



ADDENDUM TO INITIAL ENVIRONMENTAL EXAMINATION

BANGLADESH: DHAKA AND WESTERN ZONE TRANSMISSION GRID EXPANSION PROJECT

**LILO OF GHORASHAL-TONGI 230 KV LINE TO KALIGANJ AND
LILO OF GHORASHAL-KALIGANJ-PURBACHAL-BASHUNDHARA 400 KV AND 230 KV
LINE TO KALIGANJ AND PURBACHAL (STRINGING ONLY)**



IEE Addendum-6

FINAL REPORT

PREPARED BY

POWER GRID BANGLADESH PLC (POWER GRID)

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ACRONYMS AND ABBREVIATIONS

Acronym	Full Form
ADB	Asian Development Bank
AP	Affected Person
BBS	Bangladesh Bureau of Statistics
BDT	Bangladesh Taka
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
DoE	Department of Environment (Bangladesh)
DoF	Department of Forests
DoH	Department of Health
ECA	Environmental Conservation Act
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rules
EHS	Environmental, Health and Safety
EMP	Environmental Management Plan
EMoP	Environmental Monitoring Plan
ESMU	Environmental and Social Management Unit (ESMU)
FC	Fecal Coliform
GoB	Government of Bangladesh
GRM	Grievance Redress Mechanism
H&S	Health and Safety
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IRRI	International Rice Research Institute / Irrigated Rice (as locally used for Boro variety)

kV	Kilovolt
LILO	Loop-In Loop-Out
LMP	Labor Management Plan
MoEFCC	Ministry of Environment, Forest and Climate Change
MW	Megawatt
NGO	Non-Governmental Organization
OHS	Occupational Health and Safety
RoW	Right-of-Way
SPS	Safeguard Policy Statement (ADB, 2009)
SW	Surface Water
TC	Total Coliform
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
WB	World Bank

EXECUTIVE SUMMARY

Chapter 1: Introduction

- i. This Initial Environmental Examination (IEE) Addendum has been prepared for the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1. The project is part of the Government of Bangladesh's initiative to strengthen the national transmission network and meet the growing electricity demand in Dhaka and its adjoining regions. The IEE Addendum supplements the original assessment, ensuring compliance with the Environmental Conservation Rules (ECR 2023) and incorporating changes in final design and alignment. The addendum reassesses baseline conditions, updates environmental and social impacts, and refines mitigation measures through a revised Environmental Management Plan (EMP).

Chapter 2: Administrative and Legal Framework

- ii. The project is governed by the Environmental Conservation Act (1995, amended 2010) and ECR 2023, which set standards for air, water, noise, and waste management. Other applicable instruments include the Forest Act 1927 (amended 2000), the Bangladesh Labor Act 2006, and land acquisition and resettlement policies. The project also follows ADB's Safeguard Policy Statement (SPS, 2009) and international best practices such as the IFC Environmental, Health, and Safety (EHS) Guidelines for power transmission projects. Power Grid, as the executing agency, is responsible for ensuring regulatory compliance, including obtaining Environmental Clearance Certificates (ECC) from the Department of Environment (DoE).

Chapter 3: Project Description

1. The project covers the construction of approximately 3.33 km of LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and 240m of LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only). Activities include tower erection, conductor stringing, excavation, and site preparation. Temporary facilities such as access roads, storage yards, and workforce camps will also be established. The alignment has been carefully designed to minimize environmental and social impacts while ensuring efficient connection to the national grid. The project will significantly enhance power transmission capacity, reduce bottlenecks, and support the industrial and urban growth of greater Dhaka.

Chapter 4: Environmental and Social Baseline

- iii. Baseline studies were conducted on physical, biological, and socio-economic aspects of the project area. Air quality, soil, and noise levels are generally within permissible limits. Groundwater and surface water assessments confirmed that pH and ammonia levels are within acceptable standards, though exceedances of COD, Total Coliform (TC), and Fecal Coliform (FC) were observed in some locations. Vegetation in the project area consists largely of agricultural fields, homestead trees, and scattered forest patches. Socio-economic surveys revealed that agriculture—particularly rice (Irri and Amon), corn, and vegetables—is the dominant livelihood, supported by small-scale businesses and wage labor. Communities face challenges from unreliable electricity supply, underscoring the urgent need for the project.

Chapter 5: Impact Assessment and Evaluation

- iv. The assessment identified both positive and negative impacts. Positive impacts include improved electricity reliability, stimulation of industrial and commercial activities, job creation, and improved education and living standards through better access to power. Negative impacts are associated mainly with the construction phase, such as temporary dust and noise generation, soil disturbance, loss of some vegetation, localized water quality issues, and occupational health and safety risks. Social risks include disruption to agricultural activities, temporary land use restrictions, and risks

linked to labor influx. Importantly, these impacts are site-specific, temporary, and reversible, and can be effectively managed through EMP implementation.

Chapter 6: Environmental Management Plan (EMP)

- v. The EMP provides mitigation measures for both the construction and operational phases. These include minimizing tree clearance, implementing compensatory plantation programs, and ensuring proper disposal of construction and domestic waste. Regular monitoring of air, water, and noise is mandated, with corrective measures required in case of non-compliance. Construction equipment must be maintained to reduce emissions, noise, and vibration. Social measures include prioritizing local labor, establishing awareness campaigns on gender-based violence prevention, and developing a robust Grievance Redress Mechanism (GRM). The EMP also allocates budget and defines responsibilities for Power Grid, contractors, and supervising consultants.

Chapter 7: Grievance Redress Mechanism (GRM)

- vi. A structured three-tier GRM has been developed to address community grievances effectively. Local Grievance Redress Committees (LGRCs) will address site-level complaints, while unresolved cases can be escalated to a Project-level Grievance Redress Committee (PGRC) and ultimately to higher authorities if needed. The GRM ensures accessibility, inclusiveness, and transparency, allowing affected people to raise concerns related to land use, compensation, safety, or environmental impacts.

Chapter 8: Public Consultation and Disclosure

- vii. Extensive consultations were conducted with local communities, women's groups, and other stakeholders. Participants welcomed the project due to its potential to provide reliable electricity, attract new industries, and create jobs. Concerns raised included deforestation, noise and dust during construction, and risks of social conflict from labor influx. Communities strongly emphasized that local people should be given priority for employment during construction and that measures should be taken to safeguard women against harassment. Women, while facing challenges such as early marriage and limited education, expressed support for the project, noting its potential to create opportunities for female employment and improve quality of life.

Chapter 9: Conclusion and Recommendations

- viii. The study concludes that the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) both environmentally and socially feasible. Baseline conditions largely comply with ECR 2023, and identified impacts are temporary and manageable with appropriate mitigation. The project has strong community support and is expected to deliver long-term socio-economic benefits by improving electricity supply and stimulating industrial growth.

Key recommendations include:

- Strict compliance with ECR 2023 during environmental monitoring.
 - Limiting tree clearance and implementing compensatory plantation programs.
 - Regular monitoring of air, water, and noise quality, with corrective actions for non-compliance.
 - Prioritizing employment of local labor to reduce labor influx and maximize community benefits.
 - Implementing gender-sensitive awareness and safety programs to prevent harassment and ensure inclusiveness.
 - Continuous stakeholder engagement through consultations and effective operation of the GRM.
- ix. The project will deliver significant national and regional benefits by strengthening Dhaka's power grid. While minor environmental and social impacts are expected during construction, these are temporary and can be effectively mitigated. With robust implementation of the EMP, active

stakeholder engagement, and strict monitoring, the project is recommended for approval and implementation.

1. INTRODUCTION

1. This report is addendum to the original IEE report¹ that was approved by ADB in July 2019. The addendum is only in respect of two lines; LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1. The report is based on the final alignment of the EPC Contractor and considers the risks and impacts in order to formalize the management plan. The original IEE depicted a detailed project description, baseline data, impact assessment and management plans and remains applicable for the project.

2. In order to prepare this addendum 6, EQMS performed desk-based study (which included data from literature reviews, maps, original IEE report and monitoring reports) supported by on-ground reconnaissance visits, surveys and consultations to establish an understanding of the environmental and socio-economic baseline. The identified impacts have been compared with the original routes as predicted in the original IEE and additional mitigation measures have been proposed along with the upgradation of the EMP in accordance with the requirements of ADB SPS 2009 for unanticipated environmental impacts. The additional risks and mitigation measures are described in this report under this addendum consist of LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1.

1.1 Background

3. The Power Division, under the Ministry of Power, Energy and Mineral Resources (MPEMR) leads the power sector while the Bangladesh Energy Regulatory Commission (BERC) is the regulatory agency which regulates electricity, gas, and petroleum sectors. The electricity sector is unbundled into generation, transmission, and distribution segments. Backbone Transmission Lines and substation network in the country are operated by the Power Grid Company of Bangladesh Limited (Power Grid). As of December 2018,² Power Grid network comprised, Transmission Lines operated at 400 kV, 230 kV and 132 kV voltage levels with a total length of 11,396 circuit km and 125 132/33 kV substations with a cumulative capacity of 20,211 MVA. Development of transmission and distribution network in line with generation has been identified as a key element of the power sector strategy in the 'Bangladesh Seventh Five Year Plan FY2016 - FY2020'. Development of an inter-region transmission network is required due to the unbalance in concertation of generation and demand, while local network expansions are required to cater to the increasing demand at new load centers. Due to the growing electricity demand, a considerable number of grid substations and Transmission Lines have already been overloaded. Therefore, urgent upgrades and expansions are required by Power Grid to supply power to the key economic corridors in the southern and western regions including greater Dhaka area.

4. The Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGEP) focuses on expanding the local transmission network to deliver electricity to new and expanding load centers while meeting the network operating criteria. Power Grid has appointed EQMS Consulting Limited for Conducting Social Value Assessment Surveys, Preparation, Upgradation, and Implementation of Resettlement Action Plans and Environmental and Social Safeguard Supervision and Monitoring for the Proposed LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1.

5. The concept paper for the project was approved by ADB on 6 March 2019, comprising three main investment components. The loan was made effective on 16 July 2020.

¹<https://www.adb.org/projects/documents/ban-51137-003-iee>.

²Power Grid Company of Bangladesh Ltd. (Power Grid) at a glance.

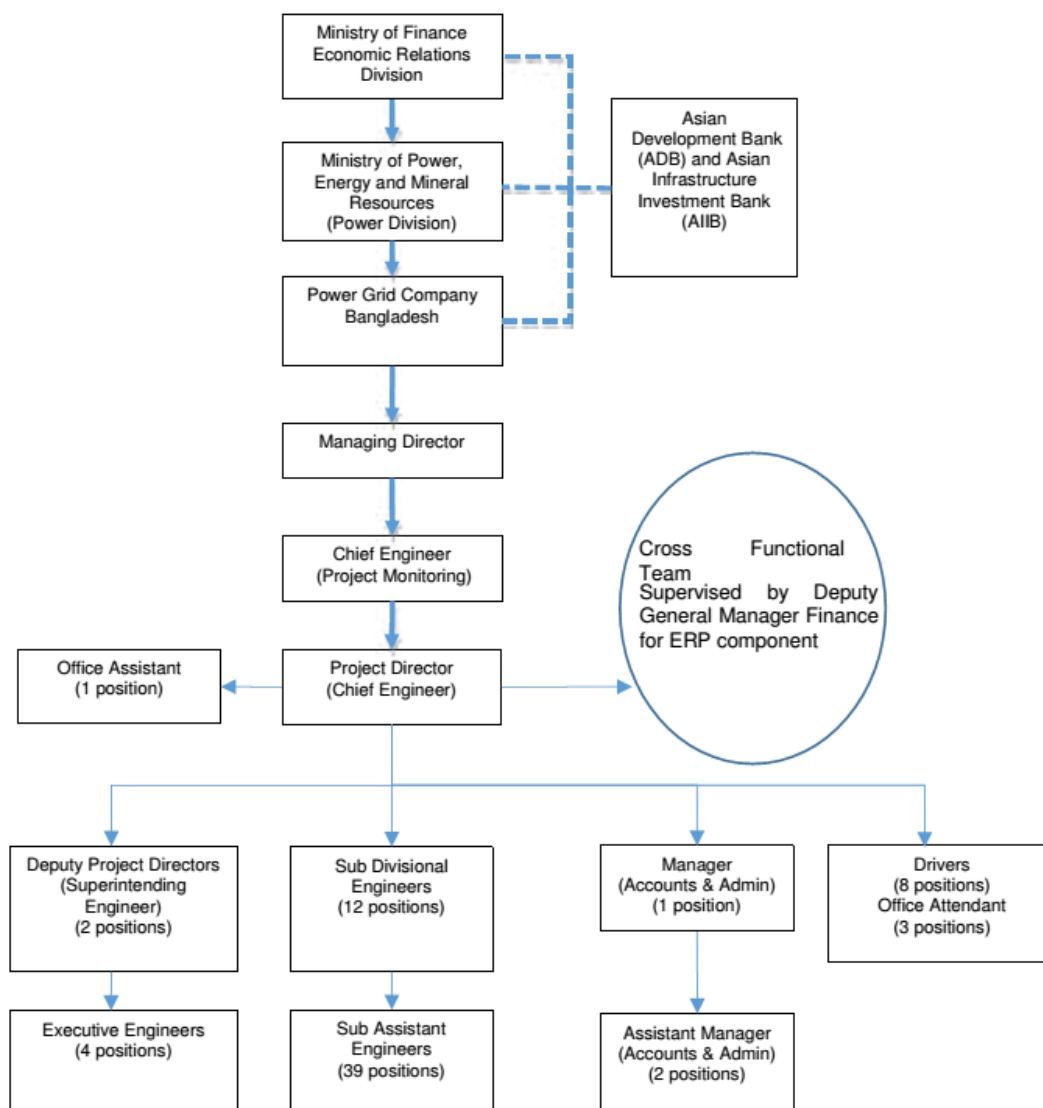
Component 1: Transmission system in Greater Dhaka expanded. The project will construct and commission substations with a total capacity of 4,450 MVA and 40 km of Transmission Lines in Greater Dhaka.

Component 2: Transmission system in Western Zone expanded. The project will construct and commission substations with a total capacity of 3,070 MVA and 368 km of transmission line in the western zone.

Component 3: Institutional Capacity of Power Grid strengthened. The project will enhance capacity by (a) supporting installation and operation of an enterprise resource planning (ERP) system to assist Power Grid in optimally managing its capital-intensive assets; (b) establishing a Drone Inspection Center within the operation and maintenance department of Power Grid with some gender equality element.

6. On behalf of the government, overall coordination of the project will be managed by MPEMR. Power Grid will be the Executing Agency (EA) for Component 1, 2 and 3. The project preparation, implementation, monitoring, and reporting to ADB and the government will be handled by the Project Management Unit (PMU) established by Power Grid. EPC Contractors with separate environmental officer and Health and Safety Officer for each package will implement Environment Management Plan (EMP). Designated PMU engineers will be trained and supervised by the Power Grid safeguards unit to work together with contractors for EMP implementation. Figure 1-1 shows the institutional framework for DWZTGEP.

Figure 1-1: Institutional Framework for Dhaka and Western Zone Transmission Grid Expansion Project



Source: Power Grid.

Note: ERP component implementation will be supervised by a deputy general manager (project finance) with support from Power Grid 's Cross Functional Team which comprises 7 members.

ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, ERP = Enterprise Resources Planning, Power Grid = Power Grid Company of Bangladesh Limited, P&D = planning and design.

1.2 Objectives of the Initial Environmental Examination

7. The implementation of the project may result in both negative and positive impacts on the surrounding environment, depending on site-specific environmental sensitivities and the effectiveness of the proposed mitigation measures. These impacts include physical, ecological, and socio-economic aspects. Based on the rapid environmental assessment conducted under the original Initial Environmental Examination (IEE) and in accordance with the ADB Safeguard Policy Statement (SPS), 2009, the project is classified as an Environmental Category B project. For Category B projects, the

anticipated environmental impacts are site-specific, largely reversible, and can be effectively mitigated through appropriate measures.

8. An IEE Addendum (Addendum 6) has been prepared for this project to address final EPC design refinements within the LILO scope only. The environmental categorization, impact significance, and conclusions established in the original IEE remain unchanged under this addendum. Accordingly, no new or additional significant environmental impacts are anticipated beyond those already assessed. Any updates to the IEE and Environmental Management Plan (EMP) presented in this addendum are limited to refining mitigation measures, monitoring requirements, and implementation arrangements, as necessary, to reflect the finalized EPC designs, in full compliance with the requirements of the ADB SPS (2009). Power Grid will ensure that the safeguard measures outlined in the IEE and EMP continue to be updated and implemented if any further changes are identified during detailed engineering or project implementation.

1.3 Scope of Work

9. This IEE requires identification of potential environmental issues associated with the project and appropriate mitigation measures to minimize the environmental impacts. The broad scope of the IEE is:

- i. To conduct field visits to collect data relevant to the study area and also collect secondary data so as to establish the baseline environmental status of the study area;
- ii. To assess the impacts on environmental attributes due to the location, design, construction and operation of the proposed project;
- iii. To identify critical environmental parameters required to be monitored subsequent to the implementation of the proposed project;
- iv. To carry out consultation with local people to identify public perception regarding the project;
- v. To prepare an EMP and an Environment Monitoring Plan (EMoP) including cost estimates for Power Grid to comply with during the project implementation; and
- vi. To prepare an IEE report in accordance with the ADB's SPS 2009 and the national regulations of the government.

1.4 Methodology

10. The IEE is usually used to estimate the potential environmental impacts of a proposed project, based on available preliminary information and information readily acquired through rapid environmental surveys. This study has been conducted in accordance with the ADB's SPS 2009 and other relevant national/international laws and treaties applicable to the proposed project.

11. The field survey team used a combination of desk studies, field investigations, census data, structured interviews, focus group discussions (FGDs), google maps, and reports to generate the data required to describe the existing environment and assess the potential impacts due to the construction and operation of the project. Local knowledge about the ecosystem and problems associated with the project activities were carefully recorded through public consultations and used in the impact assessment and to develop the mitigation plan. Formal public consultations, as well as informal ones, involving local villagers and Affected Persons (APs) were carried out in August 2025.

1.4.1 Secondary Data Collection

12. The review of secondary sources and informal initial field investigations were undertaken to prepare a preliminary assessment of the physical and social environment, biodiversity, and conservation significance of the identified project area. The preliminary literature reviews also assisted in identifying data gaps which could be addressed with collection of additional primary information through field surveys.

13. Relevant data/information was collected from various government and non-governmental organizations, especially related to site aspects, climate (weather), topography, geology, waterbodies, surface/groundwater quality, ecology/biology, socioeconomics, and other aspects. Previous environmental site studies, where available, were reviewed, as well as relevant articles and web sites.

