µg/m³	mg/m³	mg/m³	µg/m³	µg/m³	mg/m³
Monitoring Duration as per APCR'2022		-	24	24	-	8	8	24	8
Monitoring Principle		*High precision Electrochemical sensor*					*Light scattering technique*		*AAS*
Bangladesh Standard		80	80	100	5	NYS	65	150	0.5
IFC EHS Guidelines' 30 April 2007		20	200/1 hr.	100	NYS	NYS	25	50	NYS

*__Standard__: Air pollution Control Rules (__APCR__) On 26th July 2022; Vide S.R.O. NO. 255-Law/ 2022
*__Note__: This ambient air monitoring report was usually accomplished by- portable __OCEANUS AQM-09__ Machine; NYS=Not Yet set, BDL= Below Detection Limit

Envirocare International Ltd. Dhaka

Prepared By	***Reviewed By***	***Approved By***
Sharmin Sultana	Sanjoy Kumar Mondol	Shorov Roy
B.Sc. in Environmental Science and Resource Management &	B.Sc. in ESRM (MBSTU)	B.Sc. in ESRM (MBSTU)
MS in Environmental Science (MBSTU)	MS in Environmental Science (MBSTU)	MS in Environmental Science (BAU)
Consultant (Environment)	Technical Manager	Quality Manager

EnviroCare International Ltd.
A house of Inspection, Testing, Assessment &Consultancy

Ref: ECIL/2025/22-08/ANLM

Test Results of Noise Level Analysis

Name of Project	**: Implementation of Madunaghat—Moheshkhali 765kV Transmission Lines Project**
Description of Sample	: Ambient Noise Level (ANL)
Sample Collector	: EnviroCare Technical Team
Monitoring Date	: 20.07.2025-25.07.2025
Date of Analysis	: 26.07.2025-04.08.2025
Reporting Date	: 06.08.2025

Test Results

Location	Concentration Present (dBA)						Category
	Day			Night			
	L_{eq}	L_{max}	L_{min}	L_{eq}	L_{max}	L_{min}	
NL-1, (Nunachori Paschimpara, (Moheshkhali, Cox's Bazar) 21°39'29.32"N; 91°54'34.50"E	50.17	65.42	41.02	41.10	58.2	34.8	Residential Zone
NL-2, (Afjali para, Yunus Khali Road) 21°42'21.57"N; 91°55'20.36"E	52.35	68.6	39.2	39.26	57.3	33.0	Residential Zone
NL-3, (Jaliakhali, Pekua, Cox's Bazar) 21°48'26.29"N, 91°56'59.96"E	49.37	61.58	37.18	38.87	59.9	34.6	Residential Zone
NL-4, (9 no. word, Shekherkhil, Laljibon, Bashkhali, Chattogram) 21°55'8.54"N; 91°57'0.53"E	46.83	60.07	32.07	37.19	55.1	31.7	Silent Zone
NL-5, (Maizpara, 9 no. Shilcock, Bashkhali, Chattogram) 21°58'29.84"N; 91°56'38.76"E	51.29	67.54	43.14	42.73	60.7	35.5	Residential Zone
NL-6, (Moddhomanik Pathan, 4 no. Word, Bashkhali, Chattogram) 22° 3'8.32"N; 91°55'14.63"E	51.79	66.04	39.64	38.43	56.4	31.2	Residential Zone
NL-7, (Uttar Boilgaon, 2 no. Sadanpur, Bashkhali, Chattogram) 22° 8'20.15"N; 91°54'27.65"E	50.47	66.72	33.32	40.81	59.8	31.9	Residential Zone
NL-8, (Bilpur, Dumuria, Anowara, Chattogram) 22°13'18.07"N; 91°55'13.66"E	52.80	70.05	36.65	39.54	57.5	32.3	Residential Zone
NL-9, (6 no. Word, Poschim Perula, Borolia, Pothia, Chattogram) 22°18'0.83"N; 91°56'35.15"E	47.35	59.6	36.2	38.76	55.3	31.0	Silent Zone
NL-10, (In front of Tajpark, Collegepara, Kanungopara, Boalkhali, Chattogram) 22°22'49.66"N; 91°58'8.52"E	57.64	70.92	54.52	47.52	67.5	43.6	Mixed Zone
NL-11, (Kuipara, Baguan, Rawjan, Chattogram) 22°25'35.53"N; 91°57'16.97"E	48.27	65.52	32.12	38.50	56.3	32.5	Residential Zone
NL-12, (Goschi Area, Rawjan, Chattogram) 22°27'5.93"N; 91°56'5.05"E	50.17	68.42	34.02	38.65	56.3	31.1	Residential Zone

Bangladesh Standard	**Day Time**	**Night Time**
Industrial area	75	70
Commercial	70	60

Location	Concentration Present (dBA)						Category	
	Day			Night				
	L_{eq}	L_{max}	L_{min}	L_{eq}	L_{max}	L_{min}		
Mixed area							60	50
Residential area							55	45
Silent Area							50	40
World Bank / IFC Standard								
Industrial area							70	70
Residential; Intuitional; Educational							55	45

* Noise Pollution Control Rules 2006, Schedule 1 (Zone Based Noise Level Standard)

*Exceeds the Standard

Prepared By	***Reviewed By***	***Approved By***
Sharmin Sultana	Sanjoy Kumar Mondol	Shorov Roy
B.Sc. in Environmental Science and Resource Management & MS in Environmental Science (MBSTU)	B.Sc. in ESRM (MBSTU) MS in Environmental Science (MBSTU)	B.Sc. in ESRM (MBSTU) MS in Environmental Science (BAU)
Consultant (Environment)	Technical Manager	Quality Manager

Government of the People's Republic of Bangladesh
Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080116	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Cox`s Bazar, Upa:Maheshkhali
Care Taker: Envirocare International Ltd.(Sample : GW-01)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	12	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	3.44	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.33	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	1.2	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	0.22	mg/L	UVS	0.02
8	pH	6.5-8.5	8.1	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	100	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	15	mg/L	Gravimetric Method	-
11	Turbidity	10	60.2	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	Parves 24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Taslima Akhter Designation: Sample Analyzer	Taslima 24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	24/08/2025 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

Page 1 of 1

Government of the People's Republic of Bangladesh
Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02 9881927, Fax: 88-02 9882003 , Email: wqmso_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka — Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080117	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Cox's Bazar, Upa:Maheshkhali
Care Taker: Envirocare International Ltd.(Sample : GW-02)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	16	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	0.07	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.06	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	1.7	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	0.28	mg/L	UVS	0.02
8	pH	6.5-8.5	8.4	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	150	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	1	mg/L	Gravimetric Method	-
11	Turbidity	10	1.8	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Taslima Akhter Designation: Sample Analyzer	24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	24/08/2025 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

Page 1 of 1

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka — Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080118	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Cox`s Bazar, Upa:Pekua
Care Taker: Envirocare International Ltd.(Sample : GW-03)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	20	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	0.17	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	2.1	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	0.30	mg/L	UVS	0.02
8	pH	6.5-8.5	8.4	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	210	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	1	mg/L	Gravimetric Method	-
11	Turbidity	10	2.5	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	Parves 24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Taslima Akhter Designation: Sample Analyzer	Taslima 24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	24/08/2025 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

Page 1 of 1

Government of the People's Republic of Bangladesh
Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka — Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080119	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Banshkhali
Care Taker: Envirocare International Ltd.(Sample : GW-04)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	10	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	2.81	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	0.91	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	0.22	mg/L	UVS	0.02
8	pH	6.5-8.5	8.0	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	210	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	10	mg/L	Gravimetric Method	-
11	Turbidity	10	21.1	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by: Signature

1.) Name: S.M. Parves Talukder
Designation: Sample Analyzer
24/08/2025

2.) Name: Taslima Akhter
Designation: Sample Analyzer
24.08.2025

Countersigned/Approved by: Signature

1.) Name: Mita Sarker
Designation: Senior Chemist

2.) Name: Md. Biplab Hossain
Designation: Chief Chemist
24/08/2025
Md. Biplab Hossain
Chief Chemist
Department of Public Health Engineering
Central Laboratory Mohakhali, Dhaka

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Government of the People's Republic of Bangladesh
Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080120	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Banshkhali
Care Taker: Envirocare International Ltd.(Sample : GW-05)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	10	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	7.39	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.12	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	0.82	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	0.18	mg/L	UVS	0.02
8	pH	6.5-8.5	7.9	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	70	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	16	mg/L	Gravimetric Method	-
11	Turbidity	10	92.3	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	Parves 24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Taslima Akhter Designation: Sample Analyzer	Taslima 24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	24/08/2025 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080121	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Banshkhali
Care Taker: Envirocare International Ltd.(Sample : GW-06)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	12	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	4.85	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.38	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	1.0	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	0.40	mg/L	UVS	0.02
8	pH	6.5-8.5	7.7	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	90	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	13	mg/L	Gravimetric Method	-
11	Turbidity	10	51.4	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Countersigned/Approved by:
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer Signature: Parves 24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist Signature: 24/08/2025
2.) Name: Taslima Akhter Designation: Sample Analyzer Signature: Taslima 24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9661927, Fax: 88-02-9662003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080122	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Banshkhali
Care Taker: Envirocare International Ltd.(Sample : GW-07)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	10	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	0.33	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.55	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	1.2	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	0.36	mg/L	UVS	0.02
8	pH	6.5-8.5	7.6	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	75	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	2	mg/L	Gravimetric Method	-
11	Turbidity	10	4.2	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by: Signature

1.) Name: S.M. Parves Talukder
Designation: Sample Analyzer
24/08/2025

2.) Name: Taslima Akhter
Designation: Sample Analyzer
24.08.2025

Countersigned/Approved by: Signature

1.) Name: Mita Sarker
Designation: Senior Chemist

2.) Name: Md. Biplab Hossain
Designation: Chief Chemist
24/08/2025
Md. Biplab Hossain
Chief Chemist
Department of Public Health Engineering
Central Laboratory Mohakhali, Dhaka

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080123	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Anowara
Care Taker: Envirocare International Ltd.(Sample : GW-08)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	950	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	2.34	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.60	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	1.7	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	10.80	mg/L	UVS	0.02
8	pH	6.5-8.5	7.9	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	1480	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	1	mg/L	Gravimetric Method	-
11	Turbidity	10	22.8	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Countersigned/Approved by:
1.) Name: S.M. Parves Talukder Signature 24/08/2025	1.) Name: Mita Sarker
Designation: Sample Analyzer	Designation: Senior Chemist
2.) Name: Taslima Akhter 24.08.2025	2.) Name: Md. Biplab Hossain 24/08/2025
Designation: Sample Analyzer	Designation: Chief Chemist

Md. Biplab Hossain
Chief Chemist
Department of Public Health Engineering
Central Laboratory Mohakhali, Dhaka

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Government of the People's Republic of Bangladesh
Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080124	Sample Receiving date: 24-07-2025
Ref. Memo No. ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Boalkhali
Care Taker: Envirocare International Ltd.(Sample : GW-09)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	20	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	0.09	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	1.6	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	1.0	mg/L	UVS	0.02
8	pH	6.5-8.5	8.4	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	190	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	1	mg/L	Gravimetric Method	-
11	Turbidity	10	1.1	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Countersigned/Approved by:
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer Signature 24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist
2.) Name: Taslima Akhter Designation: Sample Analyzer 24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist 24/08/2025 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080125	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Ground Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Raozan
Care Taker: Envirocare International Ltd.(Sample : GW-10)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-24/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chloride	150-600	10	mg/L	Titrimetic	-
3	Copper (Cu)	1.0	0.03	mg/L	AAS	0.03
4	Iron (Fe)	0.3-1	2.56	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.35	mg/L	AAS	0.03
6	Nitrogen (Nitrate)	10.0	1.9	mg/L	UVS	0.10
7	Nitrogen (Nitrite)	<1.0	0.26	mg/L	UVS	0.02
8	pH	6.5-8.5	8.0	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	85	mg/L	Multimeter	-
10	Total Suspended Solid (TSS)	10	12	mg/L	Gravimetric Method	-
11	Turbidity	10	43.7	NTU	Turbidity Meter	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Countersigned/Approved by:
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer Signature 24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist Signature 24/08/2025
2.) Name: Taslima Akhter Designation: Sample Analyzer 24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Bangladesh, Phone: +88-02-7175845, Mobile: +88 01713034889
Email: info.beetlsl@gmail.com

Customer/Accounts/Office Copy

Physical/ Chemical/ Bacteriological Analysis of Groundwater Sample

Name of the Project	**: Implementation of Madunaghat–Moheshkhali 765kV Transmission Lines**
Name of the Client	**: INFRASTRUCTURE INVESTMENT FACILITATION COMPANY**
Description of sample	: Groundwater
Sample Collector	: Collected by EnviroCare Technical Team
Analyzed By	: BEETLSL Laboratory
Sample Collection Date	: 20.07.2025

LABORATORY TEST RESULTS

SN	Parameters	Unit	Analysis Method	Concentration					BD Standard ECR '2023	WHO Standard '2024
				GW-1	GW-2	GW-3	GW-4	GW-5		
1	Total Coliform (TC)	CFU/100	MFM	0	0	0	0	0	0	0
2	Faecal Coliform (FC)	CFU/100	MFM	0	0	0	0	0	0	0
3	Cyanide (Cn)	mg/l	Colorimetry	BDL	BDL	BDL	BDL	BDL	0.05	NYS
4	Lead (Pb)	mg/l	AAS	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NYS
5	Cadmium (Cd)	mg/l	AAS	BDL	0.0001	BDL	0.0001	0.0002	0.003	NYS
6	Chromium (Cr)	mg/l	AAS	BDL	BDL	0.002	BDL	0.002	0.05	NYS

***NOTE**: ECR =Environmental Conservation Rules, NYS =Not Yet Set, MFM=Membrane Filtration Method, AAS= Atomic Absorption Spectrophotometry, BDL= Below Detection Level

Lab Test Performed by	Reviewed and checked by	Approved By
Mahadi Hasan Executive (Environmental Lab), BEETLSL	**Md. Nasim Reza** Environmental Monitoring Officer (Executive), BEETLSL	**Dr. Fatima Akter** Director, BEETLSL
17.08.2025	17.08.2025	17.08.2025

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Mamun Plaza (First Floor)31, Shahid Nazrul Islam sharak, Hatkhola, Tikatuli, Dhaka - 1203,
Bangladesh, Phone: +88-02-7175845, Mobile: +88 01713034889
Email: info.beetlsl@gmail.com

Customer/Accounts/Office Copy

Physical/ Chemical/ Bacteriological Analysis of Groundwater Sample

Name of the Project	**: Implementation of Madunaghat–Moheshkhali 765kV Transmission Lines**
Name of the Client	**: INFRASTRUCTURE INVESTMENT FACILITATION COMPANY**
Description of sample	: Groundwater
Sample Collector	: Collected by EnviroCare Technical Team
Analyzed By	: BEETLSL Laboratory
Sample Collection Date	: 20.07.2025

LABORATORY TEST RESULTS

SN	Parameters	Unit	Analysis Method	Concentration					BD Standard ECR '2023	WHO Standard '2024
				GW-6	GW-7	GW-8	GW-9	GW-10		
1	Total Coliform (TC)	CFU/100	MFM	0	0	0	0	0	0	0
2	Faecal Coliform (FC)	CFU/100	MFM	0	0	0	0	0	0	0
3	Cyanide (Cn)	mg/l	Colorimetry	BDL	BDL	BDL	BDL	BDL	0.05	NYS
4	Lead (Pb)	mg/l	AAS	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NYS
5	Cadmium (Cd)	mg/l	AAS	0.0018	BDL	0.002	0.0022	0.002	0.003	NYS
6	Chromium (Cr)	mg/l	AAS	0.012	BDL	0.018	0.016	0.018	0.05	NYS

***NOTE**: ECR =Environmental Conservation Rules, NYS =Not Yet Set, MFM=Membrane Filtration Method, AAS= Atomic Absorption Spectrophotometry, BDL= Below Detection Level

Lab Test Performed by	Reviewed and checked by	Approved By
Mahadi Hasan Executive (Environmental Lab), BEETLSL	**Md. Nasim Reza** Environmental Monitoring Officer (Executive), BEETLSL	**Dr. Fatima Akter** Director, BEETLSL
17.08.2025	17.08.2025	17.08.2025

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka — Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080126	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Cox's Bazar, Upa:Maheshkhali
Care Taker: Envirocare International Ltd.(Sample : SW-01)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.002	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	20	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	4.85	mg/L	Multimeter	"
4	Nitrogen (Nitrate)	10.0	0.32	mg/L	UVS	0.10
5	pH	6.5-8.5	8.0	-	pH Meter	"
6	Phosphate	6.0	0.65	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	3	mg/L	Gravimetric Method	"

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Countersigned/Approved by:
1.) Name: S.M. Parves Talukder — Signature — 24/08/2025	1.) Name: Mita Sarker
Designation: Sample Analyzer	Designation: Senior Chemist
2.) Name: Taslima Akhter — 24.08.2025	2.) Name: Md. Biplab Hossain — 24/08/2025
Designation: Sample Analyzer	Designation: Chief Chemist

Md. Biplab Hossain
Chief Chemist
Department of Public Health Engineering
Central Laboratory Mohakhali, Dhaka

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Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080127	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Cox's Bazar, Upa:Pekua
Care Taker: Envirocare International Ltd.(Sample : SW-02)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.003	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	12	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	5.60	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.70	mg/L	UVS	0.10
5	pH	6.5-8.5	7.8	-	pH Meter	-
6	Phosphate	6.0	0.60	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	45	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	Parves 24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	B Hosen 24/08/2025
2.) Name: Taslima Akhter Designation: Sample Analyzer	Taslima 24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Government of the People's Republic of Bangladesh
Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080128	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Cox`s Bazar, Upa:Pekua
Care Taker: Envirocare International Ltd.(Sample : SW-03)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	36	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	4.90	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.90	mg/L	UVS	0.10
5	pH	6.5-8.5	7.8	-	pH Meter	-
6	Phosphate	6.0	1.0	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	16	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	24/08/2025
2.) Name: Taslima Akhter Designation: Sample Analyzer	24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080129	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Banshkhali
Care Taker: Envirocare International Ltd.(Sample : SW-04)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.002	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	16	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	5.85	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.42	mg/L	UVS	0.10
5	pH	6.5-8.5	7.6	-	pH Meter	-
6	Phosphate	6.0	0.62	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	20	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Taslima Akhter Designation: Sample Analyzer	24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	24/08/2025 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080130	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Banshkhali
Care Taker: Envirocare International Ltd.(Sample : SW-05)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.002	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	32	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	5.60	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.43	mg/L	UVS	0.10
5	pH	6.5-8.5	7.8	-	pH Meter	-
6	Phosphate	6.0	0.64	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	210	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Countersigned/Approved by:
Signature	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer 24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist
2.) Name: Taslima Akhter Designation: Sample Analyzer 24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist 24/08/2025 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02 9881927, Fax: 88-02 9882003, Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka — Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080131	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd , Dhaka.	Dist:Chittagong, Upa:Anowara
Care Taker: Envirocare International Ltd.(Sample : SW-06)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.002	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	20	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	5.70	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.61	mg/L	UVS	0.10
5	pH	6.5-8.5	7.7	-	pH Meter	-
6	Phosphate	6.0	0.48	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	15	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Countersigned/Approved by:
1.) Name: S.M. Parves Talukder — Signature 24/08/2025	1.) Name: Mita Sarker
Designation: Sample Analyzer	Designation: Senior Chemist
2.) Name: Taslima Akhter 24.08.2025	2.) Name: Md. Biplab Hossain — 24/08/2025
Designation: Sample Analyzer	Designation: Chief Chemist — Md. Biplab Hossain, Chief Chemist, Department of Public Health Engineering, Central Laboratory Mohakhali, Dhaka

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080132	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Patiya
Care Taker: Envirocare International Ltd.(Sample : SW-07)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	28	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	5.90	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.40	mg/L	UVS	0.10
5	pH	6.5-8.5	7.8	-	pH Meter	-
6	Phosphate	6.0	0.71	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	12	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Taslima Akhter Designation: Sample Analyzer	24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	24/08/2025 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080133	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Raozan
Care Taker: Envirocare International Ltd.(Sample : SW-08)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	28	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	5.60	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.50	mg/L	UVS	0.10
5	pH	6.5-8.5	7.9	-	pH Meter	-
6	Phosphate	6.0	0.85	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	16	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	Parves 24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Taslima Akhter Designation: Sample Analyzer	24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	24/08/2025 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9883927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080134	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Raozan
Care Taker: Envirocare International Ltd.(Sample : SW-09)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	36	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	5.45	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.91	mg/L	UVS	0.10
5	pH	6.5-8.5	7.6	-	pH Meter	-
6	Phosphate	6.0	0.72	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	7	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	24/8/2025
2.) Name: Taslima Akhter Designation: Sample Analyzer	24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9883927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080134	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Raozan
Care Taker: Envirocare International Ltd.(Sample : SW-09)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	36	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	5.45	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.91	mg/L	UVS	0.10
5	pH	6.5-8.5	7.6	-	pH Meter	-
6	Phosphate	6.0	0.72	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	7	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	24/8/2025
2.) Name: Taslima Akhter Designation: Sample Analyzer	24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 160/ CC, DPHE, CL, Dhaka

Date: 24-08-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025080135	Sample Receiving date: 24-07-2025
Ref. Memo No: ECIL/2025/Nill & Dated: 24-07-2025	Sample Source: Surface Water
Sent by:Dipon Biswas ,Accounts & Admin Officer , Envirocare International Ltd., Dhaka.	Dist:Chittagong, Upa:Raozan
Care Taker: Envirocare International Ltd.(Sample : SW-10)	Union:, Vill.:
Sample Collection date:	Date of Testing: 24/07/2025-21/08/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.002	mg/L	AAS	0.001
2	Chemical Oxygen Demand (COD)	4.0	16	mg/L	CRM	4.0
3	Dissolved Oxygen (DO)	6.0	5.90	mg/L	Multimeter	-
4	Nitrogen (Nitrate)	10.0	0.63	mg/L	UVS	0.10
5	pH	6.5-8.5	7.8	-	pH Meter	-
6	Phosphate	6.0	0.78	mg/L	UVS	0.10
7	Total Suspended Solid (TSS)	10	10	mg/L	Gravimetric Method	-

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	24/08/2025	1.) Name: Mita Sarker Designation: Senior Chemist	24/08/2025
2.) Name: Taslima Akhter Designation: Sample Analyzer	24.08.2025	2.) Name: Md. Biplab Hossain Designation: Chief Chemist	Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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TRAINING & LAB SERVICES LTD.
Mamun Plaza (First Floor)31, Shahid Nazrul Islam sharak, Hatkhola, Tikatuli, Dhaka - 1203,
Bangladesh, Phone: +88-02-7175845, Mobile: +88 01713034889
Email: info.beetlsl@gmail.com

Customer/Accounts/Office Copy

Physical/ Chemical/ Bacteriological Analysis of Surface Water Sample

Name of the Project	**: Implementation of Madunaghat–Moheshkhali 765kV Transmission Lines**
Name of the Client	**: INFRASTRUCTURE INVESTMENT FACILITATION COMPANY**
Description of sample	: Surface Water
Sample Collector	: Collected by EnviroCare Technical Team
Analyzed By	: BEETLSL Laboratory
Sample Collection Date	: 20.07.2025- 21.07.2025

LABORATORY TEST RESULTS

SN	Parameters	Unit	Analysis Method	Concentration				BD Standard ECR '2023	WHO Standard '2024
				SW-1	SW-2	SW-3	SW-4		
1	Total Coliform (TC)	CFU/100ml	MFM	250	243	285	290	1000	400 *MPN/100 ml
2	Fecal Coliform (FC)	CFU/100ml	MFM	115	175	138	159	200	NYS
3	Oil & Grease	mg/L	(APHA 23RD EDN. 2017 (5520-B)	2.1	2.7	2.3	2.5	0.14	10
4	Phenols	mg/L	Gas chromatography	BDL	BDL	BDL	BDL	0.05	NYS
5	Cadmium (Cd)	mg/L	AAS	0.0002	0.0004	0.0001	0.0002	0.005	NYS
6	Cyanide (CN)	mg/L	Colorimetry	BDL	BDL	BDL	BDL	0.007	NYS
7	Hexavalent Cr	mg/L	AAS	BDL	BDL	BDL	BDL	0.05	NYS
8	Lead (Pb)	mg/L	AAS	<0.1	<0.1	<0.1	<0.1	0.1	NYS
9	Mercury (Hg)	mg/L	AAS	BDL	BDL	BDL	BDL	0.004	NYS

***NOTE**: ECR =Environmental Conservation Rules, NYS =Not Yet Set, MFM=Membrane Filtration Method, AAS= Atomic Absorption Spectrophotometry, BDL= Below Detection Level, *MPN = Most Probable Number

Lab Test Performed by	Reviewed and checked by	Approved By
Mahadi Hasan Executive (Environmental Lab), BEETLSL	**Md. Nasim Reza** Environmental Monitoring Officer (Executive), BEETLSL	**Dr. Fatima Akter** Director, BEETLSL
17.08.2025	17.08.2025	17.08.2025

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Mamun Plaza (First Floor)31, Shahid Nazrul Islam sharak, Hatkhola, Tikatuli, Dhaka - 1203,
Bangladesh, Phone: +88-02-7175845, Mobile: +88 01713034889
Email: info.beetlsl@gmail.com

Customer/Accounts/Office Copy

Physical/ Chemical/ Bacteriological Analysis of Surface Water Sample

Name of the Project	**: Implementation of Madunaghat–Moheshkhali 765kV Transmission Lines**
Name of the Client	**: INFRASTRUCTURE INVESTMENT FACILITATION COMPANY**
Description of sample	: Surface Water
Sample Collector	: Collected by EnviroCare Technical Team
Analyzed By	: BEETLSL Laboratory
Sample Collection Date	: 22.07.2025- 23.07.2025

LABORATORY TEST RESULTS

SN	Parameters	Unit	Analysis Method	Concentration				BD Standard ECR '2023	WHO Standard '2024
				SW-5	SW-6	SW-7	SW-8		
1	Total Coliform (TC)	CFU/100ml	MFM	257	1600	1350	1090	1000	400 *MPN/100 ml
2	Fecal Coliform (FC)	CFU/100ml	MFM	108	190	235	220	200	NYS
3	Oil & Grease	mg/L	(APHA 23RD EDN. 2017 (5520-B)	2.3	3.4	3.5	3.1	0.14	10
4	Phenols	mg/L	Gas chromatography	BDL	BDL	BDL	BDL	0.05	NYS
5	Cadmium (Cd)	mg/L	AAS	0.0001	0.009	0.008	0.006	0.005	NYS
6	Cyanide (CN)	mg/L	Colorimetry	BDL	BDL	BDL	BDL	0.007	NYS
7	Hexavalent Cr	mg/L	AAS	BDL	BDL	BDL	BDL	0.05	NYS
8	Lead (Pb)	mg/L	AAS	0.12	0.8	0.19	0.2	0.1	NYS
9	Mercury (Hg)	mg/L	AAS	BDL	BDL	BDL	BDL	0.004	NYS

***NOTE**: ECR =Environmental Conservation Rules, NYS =Not Yet Set, MFM=Membrane Filtration Method, AAS= Atomic Absorption Spectrophotometry, BDL= Below Detection Level, *MPN = Most Probable Number

Lab Test Performed by	Reviewed and checked by	Approved By
Mahadi Hasan Executive (Environmental Lab), BEETLSL	**Md. Nasim Reza** Environmental Monitoring Officer (Executive), BEETLSL	**Dr. Fatima Akter** Director, BEETLSL
17.08.2025	17.08.2025	17.08.2025

BANGLADESH ENVIRONMENTAL ENGINEERING TRAINING & LAB SERVICES LTD.