1.4.2 Primary Data Collection

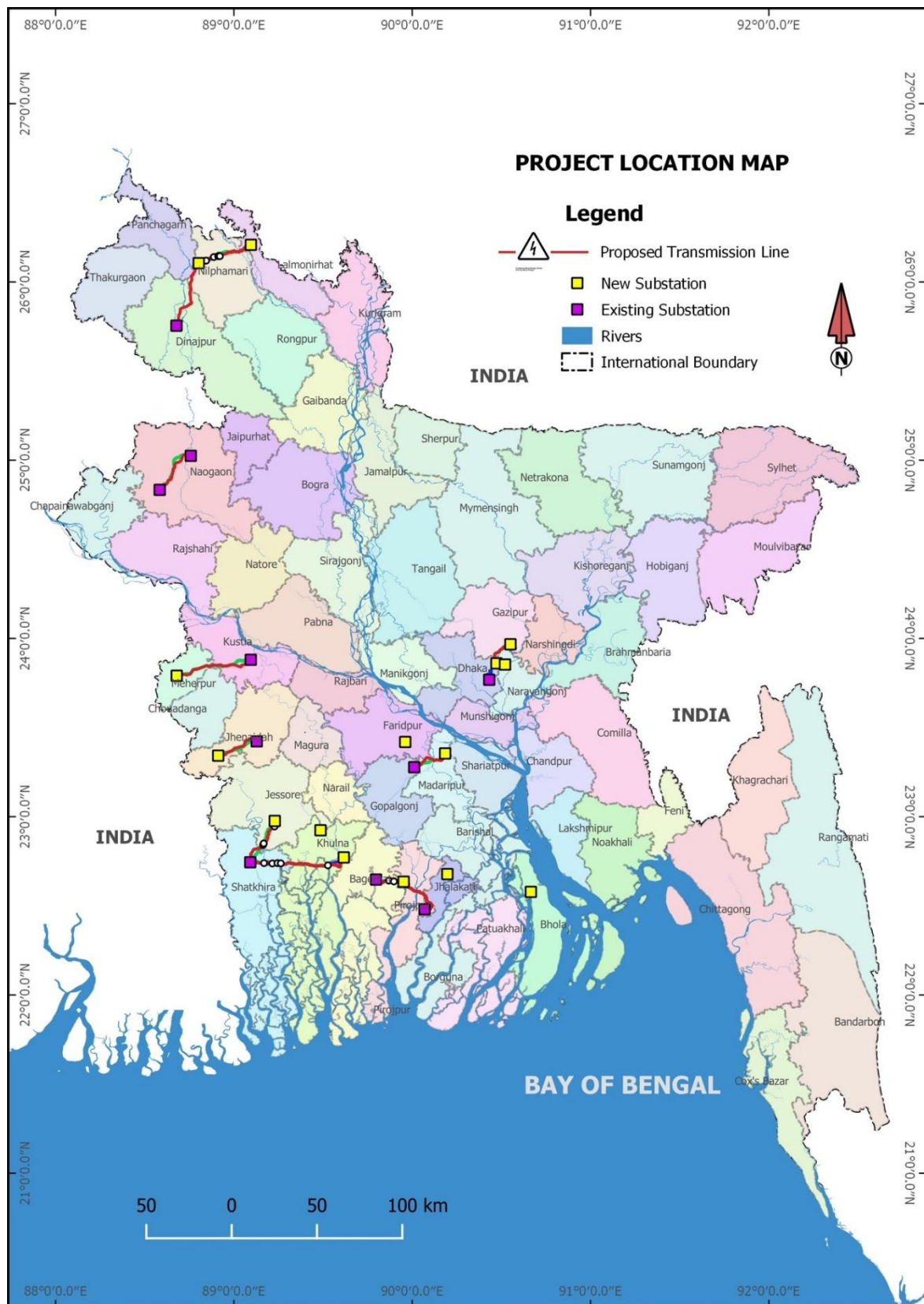
14. Primary data/ information included data collected during the field surveys and observations, and discussions with stakeholders, such as community representatives and APs at key project locations and in the project influence area. The main purpose of this approach was to obtain a clear impression on the people's perceptions of the project and its environmental impacts and possible mitigation measures.

15. Primary data on the environmental and socioeconomic aspects of the project area were collected from February 2025 and August 2025 by the safeguards survey team to comprehensively evaluate the existing environmental baseline conditions of the project area.

16. Status of flora and fauna within the project area was determined by reviewing the literature relevant to the area, as well as observations and surveys at the project sites. Tree counting at the project sites within the RoW was also carried out by the safeguard survey team. Identification of tree species in different habitats, such as home gardens, plantations, and agricultural lands, and assessment of stage of growth (whether mature tree or sapling) were also carried out.

17. A discussion with Power Grid officials revealed that trees or saplings below five meters in height will not be cleared within the RoW. Trees taller than five meters in height and within 12 meters from the centre of the RoW will be cleared to make space for the tower footings and conductors. Tree branches outside 12 meters of the RoW will be cut at a 45° angle to the tower. Cutting branches that grow horizontally towards the conductors and towers will be carried out every three months to prevent the in-growth. The value of the trees was determined according to the information provided by the Bangladesh Forest Department and Department of Agriculture

Figure 1-2: Diagrammatic Representation of the Proposed Subprojects in Dhaka and Western Zone Transmission Grid Expansion Project



2. ADMINISTRATIVE AND LEGAL FRAMEWORK

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

19. Several new policies and guidelines have been introduced since the original IEE was produced and taken into account this addendum for assessment. The newly introduced policies/laws/guidelines are: National Environment Policy, 2018, EIA Guidelines for Industry, 2021, Hazardous Waste (e-waste) Management Rules, 2021, Solid Waste Management Regulations 2021 and Grid Code, 2019.

2.1 Environment related policies in Bangladesh

Table 2-1: Related policies in Bangladesh

Policies	Description/ Applicability of Acts
National Environment Policy, 2018	- Ensuring sustainable development through reducing human pressure on nature and natural resources. - Considering environmental protection as an integral part of the development programs planned to meet the need of the present and future generations. - Making natural resources extraction, use, environmental conservation, etc. to be based on science. - Considering environmental impacts and risks in extracting and using natural resources. - Evaluating the economic contribution of ecosystem services simultaneously to that of natural resources. - Giving priority to poor and underprivileged groups of people to ensure their participation, equity, justice, accessibility to the use of natural resources, and getting ecosystem services on which they are dependent. - Taking initiatives to prevent misuse and ensure optimum water, land, natural gas, and other natural resources in the production process as well as day-to-day purposes. - Encouraging sustainable use of new and renewable resources. - Enhancing long-term poverty alleviation and food security through conserving biological diversity. - Realizing compensation from persons and institutes those who are liable to environmental pollution through applying polluter pay principle. - Including environmental conservation and preservation in all national policies and ensuring implementation of the environment policy at both government and nongovernment levels. - Giving priority to preventive measures over curative measures in environmental conservation. - Including adaptation and mitigation programs in all development projects to address adverse impacts of climate change. - Ensure sustainable utilization of ecosystem goods and services. - Implementation of the 3R principle in the utilization of resources.

Policies	Description/ Applicability of Acts
	• Strengthening the institutional and legal capacity of the institution (Government, local, private, and technical) relevant to the enforcing and implementation of rules and regulations relating to environmental policy and environment conservation. • Ensuring considerations of climate change and challenges of calamities in all kinds of infrastructure projects. • Reducing all SLCP (Short-Lived climate pollutants) that are harmful to health and the environment. • Taking development programs considering sustainable production and consumption as an integral part of environmental conservation to meet the need of present and future generations. • Allocating necessary funds to all areas of environmental conservation, preservation, and control. • Taking up programs in favor of a flourishing environment-friendly economy
National Environment Management Action Plan, 1995	• Identification of key environmental issues affecting Bangladesh; • Identification of actions necessary to halt or reduce the rate of environmental degradation; • Improvement of the natural environment; • Conservation of habitats and biodiversity; • Promotion of sustainable development; and • Improvement of the quality of life of the people.
The National Biodiversity Strategy and Action Plan, 2004	• Conserve and restore the biodiversity of the country for the wellbeing of the present and future generations; • Ensure that long-term food, water, health, and nutritional securities of the people are met through conservation of biological diversity; • Maintain and improve environmental stability of ecosystems; • Ensure preservation of the unique biological heritage of the nation for the benefit of the present and future generations; • Guarantee the safe passage and conservation of globally endangered migratory species, especially birds and mammals in the country; and • Stop introduction of invasive alien species, genetically modified organisms, and living modified organisms.
Environment and Social Related Legislations in Bangladesh	
The Environment Conservation Act, 1995 and Subsequent Amendments	• Declaration of Ecologically Critical Areas (ECAs); • Obtaining an Environmental Clearance Certificate (ECC); • Regulation with respect to vehicles emitting smoke harmful to the environment; • Regulation of development activities from an environmental perspective; • Promulgation of standards for quality of air, water, noise, and soils in different areas and for different purposes; • Promulgation of acceptable limits for discharging and emitting waste; and • Formulation of environmental guidelines relating to control and mitigation of environmental pollution, conservation, and improvement of the environment.

Policies	Description/ Applicability of Acts
The Environment Conservation Rules, 2023	• The NEQS for ambient air, surface water, groundwater, drinking water, industrial effluents, emissions, noise, and vehicular exhaust; • Categorization of industries, development projects, and other activities on the basis of actual (for existing industries/development projects/activities) and anticipated (for proposed industries/development projects/activities) pollution load; • Procedure for obtaining ECC; • Requirements for undertaking IEE and EIA's as well as formulating EMP according to categories of industries/development projects/activities; and • Procedure for damage-claim by persons affected or likely to be affected due to polluting activities or activities causing hindrance to normal civic life.
Noise Pollution (Control) Rules, 2006	• According to the Rules, motor honking within a 100-meter radius of a hospital, school, and office is prohibited. • The rules also do not allow the use of brick crushers and cement mixers within a 500-meter radius of a residential area. Besides, prior permission is mandatory for using loudspeakers or megaphones. • The rules stipulate safety and precautionary measures in workplaces, designated authorities for allowing noise-generating appliances.
EIA Guidelines for Industry, 2021	The EIA Guidelines for Industry, 2021, introduced by the Department of Environment, Bangladesh, is the only guideline for conducting an Environmental Impact Assessment in Bangladesh. It is not only for industries but also for all types of development works.
Air Pollution (Control) Rules 2022	The Rules are regarded as subordinate regulations of the Bangladesh Environment Conservation Act, 1995 and its main provisions are as follows. • The Rules stipulate environmental air quality standards (general standards), emission standards for vehicles, emission standards applicable to industries or projects, and odor standards • After the promulgation of the Rules, the Department of Environment (DoE) shall prepare a National Air Quality Management Plan that includes an organizational working framework and efficient management of indoor air quality. When preparing the National Air Quality Management Plan, the standards and methods specified in the Rules shall be followed. • The DoE shall prepare and publish a list of industries, projects, and activities that are harmful to the environment and human health. For the industries and activities included in the list, the DoE shall establish emission standards and conditions for management as appropriate. • In order to control air pollution from motor vehicles, the regulatory authority for motor vehicles (http://www.brta.gov.bd/) shall comply with the standards and control methods specified in the Rules and follow the work procedures recommended in the National Air Quality Management Plan. • The DoE may inspect the emissions of motor vehicles and restrict the movement of old motor vehicles that give off emissions exceeding the standards. The DoE may also regulate and prohibit certain engines in order to enforce the standards and control methods specified in the Rules. • Local government organizations, construction management authorities, and other relevant organizations shall comply with the standards and

Policies	Description/ Applicability of Acts
	control methods specified in the Rules and follow the work procedures recommended in the National Air Quality Management Plan. The Rules also provide for the prevention of air pollution from hazardous waste, excessive emissions of air pollutants, air quality monitoring and warning, data management, establishment of a national executive committee for air pollution control, measures to prevent damage to ecosystems caused by air pollution, awards for contributions to air pollution control, and penalties for violations.

Table 2-2: Relevant National Environmental Regulations

Regulation	Brief Description	Remarks
Environment Court Act 2000 (amended in 2002 and 2010)	This Act is under the Judiciary and MoEFCC to ensure the resolution of disputes on environmental and social damages resulting from any development activities. This Act also allows for the completion of environment-related legal proceedings effectively	Power Grid will ensure that all potential environmental complaints will be dealt with effectively at the project level through the PMU. SPS 2009 requires setting up of a grievance redress mechanism for projects known to cause potential environmental impacts
Bangladesh Water Act 2013	Makes provisions for integrated development, management, abstraction, distribution, use, protection, and conservation of water resources	Approved LILO line will cross a canal and three ponds and Power Grid will ensure compliance with this Act.
Vehicle Act 1927, the Motor Vehicles Ordinance 1983	These are under the Bangladesh Road Transport Authority (BRTA) which regulates vehicular emissions and noise including road safety.	This regulation will be complied with by vehicles that may be used during the construction and operation of the LILO lines.
Factories Act 1965 and Bangladesh Labour 2006, Bangladesh Labor Act 2013	Regulations that aim to protect the interests and rights of the workers and to ensure their safety.	Workers recruited under the LILO line will be provided with PPE (if needed) and will comply with these regulations. No worker under 18 years old will be recruited
The Forest Act 1927 (amended in 1982 and 1989)	This Act under the MoEFCC aims to protect forest resources.	LILO lines will not traverse protected forest areas or other forest types.
Telegraph Act 1885	Under the Ministry of Posts and Telecommunications, this provides power to the Telegraph Authority to alter the position of gas or water pipes or drain (Sect. 14; a and b).	The route for LILO lines were selected considering this Act.
Electricity Act 2018	Relates to the supply and use of electrical energy, allows any person to secure a license to supply energy and to put down or place	LILO lines referred to the applicable provisions in this Act.

Regulation	Brief Description	Remarks
	electrical supply lines for the transmission of energy. The Act provides that the licensee, in the exercise of any of the powers conferred by or under this Act, will cause as little damage, detriment, and inconvenience as may be, and will make full compensation for any damage, detriment or inconvenience caused by the licensee or by anyone employed by the licensee.	
The Antiquities Act 1968 (amended 1976)	Regulations on the preservation and protection of antiquities.	Not Applicable
Natural Water Bodies Protection Act 2000	According to this Act, the character of water bodies i.e., rivers, canals, tanks, or floodplains identified as water bodies in the master plans or in the master plans formulated under the laws establishing the municipalities in division and district towns shall not be changed without approval of the concerned ministry. This Act is under the Rajdhani Unnayan Kartipakkha/ Town Development Authority/Municipalities.	Any part of LILO lines that will cross rivers, ponds, canals, and drainage channels will refer to this Act and will secure the required approval and clearances.
Wildlife (Protection and Safety) Act 2012	Provides for the conservation and safety of biodiversity, forest, and wildlife of the country by repealing the existing law relating to the conservation and management of wildlife of Bangladesh. Under this Act, hunting, trapping, the killing of wildlife is strictly prohibited.	LILO lines will not affect areas of habitats known to host wildlife. The route is along with urban areas.
National River Protection Act 2013	Creation of National River Protection Commission to manage and control water and environmental pollution, etc., and ensure socio-economic development of a multi-use and rational use of natural resources	LILO lines will ensure compliance with relevant provisions of this Act
The Protection and Conservation of Fish Act 1950 (amended 1973, 1982, 1995, 2002)	Provides the requirements for the protection and conservation of fish. This Act defines fish as “all cartilaginous, bony fishes, prawn, shrimp, amphibians, tortoise, turtles, crustacean animals, mollusks, echinoderms and frogs at all stages in their life history.”	LILO lines will ensure compliance with relevant provisions of this Act
Acquisition and Requisition of Immovable property Act, 2017	The 2017 Act requires that compensation be paid for (i) land and assets permanently acquired (including houses, trees, and standing crops,); and (ii) any other impacts caused by such acquisition.	-

Regulation	Brief Description	Remarks
Environment Conservation Rules 2023	has promulgated the Environment Conservation Rules 2023 under the ECA 1995 to evaluate, review the Environmental Impact Assessment (EIA) of various projects and activities, and procedures are established for approval.	LILO lines will comply with this rule.
Grid Code 2019	The Grid Code specifies criteria, guidelines, basic rules, procedures, responsibilities, standards, and obligations for the operation, maintenance, and development of the Electricity Transmission System of Bangladesh to ensure transparent, non-discriminatory, and economic access and use of the Grid, whilst maintaining a safe, reliable and efficient operation of the same to provide a quality and secure electricity supply as reasonably as practicable.	LILO lines will ensure the compliance of this grid code.
Hazardous Waste (e-waste) Management Rules, 2021	On June 10, 2021, Bangladesh's Department of Environment (DOE) published the Hazardous Waste (e-waste) Management Rules, 2021 under the Bangladesh Environmental Protection Act, 1995. The E-waste rule covers the products listed in the Schedule (home appliances, monitoring and control equipment, medical equipment, automatic machines, IT and communication equipment), and establishes obligations for manufacturers, assemblers, collectors, sellers, and consumers of the products. The rule also sets provisions to limit the use of the 10 substances covered by the EU RoHS Directive. This regulation entered in force upon publication. The main provisions of this regulation are as follows. • Manufacturers, traders, sellers, transporters, repairers, collection centers, recyclers, dismantlers, etc. of the subject products are required to register with a prescribed form to the DOE. When applying for registration, they shall also submit the Waste Electrical and Electronic Equipment (WEEE) management plan. • Registered manufacturers, recyclers, etc. shall obtain environmental clearance in accordance with the Bangladesh Environmental Conservation Rules, 2023. • Manufacturers have to establish individual or joint collection centers and set aside funds for the management of the Waste Electrical and Electronic Equipment (WEEE).	LILO lines will ensure compliance with relevant provisions of this rules.

Regulation	Brief Description	Remarks
	- For fluorescent lamps and mercury incandescent lamps, if they cannot be recycled, they need to be handed over to collection centers for storage and disposal. - Manufacturers, importers, etc. shall meet the collection targets for the Waste Electrical and Electronic Equipment (WEEE) as specified in the Schedule (10% in the first year of the implementation, 20% in the second year, 30% in the third year, 40% in the 4th year, and 50% in the fifth year and thereafter). - In order to facilitate the proper management of the Waste Electrical and Electronic Equipment (WEEE), the name, address and contact information of the trader or seller as well as the information on the registered collection center shall be displayed on the product or on the product label, or this information shall be provided to consumers or large consumers. - Traders, sellers and collectors of the Waste Electrical and Electronic Equipment (WEEE) shall receive them from consumers at designated points and transport them to collection centers.	
Solid Waste Management Regulations 2021	The Solid Waste Management Regulations 2021 were published in Bangladesh on December 23, 2021, under the Bangladesh Environmental Protection Act, 1995. The Regulations define the responsibilities of businesses involved in solid waste management and impose collection, recycling, and disposal obligations according to Extended Producer Responsibility (EPR) on manufacturers of non-biodegradable products such as glass, plastic, and bottles. The Regulations also include provisions for the treatment of solid waste such as composting and energy recovery. The main provisions of the Regulations are as follows. When recovering resources from waste, the principles of management that consider the waste hierarchy, such as the 3Rs, segregation, and reduction, must be followed at all stages from waste generation to final disposal.	LIFO lines will ensure compliance with relevant provisions of these regulations.

Regulation	Brief Description	Remarks
	• Responsibilities of waste generators, consumers, and users: — Dispose of waste in accordance with the regulations of authorities including local government. — Dispose of waste separately. — Do not dump, store, or burn waste outdoors. • Responsibilities of manufacturers and importers of products — Collect non-biodegradable products such as glass, plastic, polyethylene, multi-layered packaging, bottles, and cans from consumers and recycle or dispose of them if appropriate. — Determine work plans and implementation procedures for recycling and disposal. — Ensure that EPR is properly implemented. — Submit an annual report to the Department of Environment (DOE) on the amount of plastic recycled. — Raise public awareness of proper waste management.	

3. PROJECT DESCRIPTION

20. This addendum is only in respect of LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1.

21. LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1 were finalized during original IEE (ref: Table 3-1 of the original IEE, <https://www.adb.org/projects/documents/ban-51137-003-ieee>). The final alignment was done considering less impacts e.g., damage to community structures, tree cutting etc. and avoided all types of settlements beneath the RoW from start to end. Lesser number of trees to be cut for final alignments than the original routes (Table 5-2). The summary and comparisons of both the final routes and original routes are given in Table 3-1.