Mamun Plaza (First Floor)31, Shahid Nazrul Islam sharak, Hatkhola, Tikatuli, Dhaka - 1203,
Bangladesh, Phone: +88-02-7175845, Mobile: +88 01713034889
Email: info.beetlsl@gmail.com

Customer/Accounts/Office Copy

Physical/ Chemical/ Bacteriological Analysis of Surface Water Sample

Name of the Project	**: Implementation of Madunaghat–Moheshkhali 765kV Transmission Lines**
Name of the Client	**: INFRASTRUCTURE INVESTMENT FACILITATION COMPANY**
Description of sample	: Surface Water
Sample Collector	: Collected by EnviroCare Technical Team
Analyzed By	: BEETLSL Laboratory
Sample Collection Date	: 23.07.2025

LABORATORY TEST RESULTS

SN	Parameters	Unit	Analysis Method	Concentration		BD Standard ECR '2023	WHO Standard '2024
				SW-9	SW-10		
1	Total Coliform (TC)	CFU/100ml	MFM	215	300	1000	400 *MPN/100 ml
2	Total Cr	mg/L	AAS	BDL	BDL	0.1	NYS
3	Lead (Pb)	mg/L	AAS	0.05	0.03	0.1	NYS
4	Mercury (Hg)	mg/L	AAS	BDL	BDL	0.004	NYS
5	Biochemical Oxygen Demand (BOD5)	mg/L	5 days Incubation with 20° C	5.5	4.7	6 or less	30
6	NH4-N	mg/L	colorimetric	0.002	0.005	0.3	NYS
7	Total Dissolved Solid (TDS)	mg/L	Multimeter	700	400	1000	NYS

***NOTE**: ECR =Environmental Conservation Rules, NYS =Not Yet Set, MFM=Membrane Filtration Method, AAS= Atomic Absorption Spectrophotometry, BDL= Below Detection Level, *MPN = Most Probable Number

Lab Test Performed by	Reviewed and checked by	Approved By
Mahadi Hasan Executive (Environmental Lab), BEETLSL	**Md. Nasim Reza** Environmental Monitoring Officer (Executive), BEETLSL	**Dr. Fatima Akter** Director, BEETLSL
17.08.2025	17.08.2025	17.08.2025

BANGLADESH INSTITUTE OF NUCLEAR AGRICULTURE
B.A.U. CAMPUS, MYMENSINGH, BANGLADESH.
Phone: (091) 67834
Fax: 880-91-67842.
Email: dg@bina.gov.bd

Soil Science Division

Requested by : Accounts & Admin Officer, EnviroCare International Ltd.
References : Application Date: 24/07/2025
Types of Sample : Soil Sample (Surface Soil)
Sample number : 10

Date: 07-08-2025

Analytical Result

SL No.	Sample ID.	Total Iron (Fe) ppm	Total Zinc (Zn) ppm	Total Copper (Cu) ppm	Total Lead (Pb) ppm	Total Nickle (Ni) ppm
1	SQ-1	195.52	52.45	9.62	10.95	20.66
2	SQ-2	125.42	41.25	16.53	13.16	26.90
3	SQ-3	128.18	52.00	25.29	17.49	29.78
4	SQ-4	70.85	67.55	20.57	16.51	29.82
5	SQ-5	385.89	134.65	37.04	22.95	47.32
6	SQ-6	87.86	54.70	24.79	16.24	36.32
7	SQ-7	57.49	57.20	16.01	14.07	27.38
8	SQ-8	182.46	60.60	25.61	19.24	42.97
9	SQ-9	327.41	75.00	30.49	21.50	39.14
10	SQ-10	366.81	61.85	19.47	13.81	33.62

(Dr. Md. Mahbubul Alam Tarafder)
Principal Scientific Officer & Head

CamScanner

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Bangladesh, Phone: +88-02-7175845, Mobile: +88 01713034889
Email: info.beetlsl@gmail.com

Customer/Accounts/Office Copy

Physical/ Chemical/ Bacteriological Analysis of Surface Soil Quality

Name of the Project	**: Implementation of Madunaghat–Moheshkhali 765kV Transmission Lines Project**
Description of sample	: Surface Soil
Sample Collector	**:** Collected by EnviroCare Technical Team
Analyzed By	**:** BEETLSL Laboratory
Sample Collection Date	**:** 20.07.2025-25.07.2025

LABORATORY TEST RESULTS

Sl. No.	Parameter	Unit	Concentration									Dutch Standard*
			SQ-1	SQ-2	SQ-3	SQ-4	SQ-5	SQ-6	SQ-7	SQ-8	SQ-9	SQ-10	
1.	Arsenic (As)	PPM	8.54	15.32	10.65	8.41	11.15	9.55	17.26	15.17	10.22	12.35	29
2.	Mercury (Hg)	PPM	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3

***NOTE**: The size of sand particles ranges between 2.00 and 0.05 mm; silt, 0.05 mm and 0.002 mm; and clay less than 0.002 mm, AAS= Atomic Absorption Spectrophotometry

Lab Test Performed by	Reviewed and checked by	Approved By
Mahadi Hasan Executive (Environmental Lab), BEETLSL	**Md. Nasim Reza** Environmental Monitoring Officer (Executive), BEETLSL	**Dr. Fatima Akter** Director, BEETLSL
12.08.2025	12.08.2025	12.08.2025

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Email: info.beetlsl@gmail.com

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Physical/ Chemical/ Bacteriological Analysis of Surface Soil Quality

Name of the Project	**: Implementation of Madunaghat–Moheshkhali 765kV Transmission Lines Project**
Description of sample	: Surface Soil
Sample Collector	**:** Collected by EnviroCare Technical Team
Analyzed By	**:** BEETLSL Laboratory
Sample Collection Date	**:** 20.07.2025-25.07.2025

LABORATORY TEST RESULTS

Sl. No.	Parameter	Unit	Concentration									Dutch Standard*
			SQ-1	SQ-2	SQ-3	SQ-4	SQ-5	SQ-6	SQ-7	SQ-8	SQ-9	SQ-10	
1.	Arsenic (As)	PPM	8.54	15.32	10.65	8.41	11.15	9.55	17.26	15.17	10.22	12.35	29
2.	Mercury (Hg)	PPM	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3

***NOTE**: The size of sand particles ranges between 2.00 and 0.05 mm; silt, 0.05 mm and 0.002 mm; and clay less than 0.002 mm, AAS= Atomic Absorption Spectrophotometry

Lab Test Performed by	Reviewed and checked by	Approved By
Mahadi Hasan Executive (Environmental Lab), BEETLSL	**Md. Nasim Reza** Environmental Monitoring Officer (Executive), BEETLSL	**Dr. Fatima Akter** Director, BEETLSL
12.08.2025	12.08.2025	12.08.2025

Calibration Certificate

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Accredited Laboratory

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Corporate Office
Rabeya Commercial Complex, 33/kha (5th Floor)
Section-6, Mirpur Circle-10, Dhaka-1216, Bangladesh
Cell: +8801712 789 321

Laboratory Location
House # 427, Road # 6/2
Shahinbagh Tejgaon, Dhaka-1215
Tel: +88-02-48117267, +88 01919 958147-50
E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Certificate No. 02505059950
Issue Date 06/05/2025

Customer Details:

Name	**Envirocare International Ltd.**
Address	House No # 09, Road No # 06, Sector # 12, Uttara, Dhaka, Bangladesh.
Tel	+880 1533 904911
E-mail	shorove.az.08@gmail.com

Details of Unit Under Calibration (UUC):

Description	Sound Level Meter
Manufacturer	Smart Sensor
Model/Type	AR844
Serial Number	N/P
ID No.	**EIL/SLM-03**
Range/working Range (dB)	35 to 130
Least Count (dB)	0.1
Accuracy	As Per Instrument
Location of Calibration	Laboratory
Visual Inspection	OK
Date of Calibration	05/05/2025
Suggested Due Date	04/05/2026
Calibration Procedure	The calibration had been performed in accordance with calibration procedure SCS.WI-09M (Procedure based on comparision method).
Calibration Result	The details of standard equipment used for calibration & result of calibration are given in page 2.
Conclusion	For the status of measurements please refer to the guidance notes.

Environment: (certified against calibrated digital temperature & humidity meter)

Temperature (°C)	20±2
Relative Humidity (%RH)	40 to 60

Change in temperature and relative humidity of the Laboratory during the calibration was less than 0.3°C per hour and 5.0% per 4 hours respectively.

This certificate is issued strictly in accordance with the requirements of ISO 17025:2017. All calibration equipments are traceable to the International Standards . Documentary evidence is available upon request.

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Rabeya Commercial Complex, 33/kha (5th Floor)
Section-6, Mirpur Circle-10, Dhaka-1216, Bangladesh
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Laboratory Location
House # 427, Road # 6/2
Shahinbagh Tejgaon, Dhaka-1215
Tel: +88-02-48117267, +88 01919 958147-50
E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Details of Standard Equipment Used for Calibration:

Sl. No.	Description	Make	Inst. Sl. /ID NO.	Certificate No.	Validity	Calibrated By
01	Environment Meter	Suja	SCS/EMM/01	CI/06/2024/109/DIL /08	29/Jun/2025	DIL
02	Digital Thermo Hygrometer	CEM	SCS/DL/01	QSI/3966/24/07	15/07/2025	QSI

Guidance Notes:

Status A The measurement is within tolerance, due allowances having been made for the uncertainty of the measurement.

Status B The measurement may be out of tolerance, due allowances having been made for the uncertainty of the measurement.

Status C The measurement is out of tolerance, due allowances having been made for the uncertainty of the measurement.

Status D No conclusion can be drawn, because the standard(s) do(es) not specify a tolerance for this measurement.

OBSERVATION:

Sound Weighting: (verified against calibrated master equipment)

Sl. No.	Description	Standard Value (dB)	U.U.C. Value (dB)	Error (dB)	Tolerance (dB)	Status	Uncertainty (dB)
01	Before Adjustment	94.0	91.1	-2.9	N/S	D	±1.2
02		114.0	109.5	-4.5	N/S	D	
03	After Adjustment	94.0	94.0	0.0	N/S	D	
04		114.0	114.1	0.1	N/S	D	

The overall uncertainty shall be calculated as per ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level.

Notes:
1. The values mentioned above are the mean readings.
2. Adjustment was done during the calibration.
3. Any section marked, "N/A" means Not Applicable, "N/P" means Not Provided, "N/R" means Not Readable, "N/S" means Not Specified.

Calibrated By:

Md. Mobinul Islam
(Sr. Calibration Engineer)

Issued By:

Md. Arman Ahmed Razu
(Technical Manager)

End of Calibration Certificate

02505059950

Page 2 of 2

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Section-6, Mirpur Circle-10, Dhaka-1216, Bangladesh
Cell: +8801712 789 321

Laboratory Location
House # 427, Road # 6/2
Shahinbagh Tejgaon, Dhaka-1215
Tel: +88-02-48117267, +88 01919 958147-50
E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Certificate No. 02505059945
Issue Date 06/05/2025

Customer Details:

Name	**Envirocare International Ltd.**
Address	House No # 09, Road No # 06, Sector # 12, Uttara, Dhaka, Bangladesh.
Tel	+880 1533 904911
E-mail	shorove.az.08@gmail.com

Details of Unit Under Calibration (UUC):

Description	Sound Level Meter
Manufacturer	Lutron
Model/Type	SL-4012
Serial Number	I.412780
ID No.	**EIL/SLM-01**
Range/working Range (dB)	35 to 130
Least Count (dB)	0.1
Accuracy	As Per Instrument
Location of Calibration	Laboratory
Visual Inspection	OK
Date of Calibration	05/05/2025
Suggested Due Date	04/05/2026
Calibration Procedure	The calibration had been performed in accordance with calibration procedure SCS.WI-09M (Procedure based on comparision method).
Calibration Result	The details of standard equipment used for calibration & result of calibration are given in page 2.
Conclusion	For the status of measurements please refer to the guidance notes.

Environment: (certified against calibrated digital temperature & humidity meter)

Temperature (°C)	20±2
Relative Humidity (%RH)	40 to 60

Change in temperature and relative humidity of the Laboratory during the calibration was less than 0.3°C per hour and 5.0% per 4 hours respectively.

This certificate is issued strictly in accordance with the requirements of ISO 17025:2017. All calibration equipments are traceable to the International Standards . Documentary evidence is available upon request.

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Cell: +8801712 789 321

Laboratory Location
House # 427, Road # 6/2
Shahinbagh Tejgaon, Dhaka-1215
Tel: +88-02-48117267, +88 01919 958147-50
E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Details of Standard Equipment Used for Calibration:

Sl. No.	Description	Make	Inst. Sl. /ID NO.	Certificate No.	Validity	Calibrated By
01	Environment Meter	Suja	SCS/EMM/01	CI/06/2024/109/DIL /08	29/Jun/2025	DIL
02	Digital Thermo Hygrometer	CEM	SCS/DL/01	QSI/3966/24/07	15/07/2025	QSI

Guidance Notes:

Status A The measurement is within tolerance, due allowances having been made for the uncertainty of the measurement.

Status B The measurement may be out of tolerance, due allowances having been made for the uncertainty of the measurement.

Status C The measurement is out of tolerance, due allowances having been made for the uncertainty of the measurement.

Status D No conclusion can be drawn, because the standard(s) do(es) not specify a tolerance for this measurement.

OBSERVATION:

Sound **Weighting:** (verified against calibrated master equipment)

Sl. No.	Description	Standard Value (dB)	U.U.C. Value (dB)	Error (dB)	Tolerance (dB)	Status	Uncertainty (dB)
01	Before Adjustment	94.0	91.9	-2.1	N/S	D	±1.2
02		114.0	108.6	-5.4	N/S	D	
03	After Adjustment	94.0	94.0	0.0	N/S	D	
04		114.0	113.9	-0.1	N/S	D	

The overall uncertainty shall be calculated as per ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level.

Notes:
1. The values mentioned above are the mean readings.
2. Adjustment was done during the calibration.
3. Any section marked, "N/A" means Not Applicable, "N/P" means Not Provided, "N/R" means Not Readable, "N/S" means Not Specified.

Calibrated By:

Md. Mobinul Islam
(Sr. Calibration Engineer)

Issued By: Calibration Service Private Limited Standard Dhaka

Md. Ayman Ahmed Razu
(Technical Manager)

End of Calibration Certificate

02505059945

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Cell: +8801712 789 321

Laboratory Location
House # 427, Road # 6/2
Shahinbagh Tejgaon, Dhaka-1215
Tel: +88-02-48117267, +88 01919 958147-50
E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Certificate No. 02505059948
Issue Date 06/05/2025

Customer Details:

Name	**Envirocare International Ltd.**
Address	House No # 09, Road No # 06, Sector # 12, Uttara, Dhaka, Bangladesh.
Tel	+880 1533 904911
E-mail	shorove.az.08@gmail.com

Details of Unit Under Calibration (UUC):

Description	Air Quality Monitor System
Manufacturer	Henan Oceanus Import & Export co.,Ltd
Model/Type	AQM-09
Serial Number	OC202203252070031
ID No.	**EIL/AQM-02**
Range/working Range	Ref on Obs
Least Count	Ref on Obs
Accuracy	As Per Instrument
Location of Calibration	Laboratory
Visual Inspection	OK
Date of Calibration	05/05/2025
Suggested Due Date	04/05/2026
Calibration Procedure	The calibration had been performed in accordance with calibration procedure COP/SCS/115 (Procedure based on Comparision Method).
Calibration Result	The details of standard equipment used for calibration & result of calibration are given in page 2 to 4.
Conclusion	For the status of measurements please refer to the guidance notes.

Environment: (certified against calibrated digital temperature & humidity meter)

Temperature (°C)	25±3
Relative Humidity (%RH)	40 to 60

Change in temperature and relative humidity of the Laboratory during the calibration was less than 0.3°C per hour and 5.0% per 4 hours respectively.

This certificate is issued strictly in accordance with the requirements of ISO 17025:2017. All calibration equipments are traceable to the International Standards . Documentary evidence is available upon request.

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Rabeya Commercial Complex, 33/kha (5th Floor)
Section-6, Mirpur Circle-10, Dhaka-1216, Bangladesh
Cell: +8801712 789 321

Laboratory Location
House # 427, Road # 6/2
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CERTIFICATE of CALIBRATION

Details of Standard Equipment Used for Calibration:

Sl. No.	Description	Make	Inst. Sl. /ID NO.	Certificate No.	Validity	Calibrated By
01	Carbon Oxide Meter	EXTECH	SCS/COM/01	QSI/1152/24/07	15/07/2025	QSI
02	Carbon Monoxide Meter	Smart Sensor	SCS/CMM/01	QSI/1155/24/07	15/07/2025	QSI
03	Portable Flue Gas Analyzer	LOOBO	SCS/PFGA/01	QSI/1158/24/07	15/07/2025	QSI
04	RTD with Indicator	Eurotherm/ Tempsens	SCS/RTD/01	QSI/3963/24/07	15/07/2025	QSI
05	Process Calibrator	Fluke	SCS/PC/01	QSI/4013/24/07	15/07/2025	QSI
06	Digital Thermo Hygrometer	CEM	SCS/DL/01	QSI/3966/24/07	15/07/2025	QSI

Guidance Notes:

Status A The measurement is within tolerance, due allowances having been made for the uncertainty of the measurement.
Status B The measurement may be out of tolerance, due allowances having been made for the uncertainty of the measurement.
Status C The measurement is out of tolerance, due allowances having been made for the uncertainty of the measurement.
Status D No conclusion can be drawn, because the standard(s) do(es) not specify a tolerance for this measurement.

OBSERVATION:

Temperature: (verified against calibrated instruments)

Sl. No.	Standard Value (°C)	U.U.C. Value (°C)	Error (°C)	Tolerance	Status	Uncertainty (°C)
01	-10.12	-10.0	0.12	N/S	D	±0.20
02	0.02	0.0	-0.02	N/S	D	
03	9.83	10.0	0.17	N/S	D	±0.30
04	19.72	20.0	0.28	N/S	D	
05	29.61	30.0	0.39	N/S	D	
06	49.49	50.0	0.51	N/S	D	

Humidity: (verified against calibrated instruments)

Sl. No.	Standard Value (%)	U.U.C. Value (%)	Error (%)	Tolerance	Status	Uncertainty (%)
01	19.9	20.0	0.1	N/S	D	±1.0
02	29.8	30.0	0.2	N/S	D	
03	39.6	40.0	0.4	N/S	D	
04	49.3	50.0	0.7	N/S	D	
05	69.0	70.0	1.0	N/S	D	
06	88.8	90.0	1.2	N/S	D	

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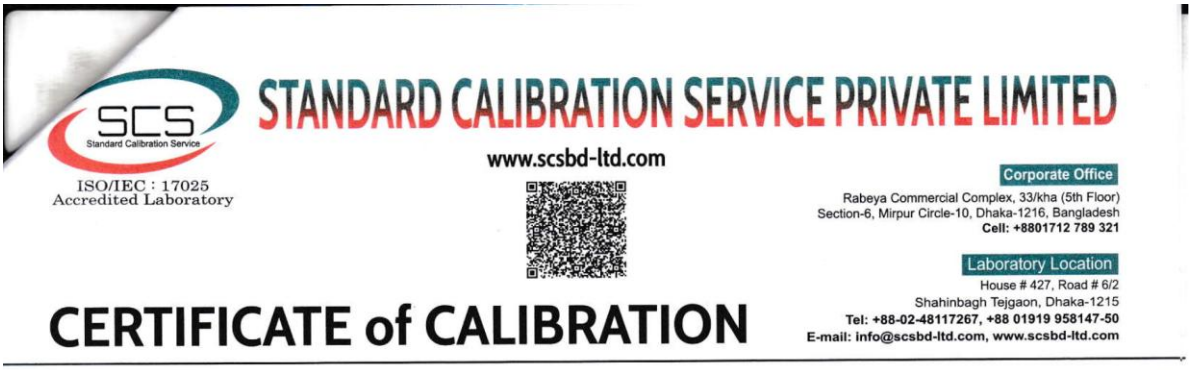

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Rabeya Commercial Complex, 33/kha (5th Floor)
Section-6, Mirpur Circle-10, Dhaka-1216, Bangladesh
Cell: +8801712 789 321

Laboratory Location
House # 427, Road # 6/2
Shahinbagh Tejgaon, Dhaka-1215
Tel: +88-02-48117267, +88 01919 958147-50
E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Carbon Monoxide CO :(Upto 10 ppm)

Sl. No.	Target Value (ppm)	Actual Value (ppm)	Error	Tolerance	Status	Uncertainty
01	0	0.0	0.0	N/S	D	---
02	1	1.0	0.0	N/S	D	±0.05 % of rdg.
03	2	1.9	0.1	N/S	D	±0.05 % of rdg.
04	5	4.9	0.1	N/S	D	±0.05 % of rdg.
05	8	7.7	0.3	N/S	D	±0.05 % of rdg.

Nitrogen Dioxide NO_2 :(Upto 500 ppb)

Sl. No.	Target Value (ppb)	Actual Value (ppb)	Error	Tolerance	Status	Uncertainty
01	0	0.0	0.0	N/S	D	---
02	100	100.3	-0.3	N/S	D	±0.05 % of rdg.
03	200	200.8	-0.8	N/S	D	±0.05 % of rdg.
04	300	301.1	-1.1	N/S	D	±0.05 % of rdg.
05	450	451.4	-1.4	N/S	D	±0.05 % of rdg.

Ozone O_3 :(upto 10 ppm)

Sl. No.	Target Value (ppm)	Actual Value (ppm)	Error	Tolerance	Status	Uncertainty
01	0	0.0	0.0	N/S	D	---
02	1	1.0	0.0	N/S	D	±0.05 % of rdg.
03	2	2.1	-0.1	N/S	D	±0.05 % of rdg.
04	5	5.2	-0.2	N/S	D	±0.05 % of rdg.
05	8	8.2	-0.2	N/S	D	±0.05 % of rdg.

Sulfur Dioxide SO_2 :(upto 500 ppb)

Sl. No.	Target Value (ppb)	Actual Value (ppb)	Error	Tolerance	Status	Uncertainty
01	0	0.0	0.0	N/S	D	---
02	100	100.2	-0.2	N/S	D	±0.05 % of rdg.
03	200	200.5	-0.5	N/S	D	±0.05 % of rdg.
04	300	301.0	-1.0	N/S	D	±0.05 % of rdg.
05	450	451.2	-1.2	N/S	D	±0.05 % of rdg.

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Section-6, Mirpur Circle-10, Dhaka-1216, Bangladesh
Cell: +8801712 789 321

Laboratory Location
House # 427, Road # 6/2
Shahinbagh Tejgaon, Dhaka-1215
Tel: +88-02-48117267, +88 01919 958147-50
E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Particulate Matter (PM2.5) : (0 to 1000) µg/m³ (Verified Against Traceable Sample)

Sl. No.	STD. Readings (µg/m³)	U.U.C. Readings (µg/m³)	Error (µg/m³)	Tolerance (µg/m³)	Status	Uncertainty (µg/m³)
01	50.07	50.0	0.07	N/S	D	±0.001
02	100.15	100.0	0.15	N/S	D	±0.001
03	200.23	200.0	0.23	N/S	D	±0.001
04	500.41	500.0	0.41	N/S	D	±0.001
05	900.69	900.0	0.69	N/S	D	±0.001

Particulate Matter (PM10) : (0 to 1000) µg/m³ (Verified Against Traceable Sample)

Sl. No.	STD. Readings (µg/m³)	U.U.C. Readings (µg/m³)	Error (µg/m³)	Tolerance (µg/m³)	Status	Uncertainty (µg/m³)
01	50.13	50.0	0.13	N/S	D	±0.001
02	100.28	100.0	0.28	N/S	D	±0.001
03	200.41	200.0	0.41	N/S	D	±0.001
04	500.66	500.0	0.66	N/S	D	±0.001
05	900.87	900.0	0.87	N/S	D	±0.001

TSP (0 to 1000) µg/m³: (Verified Against Traceable Sample)

Sl. No.	Standard Value (µg/m³)	U.U.C Value (µg/m³)	Error (µg/m³)	Tolerance (µg/m³)	Status	Uncertainty
01	30.6	30.0	0.6	N/S	D	±0.4% of rdg.
02	52.0	50.0	2.0	N/S	D	±0.4% of rdg.
03	102.5	100.0	2.5	N/S	D	±0.4% of rdg.
04	503.3	500.0	3.3	N/S	D	±0.4% of rdg.
05	904.2	900.0	4.2	N/S	D	±0.4% of rdg.

The overall uncertainty shall be calculated as per ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level.

Notes:
1. The values mentioned above are the mean readings.
2. No adjustment was done during the calibration.
3. Any section marked, "N/A" means Not Applicable, "N/P" means Not Provided, "N/R" means Not Readable, "N/S" means Not Specified.

Calibrated By:
Md. Mobinul Islam
(Sr. Calibration Engineer)

Issued By:
Md. Arman Ahmed Razu
(Technical Manager)

End of Calibration Certificate

02505059948

Page 4 of 4

STANDARD CALIBRATION SERVICE PRIVATE LIMITED

ISO/IEC : 17025
Accredited Laboratory

www.scsbd-ltd.com

Corporate Office
Rabeya Commercial Complex, 33/kha (5th Floor)
Section-6, Mirpur Circle-10, Dhaka-1216, Bangladesh
Cell: +8801712 789 321

Laboratory Location
House # 427, Road # 6/2
Shahinbagh Tejgaon, Dhaka-1215
Tel: +88-02-48117267, +88 01919 958147-50
E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Certificate No. 02505059949
Issue Date 06/05/2025

Customer Details:

Name	**Envirocare International Ltd.**
Address	House No # 09, Road No # 06, Sector # 12, Uttara, Dhaka, Bangladesh.
Tel	+880 1533 904911
E-mail	shorove.az.08@gmail.com

Details of Unit Under Calibration (UUC):

Description	Air Quality Monitor System
Manufacturer	Henan Oceanus Import & Export co.,Ltd
Model/Type	AQM-09
Serial Number	OC202208267810240
ID No.	**EIL/AQM-01**
Range/working Range	Ref on Obs
Least Count	Ref on Obs
Accuracy	As Per Instrument
Location of Calibration	Laboratory
Visual Inspection	OK
Date of Calibration	05/05/2025
Suggested Due Date	04/05/2026
Calibration Procedure	The calibration had been performed in accordance with calibration procedure COP/SCS/115 (Procedure based on Comparision Method).
Calibration Result	The details of standard equipment used for calibration & result of calibration are given in page 2 to 4.
Conclusion	For the status of measurements please refer to the guidance notes.