Table 3-1: The summary and comparisons of Final and Original Alignments

Subproject	Final Alignment				Original Routes
	Size/Length	Upazila	District	Division	Size/Length
LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and	3.33 Km, 6 AT and 7 ST	Kaliganj	Gazipur	Dhaka	3.5 Km
LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only)	240 m (Stringing Only)	Kaliganj	Gazipur	Dhaka	-

Source: Power Grid, 2025

3.1 Site Details

3.1.1 Location of the Project Site

22. This addendum is only in respect of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1. This alignment comprises of one administrative division and one district of Bangladesh. As per the Table 3.1 of the original IEE, <https://www.adb.org/projects/documents/ban-51137-003-ieee>, and current site visits, the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj alignment covers Kaliganj Upazila under Gazipur districts. As per the EMP requirement, Power Grid avoids housing or school structures directly over the line as the LILO route designed beside the road. As per the confirmation from Power Grid and on ground site visits, there are no housing or school structures directly under these final routes. The major waterbodies covered in the final routes are mostly canals, however, the LILO Lines will not pose any risk to these wetlands as well as seasonal habitats of wildlife and birds. Layout plan and tower wise mouza map are presented in Appendix D and Appendix E.

3.2 Project Details

23. The Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGEP) have been undertaken by the Power Grid Bangladesh PLC under the Ministry of Power, Energy and Mineral Resources (MPEMR), with financial support from the Asian Development Bank (ADB). The project is a key initiative to address the growing demand for electricity in Bangladesh, particularly in the Greater Dhaka region and the western zones, where transmission lines and substations are already overloaded due to rapid urbanization, industrial growth, and population expansion. Strengthening the transmission

grid is therefore essential to improve reliability, expand access to new load centers, and support the country's long-term power sector strategy.

24. Under this initiative, Package-1 of the project focuses on the Design, Supply, Installation, Testing, and Commissioning of LILO of Ghorashal-Tongi 230 kV Line to Kaliganj at Kaliganj and stringing only LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only). The contract (No. POWER GRID/ADB/3853-BAN/DWZTGEP/400kVand230kV LILO/P1) has been awarded to Hanbaek Company Limited, who will execute the works with full responsibility for engineering design, material supply, installation, and commissioning.

25. Originally, the project scope included construction of an 18 km 400kV Kaliganj–Purbachal transmission line and the Kaliakoir–Bhulta 400kV LILO. However, due to Right of Way (RoW) challenges and delays in related projects, these components were excluded from this package. The revised scope now emphasizes the LILO of the Tongi–Ghorasal 230kV double circuit line at Kaliganj, covering approximately 3.33 route-km with four circuits. This adjustment reduces potential social and environmental impacts while maintaining the strategic goal of strengthening electricity supply links to Kaliganj and Purbachal substations, both of which are critical nodes in Dhaka's transmission network.

26. The key project components include construction of overhead transmission lines (OHLs), erection of towers and associated civil works, stringing of conductors, and electrical integration at substations. Supporting infrastructure such as worker camps, storage yards, access roads, and transportation logistics will also be developed. The contractor will ensure quality control and testing at every stage, leading to successful commissioning of the new circuits.

3.2.1.1 Key Project Activities

27. The project involves a series of integrated activities essential for establishing reliable transmission connectivity between Kaliganj and Purbachal substations. The main activities include detailed engineering design, procurement and transportation of equipment, site preparation, tower erection, stringing of conductors, substation integration works, and commissioning of the new LILO connections. Alongside physical construction, the project also requires the establishment of worker camps, construction yards, and logistics arrangements for the safe handling of materials. Environmental management and monitoring, occupational health and safety measures, and community engagement activities will also be carried out as cross-cutting tasks throughout the construction period.

3.2.1.2 Primary Construction Requirement: Construction of Overhead Transmission Lines (OHLs)

28. The primary construction requirement of this project is the establishment of overhead transmission lines (OHLs) to connect the Tongi–Ghorasal 230kV double circuit line into Kaliganj through a Loop-In Loop-Out (LILO) arrangement and stringing only for LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal. This includes a series of sequential activities starting with route surveys and site preparation, followed by tower foundation works, erection of steel lattice towers, conductor stringing, installation of fittings and accessories, and finally, testing and commissioning.

29. The construction process will involve specialized machinery such as excavators, cranes, tensioners, and winches, supported by a skilled workforce trained in tower erection and stringing operations. Civil works for tower foundations will include excavation, reinforcement, and concreting, while mechanical and electrical works will focus on conductor installation, insulator placement, and tower earthing. Each stage will be conducted in compliance with safety protocols, environmental safeguards, and international technical standards to ensure operational reliability.

30. Environmental protection and worker safety will remain a priority throughout construction. Measures such as dust suppression, soil erosion control, noise reduction, waste management, PPE usage, and fall protection systems will be strictly enforced. In addition, community safety protocols will

be followed to minimize disruption in the project area. The following table presents the construction phase activities for OHLs, along with indicative timelines and safeguards:

Table 3-2: Construction Activities Schedule

Phase	Key Activities	Resources/ Requirements	Environmental and Safety Considerations	Timeline
Site Preparation	Route survey, alignment verification, access road preparation, and camp setup.	Survey team, GPS equipment, light vehicles, temporary fencing, worker camps.	Minimize vegetation clearance, dust suppression, traffic control.	01–20 July 2025
Foundation Works	Excavation, concreting, and reinforcement for tower foundations.	Excavators, concrete mixers, reinforcement steel, formwork materials.	Soil erosion control, safe excavation, waste disposal.	21 July – 20 Aug 2025
Tower Assembly and Erection	Assembly of steel lattice sections and erection using cranes or gin poles.	Tower steel sections, cranes, winches, rigging equipment, skilled erection crew.	Fall protection, controlled lifting, PPE compliance.	21 Aug – 30 Sept 2025
Conductor Stringing	Pulling, tensioning, and sagging of conductors along tower spans.	Tensioners, pullers, rollers, conductors, insulators, clamps.	Prevent conductor snapping, EMF safety, minimize disruption to communities.	01–25 Oct 2025
Fittings and Accessories	Installation of insulators, spacers, vibration dampers, and clamps.	Insulators, clamps, safety tools, hot-line working kits.	Electrical safety measures, use of insulated tools.	26 Oct – 10 Nov 2025
Testing and Commissioning	Line inspection, electrical testing, tower earthing, and final commissioning.	Testing kits, protection relays, commissioning engineers, coordination with substation.	Compliance with safety protocols, quality control, system protection.	11–30 Nov 2025

3.2.1.3 Electrical Works and Towers

31. The electrical works focus on integrating the newly constructed OHLs with the existing LILO of Ghorashal-Tongi 230 kV Line to Kaliganj. This includes installation of terminal equipment, circuit breakers, isolators, current and potential transformers, protection and control systems, and earthing arrangements. The tower works involve the assembly and erection of galvanized steel lattice towers designed to withstand mechanical loads and environmental stresses. Tower foundations will be constructed with reinforced concrete, taking into account soil characteristics and hydrological conditions of the project corridor. Anti-corrosion treatments, proper earthing, and lightning protection systems will be incorporated to enhance durability and operational safety. All electrical and structural installations will be tested and commissioned in line with international standards and the technical specifications

approved by Power Grid Bangladesh PLC. No tower would be installed and included for LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal route.

4. ENVIRONMENTAL AND SOCIAL BASELINE

32. This section describes the existing environmental and social baseline status of proposed LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1.

4.1 Methodology

33. The analysis was completed through on-ground reconnaissance and surveys to establish an understanding of the environmental and socio-economic baseline. Data for this chapter were collected from:

- Primary Sources: This included gathering information from field surveys, laboratory analysis and consultations/FGDs in the project area.
- Secondary Sources: This included data from literature reviews, maps and monitoring reports.

34. The baseline condition of environmental quality in the locality of project study area serves as the basis for identification, prediction, and evaluation of impacts. The baseline environmental quality is assessed through field studies within the impact zone for various components of the environment such as air, noise, water, land and socio-economic etc.

35. Data was collected from secondary sources for the macro-environmental setting like climate (temperature, rainfall, wind speed and direction and humidity), physiography, geology etc. Primary environmental baseline information was collected from the project site and surrounding area to know the current environmental and socio-economic condition of the project study area. Data on ambient air, noise quality, surface water and ground/drinking water quality were gathered from onsite environmental quality monitoring. FGDs were also carried out to investigate local environmental conditions, issues, and possible impacts.

36. The baseline environment is discussed in three broad categories: (i) Physical Environment which includes factors such as topography, geology, earthquake risk, climate, hydrology/drainage, and environmental pollution related elements; (ii) Biological Environment, which includes flora, fauna, Protected Areas, wildlife sanctuaries, forest reserves, and the general ecosystem; and; (iii) Socio-economic Environment, which includes anthropological factors like demography, income, land use, land requirements and infrastructure.

4.2 Physical Environment

4.2.1 Climate

37. Although less than half of Bangladesh lies within the tropics, the presence of the Himalaya Mountain range has created a tropical macro-climate across most of the east Bengal land mass. Bangladesh is divided into seven climatic zones and the sub projects are located in five climatic zones.

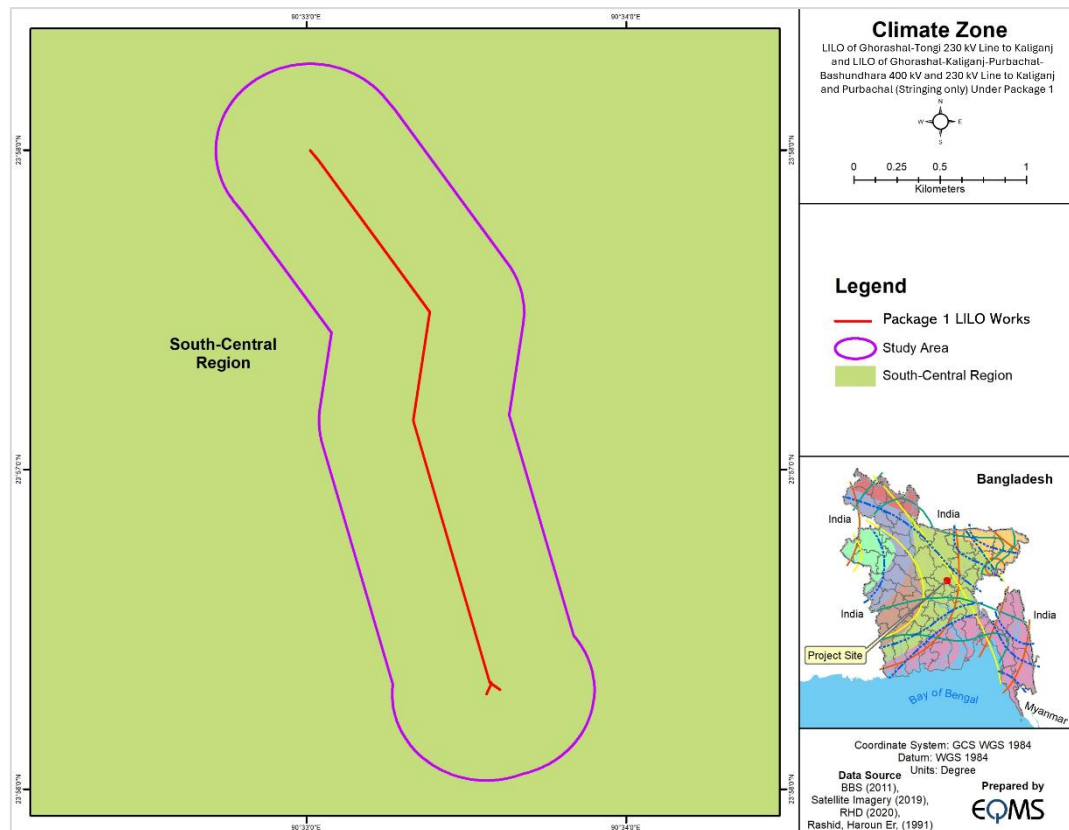
38. Three distinct seasons can be recognized in Bangladesh: the post-monsoon season from November to February; the pre-monsoon hot season from March to May, and the rainy monsoon season which lasts from June through to October. The month of March may also be considered as the spring season, and the period from mid-October to mid-November may be called the autumn season.

39. The post-monsoon season (November-February) begins first in the west-central part of the country, where its duration is about four months, and it advances toward the east and south, reaching the eastern and southern margins of the country by mid-March, where its duration is about one month.

40. The pre-monsoon hot season (March-May) is characterized by high temperatures and the occurrence of thunderstorms. April is the hottest month when mean temperatures range from 27°C in the east and south to 31°C in the west-central part of the country. In the western part, summer temperatures sometimes reach up to 40°C. After the month of April, the temperature dampens due to increased cloud cover. The pre-monsoon season is the transition period when the northerly or north-

westerly winds of the winter season gradually change to the southerly or south-westerly winds of the summer monsoon or rainy season (June-September). During the early part of this season, the winds are neither strong nor persistent. However, with the progression of this season, wind speed increases, and the wind direction becomes more persistent. Figure 4-1 represents different climatic zones under Package 1.

Figure 4-1: Climatic Zones of Package 1



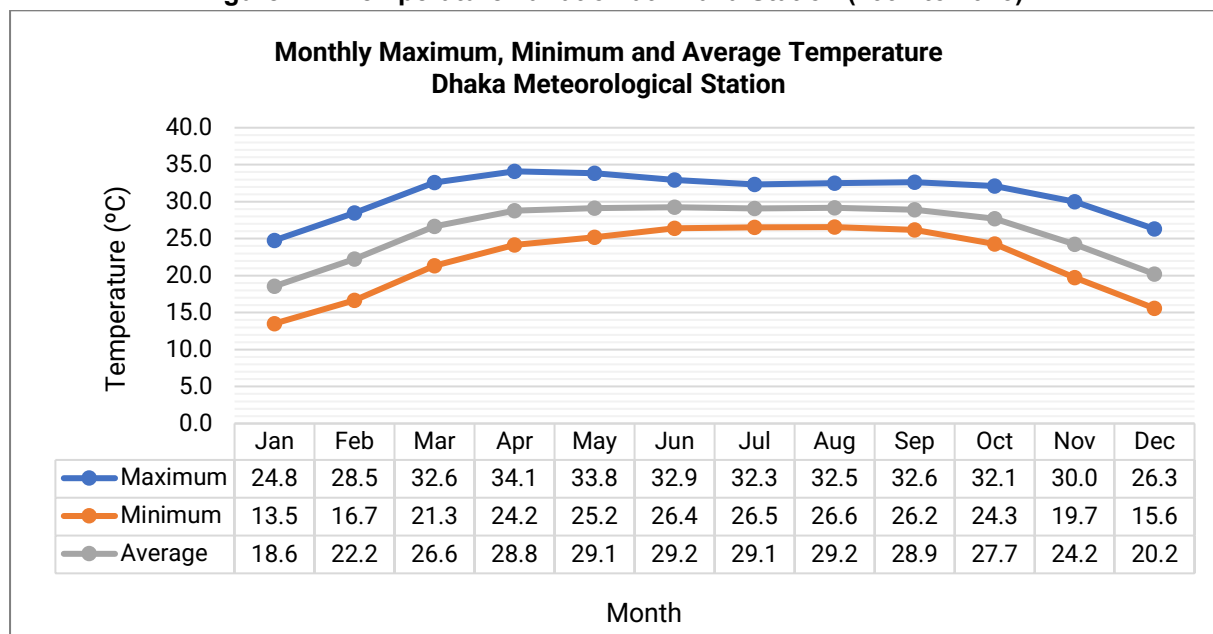
Source: Rashid, Haroun Er, 1991.

4.2.1.1 Climate at LILO TL at Package 1 Locations

41. The source of climate data is Bangladesh Meteorological Department (BMD). The climate data was collected from nearby BMD station. For LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1, data was collected from Dhaka BMD station, which has the coverage for all the area crossed within this LILO routes locations.

4.2.1.1.1 Temperature

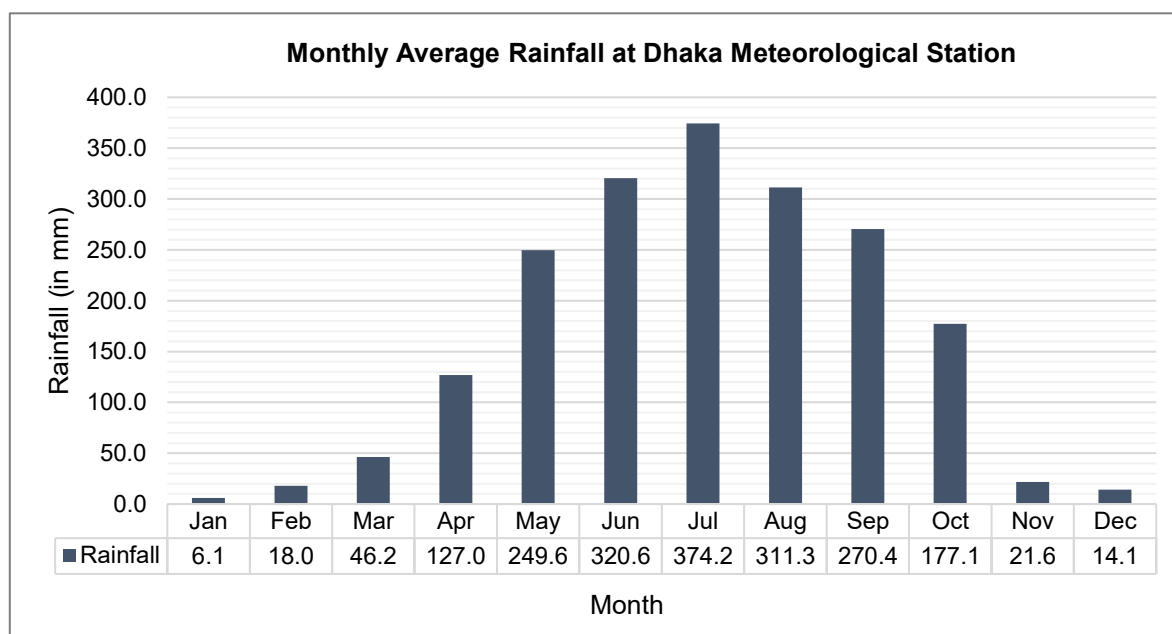
42. The monthly average minimum and maximum temperatures recorded at the Dhaka weather station are presented in **Figure 4-2**. The monthly maximum temperature varies from 24.8 to 34.1°C whereas the monthly average minimum temperature varies from 13.5°C to 26.6°C. The lowest average temperature recorded in the past 30 years was in January 2001 (10.4°C). The highest average temperature was 34.4 °C in April 2014. Throughout the year, the highest temperatures are generally in March through October and the lowest temperatures are from December to January

Figure 4-2: Temperature variation at Dhaka Station (1994 to 2023)

Source: Bangladesh Meteorological Department (BMD)

4.2.1.1.2 Rainfall

43. During the monsoon (April to October), wind direction from the southwest brings moisture laden air from the Bay of Bengal, when the heaviest rainfall occurs. About 94.5% of the total rainfall occurs in this period. Average annual total rainfall at Dhaka station is about 1936.3 mm from 1994 to 2023. The highest annual rainfall is recorded at 2892 mm in 2017. The peak one-day highest rainfall is 341 mm recorded on 14 September 2004. An insignificant amount of rainfall has also been recorded in winter (November to February). Monthly average rainfall recorded at the Dhaka station (1994 to 2023) is shown in Figure 4-3.

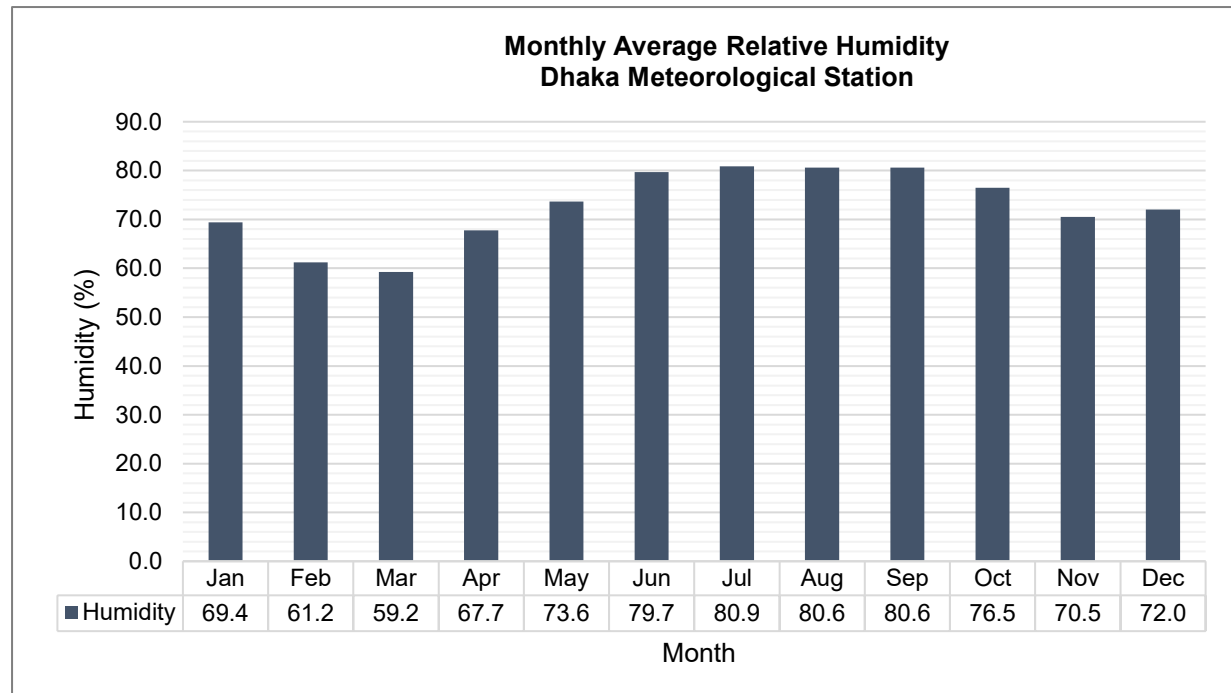
Figure 4-3: Average of Total Monthly Rainfall in mm (1994-2023) at Dhaka Station

Source: Bangladesh Meteorological Department (BMD)

4.2.1.1.3 Humidity

44. The monthly average relative humidity varies from 59% to 81% in the study area. Humidity remains high in summer and comparatively low in winter season. The meteorological data of humidity from 1994 to 2023 indicates that humidity is highest during Rainy monsoon season (June to September) and lowest during the cool dry winter season (January-March). Monthly average relative humidity at the Dhaka station is shown in **Figure 4-4**

Figure 4-4: Average Monthly Relative Humidity in % (1994-2023) at Dhaka Station



Source: Bangladesh Meteorological Department (BMD)

4.2.2 Air Quality

45. This section presents the status of ambient air quality along the alignments of the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1. Ambient air quality in these areas is influenced by multiple factors, including meteorological conditions, traffic volume and congestion, vehicular emissions, and suspended particulate matter. Continuous monitoring is essential to evaluate existing air quality and to support the development of appropriate mitigation measures for potential health risks associated with air pollution. The key “criteria pollutants” to be monitored include particulate matter (PM₁₀ and PM_{2.5}), carbon monoxide (CO), sulfur dioxide (SO₂), and nitrogen oxides (NO_x). Accordingly, to establish the baseline air quality, a primary monitoring program has been designed and implemented prior to the commencement of construction activities for the subprojects.

4.2.2.1 Air Quality Monitoring Methods

46. The existing ambient air quality at the proposed Package 1 was monitored prior to the commencement of construction activities. The assessment focused on key air pollutants, including particulate matter (SPM, PM₁₀, and PM_{2.5}) and gaseous pollutants (NO_x, SO₂, O₃, and CO). The particulate and gaseous samples have been monitored and analysed as per the procedures specified in **Table 4-1**.

Table 4-1: Air Sample Collection Time and Method

No.	Parameter	Methodology	Device/Equipment	Sampling Period
1	SPM	Gravimetric	GTI-FPS-375	8hours
2	PM10	Gravimetric	GTI-FPS-375	8hours
3	PM2.5	Gravimetric	GTI-FPS-375	8hours
4	Nox	Modified West and Gaeke Method	GTI-FPS-375 with Impinger attachment	8hours
5	SOx	Modified Jacob & Hochseiser Method	GTI-FPS-375 with Impinger attachment	8hours
6	CO	Iodine Pentoxide Method	GTI-FPS-375 with Impinger attachment	8hours
7	O3	KI Chemical Method	GTI-FPS-375 with Impinger attachment	8hours

Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

4.2.2.2 Air Quality Monitoring Locations

47. Ambient air quality for the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1 was monitored in February 2025 at five strategic locations within the project influence area. The monitoring sites were selected to represent sensitive receptors and surrounding land-use types, including residential areas, roadside sections, and substation vicinities. Sampling was carried out in accordance with standard procedures to ensure representative baseline data.

48. As per the national standard (Air Pollution Control Rules-2022), O₃ and CO need to be monitored for 8 hours to compare with the national standard whereas standard for PM₁₀, PM_{2.5}, NO_x

and SO₂, is 24-hour. So, standard duration varies from parameter to parameter. Considering all these issues, conversion factors have been used for the calculation of the parameters in the standard timelines from 8-hour monitoring period. Using the simple power law principle, Schroeder and Jugloff (2012) described the steps for converting eight-hour readings to 24-hour/annual values.

49. To provide 24-hour averages for the five parameters, the following power-law equation as defined in Schroeder and Jugloff 2012 was applied:

$$C_{\text{long}} = C_{\text{short}} (t_{\text{short}}/t_{\text{long}})^p$$

Where,

C_{long} = Expected output in specific time period

C_{short} = Outcome during Monitoring Period

t_{short} = Specific time period during monitoring (in minutes)

t_{long} = Expected time period (in minutes)

p = Exponential factor where the value is 0.39 (for project area).

Air quality monitoring samples has been monitored for a defined time interval and from different sampling points within project areas. Air quality analysis results are shown in Table 4-3. Monitoring photos are shown in Figure 4-5.

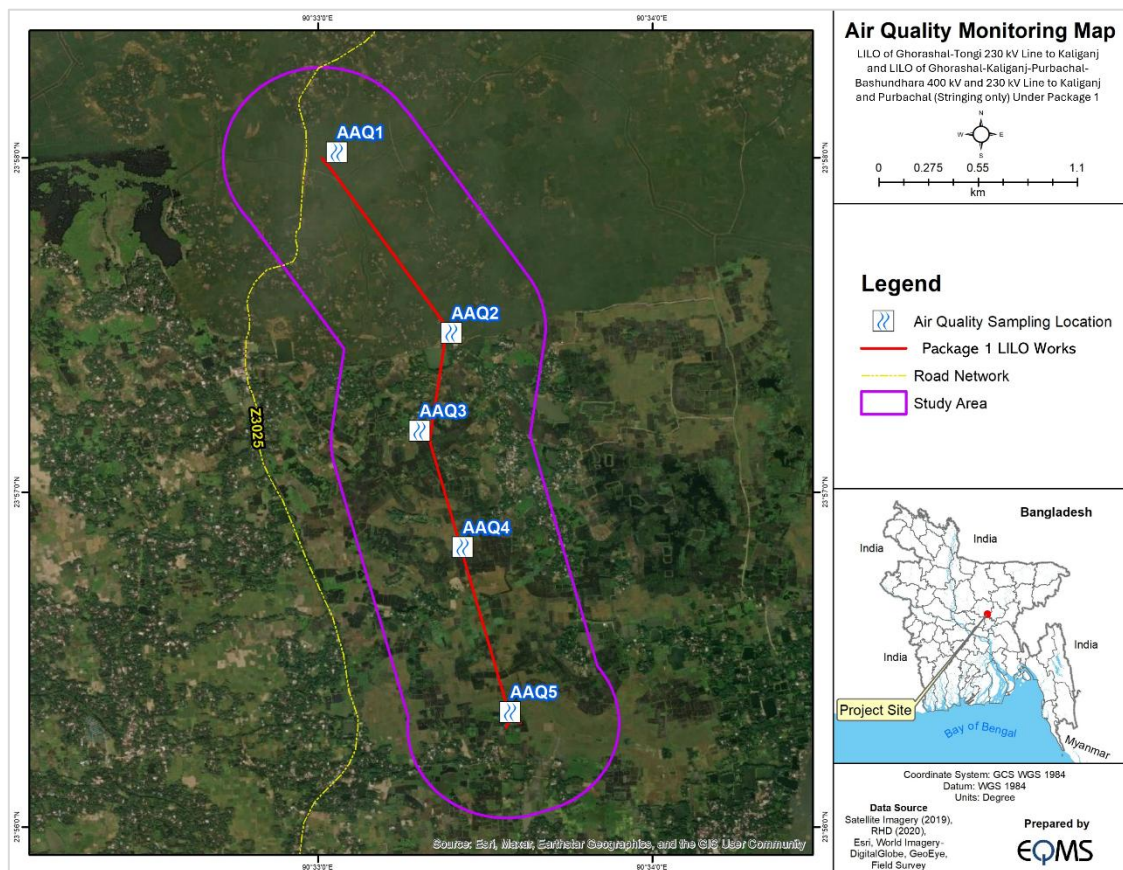
Table 4-2: Air Quality Measurement Locations and Descriptions

SL No.	Code	Tower	Date	Co-ordinates
01	AAQ-01	T-1/0	08.02.25	23°58'0.906"N 90°33'3.408"E
02	AAQ-02	T-4/0	09.02.25	23°57'28.528"N 90°33'23.954"E
03	AAQ-03	T-3/0	10.02.25	23°57'10.977"N 90°33'18.231"E
04	AAQ-04	T-2/3	11.02.25	23°56'50.084"N 90°33'25.961"E
05	AAQ-05	T-2/1	12.02.25	23°56'20.567"N 90°33'34.481"E

Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

Figure 4-5: Air Quality Monitoring Location Map



Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Figure 4-6: Air Quality Monitoring Pictures



 Monday, February 10, 2025 12:16:31.148 23°57'10.9778" N 90°33'18.23141" E ±3.79m Nambihin Rasta, Kaliganj, Bangladesh	 Tuesday, February 11, 2025 12:37:57.054 23°56'50.08492" N 90°33'25.9614" E ±3.79m WHP4+WP8, Kaliganj, Bangladesh
T 3/0 (AAQ-03)	T 2/3 (AAQ-04)
 Wednesday, February 12, 2025 12:26:48.016 23°56'20.567" N 90°33'34.481" E WHP4+WP8, Kaliganj, Bangladesh	
T 2/1 (AAQ-05)	

Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

4.2.2.3 Analysis Results

50. Air quality data was measured automatically every one minute and directly recorded onsite for measured parameters (SPM, PM10, PM2.5, SOx, NOx, O3 and CO). Different analysis methods, such as Particulates 90° Infrared Light Scattering for particulate matters (SPM, PM10, PM2.5), electrochemical sensors for toxic gases (NOx, SOx, O3, and CO).

51. As per the national standard of ambient air quality CO and O₃ were monitored for 8 hours to compare with the national standard. For Particulate Matter (SPM, PM10, and PM2.5), gaseous pollutants (NOx, and SOx) the standard duration is 24 hours. Analysis results of every location are briefly mentioned in the following Table 4-3.

Table 4-3: Air Quality Analysis Results of the Package 1

Sl. No.	Date	Coordinates	Period	Parameters (µg/m³)						
				PM _{2.5}	PM ₁₀	SOx	NOx	CO	O ₃	SPM
AAQ-01	08.02.25	23°58'0.906"N 90°33'3.408"E	8-hours	55	67	62	72	0.4	30	87
			24-hours	36	44	40.4	46.9			
AAQ-02	09.02.25	23°57'28.528"N 90°33'23.954"E	8-hours	59	71	66	73	0.4	33	77
			24-hours	38	46	43.0	47.6			
AAQ-03	10.02.25	23°57'10.977"N 90°33'18.231"E	8-hours	57	81	70	68	0.4	37	82
			24-hours	37	53	45.6	44.3			
AAQ-04	11.02.25	23°56'50.084"N 90°33'25.961"E	8-hours	62	70	71	70	0.4	30	74
			24-hours	36	44	46.3	45.6			
AAQ-05	12.02.25	23°56'20.567"N 90°33'34.481"E	8-hours	59	69	63	69	0.4	32	75
			24-hours	38	45	41.0	45.0			
Air Pollution Control Rules-2022 ³				65	150	-	-	5	100	NYS
Standard Time Period as per APCR-2022				24hr.	24hr.	-	-	8hr.	8hr.	NYS

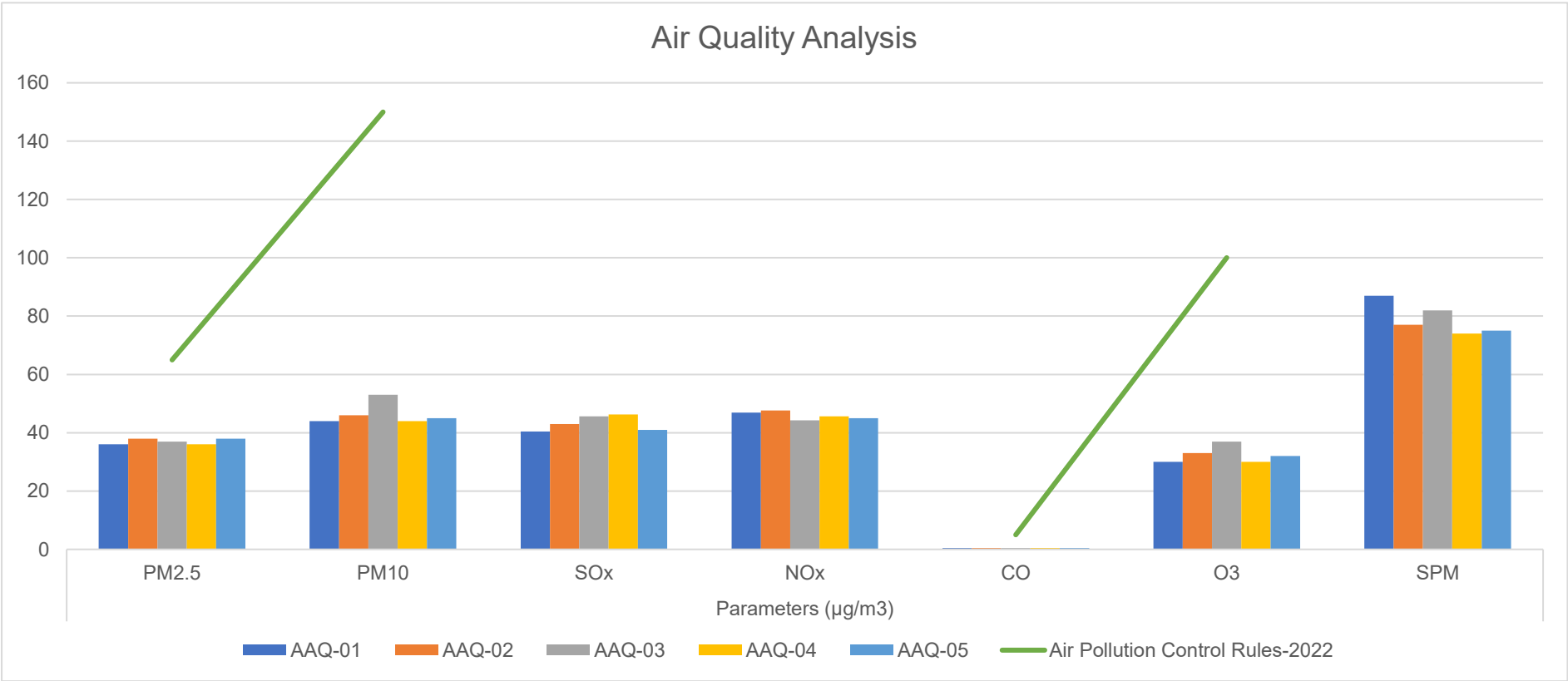
Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

Note: BDL= Below Detection Limit, NA= Not available

³ Air Pollution (Control) Rules, 2022, Schedule 1: Ambient Air Quality Standards

Figure 4-1: Graphical Representation of Air Quality Results



Source: Environmental Baseline Monitoring Report of Package 1, February 2025
Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

4.2.2.4 Discussion

52. Ambient air quality monitoring was conducted at five locations (AAQ-01 to AAQ-05) along the project alignment between 8–12 February 2025. Each sampling was carried out for an 8-hour duration, and results were compared against the Bangladesh Air Pollution Control Rules (APCR), 2022 standards, as well as reference values from international guidelines.

53. Across all five monitoring stations, concentrations of $PM_{2.5}$ ranged between 55–62 $\mu\text{g}/\text{m}^3$ and PM_{10} ranged between 67–81 $\mu\text{g}/\text{m}^3$. These values remained below the national 24-hour standards of 65 $\mu\text{g}/\text{m}^3$ for $PM_{2.5}$ and 150 $\mu\text{g}/\text{m}^3$ for PM_{10} , but exceeded the corresponding international guideline values in certain instances, particularly for $PM_{2.5}$.

54. Gaseous pollutants including SO_x (62–71 $\mu\text{g}/\text{m}^3$), NO_x (68–73 $\mu\text{g}/\text{m}^3$), CO (362–380 $\mu\text{g}/\text{m}^3$), and O_3 (30–37 $\mu\text{g}/\text{m}^3$) were found to be well within both national and international permissible limits. Suspended Particulate Matter (SPM) values (74–87 $\mu\text{g}/\text{m}^3$) were also below the relevant benchmark levels.

55. The highest particulate concentration was observed at AAQ-03 (PM_{10} : 81 $\mu\text{g}/\text{m}^3$; $PM_{2.5}$: 57 $\mu\text{g}/\text{m}^3$), located near dense roadside activity, while the lowest values were recorded at AAQ-01. Despite minor exceedances relative to international guideline values, the overall ambient air quality at all monitoring stations was confirmed to comply with the Air Pollution Control Rules (APCR), 2022.

56. These findings indicate that while localized dust and traffic emissions contribute to elevated particulate matter levels, overall air quality in the project influence area remains within acceptable limits as per national standards. Continued monitoring during construction is recommended to ensure that pollutant levels do not increase beyond permissible thresholds, particularly for $PM_{2.5}$ and PM_{10} .

4.2.3 Noise Level Monitoring Methods

57. This section presents the status of ambient noise levels along the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1. Ambient noise monitoring was conducted at selected sensitive locations within the project area over a continuous 24-hour period. Measurements were taken using an SLM-25 Sound Level Meter, which was mounted on a tripod and positioned 2–3 meters away from major noise sources.

58. The instrument was calibrated prior to the survey, and all measurements were oriented towards the facility of interest. Noise levels were recorded as A-weighted equivalent continuous sound pressure levels (LAeq) using A-weighting filters in accordance with standard procedures. Data collected from the instrument were subsequently downloaded and analyzed. The results have been evaluated against the Noise Pollution (Control) Rules, 2006 (Schedule 1) to determine compliance.