Environment: (certified against calibrated digital temperature & humidity meter)

Temperature (˚C)	25±3
Relative Humidity (%RH)	40 to 60

Change in temperature and relative humidity of the Laboratory during the calibration was less than 0.3°C per hour and 5.0% per 4 hours respectively.

This certificate is issued strictly in accordance with the requirements of ISO 17025:2017. All calibration equipments are traceable to the International Standards . Documentary evidence is available upon request.

SCS Standard Calibration Service
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E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Details of Standard Equipment Used for Calibration:

Sl. No.	Description	Make	Inst. Sl. /ID NO.	Certificate No.	Validity	Calibrated By
01	Carbon Oxide Meter	EXTECH	SCS/COM/01	QSI/1152/24/07	15/07/2025	QSI
02	Carbon Monoxide Meter	Smart Sensor	SCS/CMM/01	QSI/1155/24/07	15/07/2025	QSI
03	Portable Flue Gas Analyzer	LOOBO	SCS/PFGA/01	QSI/1158/24/07	15/07/2025	QSI
04	RTD with Indicator	Eurotherm/ Tempsens	SCS/RTD/01	QSI/3963/24/07	15/07/2025	QSI
05	Process Calibrator	Fluke	SCS/PC/01	QSI/4013/24/07	15/07/2025	QSI
06	Digital Thermo Hygrometer	CEM	SCS/DL/01	QSI/3966/24/07	15/07/2025	QSI

Guidance Notes:

Status A The measurement is within tolerance, due allowances having been made for the uncertainty of the measurement.
Status B The measurement may be out of tolerance, due allowances having been made for the uncertainty of the measurement.
Status C The measurement is out of tolerance, due allowances having been made for the uncertainty of the measurement.
Status D No conclusion can be drawn, because the standard(s) do(es) not specify a tolerance for this measurement.

OBSERVATION:

Temperature: (verified against calibrated instruments)

Sl. No.	Standard Value (°C)	U.U.C. Value (°C)	Error (°C)	Tolerance	Status	Uncertainty (°C)
01	-10.14	-10.0	0.14	N/S	D	±0.20
02	0.02	0.0	-0.02	N/S	D	
03	9.88	10.0	0.12	N/S	D	±0.30
04	19.79	20.0	0.21	N/S	D	
05	29.64	30.0	0.36	N/S	D	
06	49.52	50.0	0.48	N/S	D	

Humidity: (verified against calibrated instruments)

Sl. No.	Standard Value (%)	U.U.C. Value (%)	Error (%)	Tolerance	Status	Uncertainty (%)
01	19.9	20.0	0.1	N/S	D	±1.0
02	29.8	30.0	0.2	N/S	D	
03	39.7	40.0	0.3	N/S	D	
04	49.4	50.0	0.6	N/S	D	
05	69.1	70.0	0.9	N/S	D	
06	88.9	90.0	1.1	N/S	D	

02505059949

Page 2 of 4

SCS Standard Calibration Service
ISO/IEC : 17025
Accredited Laboratory

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CERTIFICATE of CALIBRATION

Carbon Monoxide CO :(upto 10 ppm)

Sl. No.	Target Value (ppm)	Actual Value (ppm)	Error	Tolerance	Status	Uncertainty
01	0	0.0	0.0	N/S	D	---
02	1	1.0	0.0	N/S	D	±0.05 % of rdg.
03	2	2.1	-0.1	N/S	D	±0.05 % of rdg.
04	5	5.2	-0.2	N/S	D	±0.05 % of rdg.
05	8	8.2	-0.2	N/S	D	±0.05 % of rdg.

Nitrogen Dioxide NO_2 :(upto 500 ppb)

Sl. No.	Target Value (ppb)	Actual Value (ppb)	Error	Tolerance	Status	Uncertainty
01	0	0.0	0.0	N/S	D	---
02	100	100.5	-0.5	N/S	D	±0.05 % of rdg.
03	200	200.8	-0.8	N/S	D	±0.05 % of rdg.
04	300	301.1	-1.1	N/S	D	±0.05 % of rdg.
05	450	451.4	-1.4	N/S	D	±0.05 % of rdg.

Ozone O_3 :(upto 10 ppm)

Sl. No.	Target Value (ppm)	Actual Value (ppm)	Error	Tolerance	Status	Uncertainty
01	0	0.0	0.0	N/S	D	---
02	1	1.0	0.0	N/S	D	±0.05 % of rdg.
03	2	1.9	0.1	N/S	D	±0.05 % of rdg.
04	5	4.8	0.2	N/S	D	±0.05 % of rdg.
05	8	7.8	0.2	N/S	D	±0.05 % of rdg.

Sulfur Dioxide SO_2 :(upto 500 ppb)

Sl. No.	Target Value (ppb)	Actual Value (ppb)	Error	Tolerance	Status	Uncertainty
01	0	0.0	0.0	N/S	D	---
02	100	100.3	-0.3	N/S	D	±0.05 % of rdg.
03	200	200.7	-0.7	N/S	D	±0.05 % of rdg.
04	300	301.2	-1.2	N/S	D	±0.05 % of rdg.
05	450	451.5	-1.5	N/S	D	±0.05 % of rdg.

02505059949

Page 3 of 4

ISO/IEC : 17025
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E-mail: info@scsbd-ltd.com, www.scsbd-ltd.com

CERTIFICATE of CALIBRATION

Particulate Matter (PM2.5) : (0 to 1000) µg/m³ (Verified Against Traceable Sample)

Sl. No.	STD. Readings (µg/m³)	U.U.C. Readings (µg/m³)	Error (µg/m³)	Tolerance (µg/m³)	Status	Uncertainty (µg/m³)
01	50.11	50.0	0.11	N/S	D	±0.001
02	100.18	100.0	0.18	N/S	D	±0.001
03	200.32	200.0	0.32	N/S	D	±0.001
04	500.49	500.0	0.49	N/S	D	±0.001
05	900.77	900.0	0.77	N/S	D	±0.001

Particulate Matter (PM10) : (0 to 1000) µg/m³ (Verified Against Traceable Sample)

Sl. No.	STD. Readings (µg/m³)	U.U.C. Readings (µg/m³)	Error (µg/m³)	Tolerance (µg/m³)	Status	Uncertainty (µg/m³)
01	50.17	50.0	0.17	N/S	D	±0.001
02	100.32	100.0	0.32	N/S	D	±0.001
03	200.44	200.0	0.44	N/S	D	±0.001
04	500.69	500.0	0.69	N/S	D	±0.001
05	900.63	900.0	0.63	N/S	D	±0.001

TSP (0 to 1000) µg/m³: (Verified Against Traceable Sample)

Sl. No.	Standard Value (µg/m³)	U.U.C Value (µg/m³)	Error (µg/m³)	Tolerance (µg/m³)	Status	Uncertainty
01	30.4	30.0	0.4	N/S	D	±0.4% of rdg.
02	51.8	50.0	1.8	N/S	D	±0.4% of rdg.
03	102.3	100.0	2.3	N/S	D	±0.4% of rdg.
04	503.0	500.0	3.0	N/S	D	±0.4% of rdg.
05	903.4	900.0	3.4	N/S	D	±0.4% of rdg.

The overall uncertainty shall be calculated as per ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level.

Notes:
1. The values mentioned above are the mean readings.
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3. Any section marked, "N/A" means Not Applicable, "N/P" means Not Provided, "N/R" means Not Readable, "N/S" means Not Specified.

Calibrated By:

Md. Mobinul Islam
(Sr. Calibration Engineer)

Issued By:

Md. Arman Ahmed Razu
(Technical Manager)

End of Calibration Certificate

02505059949

Page 4 of 4

GLOBAL ACCEPTANCE
BAB
BANGLADESH ACCREDITATION BOARD

ACCREDITATION CERTIFICATE

Issued under the authority of Bangladesh Accreditation Act, 2006
by Bangladesh Accreditation Board (BAB), Ministry of Industries to

Envirocare International Ltd.
House # 02, Road # 05, Dhour, Neshat Nagar
Turag, Dhaka, Bangladesh.

This is to certify that this
Inspection Body (Type-A)
is accredited in accordance with the international standard
ISO/IEC 17020:2012
in respect of the associated scope, subject to the terms and conditions governing the relevant conformity assessment body (CAB) accreditation.

CERT.NO.05.010.21
BAB
BANGLADESH ACCREDITATION BOARD
Accredited for ISO/IEC 17020:2012

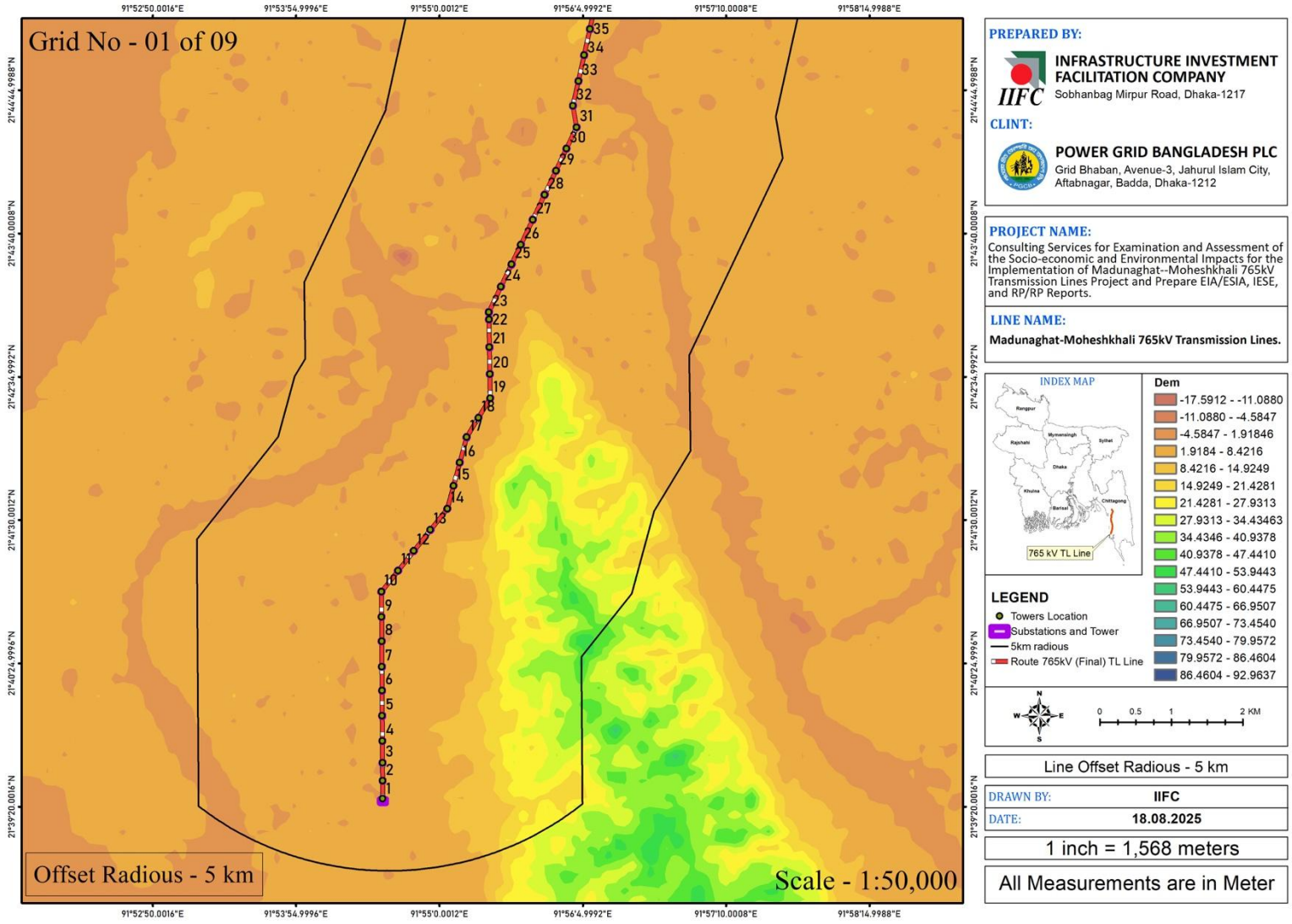
Certificate Number	:	05.010.21
Accreditation Date	:	16 June 2021
Date of Issuance	:	18 Aug 2024 (1st Renewal)
Date of Expiration	:	15 June 2027

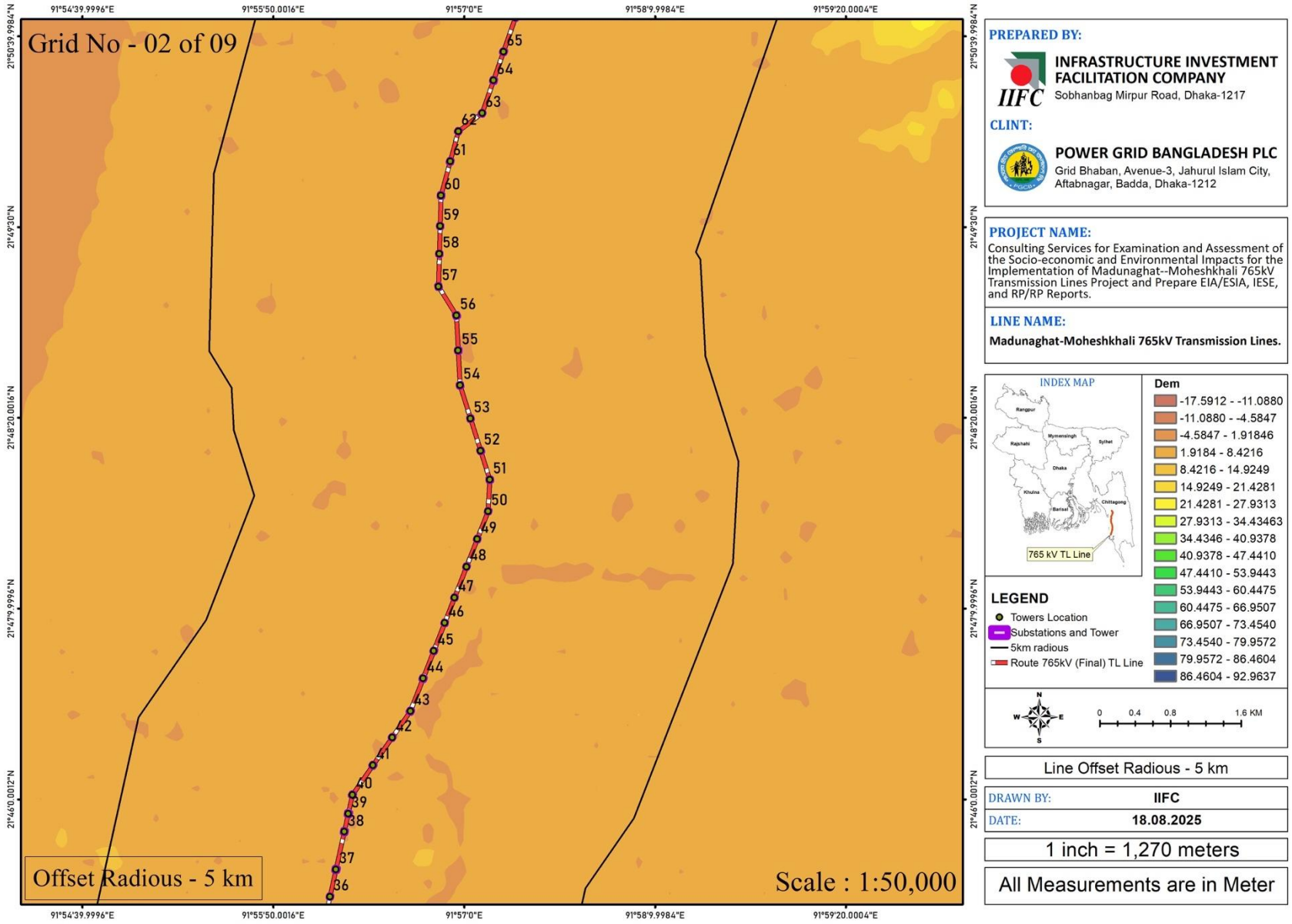
GLOBAL BAB ACCREDITED ACCEPTANCE

18.08.2024
Md. Anwarul Alam
Director General

This certificate must be returned on request; reproduction must follow BAB guidelines. For the specific scopes to which this accreditation applies, please refer to the Directory of CABs at BAB website.

Annex-XXIII: Digital Elevation Map of the TL

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91°59'20.0004"E
21°50'39.9984"N
21°49'30"N
21°48'20.0016"N
21°47'9.9996"N
21°46'0.0012"N
65
64
63
62
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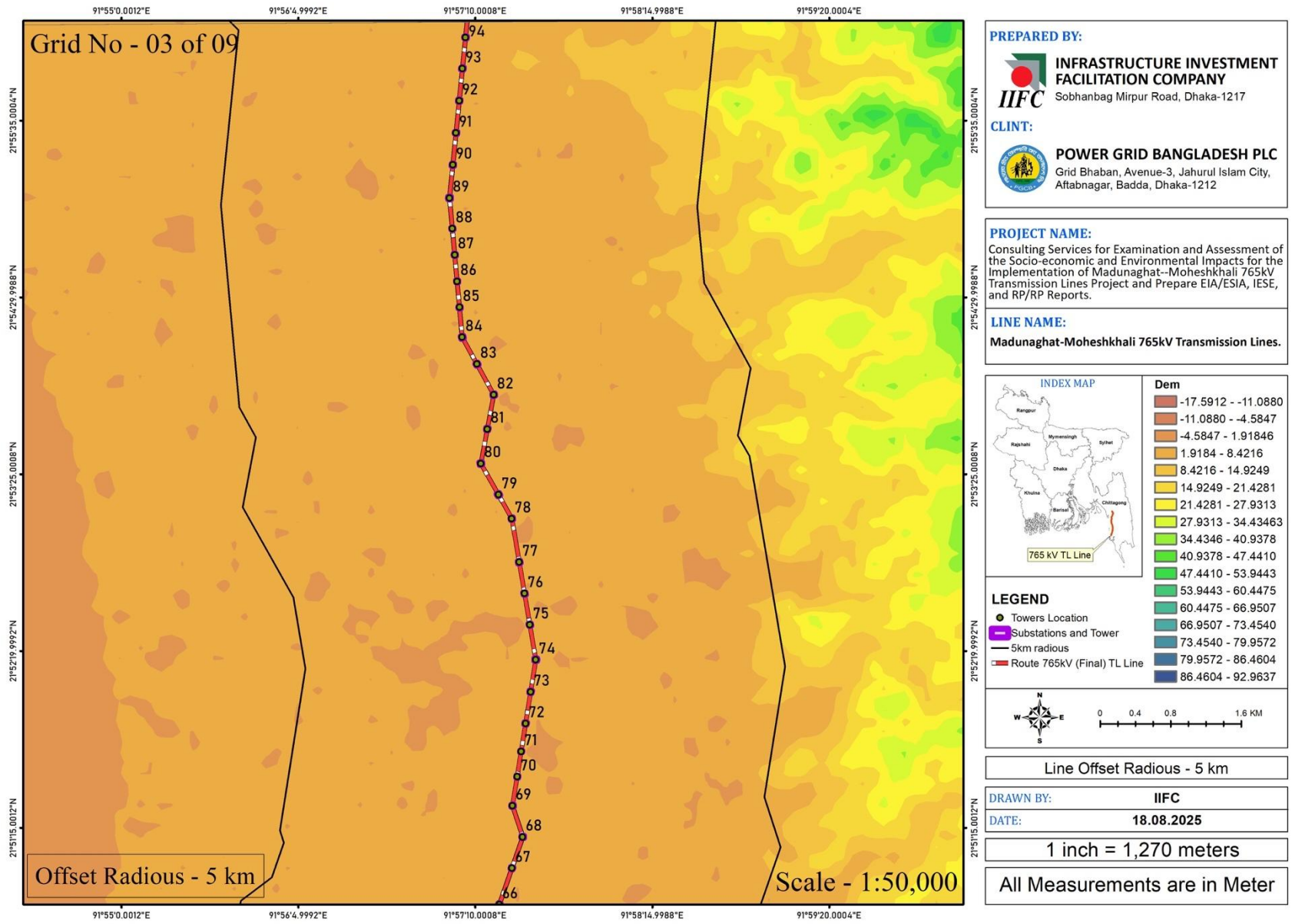
50
49
48
47
46
45
44
43
42
41
40
39
38
37
36
Offset Radious - 5 km
Scale : 1:50,000
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
Sobhanbag Mirpur Road, Dhaka-1217
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
LINE NAME:
Madunaghat-Moheshkhali 765kV Transmission Lines.
INDEX MAP
765 kV TL Line
Dem
-17.5912 - -11.0880
-11.0880 - -4.5847
-4.5847 - 1.91846
1.9184 - 8.4216
8.4216 - 14.9249
14.9249 - 21.4281
21.4281 - 27.9313
27.9313 - 34.43463
34.4346 - 40.9378
40.9378 - 47.4410
47.4410 - 53.9443
53.9443 - 60.4475
60.4475 - 66.9507
66.9507 - 73.4540
73.4540 - 79.9572
79.9572 - 86.4604
86.4604 - 92.9637
LEGEND
Towers Location
Substations and Tower
5km radious
Route 765kV (Final) TL Line
0 0.4 0.8 1.6 KM
Line Offset Radious - 5 km
DRAWN BY: IIFC
DATE: 18.08.2025
1 inch = 1,270 meters
All Measurements are in Meter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21°55'35.0004"N
21°54'29.9988"N
21°53'25.0008"N
21°52'19.9992"N
21°51'15.0012"N
94
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85
84
83
82
81
80
79
78
77
76
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72
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70
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68
67
66
Offset Radious - 5 km
Scale - 1:50,000
PREPARED BY:
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Sobhanbag Mirpur Road, Dhaka-1217
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LEGEND
Towers Location
Substations and Tower
5km radious
Route 765kV (Final) TL Line
N
W
E
S
0
0.4
0.8
1.6 KM
Line Offset Radious - 5 km
DRAWN BY: IIFC
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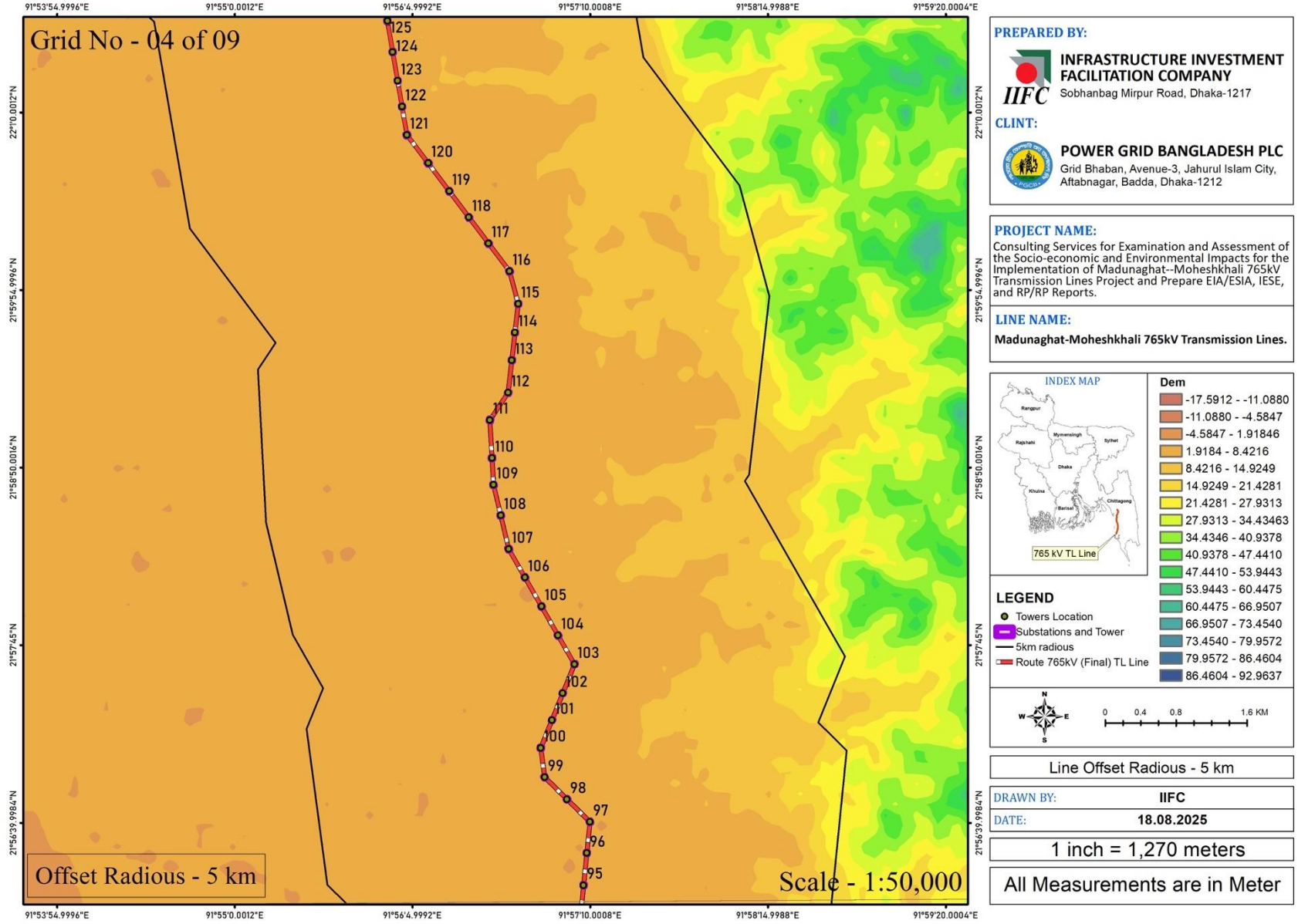
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108
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106
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73.4540 - 79.9572
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86.4604 - 92.9637
LEGEND
Towers Location
Substations and Tower
5km radious
Route 765kV (Final) TL Line
N
W
E
S
0
0.4
0.8
1.6 KM
Line Offset Radious - 5 km
DRAWN BY: IIFC
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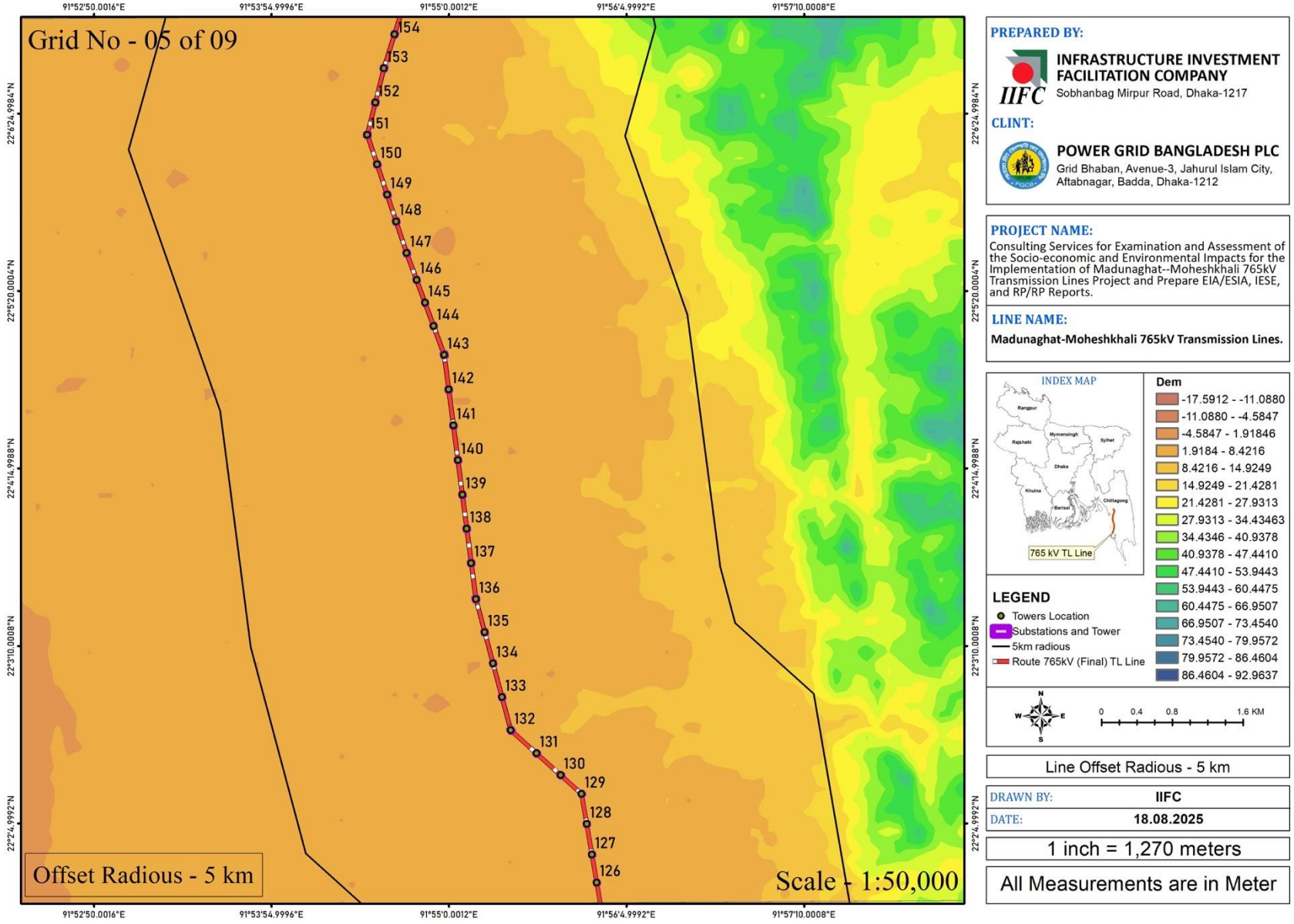
Grid No - 05 of 09
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91°53'54.9996"E
91°55'0.0012"E
91°56'4.9992"E
91°57'10.0008"E
22°6'24.9984"N
22°5'20.0004"N
22°4'14.9988"N
22°3'10.0008"N
22°2'4.9992"N
54
53
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150
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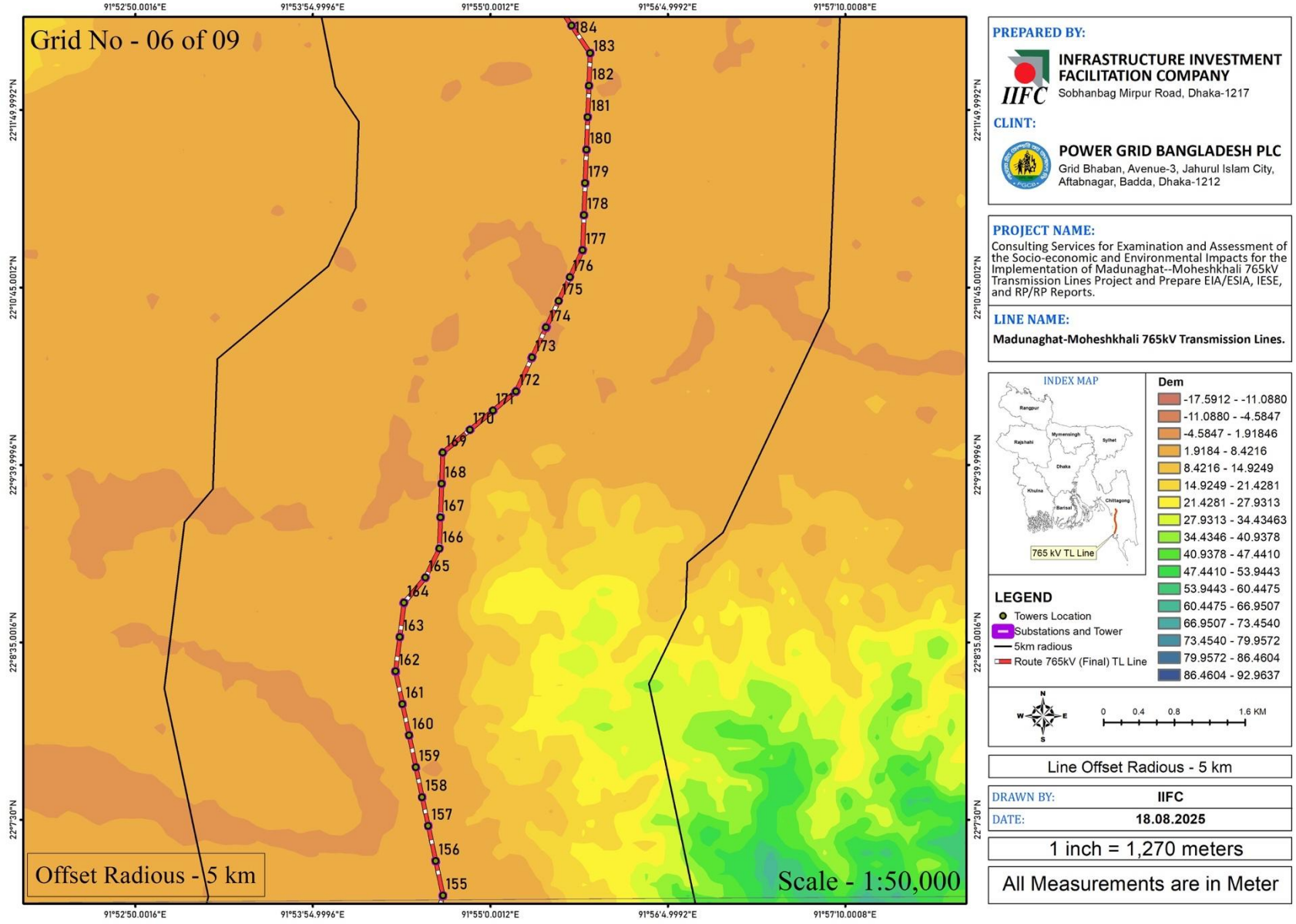
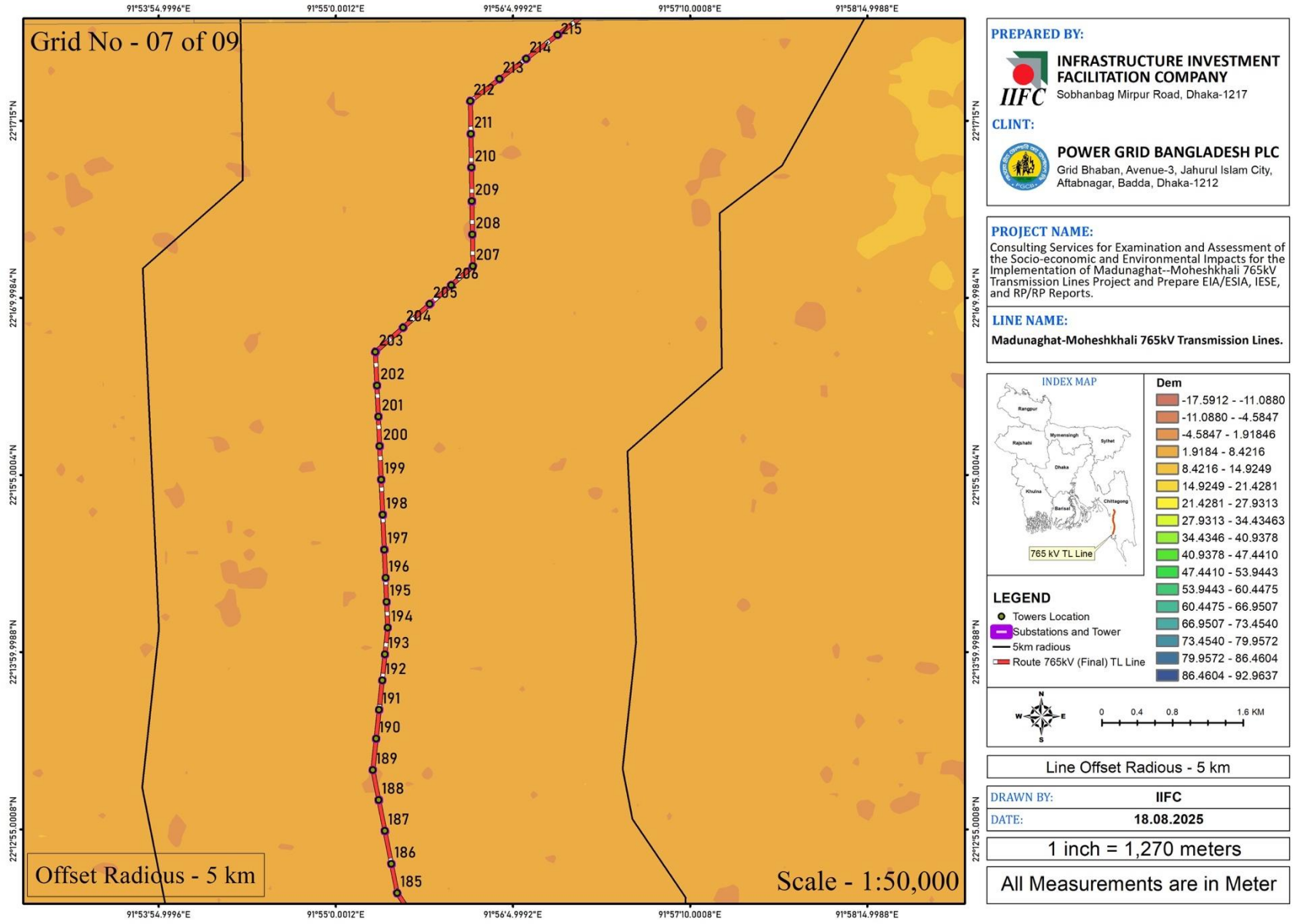
66.9507 - 73.4540
73.4540 - 79.9572
79.9572 - 86.4604
86.4604 - 92.9637
LEGEND
Towers Location
Substations and Tower
5km radious
Route 765kV (Final) TL Line
N
W
E
S
0
0.4
0.8
1.6 KM
Line Offset Radious - 5 km
DRAWN BY: IIFC
DATE: 18.08.2025
1 inch = 1,270 meters
All Measurements are in Meter


Grid No - 06 of 09
91°52'50.0016"E
91°53'54.9996"E
91°55'0.0012"E
91°56'4.9992"E
91°57'10.0008"E
22°11'49.9992"N
22°10'45.0012"N
22°9'39.9996"N
22°8'35.0016"N
22°7'30"N
184
183
182
181
180
179
178
177
176
175
174
173
172
171
170
169
168
167
166
165
164
163
162
161
160
159
158
157
156
155
Offset Radious - 5 km
Scale - 1:50,000
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
Sobhanbag Mirpur Road, Dhaka-1217
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
LINE NAME:
Madunaghat-Moheshkhali 765kV Transmission Lines.
INDEX MAP
765 kV TL Line
Dem
-17.5912 - -11.0880
-11.0880 - -4.5847
-4.5847 - 1.91846
1.9184 - 8.4216
8.4216 - 14.9249
14.9249 - 21.4281
21.4281 - 27.9313
27.9313 - 34.43463
34.4346 - 40.9378
40.9378 - 47.4410
47.4410 - 53.9443
53.9443 - 60.4475
60.4475 - 66.9507
66.9507 - 73.4540
73.4540 - 79.9572
79.9572 - 86.4604
86.4604 - 92.9637
LEGEND
Towers Location
Substations and Tower
5km radious
Route 765kV (Final) TL Line
N
W
E
S
0
0.4
0.8
1.6 KM
Line Offset Radious - 5 km
DRAWN BY: IIFC
DATE: 18.08.2025
1 inch = 1,270 meters
All Measurements are in Meter


Grid No - 07 of 09
91°53'54.9996"E
91°55'0.0012"E
91°56'4.9992"E
91°57'10.0008"E
91°58'14.9988"E
22°17'15"N
22°16'9.9984"N
22°15'5.0004"N
22°13'59.9988"N
22°12'55.0008"N
215
214
213
212
211
210
209
208
207
206
205
204
203
202
201
200
199
198
197
196
195
194
193
192
191
190
189
188
187
186
185
Offset Radious - 5 km
Scale - 1:50,000
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
Sobhanbag Mirpur Road, Dhaka-1217
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
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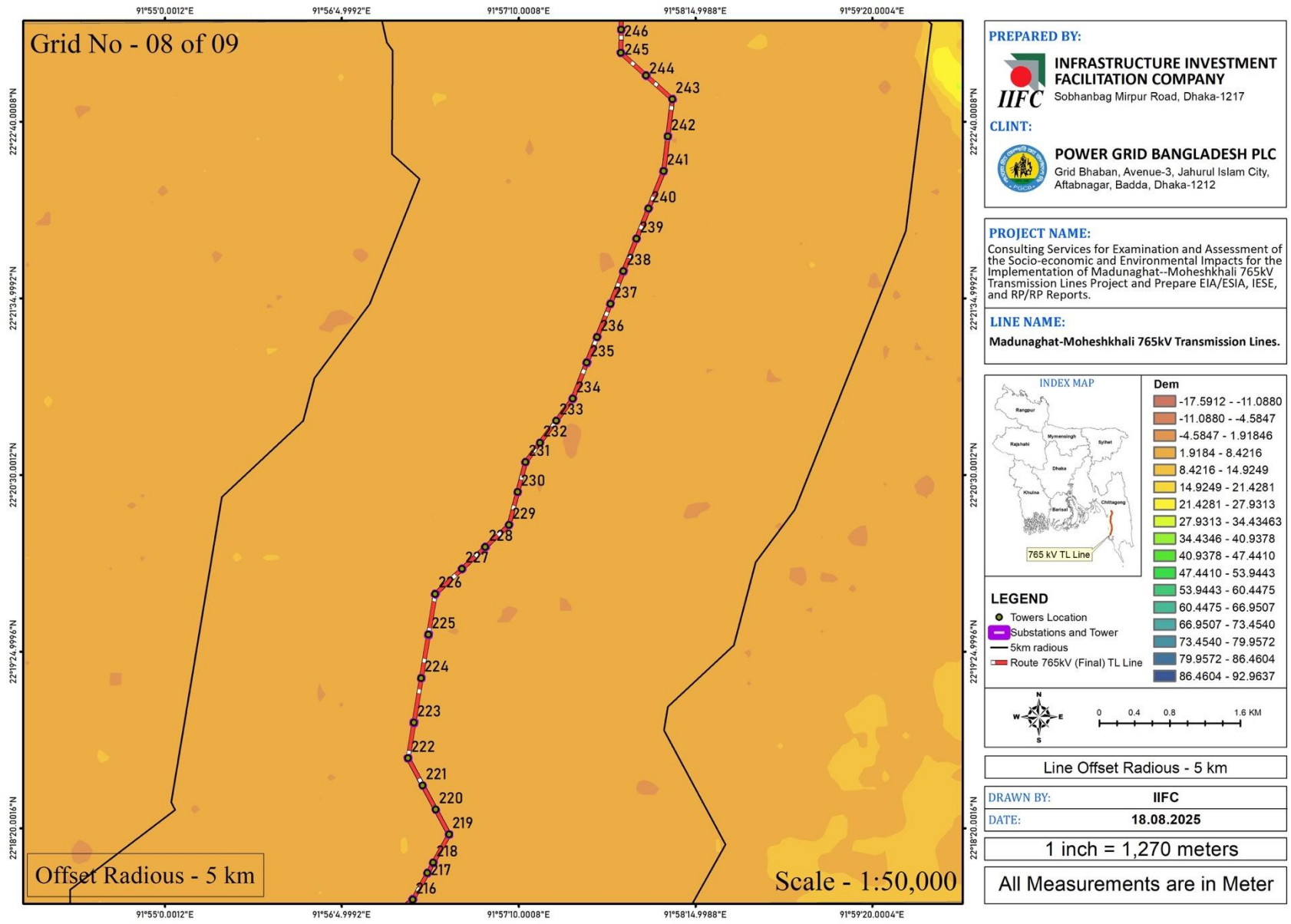
Dem
-17.5912 - -11.0880
-11.0880 - -4.5847
-4.5847 - 1.91846
1.9184 - 8.4216
8.4216 - 14.9249
14.9249 - 21.4281
21.4281 - 27.9313
27.9313 - 34.43463
34.4346 - 40.9378
40.9378 - 47.4410
47.4410 - 53.9443
53.9443 - 60.4475
60.4475 - 66.9507
66.9507 - 73.4540
73.4540 - 79.9572
79.9572 - 86.4604
86.4604 - 92.9637
LEGEND
Towers Location
Substations and Tower
5km radious
Route 765kV (Final) TL Line
N
W
E
S
0
0.4
0.8
1.6 KM
Line Offset Radious - 5 km
DRAWN BY: IIFC
DATE: 18.08.2025
1 inch = 1,270 meters
All Measurements are in Meter


Grid No - 08 of 09
91°55'0.0012"E
91°56'4.9992"E
91°57'10.0008"E
91°58'14.9988"E
91°59'20.0004"E
22°22'40.0008"N
22°21'34.9992"N
22°20'30.0012"N
22°19'24.9996"N
22°18'20.0016"N
246
245
244
243
242
241
240
239
238
237
236
235
234
233
232
231
230
229
228
227
226
225
224
223
222
221
220
219
218
217
216
Offset Radious - 5 km
Scale - 1:50,000
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
Sobhanbag Mirpur Road, Dhaka-1217
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
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Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
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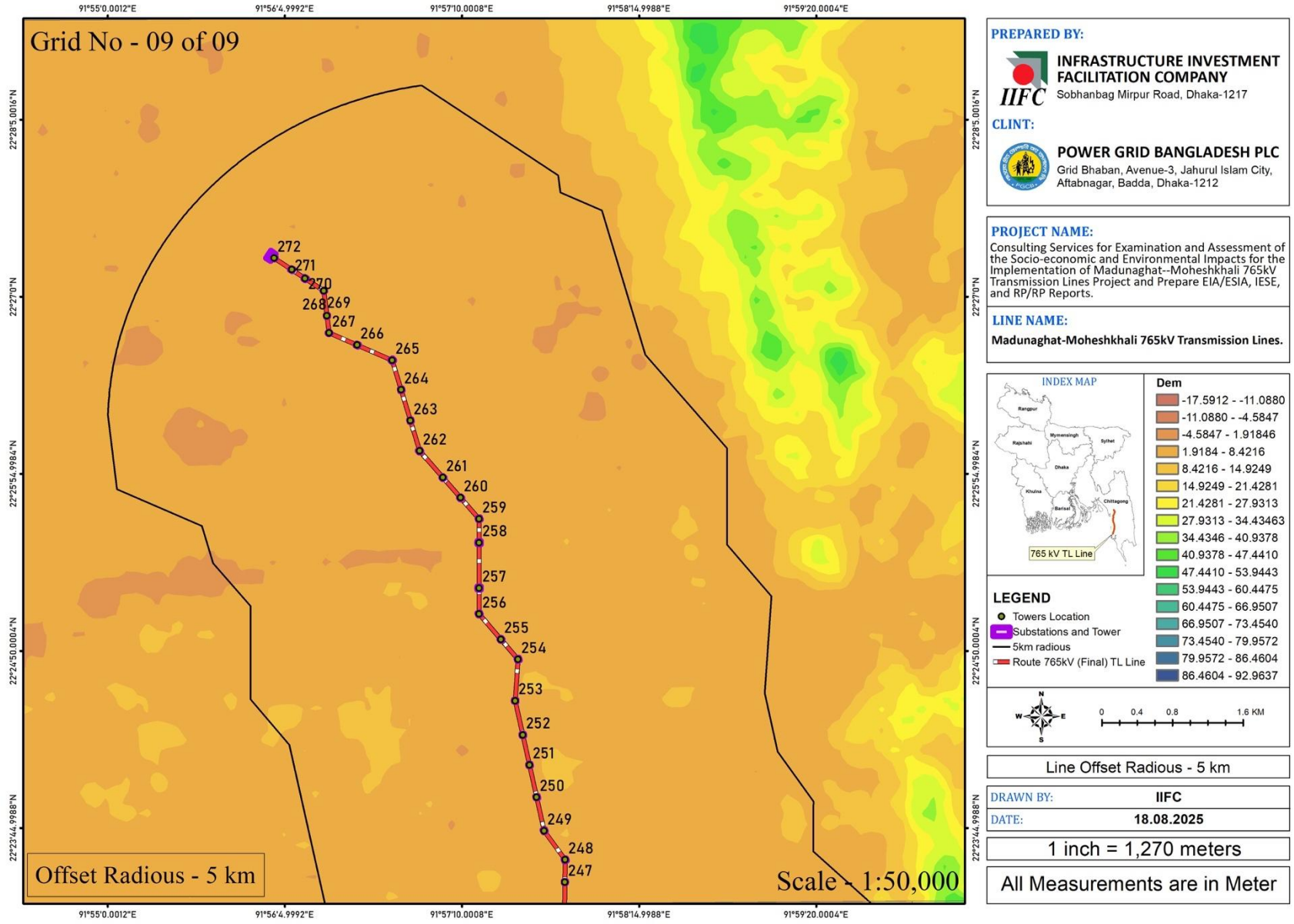
-11.0880 - -4.5847
-4.5847 - 1.91846
1.9184 - 8.4216
8.4216 - 14.9249
14.9249 - 21.4281
21.4281 - 27.9313
27.9313 - 34.43463
34.4346 - 40.9378
40.9378 - 47.4410
47.4410 - 53.9443
53.9443 - 60.4475
60.4475 - 66.9507
66.9507 - 73.4540
73.4540 - 79.9572
79.9572 - 86.4604
86.4604 - 92.9637
LEGEND
Towers Location
Substations and Tower
5km radious
Route 765kV (Final) TL Line
N
W
E
S
0
0.4
0.8
1.6 KM
Line Offset Radious - 5 km
DRAWN BY: IIFC
DATE: 18.08.2025
1 inch = 1,270 meters
All Measurements are in Meter