Table 4-4: Noise Level Standards/ Guidelines

Sl. No.	Category of Area/Receptor	Bangladesh Standard ⁴		IFC-WHO ⁵	
		Day [dB(A)] 6 AM – 9 PM	Night [dB(A)] 9 PM – 6 AM	Day [dB(A)] 7 AM – 10 PM	Night [dB(A)] 10 PM – 7 AM
1.	Silent Zone	50	40	55	45
2.	Residential Area	55	45	55	45
3.	Mixed Area	60	50	-	-
4.	Commercial Area	70	60	70	70

⁴ Noise Pollution (Control) Rules, 2006- Schedule 1

⁵ Guidelines for Community Noise, World Health Organization (WHO), 1999; As per IFC EHS noise level guidelines,

Sl. No.	Category of Area/Receptor	Bangladesh Standard ⁴		IFC-WHO ⁵	
		Day [dB(A)] 6 AM – 9 PM	Night [dB(A)] 9 PM – 6 AM	Day [dB(A)] 7 AM – 10 PM	Night [dB(A)] 10 PM – 7 AM
5.	Industrial Area	75	70	70	70

Note: The daytime is considered from 6 a.m. to 9 p.m. and the nighttime is from 9 p.m. to 6 a.m.

59. Area within 100 meters of hospital or education institution or government designated / to be designated/ specific institution/ establishment are considered Silent Zone. Use of motor vehicle horns or other signals and loudspeakers are forbidden in Silent Zone.

4.2.3.1 Noise Level Monitoring Locations

60. Noise levels were monitored at five locations along the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1. Measurements were taken using a digital sound level meter to capture sound pressure levels. The details of the monitoring locations are presented in Table 4-5.

61. Noise level was measured at every location at different times. The sound level is recorded in form of A-weighted equivalent continuous sound pressure level (Leq) values with the use of A-weighting filters in the noise measuring instrument.

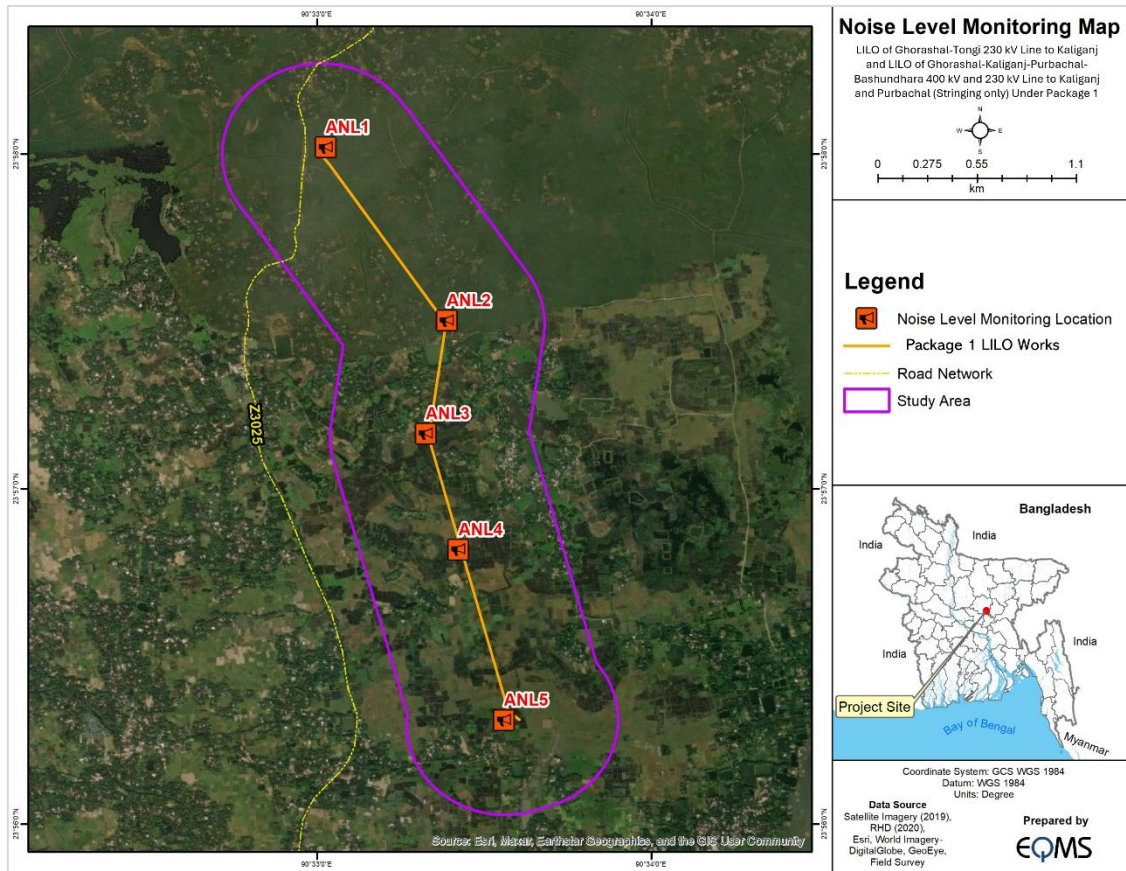
Table 4-5: Sensitive Noise Locations of the Package 1

Code	Tower	Date	Co-ordinates	Category
ANL-01	TT-1/0	08.02.25	23°58'1.116"N 90°33'1.59"E	Residential Area
ANL-02	T-4/0	09.02.25	23°57'30.075"N 90°33'23.303"E	Residential Area
ANL-03	T-3/0	10.02.25	23°57'9.805"N 90°33'19.510"E	Residential Area
ANL-04	T-2/3	11.02.25	23°56'49.083"N 90°33'25.387"E	Residential Area
ANL-05	T-2/1	12.02.25	23°56'18.556"N 90°33'33.555"E	Residential Area

Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

Figure 4-7: Noise Level Monitoring Location Map



Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

Figure 4-8: Noise Monitoring in Study Area



TT 1/0 (ANL1)



T 4/0 (ANL2)



T 3/0 (ANL3)



T 2/3 (ANL4)



T 2/1 (ANL5)

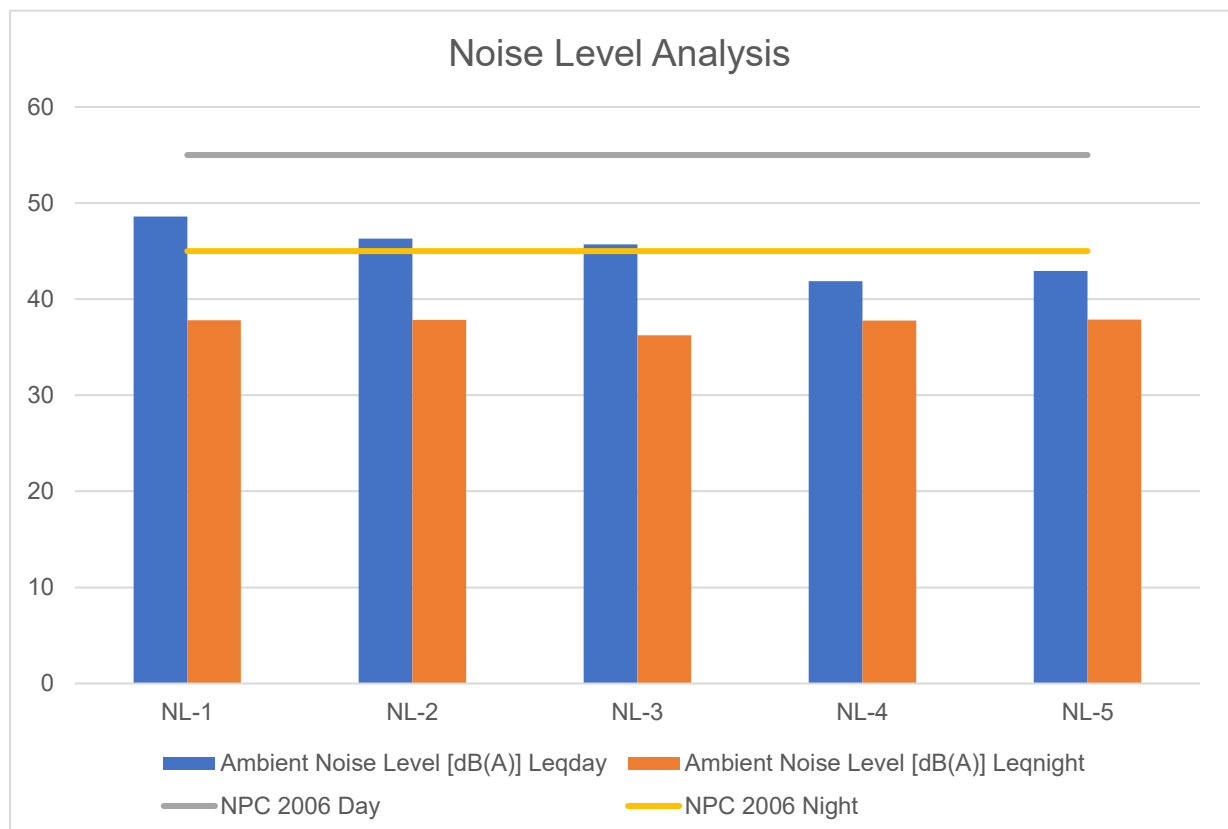
Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

4.2.3.2 Analysis Results

62. An electronic and auto-recorded noise meter has been used to conduct the study. The recorded noise levels summary monitoring results are shown in Table 4-6 Table 4-6.

Figure 4-13: Noise Level Analysis Results (Graphical representation)



Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

Table 4-6: Noise Monitoring Level

Sl. No.	Code	Period	Ambient Noise Level [dB(A)]		Bangladesh Standard ⁶		Category of Area/Receptor
			Leq _{day}	Leq _{night}	Day	Night	
1.	ANL-01	08.02.25	48.59	37.80	55	45	Residential Area
2.	ANL-02	09.02.25	46.30	37.84	55	45	Residential Area
3.	ANL-03	10.02.25	45.71	36.23	55	45	Residential Area
4.	ANL-04	11.02.25	41.86	37.77	55	45	Residential Area
5.	ANL-05	12.02.25	42.95	37.86	55	45	Residential Area

Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

⁶ Noise Pollution (Control) Rules, 2006, Schedule 1: Area-wise Noise Standards.

4.2.3.3 Discussion

63. According to the Noise Pollution (Control) Rules, 2006, all five noise monitoring locations (ANL-01 to ANL-05) under the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1 are categorized as mostly residential zones. The national permissible limits for residential zones are 55 dB(A) for daytime and 45 dB(A) for nighttime.

64. The measured noise levels ranged between 41.86–48.59 dB(A) during daytime and 36.23–37.86 dB(A) during nighttime. The highest daytime level was recorded at ANL-01 (48.59 dB(A)), while the lowest was at ANL-04 (41.86 dB(A)). For nighttime, the highest level was observed at ANL-02 (37.84 dB(A)), and the lowest at ANL-03 (36.23 dB(A)).

65. All recorded values remain below the national permissible limits, indicating that ambient noise levels in the project area are within acceptable thresholds. This suggests that the existing noise environment is not currently posing significant risks to sensitive receptors within the Silent Zone category. However, it is recommended that regular monitoring be continued during construction and operational phases to ensure compliance, particularly given the sensitivity of Silent Zone areas such as educational institutions, hospitals, or similar facilities.

4.2.4 Water Quality

4.2.4.1 Surface Water

66. LILO TL Line in Kaliganj crossed a canal and three ponds. Moreover, canal and waterbodies were found in the 500 m radius of the LILO TL (LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1) locations.

Table 4-7: Name of rivers/ other surface water sources and Transmission Lines

No.	LILO Alignment	Names and Widths of River
1.	LILO of Ghorashal-Tongi 230 kV Line to Kaliganj	The line crosses a canal and three ponds

4.2.4.1.1 Surface Water Sampling Methods

67. To determine the quality of surface water, five samples were collected from the nearest water body of the existing project site and analyzed in the lab for different parameters following the standard method. Change of any parameters of water due to construction can affect the crops, flora, and fauna.

68. The samples have been analyzed for parameters covering bacteriological and physio-chemical characteristics which include certain heavy metals and trace elements. Samples were collected from the center of the water body approximately 0.5 m below the water surface, following standard procedures for container preparation, and sample collection, storage and preservation. During surface water collection USEPA surface water sampling guideline (<https://www.epa.gov/quality/surface-water-sampling>) was followed.

69. Water samples were collected as grab samples in a pre-washed 5-litre plastic can and a 1-litre sterilized clean PET bottle for complete Physico- chemical tests respectively. Samples were labeled properly. After that, the samples were submitted to the laboratories (DPHE and ICCDR'B) for analysis of parameters. After analysis, surface water results have been compared with the national standards [ECR-2023, schedule-2A]. The name of the water quality parameters and their determination methods are given in Table 4-8.

Table 4-8: Analysis Method for Surface Water Samples

S/I	Water Quality Parameters	Unit	ECR'2023	Method of Analysis
1.	Arsenic (As)	mg/L		AAS
2.	Iron (Fe)	mg/L		AAS
3.	Manganese (Mn)	mg/L		AAS
4.	pH	-	6- 9	pH Meter
5.	Total Coliform (TC)	CFU/100mL	≤5000	Membrane Filtration
6.	Fecal Coliform (FC)	CFU/100mL	-	Membrane Filtration

Sources: *Department of Public Health and Engineering (DPHE) & ICCDR'B

*The Environment Conservation Rules (ECR) 2023, Schedule-2A Standard for Inland Surface Water

70. The quality of surface water was compared with the standards for Inland Surface Water, Environment Conservation Rules (ECR) 2023-Schedule 2(A) whereas the groundwater was compared with the Drinking Water Standard ECR 2023 Schedule-2(B). The standards have been presented along with the monitoring results of surface water for comparison.

4.2.4.1.2 Surface Water Sampling Locations

71. The monitoring team has observed various sources of water throughout the LILO route. A total of five water samples were taken from representative locations of the surface water of the project corridor on 12 February 2025. Location of sample collection is presented in (Table 4-9). The analyzed results for surface water were compared to Bangladesh Standards (ECR, 2023) Guidelines. Results of inland surface water analysis are presented in Table 4-10.

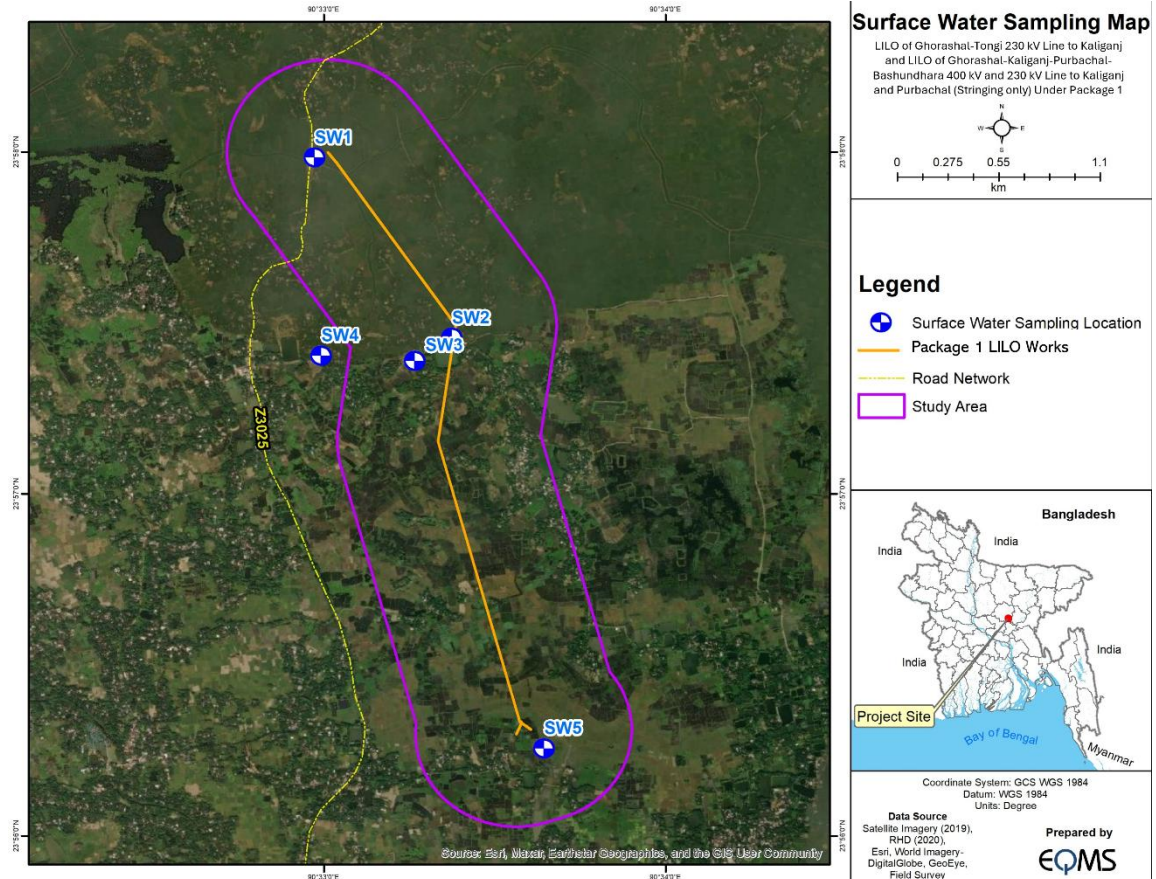
Table 4-9: Surface Water Sampling Location

Sl. No.	Code	Sampling Location	GPS Coordinate	Type of Source	Sampling Date
1.	SW-1	Near T-1/0	23°57'59.0162"N 90°32'58.406"E	Pond	12.02.2025
2.	SW-2	Near T-4/0	23°57'27.384"N 90°33'22.473"E		
3.	SW-3	Near T-3/0	23°57'23.334"N 90°33'16.017"E		
4.	SW-4	Near T-2/3	23°57'24.26"N 90°32'59.558"E		
5.	SW-5	Near T-2/1	23°56'15.322"N 90°33'38.667"E		

Source: Environmental Baseline Monitoring Report of Package 1, February 2025

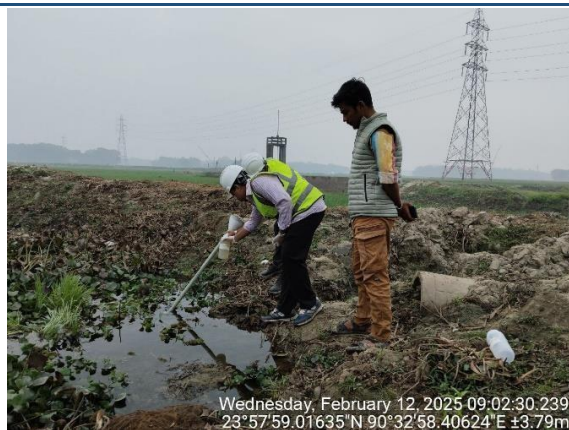
Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

Figure 4-9: Surface Water Monitoring Location Map



Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Figure 4-10: Pictures of Sampling Location



Near T-1/0 (SW-1)



Near T-4/0 (SW-2)



Near T-3/0 (SW-3)



Near T-2/3 (SW-4)



Near T-2/1 (SW-5)

Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

4.2.4.1.3 Result Analysis

72. The analyzed results for surface water were compared to the Environment Conservation Rules (ECR) 2023, Schedule 2(A). Results of inland surface water analysis are presented in Table 4-10.