Grid No - 09 of 09
91°55'0.0012"E
91°56'4.9992"E
91°57'10.0008"E
91°58'14.9988"E
91°59'20.0004"E
22°28'5.0016"N
22°27'0"N
22°25'54.9984"N
22°24'50.0004"N
22°23'44.9988"N
272
271
270
268
269
267
266
265
264
263
262
261
260
259
258
257
256
255
254
253
252
251
250
249
248
247
Offset Radious - 5 km
Scale - 1:50,000
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
Sobhanbag Mirpur Road, Dhaka-1217
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
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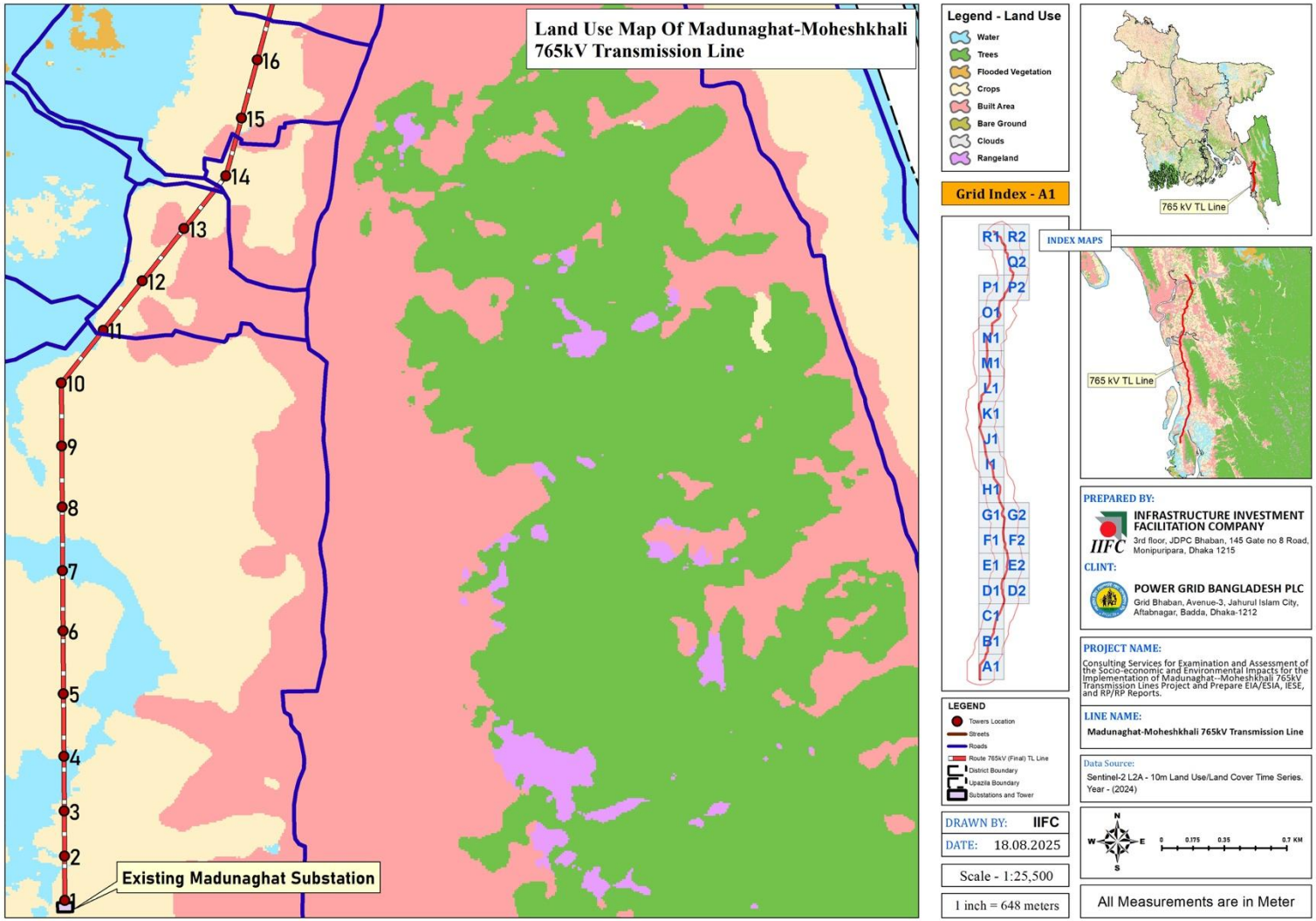
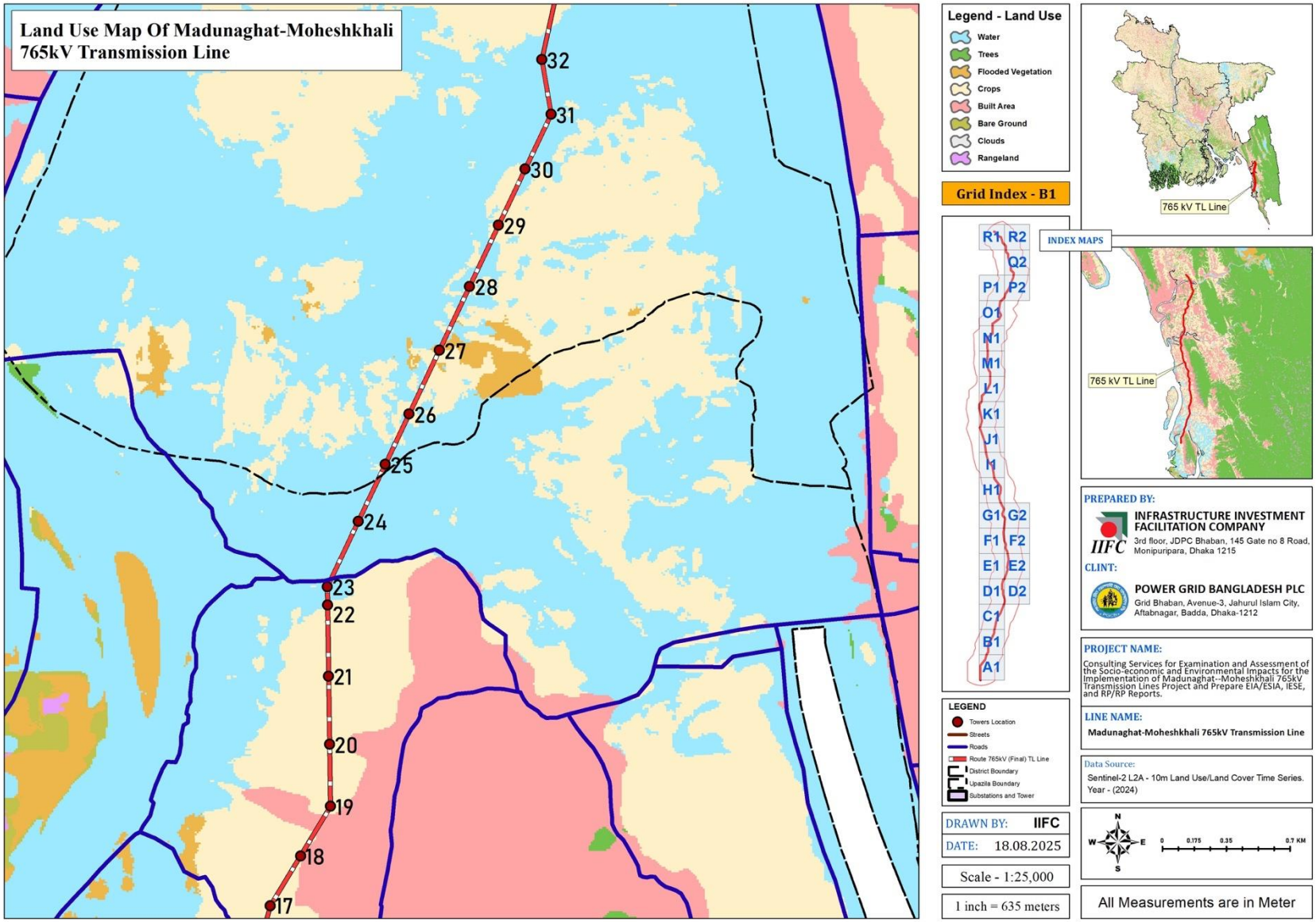
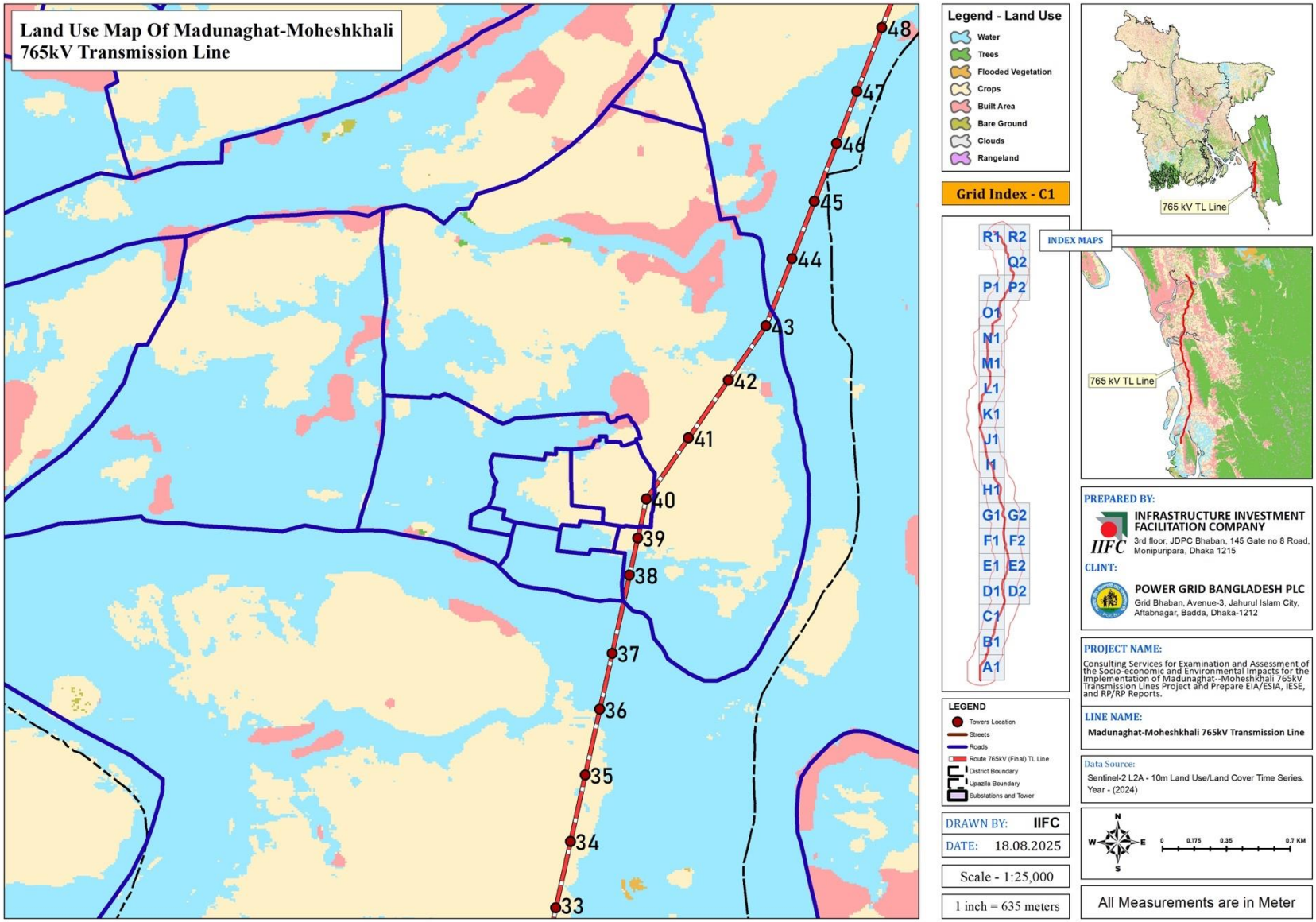
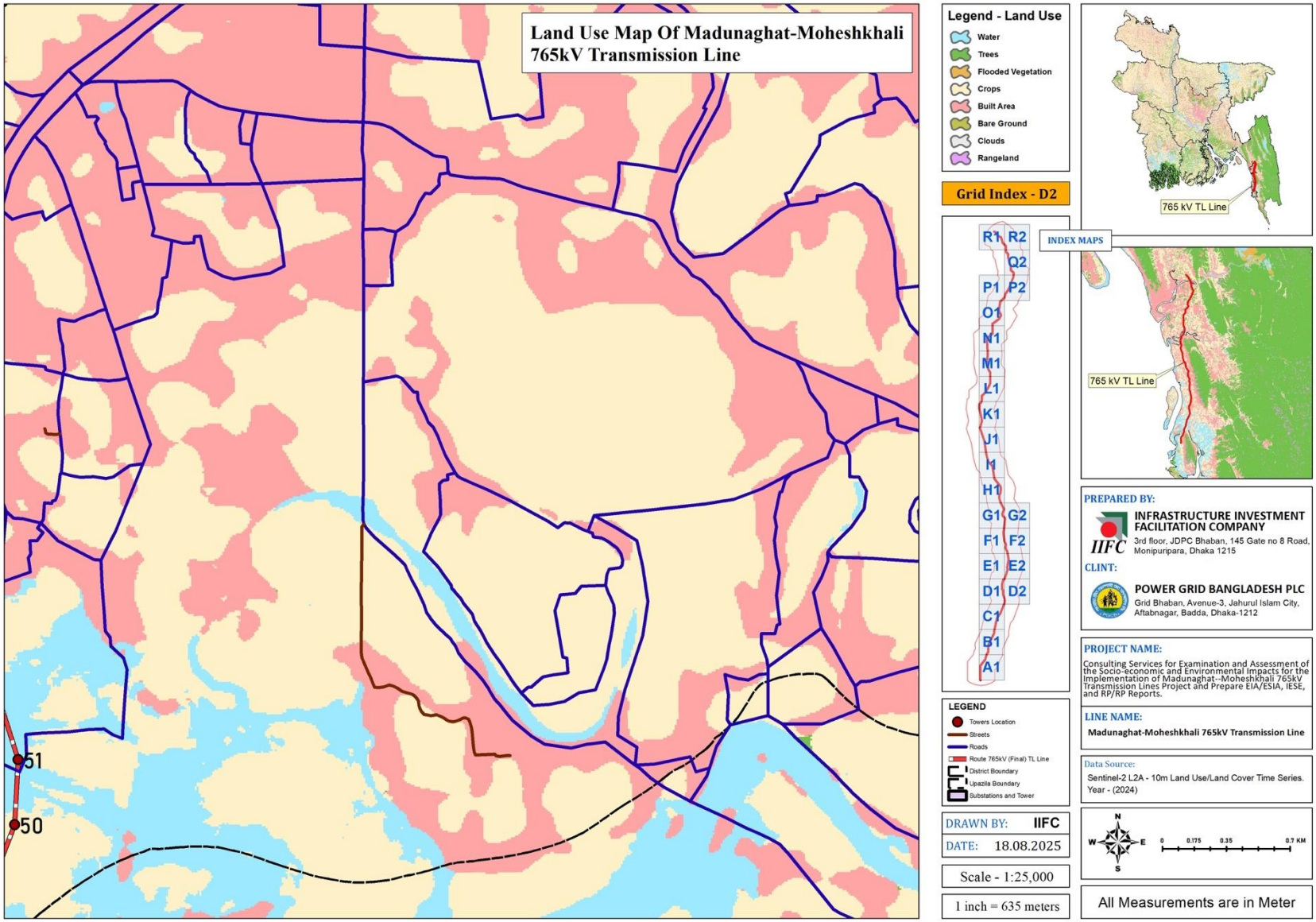
Dem
-17.5912 - -11.0880
-11.0880 - -4.5847
-4.5847 - 1.91846
1.9184 - 8.4216
8.4216 - 14.9249
14.9249 - 21.4281
21.4281 - 27.9313
27.9313 - 34.43463
34.4346 - 40.9378
40.9378 - 47.4410
47.4410 - 53.9443
53.9443 - 60.4475
60.4475 - 66.9507
66.9507 - 73.4540
73.4540 - 79.9572
79.9572 - 86.4604
86.4604 - 92.9637
LEGEND
Towers Location
Substations and Tower
5km radious
Route 765kV (Final) TL Line
N
W
E
S
0
0.4
0.8
1.6 KM
Line Offset Radious - 5 km
DRAWN BY: IIFC
DATE: 18.08.2025
1 inch = 1,270 meters
All Measurements are in Meter

Annex-XXIV: Land Use Map of the Project




Land Use Map Of Madunaghat-Moheshkhali
765kV Transmission Line
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
Legend - Land Use
Water
Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - B1
R1 R2
Q2
P1 P2
O1
N1
M1
L1
K1
J1
I1
H1
G1 G2
F1 F2
E1 E2
D1 D2
C1
B1
A1
LEGEND
Towers Location
Streets
Roads
Route 765kV (Final) TL Line
District Boundary
Upazila Boundary
Substations and Tower
DRAWN BY: IIFC
DATE: 18.08.2025
Scale - 1:25,000
1 inch = 635 meters
765 kV TL Line
INDEX MAPS
765 kV TL Line
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
3rd floor, JDPC Bhaban, 145 Gate no 8 Road, Monipuripara, Dhaka 1215
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
LINE NAME:
Madunaghat-Moheshkhali 765kV Transmission Line
Data Source:
Sentinel-2 L2A - 10m Land Use/Land Cover Time Series.
Year - (2024)
N
W
E
S
0 0.175 0.35 0.7 KM
All Measurements are in Meter


Land Use Map Of Madunaghat-Moheshkhali
765kV Transmission Line
48
47
46
45
44
43
42
41
40
39
38
37
36
35
34
33
Legend - Land Use
Water
Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - C1
R1 R2
Q2
P1 P2
O1
N1
M1
L1
K1
J1
I1
H1
G1 G2
F1 F2
E1 E2
D1 D2
C1
B1
A1
LEGEND
Towers Location
Streets
Roads
Route 765kV (Final) TL Line
District Boundary
Upazila Boundary
Substations and Tower
DRAWN BY: IIFC
DATE: 18.08.2025
Scale - 1:25,000
1 inch = 635 meters
INDEX MAPS
765 kV TL Line
765 kV TL Line
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
3rd floor, JDPC Bhaban, 145 Gate no 8 Road, Monipuripara, Dhaka 1215
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
LINE NAME:
Madunaghat-Moheshkhali 765kV Transmission Line
Data Source:
Sentinel-2 L2A - 10m Land Use/Land Cover Time Series.
Year - (2024)
N
W
E
S
0 0.175 0.35 0.7 KM
All Measurements are in Meter


Land Use Map Of Madunaghat-Moheshkhali
765kV Transmission Line
51
50
Legend - Land Use
Water
Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - D2
R1 R2
Q2
P1 P2
O1
N1
M1
L1
K1
J1
I1
H1
G1 G2
F1 F2
E1 E2
D1 D2
C1
B1
A1
LEGEND
Towers Location
Streets
Roads
Route 765kV (Final) TL Line
District Boundary
Upazila Boundary
Substations and Tower
DRAWN BY: IIFC
DATE: 18.08.2025
Scale - 1:25,000
1 inch = 635 meters
765 kV TL Line
INDEX MAPS
765 kV TL Line
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
3rd floor, JDPC Bhaban, 145 Gate no 8 Road, Monipuripara, Dhaka 1215
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
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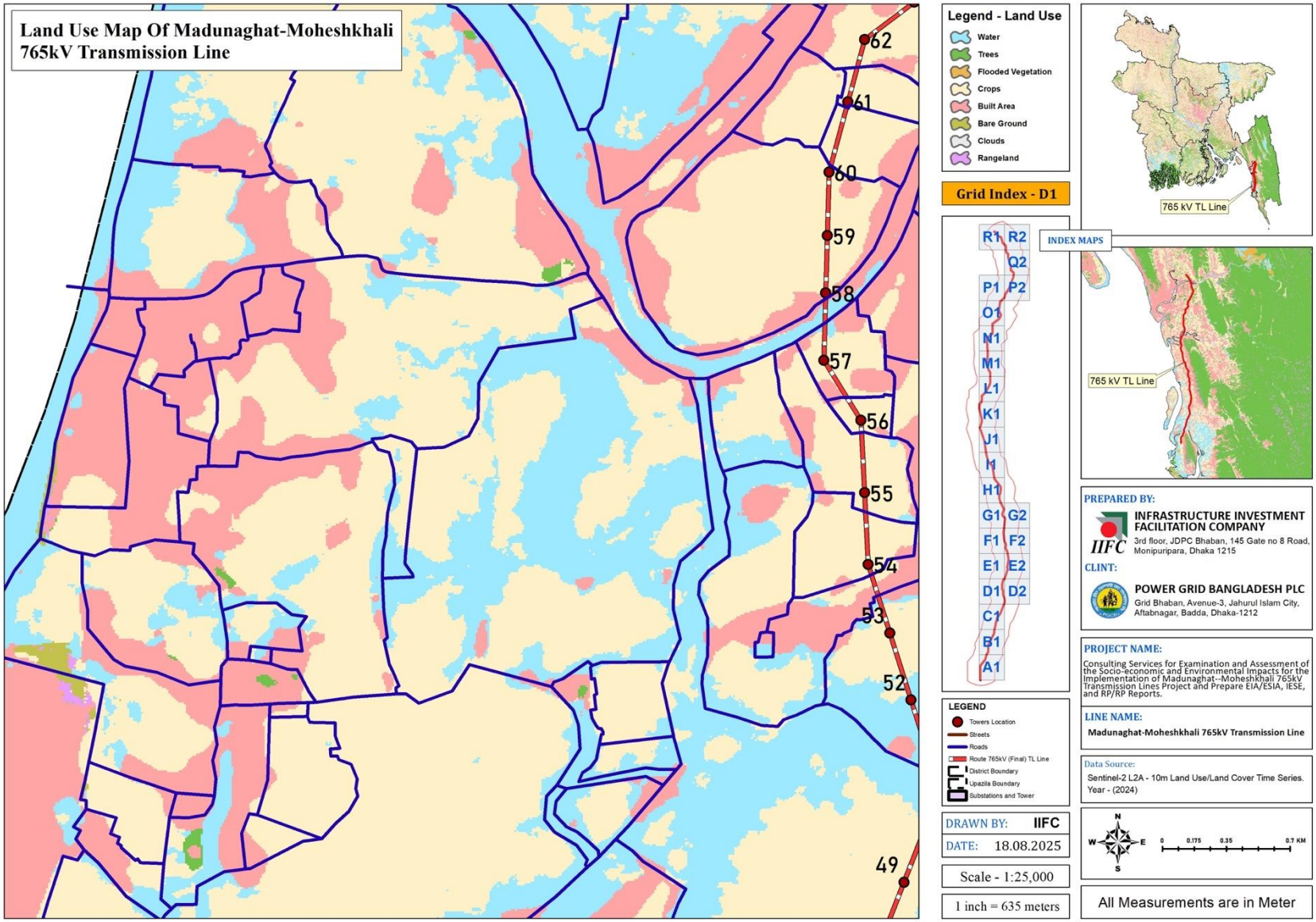
Madunaghat-Moheshkhali 765kV Transmission Line
Data Source:
Sentinel-2 L2A - 10m Land Use/Land Cover Time Series.
Year - (2024)
N
W
E
S
0 0.175 0.35 0.7 KM
All Measurements are in Meter


Land Use Map Of Madunaghat-Moheshkhali 765kV Transmission Line
62
61
60
59
58
57
56
55
54
53
52
49
Legend - Land Use
Water
Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - D1
R1 R2
Q2
P1 P2
O1
N1
M1
L1
K1
J1
I1
H1
G1 G2
F1 F2
E1 E2
D1 D2
C1
B1
A1
LEGEND
Towers Location
Streets
Roads
Route 765kV (Final) TL Line
District Boundary
Upazila Boundary
Substations and Tower
DRAWN BY: IIFC
DATE: 18.08.2025
Scale - 1:25,000
1 inch = 635 meters
INDEX MAPS
765 kV TL Line
765 kV TL Line
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
3rd floor, JDPC Bhaban, 145 Gate no 8 Road, Monipuripara, Dhaka 1215
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
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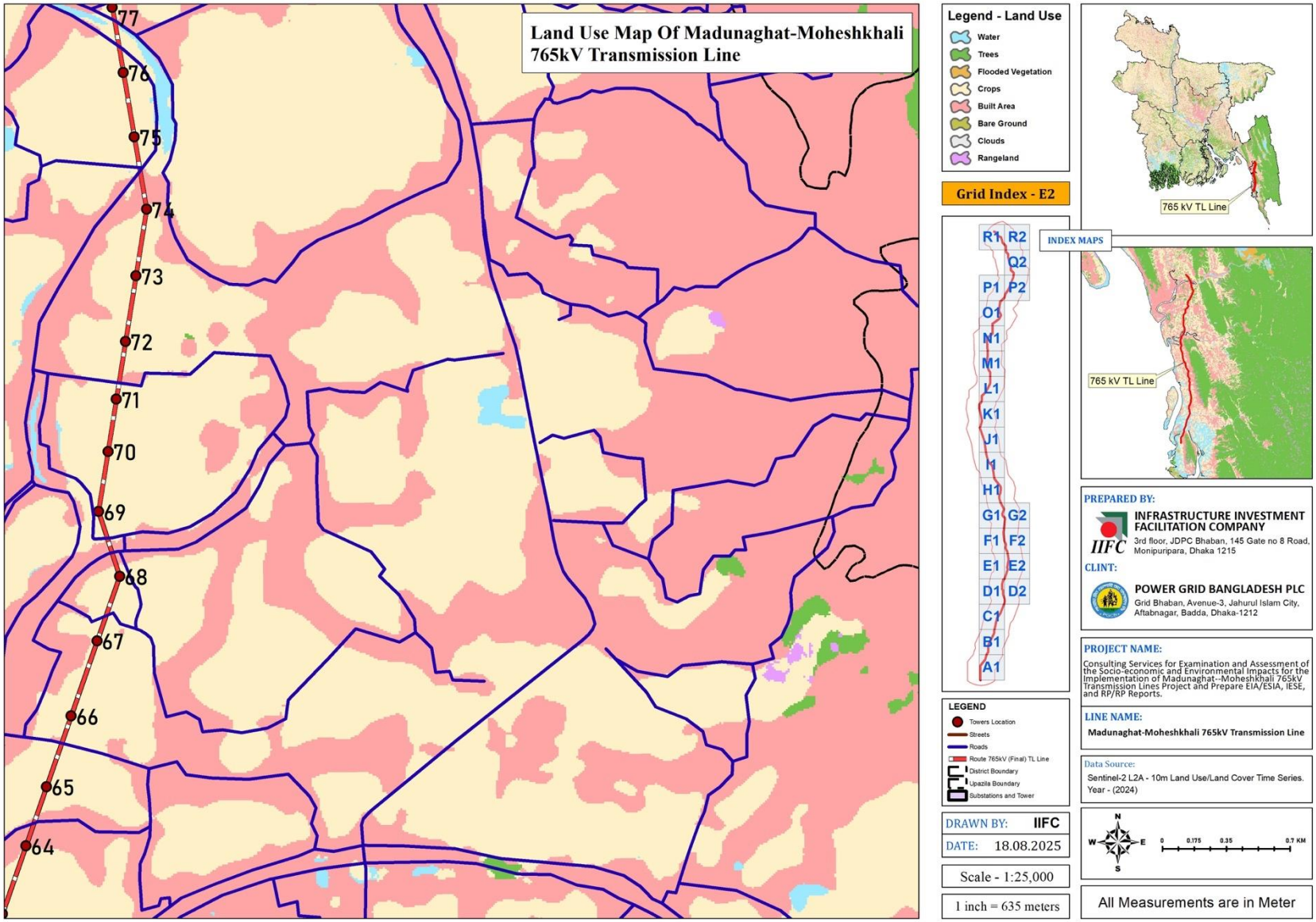
Sentinel-2 L2A - 10m Land Use/Land Cover Time Series.
Year - (2024)
N
W
E
S
0 0.175 0.35 0.7 KM
All Measurements are in Meter