Table 4-10: Surface Water Analysis Result of LILO of Package 1

Parameters		Concentration					
		As	Fe	Mn	pH	TC	FC
Unit		mg/L	mg/L	mg/L	-	(N/100 ml)	(N/100 ml)
SW1	Baseline (Feb 2025)	0.003	3.10	0.03	7.0	200	56
SW2	Baseline (Feb 2025)	0.001	8.59	0.03	6.9	3.0X10 ⁵	2.3X10 ⁵
SW3	Baseline (Feb 2025)	0.006	4.53	0.03	6.7	5200	3300
SW4	Baseline (Feb 2025)	0.001	0.99	0.06	6.7	1600	600
SW5	Baseline (Feb 2025)	0.001	4.41	0.30	7.0	500	315
Bangladesh Standards ⁷	a	-	-	-	6.5-8.5	≤100	-
	b	-	-	-	6.5-8.5	≤50	-
	c	-	-	-	6- 9	≤5000	-
	d	-	-	-	6- 9	≤5000	-
	e	-	-	-	6.5-8.5	-	-
	f	-	-	-	6.5-8.5	≤50,000	-

Source: The Environment Conservation Rules (ECR) 2023, Schedule 2-A (1) Standard for Inland Surface Water (a-f)

- a. Source of drinking water for supply only after disinfecting
- b. Water usable for recreational activity
- c. Source of drinking water for supply after conventional treatment
- d. Water usable for fisheries
- e. Water usable by various process and cooling industries
- f. Water usable for irrigation

Primary data Source: Department of Public Health and Engineering (DPHE) and ICCDR'B, Feb 2025

⁷ The Environment Conservation Rules (ECR) 2023, Schedule 2(A); Inland Surface Water Quality

4.2.4.1.4 Discussion

73. There are six categories of standards that has been set out by Department of Environment according to ECR'2023. But the category (d) is more practical and suitable to compare as it indicates the standard usable for fisheries as we know Bangladesh is a riverine country and fishes are a vital source of income and occupation here. Therefore, it is expected to meet this standard by all the waterbody to mark it as non-polluted surface water sources.

74. The pH levels of the surface water samples from the project site are within the acceptable range of 6.5 to 8.5 as per the ECR 2023 standards. However, the Total Coliform (TC) values exceed the acceptable limits in some locations, particularly at T-4/0, indicating potential contamination concerns.

75. The Fecal Coliform (FC) values show significant variation, with SW-2 having the highest count of 232,000 N/100 ml, indicating a possible contamination source at this location. However, the other sites, such as SW-1, SW-3, SW-4, and SW-5, show more acceptable levels of fecal contamination, well within limits for potable water standards. These parameters have been determined following the Initial Environmental Examination (IEE), which was conducted before 2020. Since the IEE did not align with the updated ECR 2023 standards, the current testing results may not fully comply with the ECR 2023 water quality parameters. Moving forward, all future sampling will strictly follow the ECR 2023 guidelines to ensure compliance with the latest environmental regulations and improve the monitoring framework.

76. Microbial presence (TC and FC) was detected in all samples, with higher counts in SW-2 and SW-3. However, these are likely influenced by external community activities or upstream sources, not directly linked to project operations.

77. Rest of the parameters do not have any standard in ECR 2023.

4.2.4.2 Ground Water

4.2.4.2.1 Ground Water Sampling Methods

78. To determine the quality of ground water, five samples were collected from the deep tube well of the study area and analyzed in the lab for different parameters following the standard method. Change of any parameters of water due to construction can affect the crops, flora, and fauna.

79. Ground water samples has been collected from the Ground water supply point or deep tube well or shallow tube well set up in the construction area. Ground water samples has been collected in a standard sampling bottle and 250 ml sterilized clean PET bottle for complete physio-chemical and bacteriological tests respectively. The samples have been analysed as per standard procedure/method given in Standard Method for Examination of Water and Wastewater Edition 20, published by APHA as well as using a site field test kit. Details of the analysis method and protocol are presented in **Table 4-11**.

Table 4-11: Analysis Method for Ground Water Samples

S/I	Water Quality Parameters	Unit	Bangladesh Standard for Ground Water (ECR'2023)	Method of Analysis
1	Ammonia	mg/L	1.50	UVS
2	COD	mg/L	-	CRM
3	pH	-	6.5-8.5	pH Meter
4	Phosphate	mg/L	-	UVS
5	Total Coliform	CFU/100 ml	0	Membrane Filtration
6	Fecal Coliform	CFU/100 ml	0	Membrane Filtration
7	BOD	mg/L	-	5-Day BOD Test

Sources: Department of Public Health and Engineering (DPHE) & ICCDR'B

4.2.4.2.2 Ground-Water Sampling Locations

80. Ground water samples were collected for determining the quality of existing sources. Ground water in the project area was selected as the source of groundwater. During the site visit, no springs or deep wells/tubewell were found within the ROW of the line. Details of the sampling location is provided in Table 4-12.

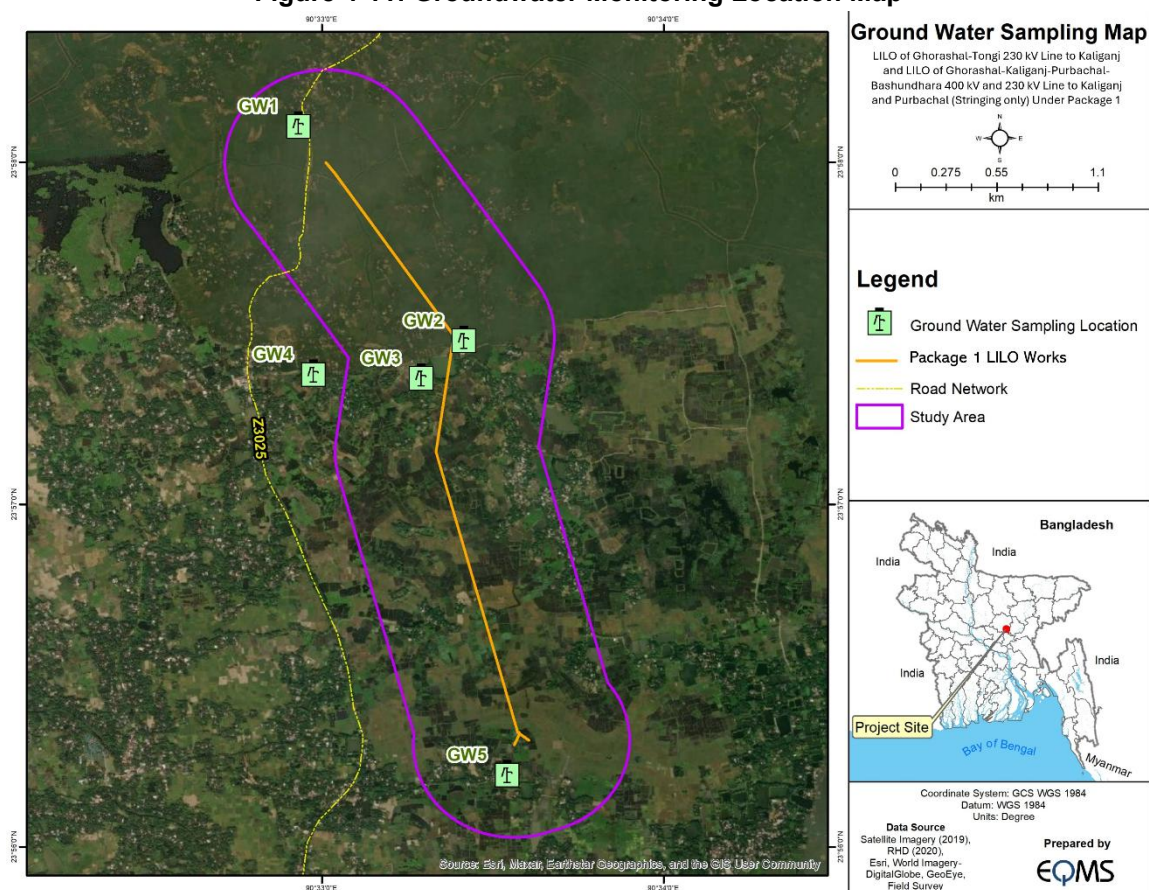
Table 4-12: Locations and Descriptions of Ground-Water Sampling

Sl. No.	Code	Sampling Location	GPS Coordinate	Type of Source	Sampling Date
1.	GW1	Near T-1/0	23°58'6.29"N 90°32'55.859"E	Tube-Well	12.02.2025
2.	GW2	Near T-4/0	23°57'28.667"N 90°33'24.84"E	Tube-Well	
3.	GW3	Near T-3/0	23°57'22.085"N 90°33'17.38"E	Tube-Well	
4.	GW4	Near T-2/3	23°57'22.755"N 90°32'58.451"E	Tube-Well	
5.	GW5	Near T-2/1	23°56'12.589"N 90°33'32.488"E	Tube-Well	

Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

Figure 4-11: Groundwater Monitoring Location Map

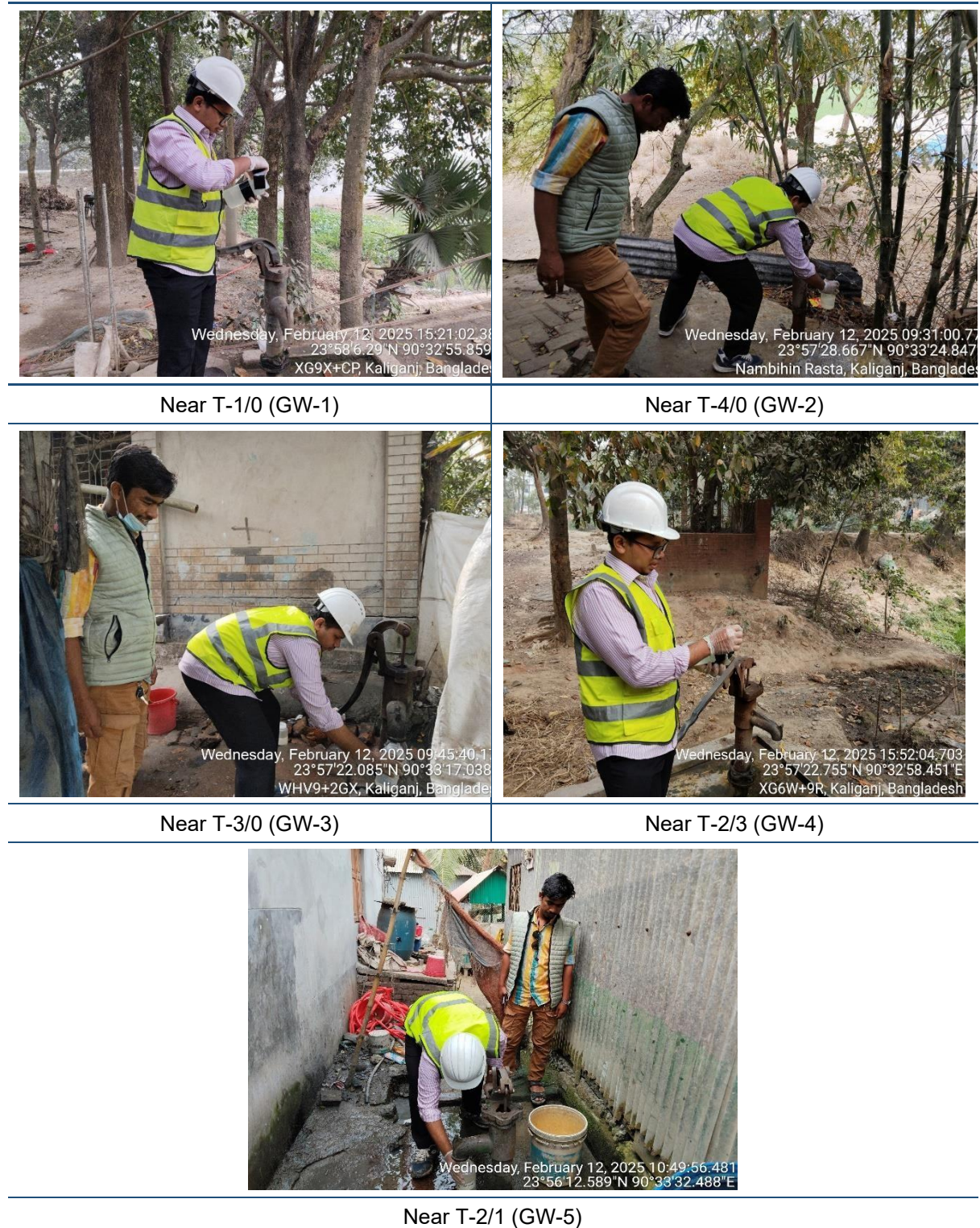


Source: Environmental Baseline Monitoring Report of Package 1, February 2025

4.2.4.2.3 Sampling Photographs

Sampling photographs of study area are mentioned in Figure 4-12.

Figure 4-12: Sampling photographs of study area



Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

4.2.4.2.4 Ground-Water Quality Analysis Results

81. Analysis results of the Ground water are represented in Table 4-13 where the values are compared with the standard limit.

Table 4-13: Ground Water Quality Analysis in Package 1

Parameters Unit		Concentrations						
		Ammonia	COD	TC	FC	pH	Phosphate	BOD
		mg/L	mg/L	N/100ml	N/100ml	-	mg/L	mg/L
GW1	Baseline (Feb. 2025)	0.40	56	0	0	7.1	2.0	2.0
GW2	Baseline (Feb. 2025)	0.32	312	0	0	6.7	1.0	2.0
GW3	Baseline (Feb. 2025)	0.23	36	17	13	7.0	0.66	2.0
GW4	Baseline (Feb. 2025)	0.30	48	0	0	6.4	0.70	2.0
GW5	Baseline (Feb. 2025)	0.35	56	48	21	6.8	1.2	1410
Bangladesh Standards ⁸		1.50	-	0	0	6.5-8.5	-	-

Primary data Source: Department of Public Health and Engineering (DPHE) and ICCDR'B February 2025

⁸ The Environment Conservation Rules (ECR), 2023, Schedule 2(B): Standards for Drinking Water

4.2.4.2.5 Discussion

82. The groundwater quality assessment across five sampling sites (GW-1 to GW-5) indicates that most parameters are within the ECR 2023 standards for drinking water. Ammonia levels, ranging between 0.23 and 0.40 mg/L, are well below the permissible limit of 0.5 mg/L, and pH values fall within the acceptable range of 6.5 to 8.5, reflecting stable water chemistry. In terms of microbial quality, total coliform (TC) and fecal coliform (FC) were not detected in most samples, though minor contamination was observed in GW-3 and GW-5, pointing to localized issues that may be managed with targeted interventions.

83. One area of concern is the chemical oxygen demand (COD), which exceeded the standard limit of 4 mg/L in all locations, with GW-2 showing indications of possible non-biological organic contamination. Additionally, GW-5 recorded a comparatively higher biochemical oxygen demand (BOD) level, suggesting accumulation of organic matter at this site. Despite these exceedances, the overall results demonstrate that groundwater quality remains generally suitable for use, and there is no evidence that ongoing construction activities have caused significant deterioration.

4.2.5 Soil Quality

84. This section presents the baseline status of soil conditions along the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1. Soil sampling and analysis were carried out at selected locations within the project area to assess key physico-chemical properties. The objective was to establish a reference baseline for evaluating potential impacts during the construction and operational phases of the project.

Table 4-15: Methodology for soil quality analysis

S/I	Soil Quality Parameters	Unit	Method of Analysis
1	pH	-	1:2:5 Glass Electrode Method
2	Total Nitrogen (TN)	%	Micro-Kjeldahl Method
3	EC	ppm	FAO-UNESCO, 1973
4	Zinc (Zn)	ppm	DTPA Extraction Method
5	Phosphorus (P)	ppm	Olsen Method and Bray & Kurtz Method
6	Potassium (K)	ppm	NH ₄ OAc Extraction Method
7	Iron (Fe)	%	DTPA Extraction Method
8	Lead (Pb)	ppm	Nitric Acid Digestion Method
9	Copper (Cu)	ppm	DTPA Extraction Method
10	Calcium (Ca)	ppm	NH ₄ OAc Extraction Method

Table 4-14: Soil Sampling Location

Sl. No.	Code	Sampling Location	GPS Coordinate	Sampling Date
1.	SQ 1	Near T-1/0	23°55'52.432"N 90°34'1.233"E	08.02.2025
2.	SQ 2	Near T-4/0	23°57'30.432"N 90°34'1.233"E	09.02.2025
3.	SQ 3	Near T-3/0	23°57'10.719"N 90°33'18.541"E	10.02.2025

Sl. No.	Code	Sampling Location	GPS Coordinate	Sampling Date
4.	SQ 4	Near T-2/3	23°56'49.0829"N 90°33'26.216"E	11.02.2025
5.	SQ 5	Near T-2/1	23°56'20.645"N 90°33'34.799"E	12.02.2025

Source: Environmental Baseline Monitoring Report of Package 1, February 2025

Monitoring dates and locations obtained from the Environmental Baseline Monitoring reports of the 3rd Party monitoring consultants appointed by EPC Contractor

Figure 4-7: Soil Quality Monitoring in Study Area

 SQ 1 Near T-1/0	 SQ 2 Near T-4/0
 SQ 3 Near T-3/0	 SQ 4 Near T-2/3



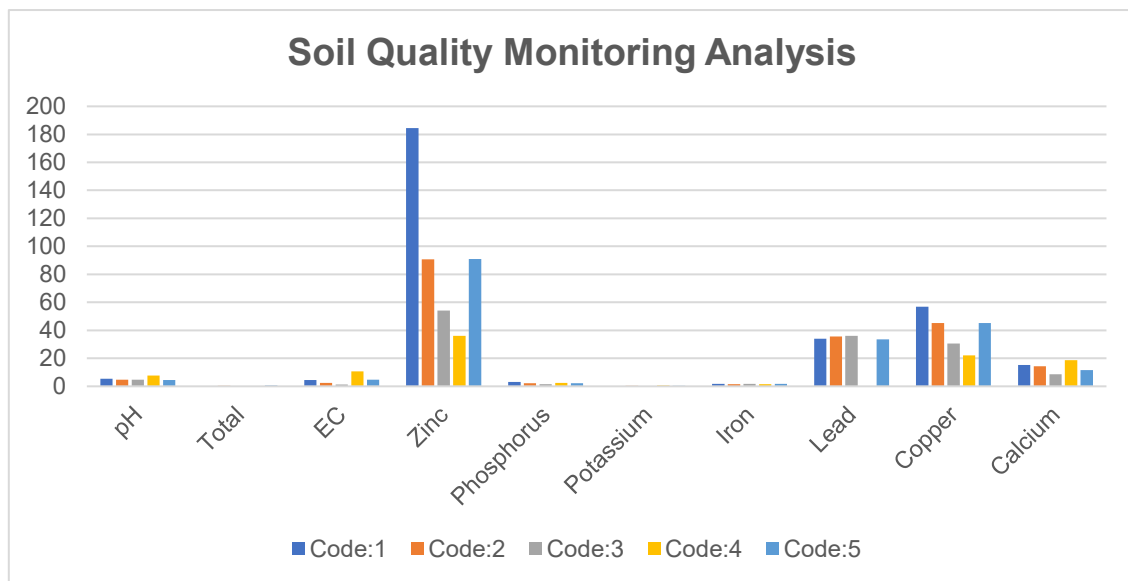
SQ 5 Near T-2/1

4.2.5.1 Analysis Results

Soil quality samples were collected from five locations within the project influence area of the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1. Each sample was collected from a depth of 0–30 cm, representing the active root zone and topsoil condition. Standard soil sampling protocols were followed to avoid contamination, and samples were stored in clean, labeled containers before laboratory analysis.

Table 4-16: Soil Quality Monitoring Result

Sample Code	pH	Total Nitrogen	EC	Zinc	Phosphorus	Potassium	Iron	Lead	Copper	Calcium
	-	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
SQ 1	5.4	0.26	4.43	184.40	3.15	0.26	1.74	34.08	56.90	15.36
SQ 2	4.8	0.28	2.55	90.82	2.10	0.31	1.57	35.65	45.11	14.24
SQ 3	4.7	0.21	1.36	54.18	1.53	0.26	1.70	36.01	30.68	8.56
SQ 4	7.8	0.09	10.6 9	36.01	2.53	0.68	1.57	0.05	22.17	18.75
SQ 5	4.5	0.50	4.70	90.94	2.18	0.30	1.68	33.59	45.11	11.70

Figure 4-16: Soil Quality Results (Graphical representation)

4.2.5.2 Discussion

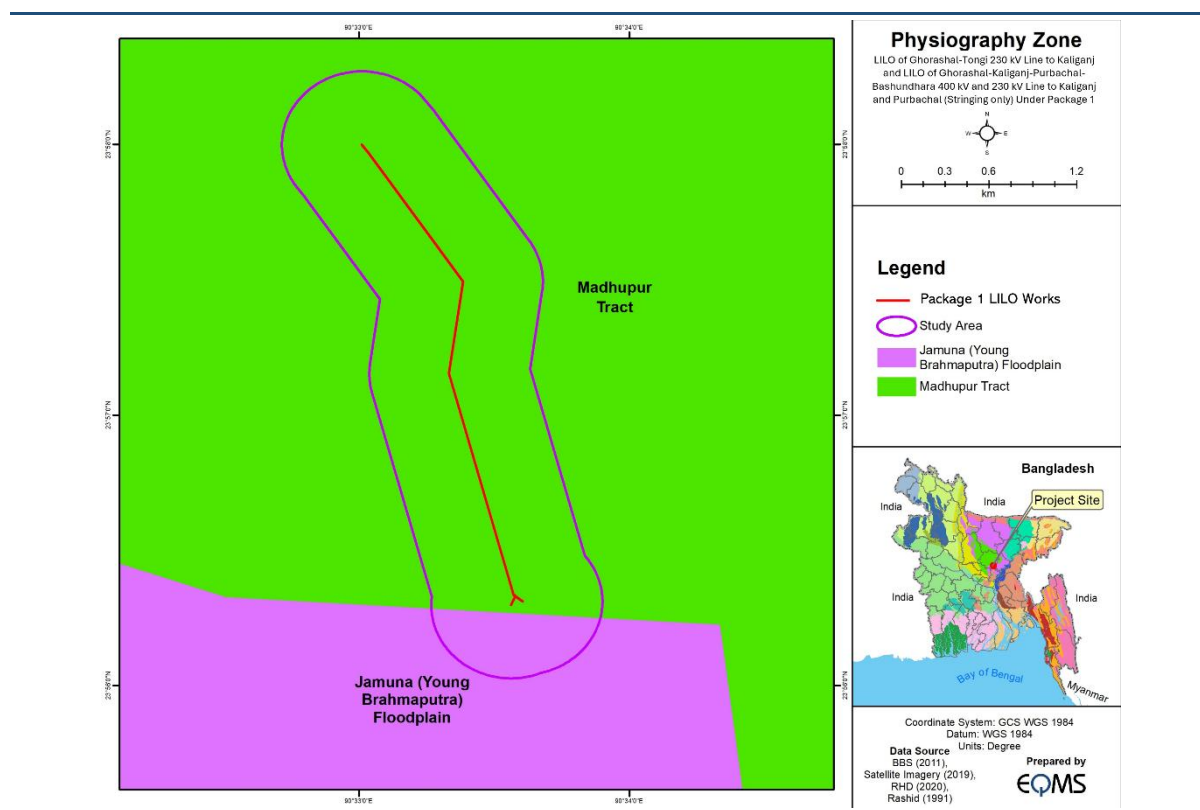
Soil samples (Code:1 to Code:5) were analyzed to assess the physico-chemical and heavy metal characteristics within the project influence area of the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1.

- **pH:** The majority of samples (Codes 1, 2, 3, and 5) were acidic in nature (pH 4.5–5.4), while Code:4 showed an alkaline condition (pH 7.8). This indicates spatial variation in soil reaction, with acidic soils dominating the study area.
- **Nutrients:** Total nitrogen content was generally low (0.09–0.50%), suggesting limited fertility. Phosphorus ranged between 1.53–3.15 ppm, with slightly higher levels in Code:1. Potassium values were also low (0.26–0.68 ppm), reflecting nutrient deficiency typical of the region's soils.
- **Micronutrients:** Zinc levels varied widely, from 36.01 ppm (Code:4) to 184.40 ppm (Code:1), with comparatively higher concentrations in acidic soils. Iron content was relatively consistent across samples (1.57–1.74%), indicating adequate availability.
- **Heavy Metals:** Lead concentrations were high in Codes 1–3 and 5 (33.59–36.01 ppm), but negligible in Code:4 (0.05 ppm). Copper ranged from 22.17–56.90 ppm, highest in Code:1. Calcium content ranged between 8.56–18.75 ppm, showing moderate availability.
- **Salinity (EC):** Electrical conductivity (EC) varied from 1.36 ppm (Code:3) to 10.69 ppm (Code:4). The elevated EC in Code:4 suggests localized salinity conditions, though other sites remained within normal levels.

4.2.6 Physiographic Features

86. In the context of physiography, Bangladesh is classified into three distinct regions: (a) floodplains; (b) terraces; and (c) hills each having distinguishing characteristics of its own. Further, the physiography of the country has been divided into 24 sub regions and 54 units. The physiography of LILO of Ghorashal-Tongi 230 kV Line to Kaliganj under Package 1 falls mostly in Madhupur tract and slightly in Jamuna (Young Brahmaputra) floodplain. Figure 4-13 shows the physiographic condition of Package 1.

Figure 4-13: Physiographic Map of LILO of Package 1



Source: SRDI, 1997, Rashid 1991, and Riemann, 1933

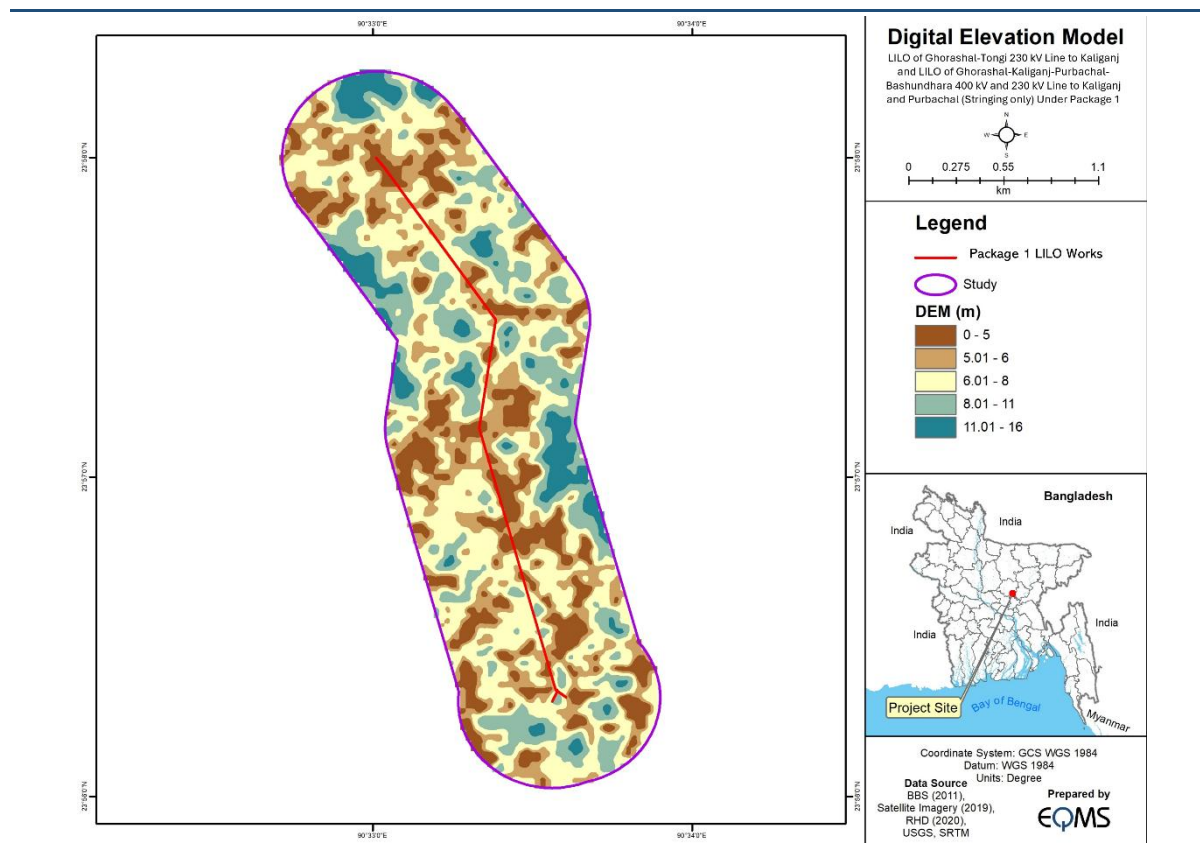
4.2.7 Topography

87. Bangladesh is one of the largest deltas in the world formed by the confluence of three Himalayan rivers: the Ganges (Padma); the Brahmaputra (Jamuna); and, the Meghna, with a long coastline along the Bay of Bengal. Floodplains (80%), terraces (8%) and hills (12%) cover the land area.

88. The country has a considerable topographic diversity. It has three distinctive features: (i) a broad alluvial plain subject to frequent flooding; (ii) a slightly elevated relatively older plain; and (iii) a small hill region drained by flashy rivers. The south is a highly irregular deltaic coastline of about 600 km fissured by many estuarine rivers and channels flowing into the Bay of Bengal. The alluvial plain is part of the larger plain of Bengal, which is sometimes called the Lower Gangetic Plain. Elevations of the plains are less than 10 m above sea level; elevations further decline to near sea level in the coastal south. Most of the southwest project area in Khulna and Barisal divisions lies in the alluvial plain. The hilly areas of the southeastern region of Chattogram, the northeastern hills of Sylhet and highlands in the north and northwest are of low elevation. The Chattogram Hills constitute the only significant hill system in the country. They rise steeply to narrow ridgelines, with elevation ranging between 600 m and 900 m above mean sea level. The highest point of 1,230 m is at Mt. Keokradong. In between the

hilly ridges lie the valleys that generally run north to south. West of the Chattogram hills is a narrow, wet coastal plain lying parallel to the shoreline. The average elevation of LILO alignment is 5- 8m. The average elevation of the LILO route is depicted in below Figure 4-14.

Figure 4-14: Topography Map of LILO of Package 1

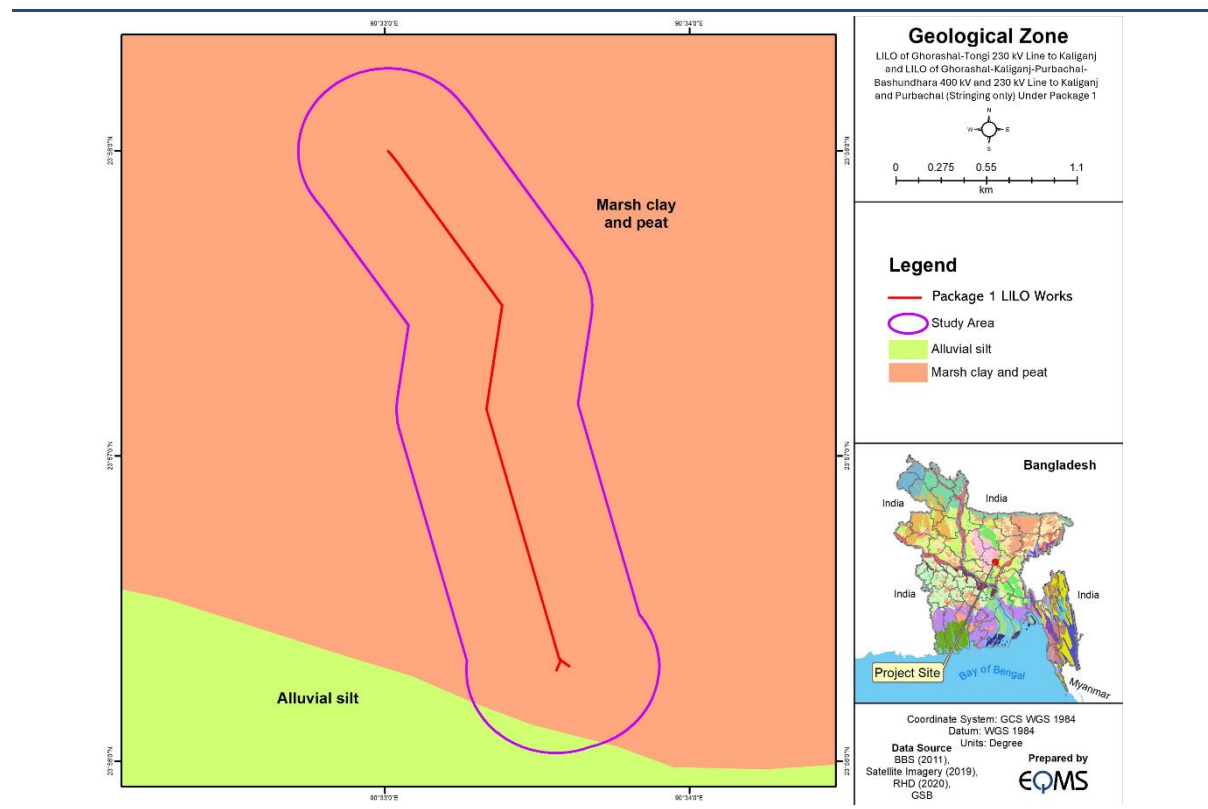


Source: SRTM Satellite Image

4.2.8 Geology

89. Bangladesh is situated to the east of the Indian sub-continental plate. Nearly 85% of Bangladesh is underlain by deltaic and alluvial deposits of the Ganges, Brahmaputra, and Meghna River systems. The project area consists of Holocene alluvial deposits in the floodplain and predominantly consists of fine sand, silts and clay. The site is on deep Cenozoic deposits that overlie Precambrian basement rock. The Precambrian rocks form the basement of all geological formations of the Bengal Basin and shield areas. The materials deposited are a mixture of sediments transported by the old Brahmaputra and by the Jamuna (Brahmaputra) River. The generalized geological features of the project area are shown in the geological map of Bangladesh. As per the geological category map of Bangladesh, the majority of the LILO route falls under Marsh Clay and Peat category (Figure 4-15).

Figure 4-15: Geology Map of LILO of Package 1



Source: Survey of Bangladesh

4.2.9 Soil

90. The project areas fall into seven different soil formation zones (Figure 4-16). The general soil types of LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1 fall under Madhupur soil category depicted in below Figure 4-16.

¹⁰ Bangladesh Agricultural Research Council (BARC)/GIS Project, BGD/95/006)



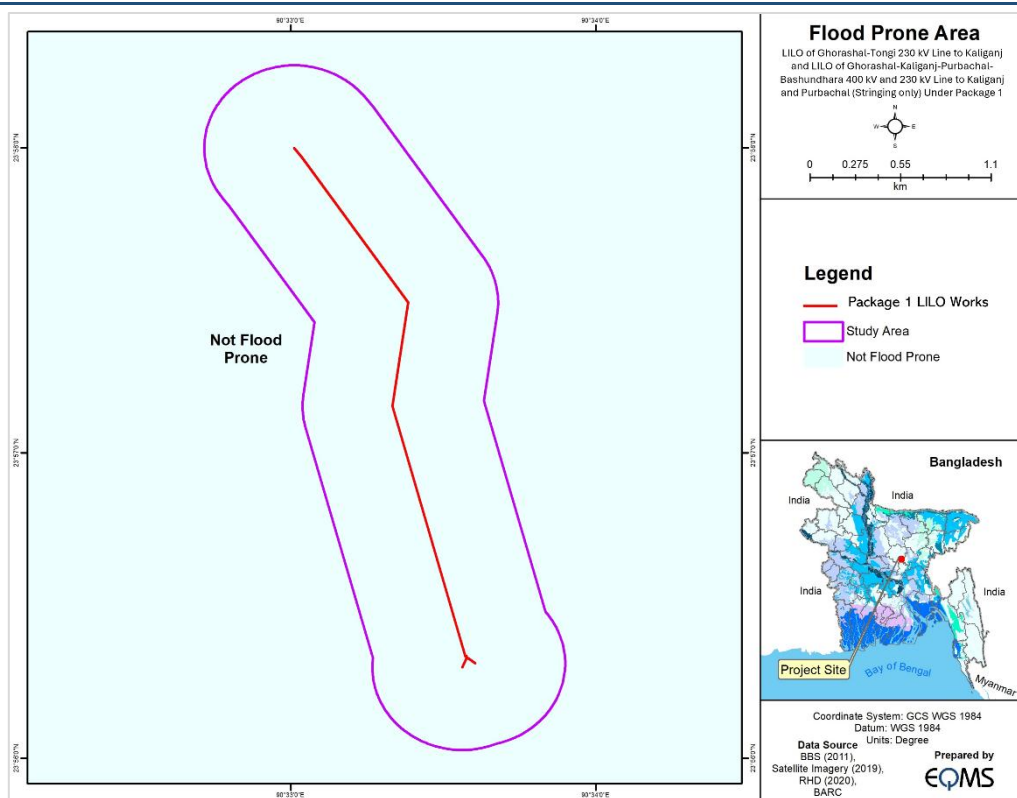
4-34 Power Grid Bangladesh

4-34 Power Grid Bangladesh

4-34 Power Grid Bangladesh

4-34 Power Grid Bangladesh

4-34 Power Grid Bangladesh

Figure 4-17: Flood Prone Category Map of Package 1

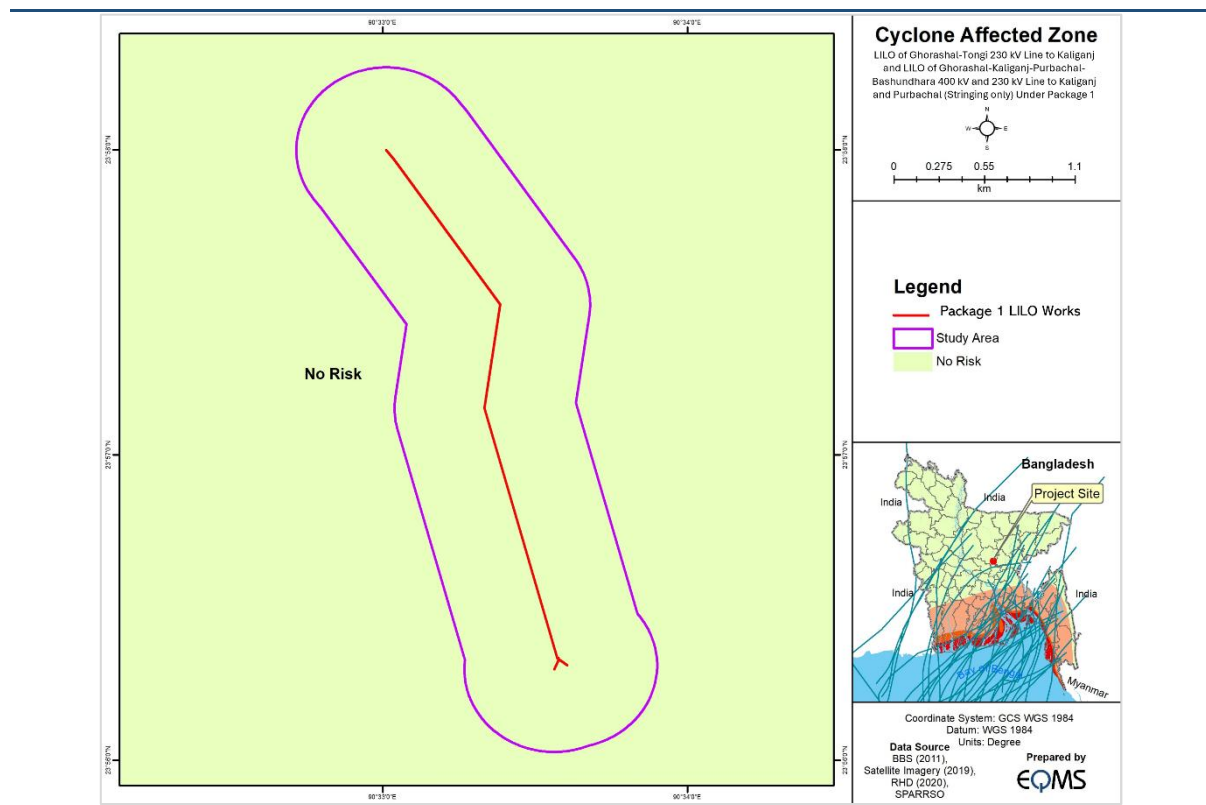
Source: Bangladesh Agricultural Research Council (BARC)

4.2.11 Cyclones

92. Bangladesh coast is one of the most cyclone prone areas of the world due to its geographical location and funnel shaped coast of the Bay of Bengal. Most of the damage occurs in the coastal regions of Khulna, Patuakhali, Barisal, Noakhali and Chattogram and the offshore islands of Bhola, Hatiya, Sandwip, Manpura, Kutubdia, Moheshkhali, Nijhum Dwip, Urir Char and other newly formed islands. Figure 4-18 shows cyclone affected area map of Bangladesh.