Land Use Map Of Madunaghat-Moheshkhali 765kV Transmission Line
77
76
75
74
73
72
71
70
69
68
67
66
65
64
Legend - Land Use
Water
Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - E2
R1 R2
Q2
P1 P2
O1
N1
M1
L1
K1
J1
I1
H1
G1 G2
F1 F2
E1 E2
D1 D2
C1
B1
A1
LEGEND
Towers Location
Streets
Roads
Route 765kV (Final) TL Line
District Boundary
Upazila Boundary
Substations and Tower
DRAWN BY: IIFC
DATE: 18.08.2025
Scale - 1:25,000
1 inch = 635 meters
765 kV TL Line
INDEX MAPS
765 kV TL Line
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
3rd floor, JDPC Bhaban, 145 Gate no 8 Road, Monipuripara, Dhaka 1215
CLINT:
POWER GRID BANGLADESH PLC
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Madunaghat-Moheshkhali 765kV Transmission Line
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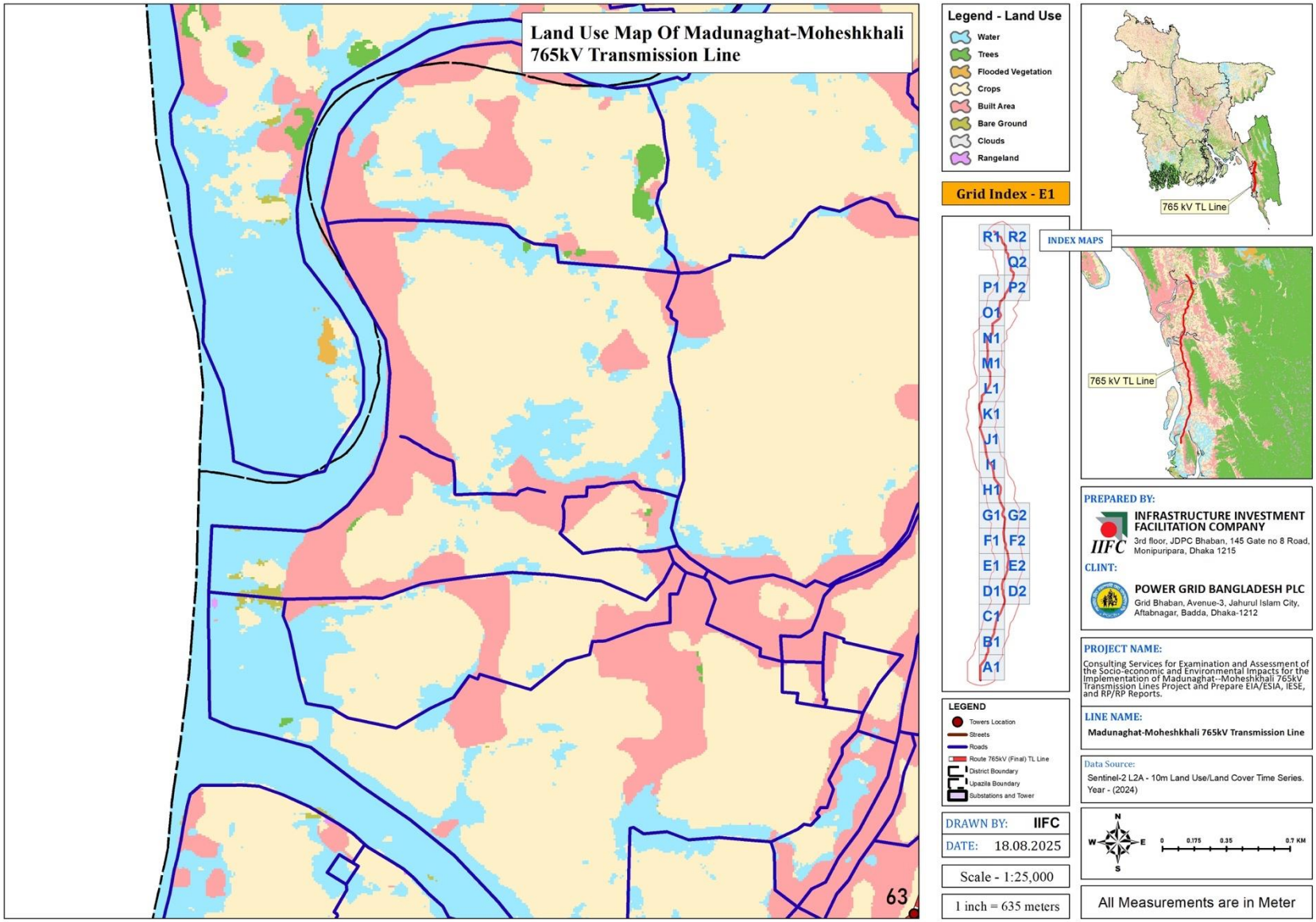
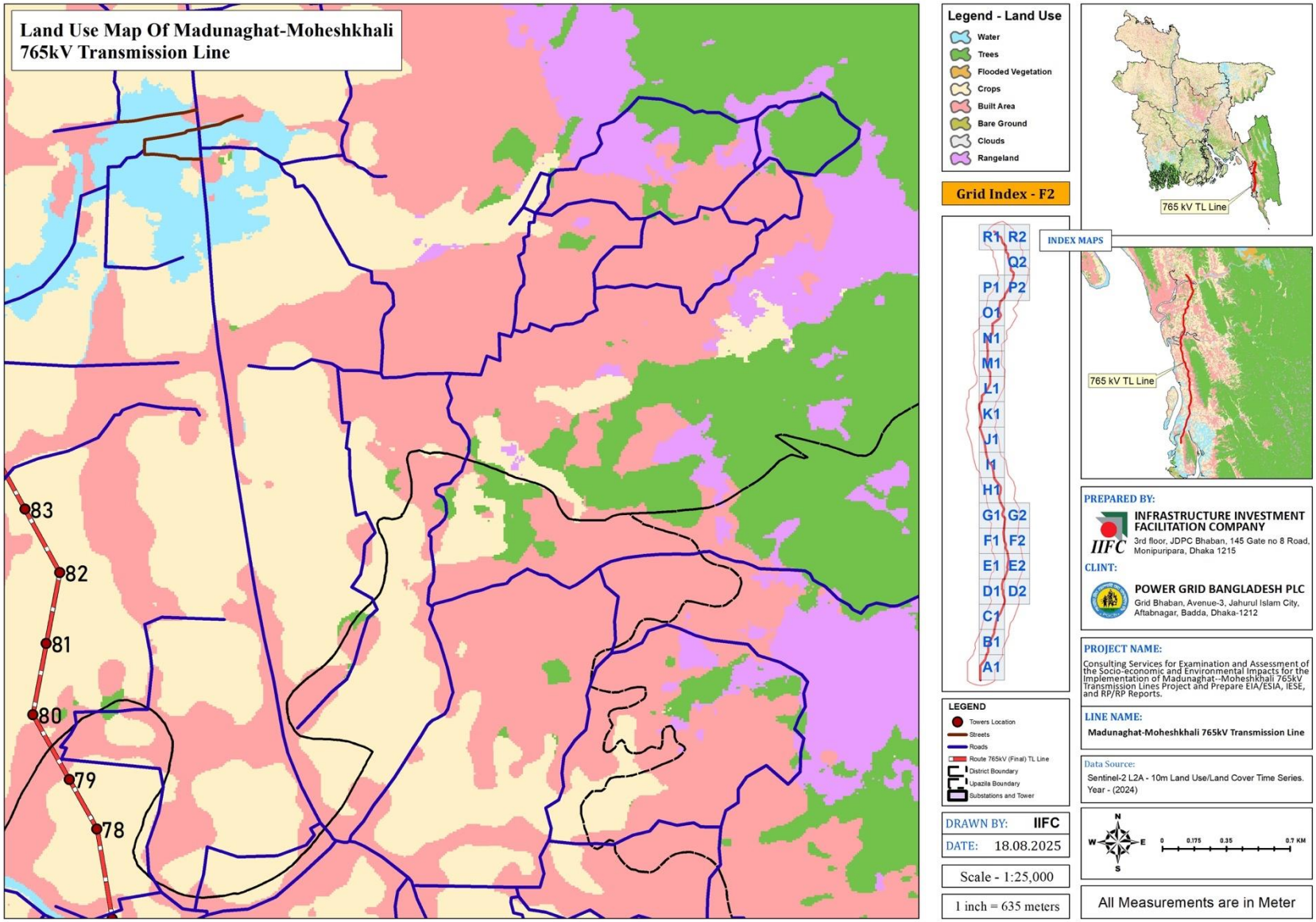
Sentinel-2 L2A - 10m Land Use/Land Cover Time Series.
Year - (2024)
N
W
E
S
0 0.175 0.35 0.7 KM
All Measurements are in Meter


Land Use Map Of Madunaghat-Moheshkhali 765kV Transmission Line
63
Legend - Land Use
Water
Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - E1
R1 R2
Q2
P1 P2
O1
N1
M1
L1
K1
J1
I1
H1
G1 G2
F1 F2
E1 E2
D1 D2
C1
B1
A1
LEGEND
Towers Location
Streets
Roads
Route 765kV (Final) TL Line
District Boundary
Upazila Boundary
Substations and Tower
DRAWN BY: IIFC
DATE: 18.08.2025
Scale - 1:25,000
1 inch = 635 meters
765 kV TL Line
INDEX MAPS
765 kV TL Line
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
3rd floor, JDPC Bhaban, 145 Gate no 8 Road, Monipuripara, Dhaka 1215
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
LINE NAME:
Madunaghat-Moheshkhali 765kV Transmission Line
Data Source:
Sentinel-2 L2A - 10m Land Use/Land Cover Time Series.
Year - (2024)
N
W
E
S
0 0.175 0.35 0.7 KM
All Measurements are in Meter


Land Use Map Of Madunaghat-Moheshkhali
765kV Transmission Line
83
82
81
80
79
78
Legend - Land Use
Water
Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - F2
R1 R2
Q2
P1 P2
O1
N1
M1
L1
K1
J1
I1
H1
G1 G2
F1 F2
E1 E2
D1 D2
C1
B1
A1
LEGEND
Towers Location
Streets
Roads
Route 765kV (Final) TL Line
District Boundary
Upazila Boundary
Substations and Tower
DRAWN BY: IIFC
DATE: 18.08.2025
Scale - 1:25,000
1 inch = 635 meters
765 kV TL Line
INDEX MAPS
765 kV TL Line
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
3rd floor, JDPC Bhaban, 145 Gate no 8 Road, Monipuripara, Dhaka 1215
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
LINE NAME:
Madunaghat-Moheshkhali 765kV Transmission Line
Data Source:
Sentinel-2 L2A - 10m Land Use/Land Cover Time Series.
Year - (2024)
N
W
E
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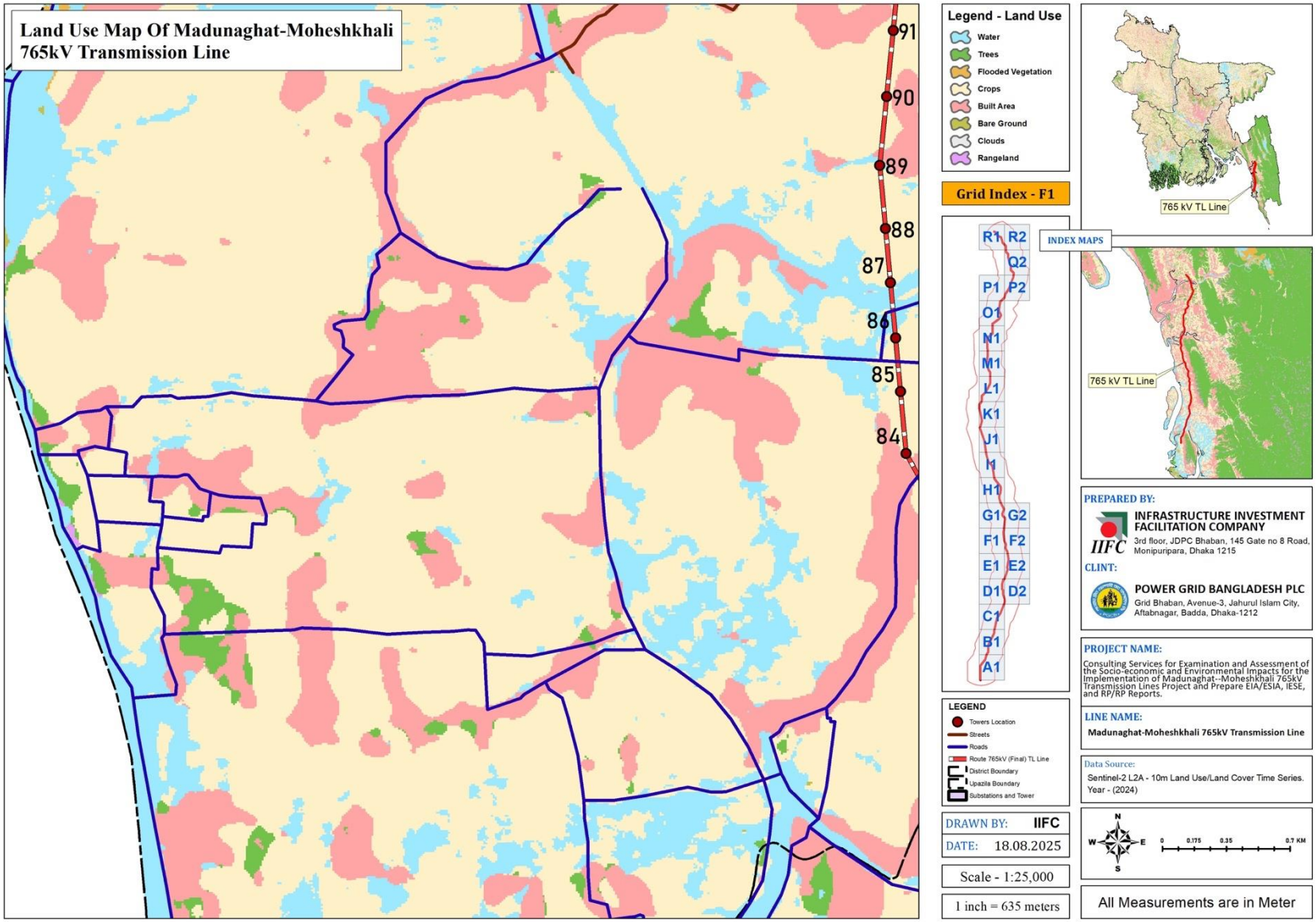
All Measurements are in Meter


Land Use Map Of Madunaghat-Moheshkhali
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C1
B1
A1
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Upazila Boundary
Substations and Tower
DRAWN BY: IIFC
DATE: 18.08.2025
Scale - 1:25,000
1 inch = 635 meters
765 kV TL Line
INDEX MAPS
765 kV TL Line
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
3rd floor, JDPC Bhaban, 145 Gate no 8 Road, Monipuripara, Dhaka 1215
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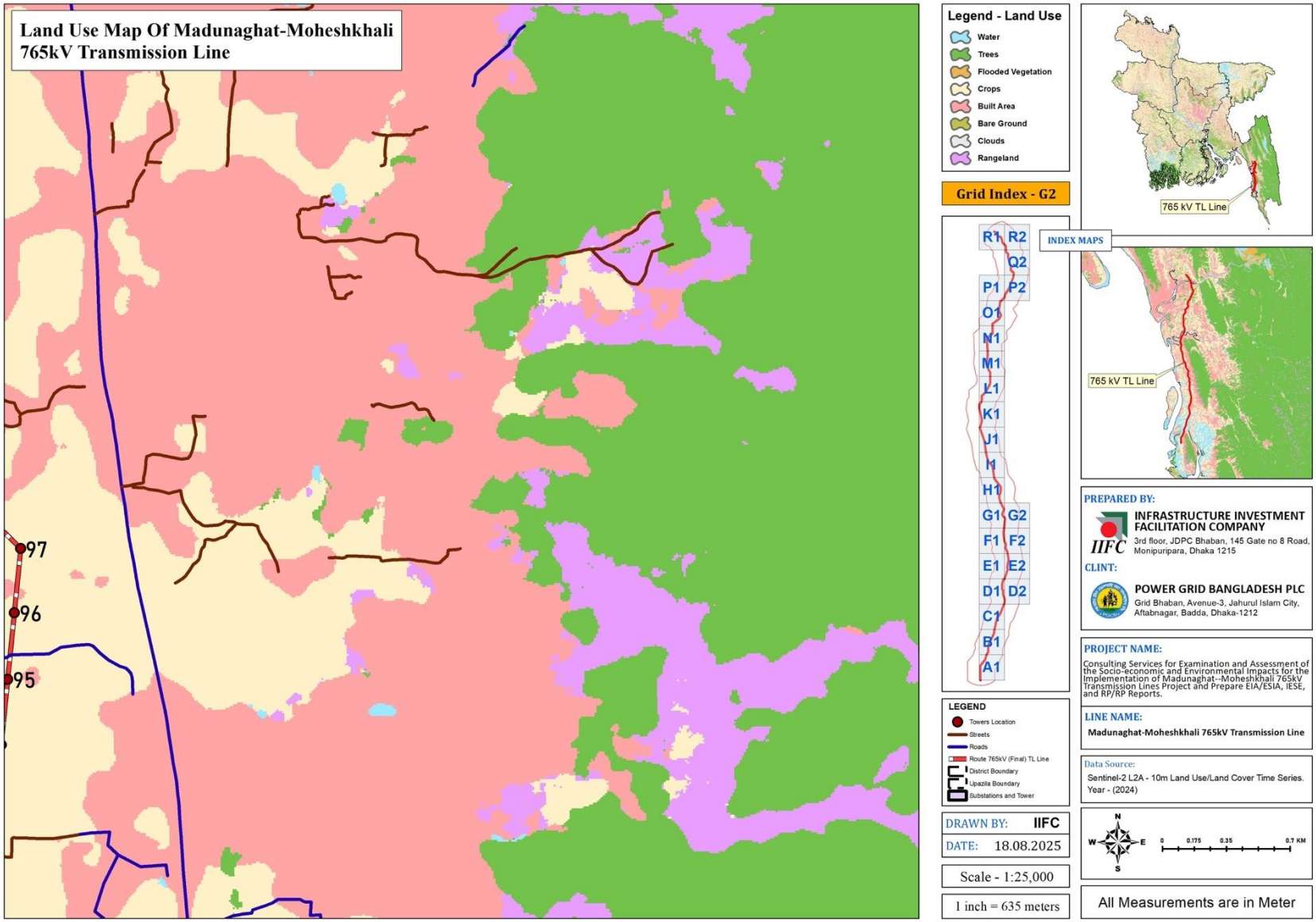
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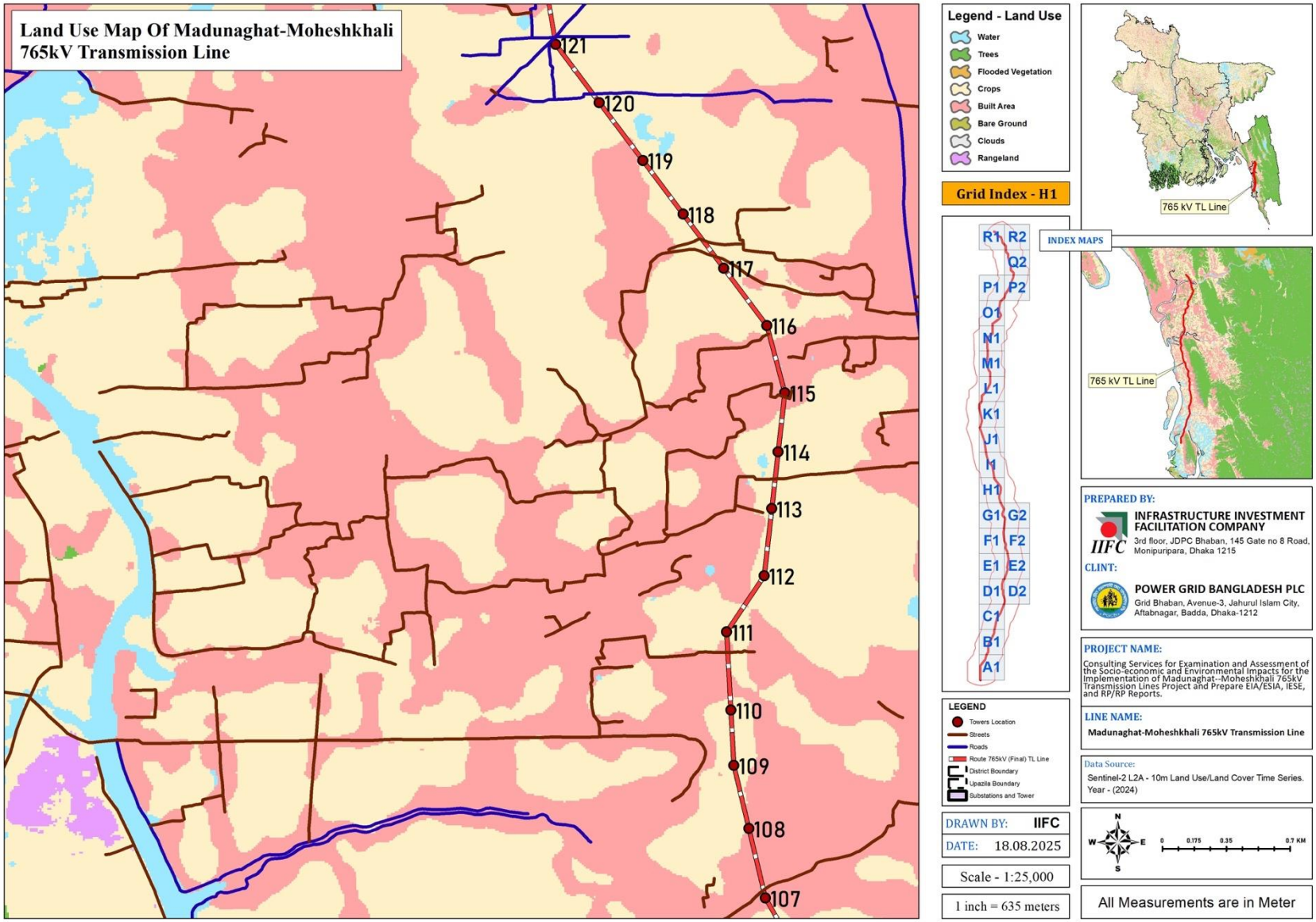
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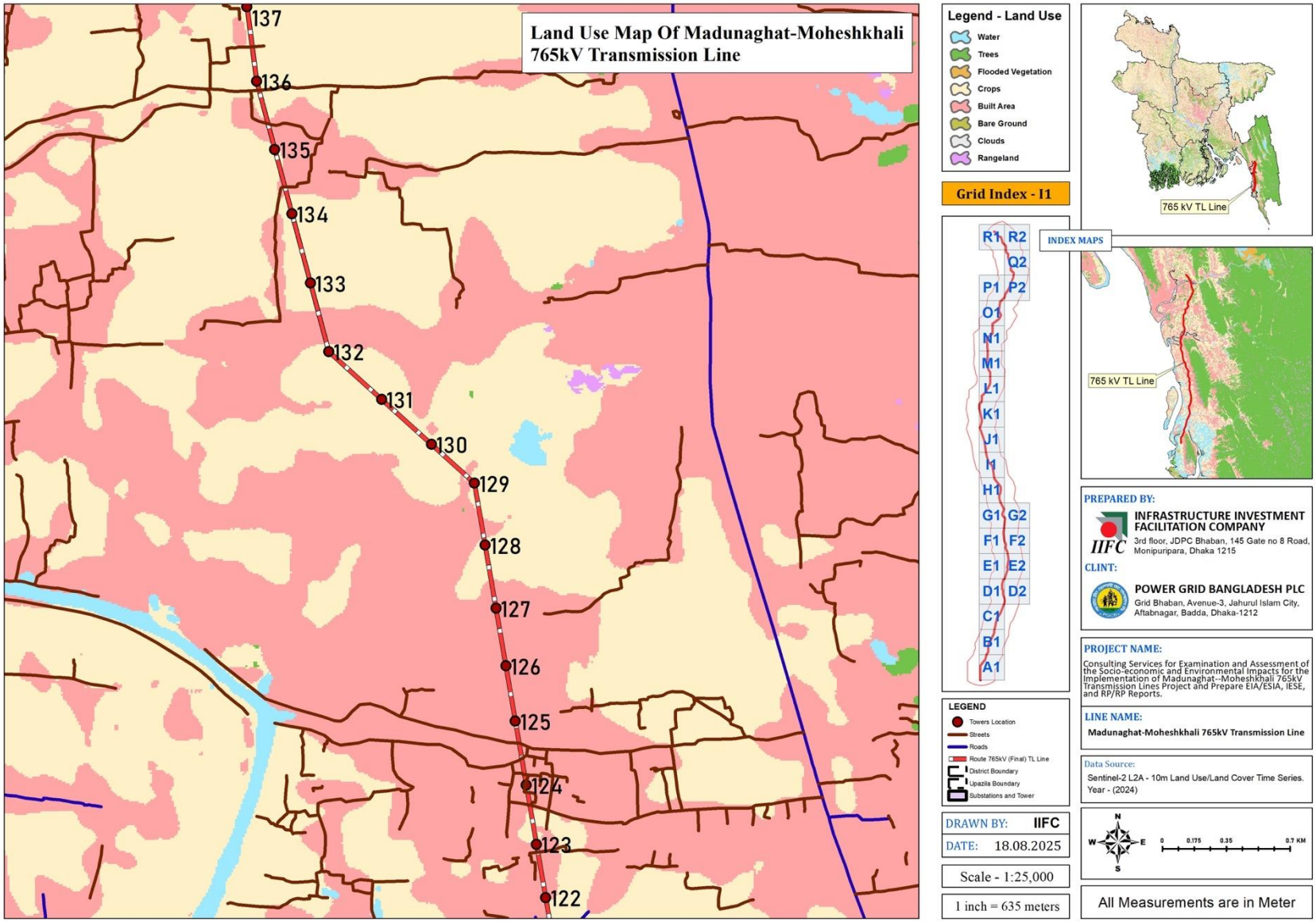
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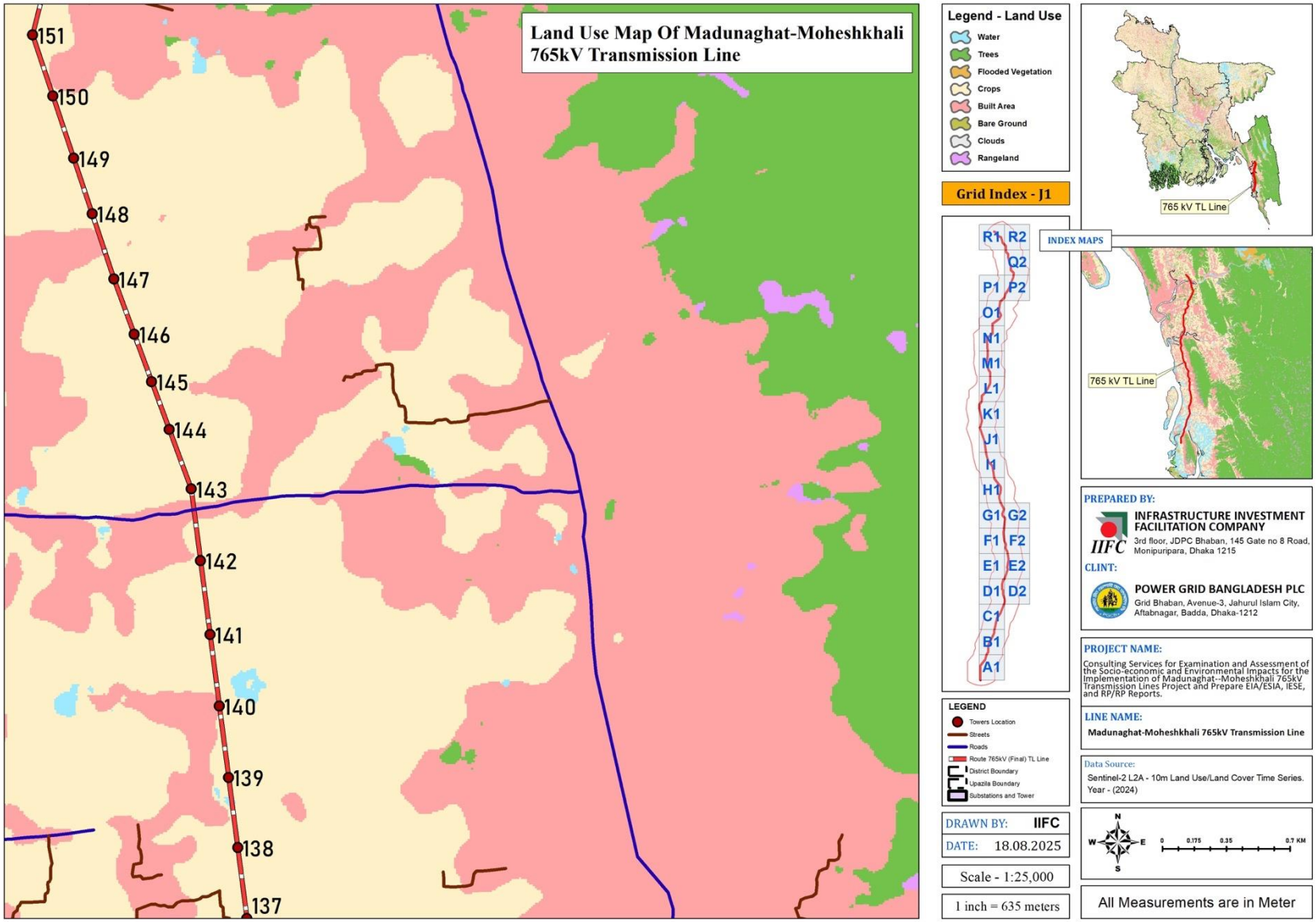
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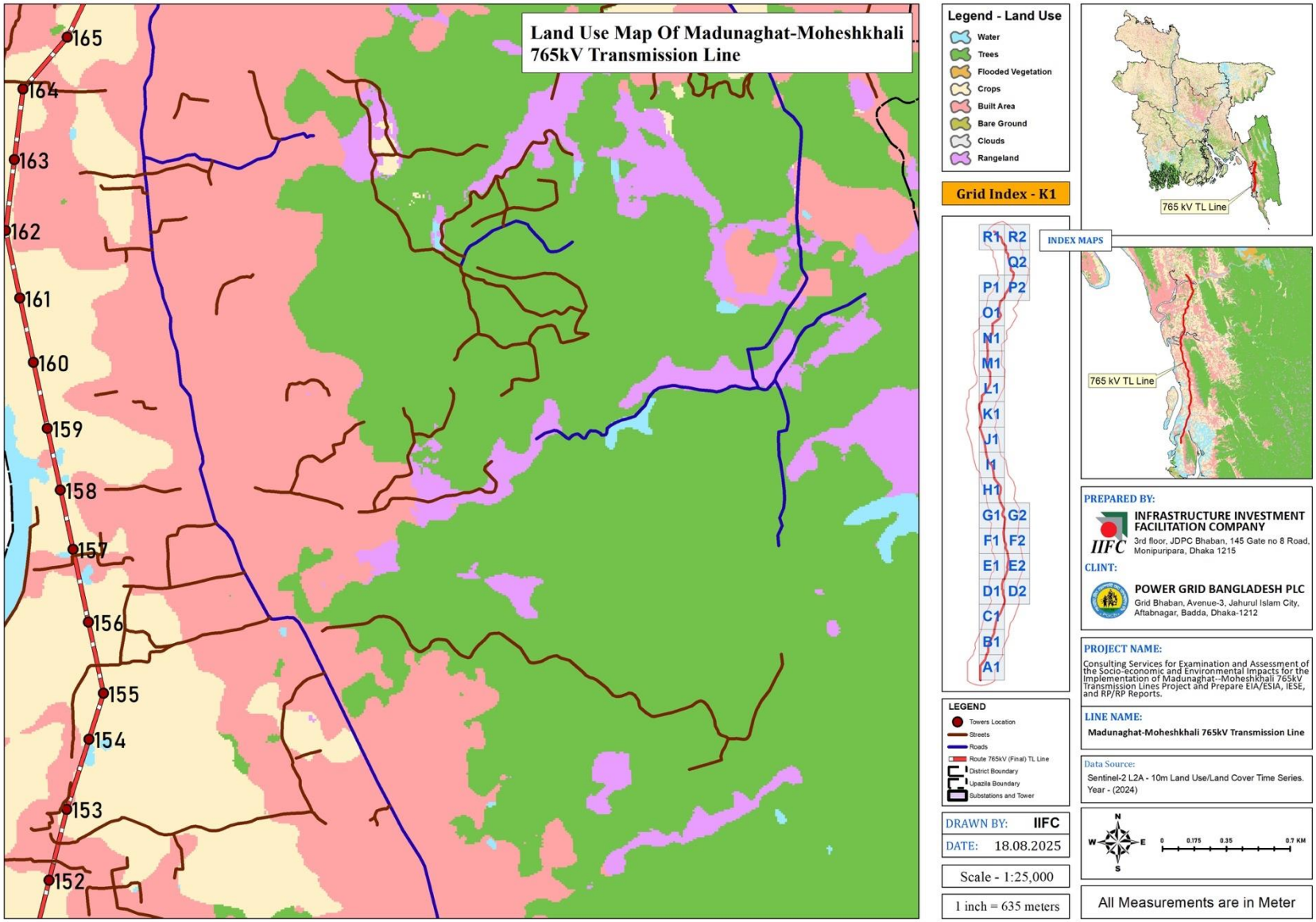
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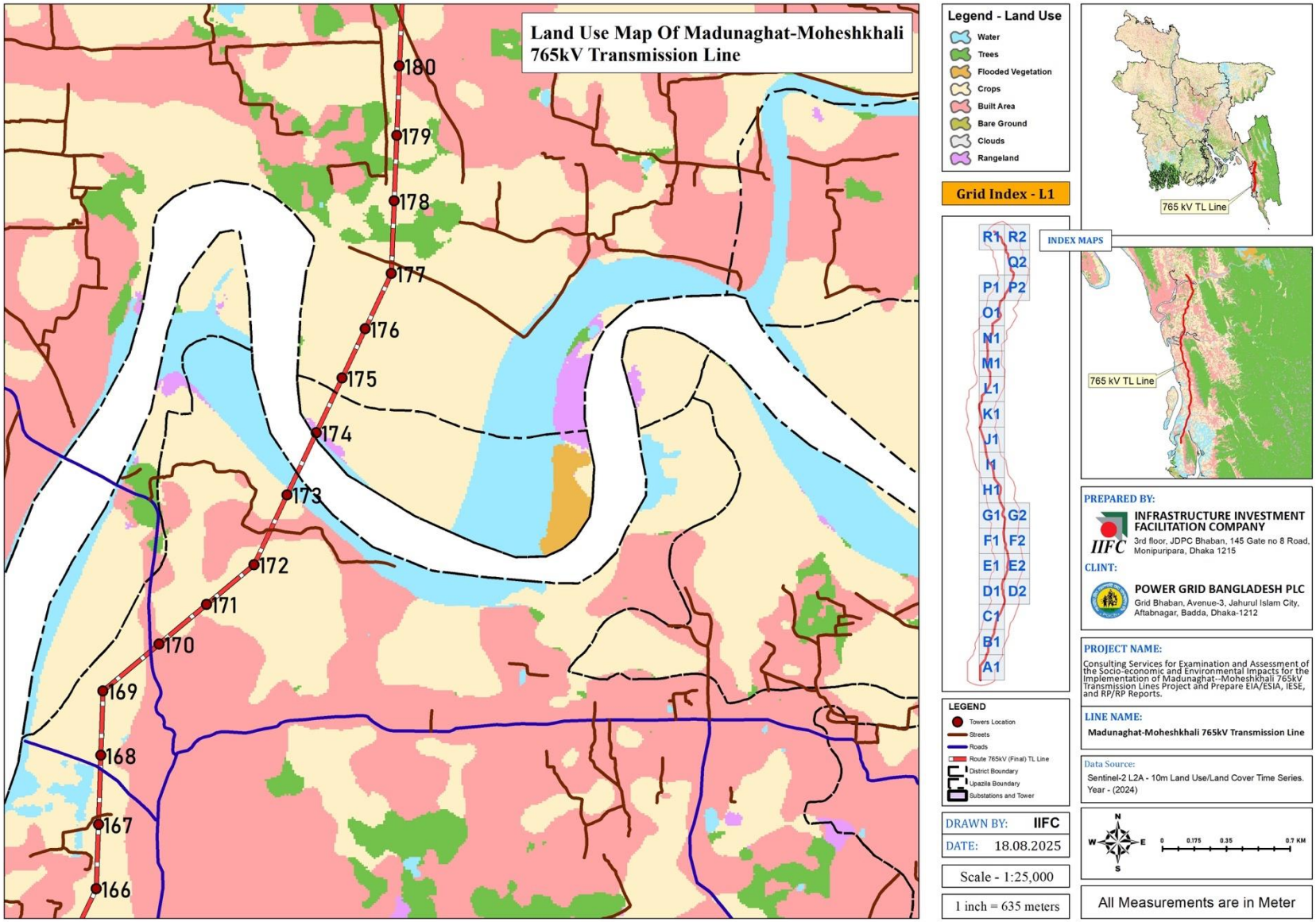
Land Use Map Of Madunaghat-Moheshkhali 765kV Transmission Line
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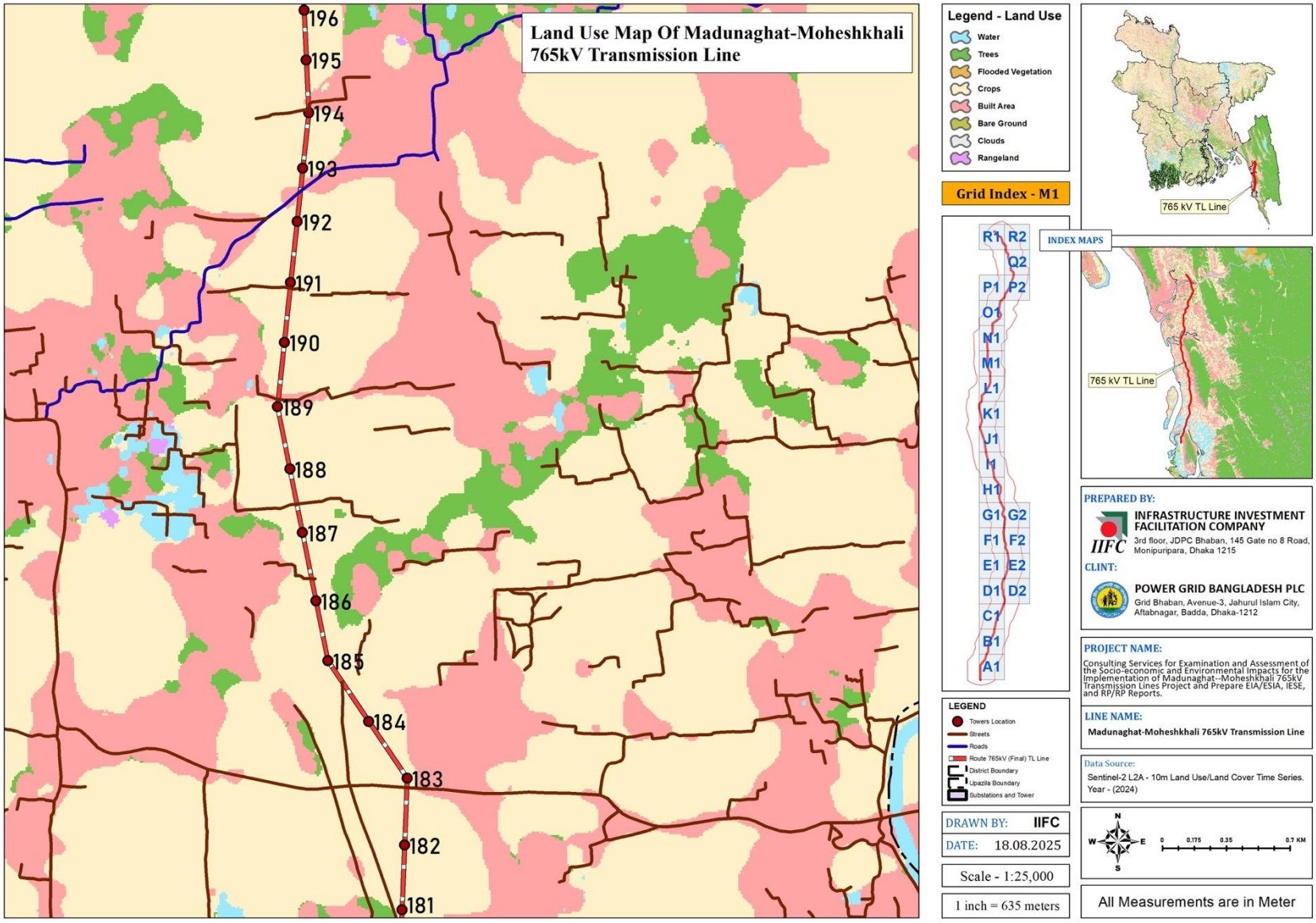
Land Use Map Of Madunaghat-Moheshkhali
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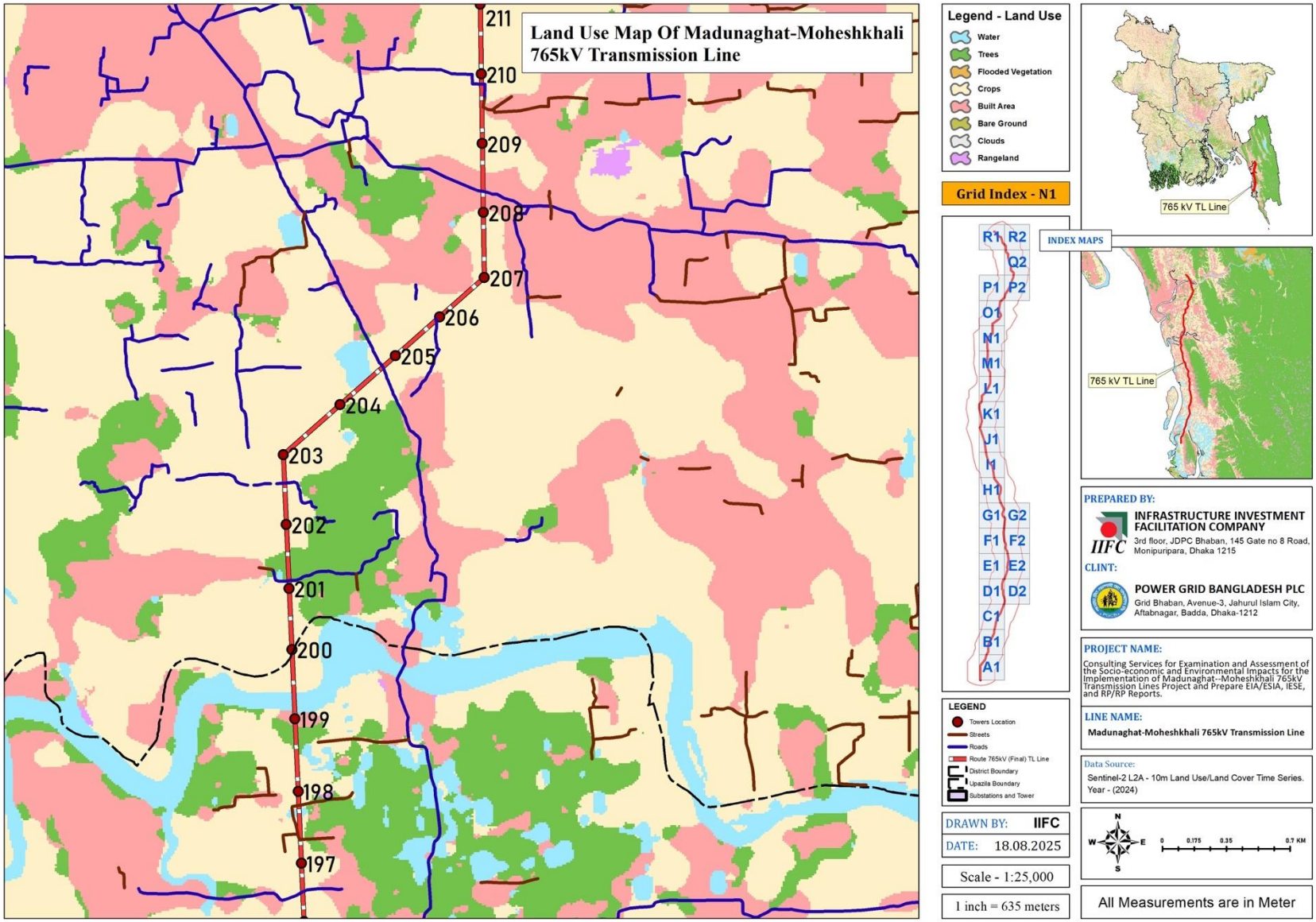
Land Use Map Of Madunaghat-Moheshkhali 765kV Transmission Line
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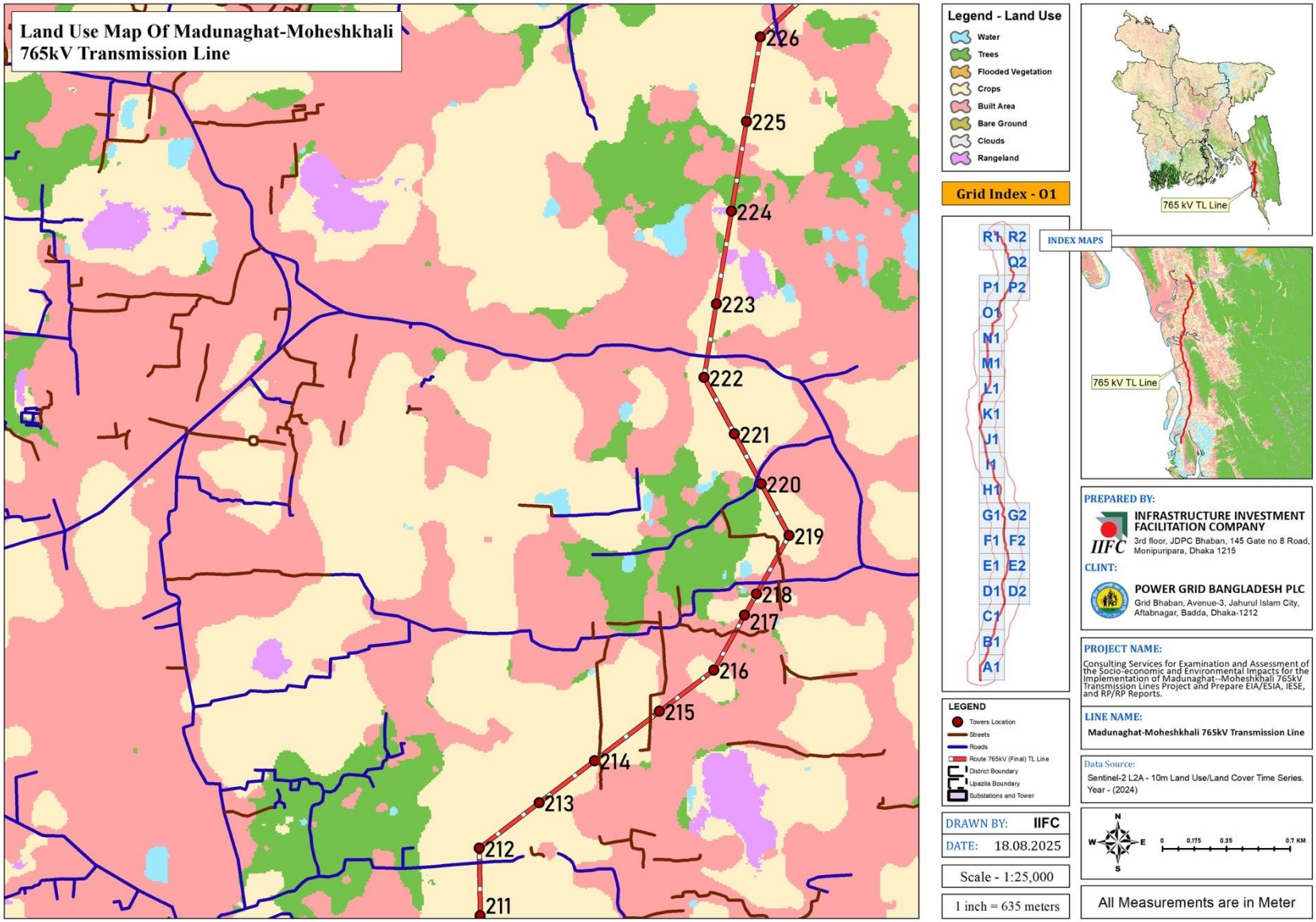
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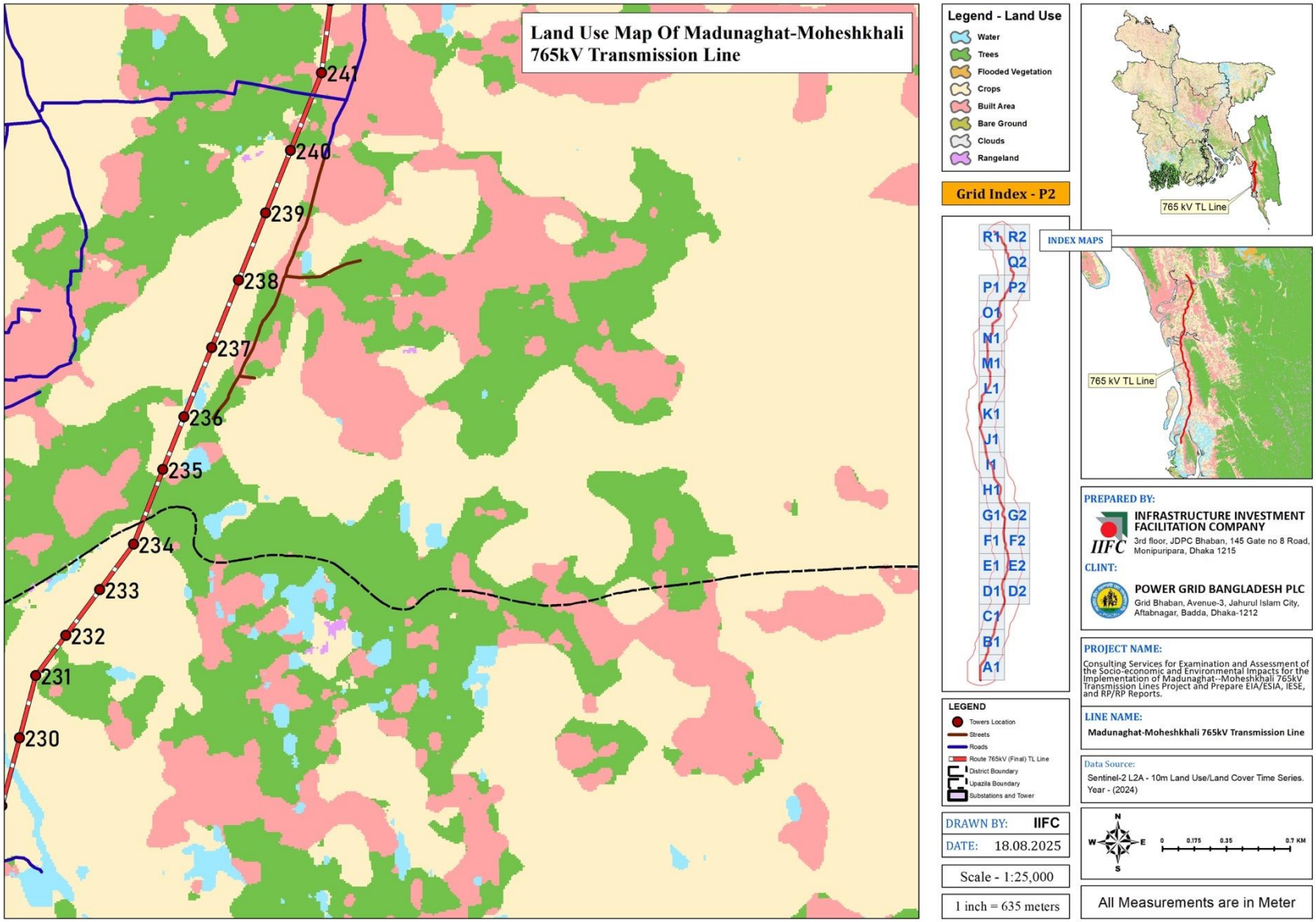
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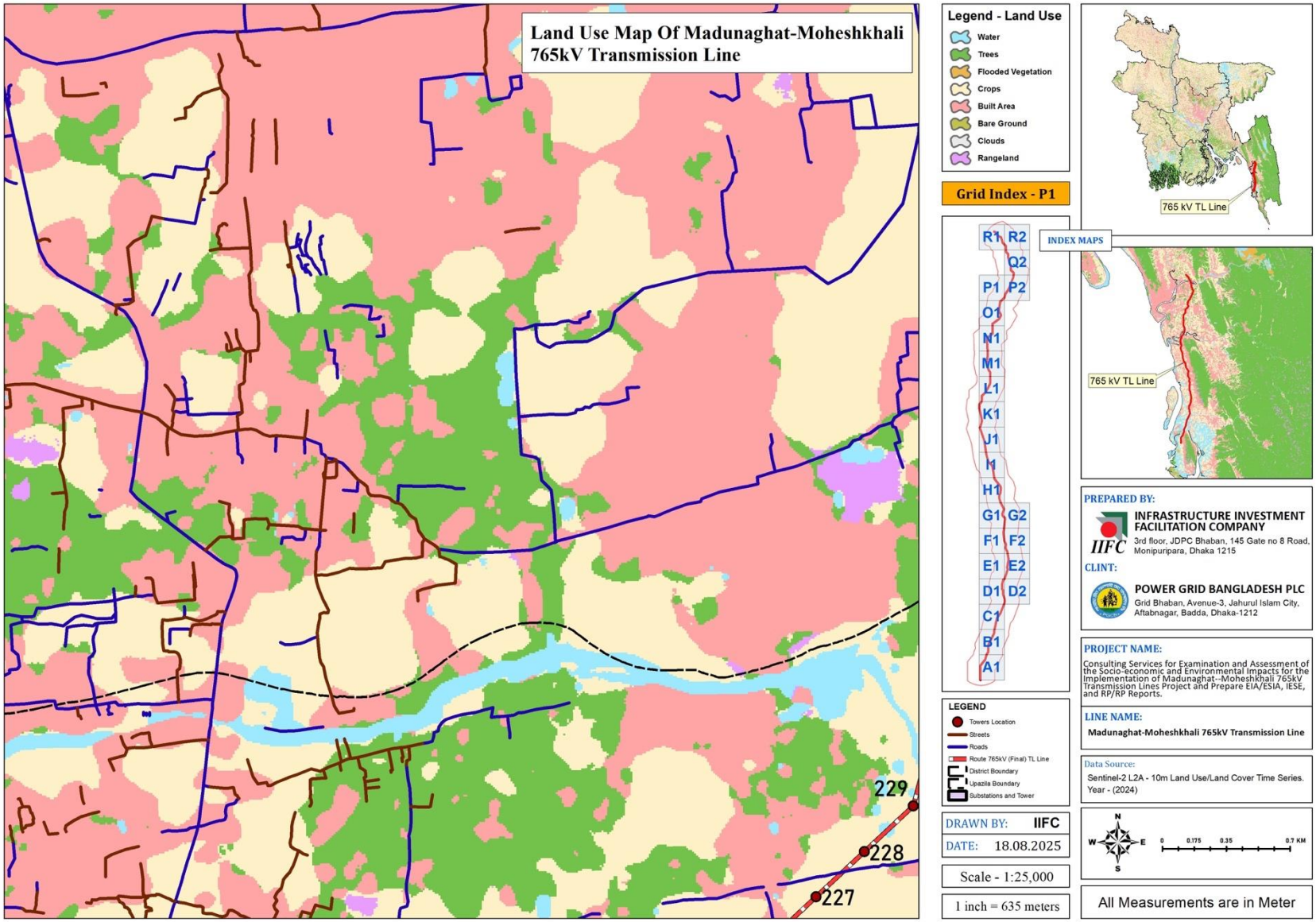
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Upazila Boundary
Substations and Tower
DRAWN BY: IIFC
DATE: 18.08.2025
Scale - 1:25,000
1 inch = 635 meters
765 kV TL Line
INDEX MAPS
765 kV TL Line
PREPARED BY:
INFRASTRUCTURE INVESTMENT FACILITATION COMPANY
3rd floor, JDPC Bhaban, 145 Gate no 8 Road, Monipuripara, Dhaka 1215
CLINT:
POWER GRID BANGLADESH PLC
Grid Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212
PROJECT NAME:
Consulting Services for Examination and Assessment of the Socio-economic and Environmental Impacts for the Implementation of Madunaghat--Moheshkhali 765kV Transmission Lines Project and Prepare EIA/ESIA, IESE, and RP/RP Reports.
LINE NAME:
Madunaghat-Moheshkhali 765kV Transmission Line
Data Source:
Sentinel-2 L2A - 10m Land Use/Land Cover Time Series.
Year - (2024)
N
W
E
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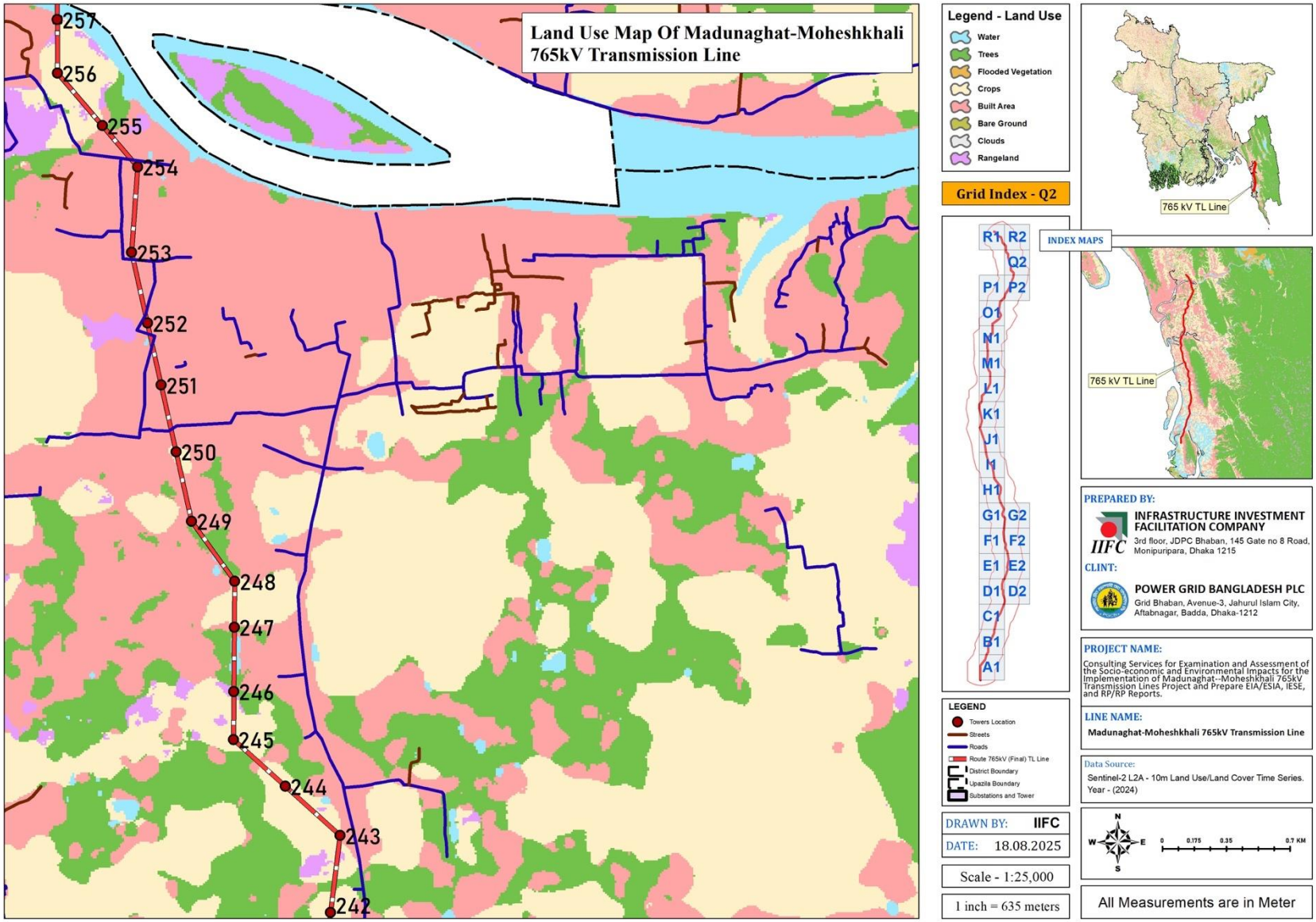
0 0.175 0.35 0.7 KM
All Measurements are in Meter


Land Use Map Of Madunaghat-Moheshkhali
765kV Transmission Line
257
256
255
254
253
252
251
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248
247
246
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244
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Legend - Land Use
Water
Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - Q2
R1 R2
Q2
P1 P2
O1
N1
M1
L1
K1
J1
I1
H1
G1 G2
F1 F2
E1 E2
D1 D2
C1
B1
A1
LEGEND
Towers Location
Streets
Roads
Route 765kV (Final) TL Line
District Boundary
Upazila Boundary
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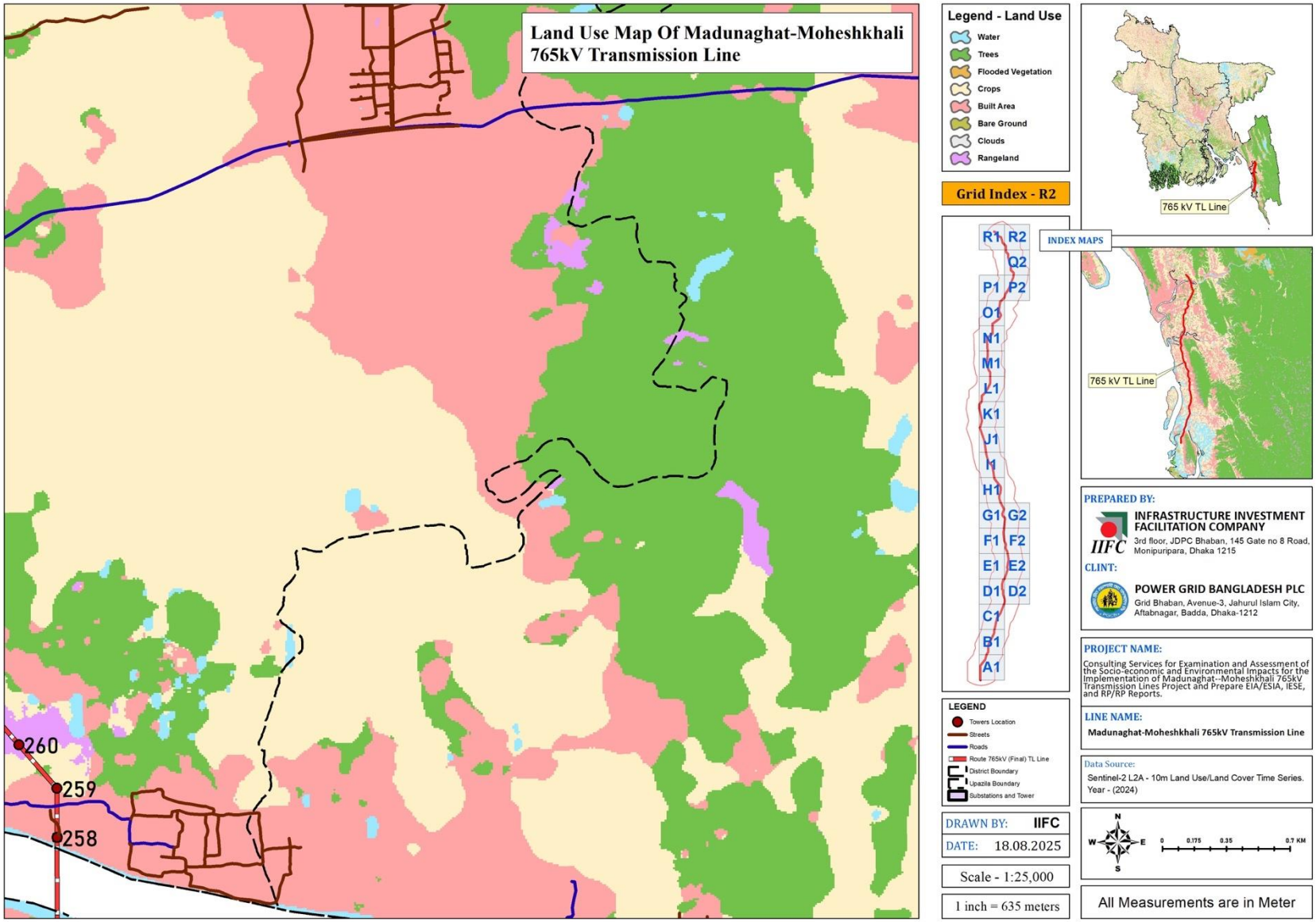
Land Use Map Of Madunaghat-Moheshkhali
765kV Transmission Line
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258
Legend - Land Use
Water
Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - R2
R1 R2
Q2
P1 P2
O1
N1
M1
L1
K1
J1
I1
H1
G1 G2
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E1 E2
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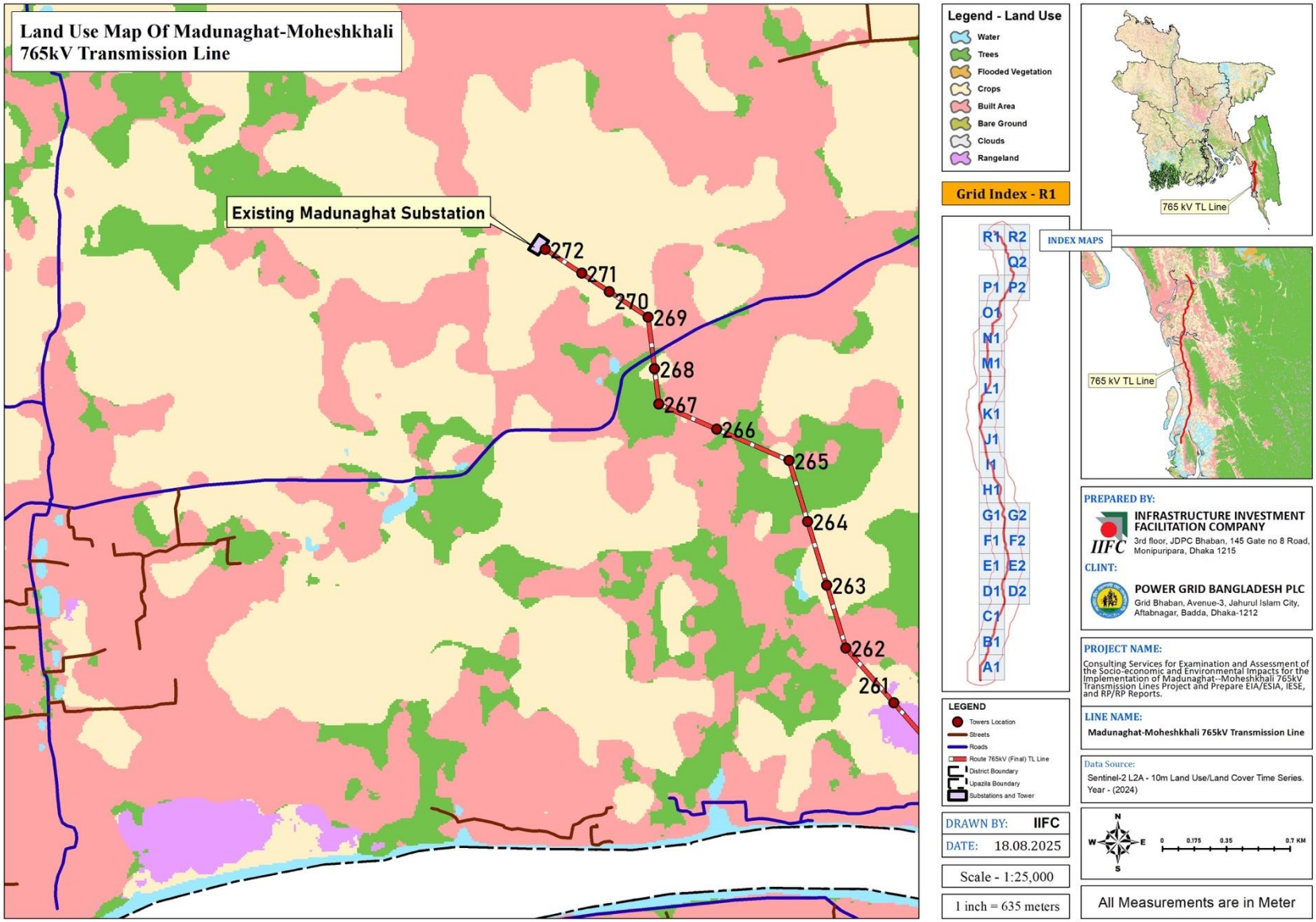
Land Use Map Of Madunaghat-Moheshkhali
765kV Transmission Line
Existing Madunaghat Substation
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265
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Legend - Land Use
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Trees
Flooded Vegetation
Crops
Built Area
Bare Ground
Clouds
Rangeland
Grid Index - R1
R1 R2
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O1
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M1
L1
K1
J1
I1
H1
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Annex-XXV: EIA Terms of Reference (ToR)

Would be included after getting from DoE

Annex-XXVI: Data Collection Checklist/Questionnaire

Power Grid Bangladesh PLC

Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Profile of the Proposed Tower Footing Land

Tower No:

No.	Required Information	Description		
A.	**Location of the Tower**			
1.	District	Chattogram----------1 Cox's-Bazar----------2		
2.	Upazila			
3.	Village			
4.	Mouza			
5.	Union			
6.	land required (acres) (মোট কতটুকু জমির প্রয়োজন)			
7.	Land ownership (জমির মালিকানা)	Private Land----------1 Government Land----------2		
8.	No. Landowners (Total) (মোট জমির মালিকের সংখ্যা)			
9.	Land price (জমির বর্তমান বাজার দর) শতকে	TK.		
B.	**Type of Land**			
10.	Status of crops seasons (Single/Double/Triple) (√)		এক ফসলি	
			দুই ফসলি	
			তিন ফসলি	
11.	Type of land জমির ধরন: (%)		ধানি/ফসলি জমি	
			ভিটা বাড়ী	
			বাণিজ্যিক এলাকা	
			পুকুর/জলাশয়	
			পতিত জমি	
			বাগান	
			রিজার্ভ ফরেস্ট	
			লবন চাষ	
			মাছের ঘের	
			নদী	
			অন্যান্য	
12.	Due to the construction of the tower, any structures have been damaged? টাওয়ার নির্মাণের কারনে কোন কাঠামোর ক্ষতিগ্রস্ত হয়েছে কিনা?	Yes----------1 No----------2		
13.	What is the current use of the structure? (multiple response) [কাঠামোর বর্তমান ব্যবহার কি?	Residential (আবাসিক) Commercial/business (ব্যবসা) Rented/leased (ভাড়া/লীজ) Common property (সাধারণ সম্পদ) Unused (অ-ব্যবহৃত) Other (অন্যান্য)		
14.	If business structure affected, how many workers/ employees are working? ব্যবসায়িক প্রতিষ্ঠান ক্ষতিগ্রস্ত হলে কত জন শ্রমিক/কর্মচারী কর্মরত আছে?	Number (সংখ্যা):		
15.	Average income of the workers/employee (শ্রমিকদের গড় মজুরি)	TK.		
16.				

Details of structures [কাঠামোর বিশদ বিবরণ]:

Item	Main Structures				Auxiliary Structures							
Type of structure	Pucca	Semi-pucca	Tin shed	Kancha	Deep Tube well	Hand Tube well	Sanitary Toilet	Slab Toilet	Tin made boundary	Pucca boundary	RCC pillars	Foundation
No. Structures												
Floor area/length (in sft)												

Inventory of Right of Way of the Transmission Lines (Cleaning Width: 70 m)

Start Tower no: ……. **End Tower no.:…….**

SL.	Tower no		Location/s (Names)				
	From	To	District	Upazila	Union	Village	Mauza
1	2	3	4	5	6	7	8

	Land use pattern													
Residential		Commercial/ industrial		Common properties (Government, School, Madrasha, Mondir, Mosque ets.)			Type of crops cultivated	Type of Forests plantations	%	Type of Water bodies	%	Barren অনুর্বর	%
9		10		11	12	13	14	15		16		17	
Type	No	Type	No	Type	No	Status CP							
Total													

9,10,11: Type of structure: Pucca=1, Semi-Pucca=2, Tin-shed=3, Kancha=4, Others=5
13: Status of Common Properties: 1= Educational institutions; 2= Religious institutions, 3= Health Centre, 4= Graveyard
14: Type of Crops cultivated: 1= Paddy; 2= Vegetables; 3= Fruits; 4= Others (mustard, onion, nuts, ginger, chili, betel leaves, jute, garlic, etc.)
15: Type of Forests: 1= Hill Forest; 2= Reserved Forests; 3= Home Garden; 4= Road Side Plantation
16: Type of water bodies: 1= Ponds, 2= Haor/Beel, 3= River; 4= Large canal/water streams

Land ownership (%)		Small Ethnic Minority (SEM) communities (Yes/No) (উপজাতি)	Relevant GPS coordinates
Private	Government		
18	19	20	21

Tree Inventory

From Tower no----------to Tower no----------

Sl	Name of Tree	Fruit=1 Timber=2 Medicinal=3 Bamboo=4 Banana=5 Guava= 6 Coconut=7 Battle leaf=8 Palm tree=9 Others =10	Description of Trees			Total
			Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
1.						
2.						
3.						
4.						

Sl	Name of Tree	Fruit=1 Timber=2 Medicinal=3 Bamboo=4 Banana=5 Guava= 6 Coconut=7 Battle leaf=8 Palm tree=9 Others =10	Description of Trees			Total
			Large (> 10 m height)	Medium (5-10 m height)	Small (< 5 m height)	
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						
20.						
21.						
22.						
23.						
24.						
25.						
	Total					

Date of Survey:

Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali765kV Transmission Line Project

Questionnaire for Census and Socio-economic Survey

Date of the interview:	Tower No:	Mauza:
Name of the enumerator:	Khatian No.	Dag No.

Village: .....Union: .....Thana/Upazila: .....District: .....

SN	QUESTIONS	RELEVANT CODES
	A. Details of the Respondent (উত্তরদাতার বিস্তারিত)	
1.	Name of AP/Land Owner জমির মালিকের নাম:	
2.	Name of the respondent (উত্তরদাতার নাম):	
3.	Respondent's Relation with Landowner: জমির মালিকের সাথে উত্তরদাতার সম্পর্ক:	
B. Details of the affected land for tower footing [টাওয়ার নির্মাণের কারণে ক্ষতিগ্রস্ত জমির বিবরণ]		
4.	Do you have other lands except this affected land by the project? [প্রকল্পের জন্য নির্ধারিত এই জমি ছাড়া আপনার অন্য কোন জমি আছে কিনা?]	Yes.....1 No.....2
5.	How much total land do you have? (আপনার মোট কতটুকু জমি আছে?)	Land Amount (জমির পরিমান) (শতক):
6.	Who are currently using the land? জমির ব্যবহারের ধরণ? (প্রাসঙ্গিক কোড ব্যবহার করুণ):	Use by landowner (মালিক নিজে).....1 Lease/Rented (ইজারা/ভাড়া দেওয়া) .....2 Sharecropper (বর্গা দেওয়া) 3
C. Socio-economic Condition of the Affected Households		
7.	Housing Condition পরিবারের প্রধান ঘরের ধরণ কি?	Pacca .....1 Semi-Pacca .....2 Tin Shed.....3 Kancha 4
8.	Indigenous (নৃতাত্ত্বিক/আদিবাসী	Yes----------1 No----------2

খানার সদস্য সংখ্যার ক্রম	Disability (প্রতিবন্ধী)	Gender (লিঙ্গ)	Age (বয়স)	Marital status (বৈবাহিক অবস্থা)	Education (শিক্ষা)	Occupation (পেশা)	Monthly income (TK) (মাসিক আয়)
9.	10.	11.	12.	13.	14.	15.	16.
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

11. Disability (প্রতিবন্ধী)**:** Yes=1; No=2

12. Gender: Male=1; Female=2; Transgender=3

14. Marital Status (বৈবাহিক অবস্থা)**:** Married=1; Single=2; Divorced=3; Separated=4; Widow=5

15. Education: 0 to 17, Children=18

16. Occupation: Farmer=1; Business=2; Service=2; Driver=4; Fisherman=5, Day Labor=6; Expatriate (প্রবাসী)=7; Pensioner (অবসর)=8; Housewife =9; Student=10; Unemployed =11; Children (Age below 6)=12, Old Age (Age Above 60)=13, Other=99

17.	Total monthly income of the household?	TK.
18.	What is the overall average monthly expenditure of the household?	TK.
19.	What is the source of energy used by the HH for lighting purposes? (Multiple Response)	Electricity .....1 Solar .....2 Kerosene .....3 Other.....4
20.	What are the energy sources used by the HH for cooking purposes? (Multiple Response)	Firewood----------1 Electricity .....2 Gas/LPG .....3 Kerosene .....4 Other.....5
21.	How does the household collect water for domestic purposes? (Multiple Response)	Tube-well .....1 Electric Motor 2

		Supply water ..... 3 Rainwater..... 4 Pond water..... 5 River ..... 6 Other..... 7
22.	What is the type of toilet used by the household? [পরিবারের দ্বারা ব্যবহৃত টয়লেট ধরনের কি?] প্রাসঙ্গিক কোড ব্যবহার করুণ:	Sanitary with water seal..... 1 Sanitary with no water seal..... 2 Non-sanitary ..... 3 No toilet 4
23.	Household assets	Mobile telephone----------1 Television----------2 Fridge----------3 Motorcycle----------4 Push cycle----------5 Computer/Laptop----------6 Private Car----------7 Bus/Truck----------8 CNG----------9 Rickshaw/Van----------10 Tractor----------11 Air Conditioner----------12
24.	Types of government assistance received by the household? [পরিবার কি ধরনের সরকারি সহযোগিতা পেয়ে থাকেন?] প্রাসঙ্গিক কোড ব্যবহার করুণ:	VGF..... 1 VGD ..... 2 Widow allowance----------3 Old age allowance..... 4 TCB Card..... 5 Freedom Fighter allowance----------6 Disability allowance ..... 7 Pregnancy allowance----------8 Agriculture subsides----------9 Education allowance----------10 No Assistance----------11
25.	What was the source of borrowing loans during the past 12 months? (Multiple Response) (গত ১২ মাসে ঋণ নেওয়ার উৎস কী ছিল?)	Bank ..... 1 NGO ..... 2 Family member/neighbor----------3 Not borrowed 4
26.	Has the household been able to repay the debts? [পরিবার কি ঋণ পরিশোধ করতে সক্ষম হয়েছে?] প্রাসঙ্গিক কোড ব্যবহার করুণ:	Yes..... 1 Partially ..... 2 No ..... 3 Not Applicable..... 4
D. Women Empowerment, Gender Equality and Social Inclusion		
27.	Type of household (পরিবারের ধরন):	Male headed (পুরুষ প্রধান)..... 1 Female headed (নারী প্রধান)..... 2
28.	What types of activities women involved? কোন কোন আয় বর্দনমূলক কাজে কাজে মহিলারা নিয়োজিত?	Not Involved---------- 1 Job/Service----------2 Business----------3 Livestock Rearing----------4 Tailoring----------5 Day/Domestic labour----------6 Vegetable Gardening----------7 Handicrafts----------8 Others----------9
29.	Who decides on the use of household money earned and cash saving?	Husband----------1 Wife----------2 Both Jointly----------3
30.	Who decides on spending money on education for your children and health care of family members?	Husband----------1 Wife----------2 Both Jointly----------3
E. Awareness about HIV/AIDS		

31.	Where would the family go for medical care/health services? (Multiple Response) [পরিবার চিকিৎসা সেবা/স্বাস্থ্য সেবার জন্য কোথায় যাবে?] প্রাসঙ্গিক কোড ব্যবহার করুণ:	Hospital ..... 1 Community clinic ..... 2 Others 3
32.	Do you/your members know HIV/AIDS? [আপনি/আপনার পরিবারের সদস্যরা কি এইচআইভি/ এইডস সম্পর্কে জানেন?]	Yes..... 1 No 2
33.	If yes, from where do you know? [যদি উত্তর হ্যাঁ হয় তাহলে কোথায় থেকে আপনি জানেন?] প্রাসঙ্গিক কোড ব্যবহার করুণ:	Newspaper ..... 1 TV Channels ..... 2 Social media ..... 3 Friends/Neighbors/NGO ..... 4 Education institutions ..... 5 Doctor 6

Contact No of the respondent:

Power Grid Bangladesh PLC

Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Public Consultations (Environmental and Social)

Tower no: _____

Number of Participants (M/F): _____

Location: _____Date/Time: _____

Name of village: _____, Union: _____

Upazila: _____District: _____

Distance from the Project Location:_____ km

Table 2: Issues of discussion and feedback of the participants regarding Socials

Issues to be discussed	Participants' Opinion, Comments and Suggestions
1. Brief description of the project to participants?	
2. What are the immediate comments/feedbacks about impact of the proposed project raised by the participants?	
3. What is the immediate response of the participants to the proposed project? Do they like it? Would they support the project? Or would they oppose the project?	
4. If participants like the project and want to support it, what are the reasons for them to support the project?	
5. What kind of benefits would they expect from the project to their own communities (both short-term and long-term)?	
6. If participants do not like the project, what are the reasons for their objections?	
7. If the project causes loss of land for transmission towers what would they propose to mitigate/compensate those land losses?	
8. If affected households opt for their relocation, where would they prefer to relocate themselves?	
9. In such relocation process, what kind of assistance is needed for their resettlement?	
10. What are community members' specific concerns/fears over the electricity lines crossing their settlements, cultivation fields, trees, etc.?	
11. What are community members' specific concerns/fears over the installation of transmission towers in their settlements or cultivation fields?	
12. What are community members' specific concerns/fears over the activities connected with civil construction work of the project and during construction work?	
13. If community members observe any negative impacts on their settlements or their livelihood activities, what are their suggestions to avoid/minimize such impacts?	
14. Would the proposed project intervention contribute to empowering women and/or narrowing gender gaps? Who will be the most affected? Why and how so?	

Issues to be discussed	Participants' Opinion, Comments and Suggestions
15. If the project causes loss of crops, trees, and other livelihood activities of the people – permanently or temporarily, what would they propose to mitigate/compensate those losses?	
16. Discuss briefly about the general socioeconomic conditions in the village – population, households, main livelihood activities, facilities available for: - activities in the village etc.	
(a) Education	
(b) Socio-economic status	
(c) Health facilities (	
(d) Unemployment levels	
(e) Development initiatives	
(f) Social challenges etc.	
17. What is the level of awareness among community members on sexually transmitted diseases like HIV/AIDS and what is their attitude toward it?	
18. Discuss about the current market prices of affected land.	
19. How does the community think that they can proactively participate in the project planning and implementation process?	
20. How can we engage women, persons with disability, ethnic minorities and transgender community in the process of project implementation?	
21. Are women's mobility and safety constrained due to poor energy services?	
22. Are persons with disability's mobility and safety constrained in the areas due to lack of streetlights due to unreliable electricity supply?	
23. Is there any gender discrimination and violence observe in area? What types of violence?	
24. What is status of Women empowerment and participations in the area? (	
25. What types of impact of gender will be happen in line of land use for transmission towers?	

Table 2: Issues of discussion and feedback of the participants regarding environment

Issues	Participants' Opinion, Comments and Suggestions
Protected areas (national park, sanctuaries, nature reserves, forest reserves, religiously sensitive sites, historical or archaeological sites), if any.	
Status of current environmental conditions in the area – air, dust, noise levels, status of soil in the area.	
Will the project sitting adversely impact the habitats (natural and man-modified) e.g., home gardens, paddy fields, agricultural crops, plantations, natural forest, fish ponds) or soil resource in the locality?	
Type of trees found in the home gardens, natural forests (if any): Fruit trees, timber trees/forest trees.	
Any threatened and endemic tree/ plant species found in the project area.	
Any Indigenous, endemic, threatened animals in the project area.	
Any critical issue or concern by the local people regarding the project?	

Power Grid Bangladesh PLC

Consultancy Services for Examination and Assessment of the Socio-economic & Environmental Impacts for Implementation of Madunaghat-Moheshkhali 765kV Transmission Line Project

Attendance Sheet for Public Consultations

Date: **Time:** **Venue:**

LIST OF PARTICIPANTS

Sl. Nº	Name of the Participant	Male/Female	Disability Yes/No	Ethnicity Yes/No	Occupation	Signature (If agreed by the participants)