93. Devastating cyclones and associated storm surges hit the coastal zones almost every year and are usually accompanied by high-speed winds, sometimes reaching 250 km/hr. or more and with 3 m to 10 m high waves, causing extensive damage to life, property and livestock. These cyclones usually occur in two seasons, April- May and October-November i.e., before and after the monsoon season.

94. As per the cyclone affected zone map, the project site falls under no cyclone risk zone depicted in below Figure 4-18.

Figure 4-18: Cyclone affected zone map of Package 1

Source: Bangladesh Space Research and Remote Sensing Organization (SPARRSO)

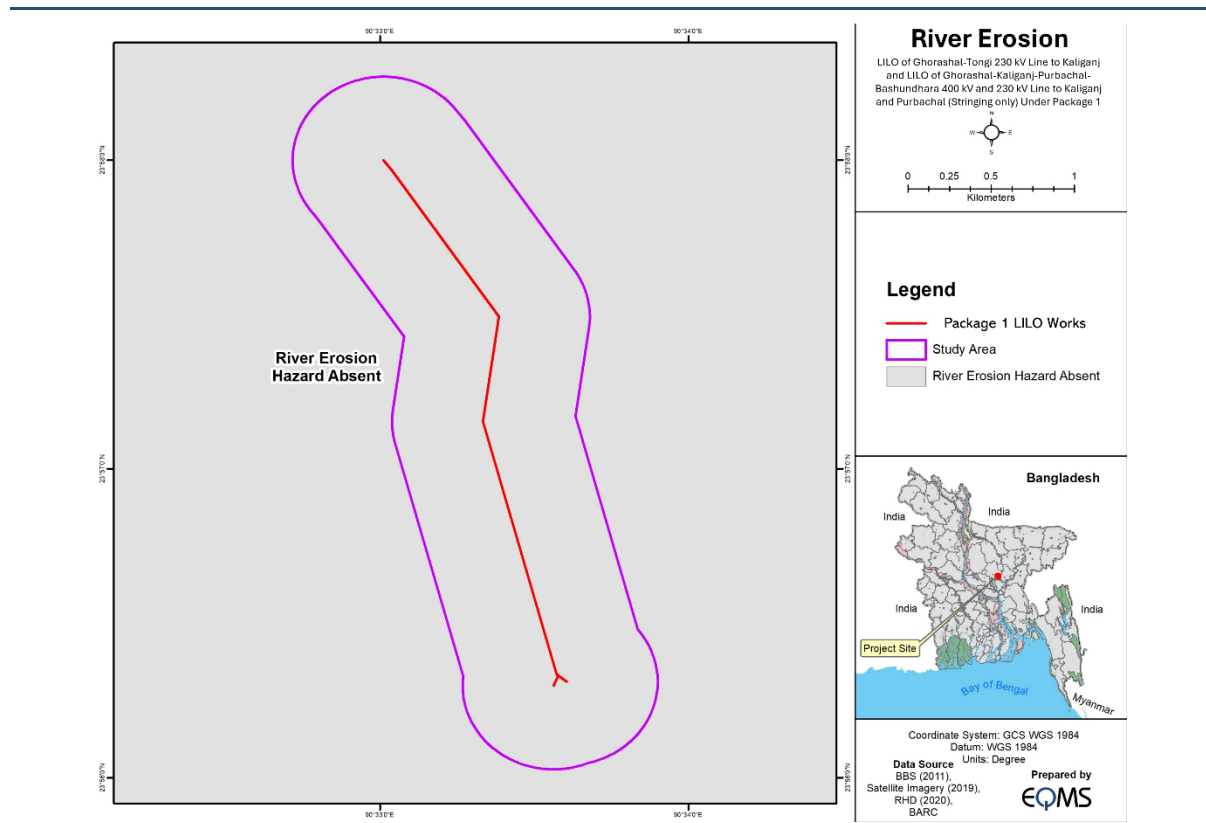
4.2.12 River Erosion

95. During the monsoon, extensive riverbank spills and riverbank erosion are typical. Riverbank erosion mainly occurs due to the braided nature of rivers in Bangladesh, and is further aggravated by heavy rainfall, particularly upstream, and increased water flow. Most recently, due to climate change, the rate of riverbank erosion has drastically increased, resulting in the collapse of riverbanks and devastation of whole Unions and Upazilla.

96. Every year, riverbank erosion leads to millions of people being affected as it results in damage and loss of crops, cattle, housing structures, and farmland. Additionally, it erodes public infrastructure and communication systems. The unpredictable shifting behavior of the rivers and their encroachments not only affect the rural floodplain population but also the urban growth centers and infrastructures.

97. According to the Bangladesh Water Development Board (BWDB) the most erosion prone districts are Bogra, Sirajganj, Kurigram, Lalmonirhat, Gaibandha and Rangpur, in the country's north, and Chandpur, Manikganj, Rajbari Shariatpur, and Faridpur in Dhaka zone, with Tangail and Jamalpur in Mymensingh zone, and the coastal areas of Patuakhali. The most erosion prone area in Bangladesh is Sirajganj, which faced a total land erosion at a rate of 622.2 ha, according to a CEGIS study in 2009 (Unnayan Onneshan 2012).

98. As per the river erosion map, river erosion hazard is absent in LILo of Ghorashal-Tongi 230 kV Line to Kaliganj and LILo of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1. The river erosion map of the project site are shown in Figure 4-19.

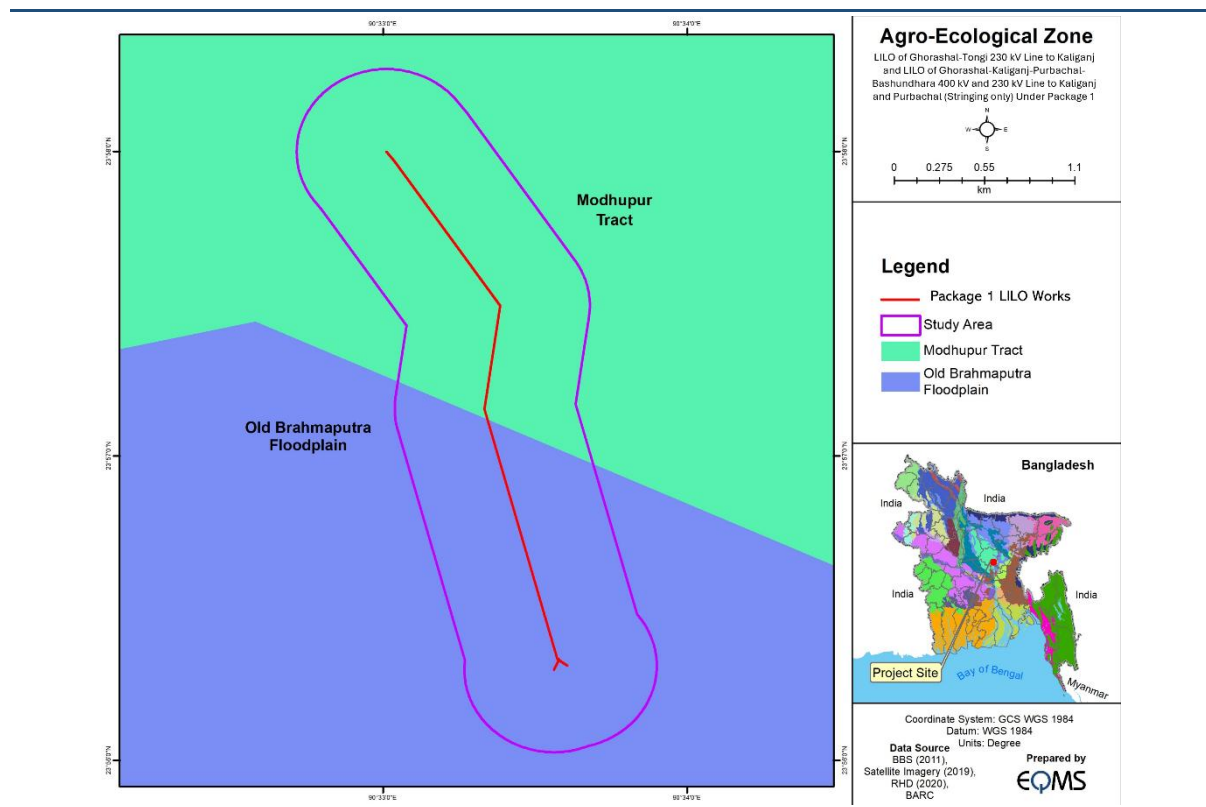
Figure 4-19: River erosion map of Package 1

Source: Bangladesh Agricultural Research Council (BARC)

4.2.13 Agro-ecological zones of Bangladesh

99. The agro-ecological zones of Bangladesh have been identified based on four elements including physiography, soils, land levels in relation to flooding, and agro-climatology. Bangladesh has been tentatively divided into 30 agro-ecological zones. These 30 zones have been further subdivided into 88 agro-ecological sub-regions, which have been further subdivided into 535 agro-ecological units. As per Agro-ecological zone category map, project area falls under Madhupur tract and Old Brahmaputra Floodplain depicted in the Figure 4-20.

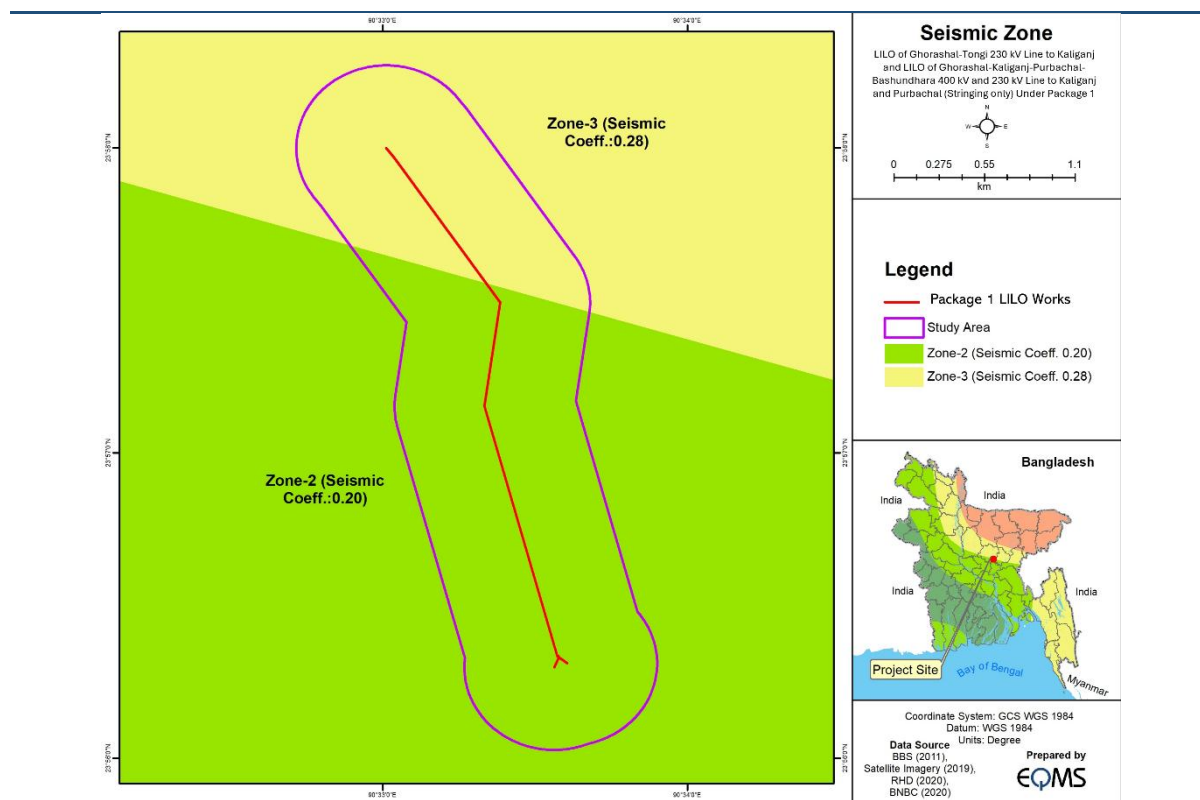
Figure 4-20: Agro-ecological zone of Package 1



Source: Bangladesh Agricultural Research Council (BARC)

4.2.14 Seismic zones of Bangladesh

100. Bangladesh can be affected by moderate to strong earthquake events due to its proximity to the collision boundary of the Northeast moving Indian plate and the Eurasian Plate. Strong historical earthquakes with magnitude greater than 7.0 (Richter scale) have affected parts of Bangladesh in the last 150 years; some of them had their epicenters within the country. As per Bangladesh National Building Code (BNBC) seismic zoning map, LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1 fall into Zone 3 and Zone-2 having the coefficient of 0.20 and 0.28 respectively depicted in the Figure 4-21.

Figure 4-21: Seismic zoning of Package 1

Source: Bangladesh National Building Code (BNBC)

4.2.15 Land Use Interpretation of the Study Area

101. The predominant land use-land cover of 500 m buffer (250m each side of the alignment) of LILO of Ghorashal-Tongi 230 kV Line to Kaliganj include mostly crop land (70.75%) and settlement with homestead vegetation (25%). During the survey, no settlements were found over the proposed LILO Line route. The major waterbodies covered are lake and canal, however, the line will not pose any risk to seasonal habitats/ wetlands and birds. The land use of the LILO buffer area is presented in Table 4-15 and Figure 4-22.

Table 4-15: Land Use Pattern for LILO of Ghorashal-Tongi 230 kV Line to Kaliganj) under Package 1

Land use Type	Area (Acres)	Percentage
Canal	9.58	0.92
Crop Land	737.60	70.75
Settlement with Homestead Vegetation	260.67	25.00
Waterbody	34.74	3.33
Total	1042.59	100

Source: GIS Mapping and Interpretation of Satellite imagery by EQMS

4.2.16 Existing Physical Cultural Features

In Package 1, school, collage, hospital, mosque and playground were found in 500m buffer area of the alignment. No resources will be affected directly by the route of the LILO. Existing physical cultural feature's locations along the alignment of LILO are shown in Figure 4-23. Nearest Physical Cultural Features from LILO mentioned in below table.

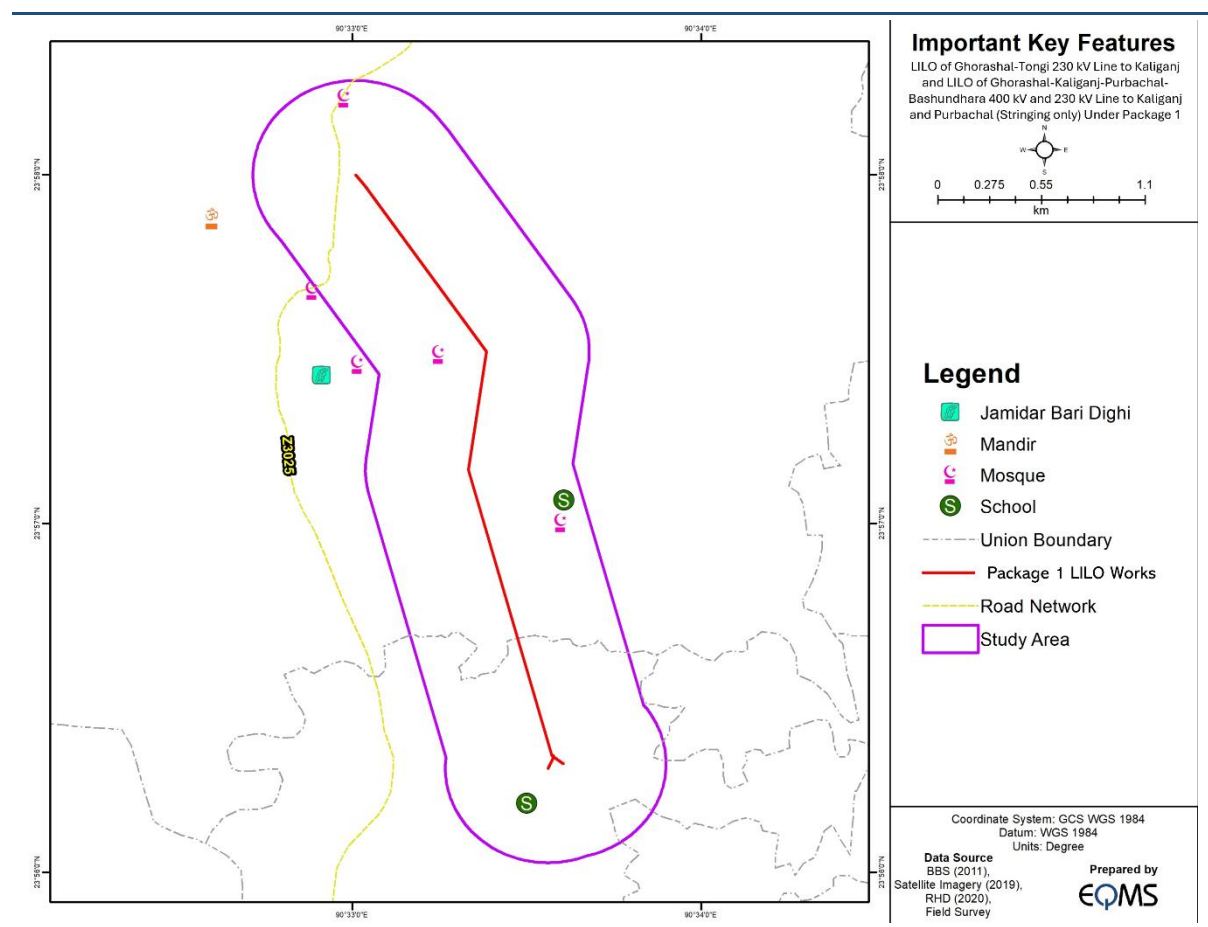
Table 4-16:Nearest Physical Cultural Features Information

Physical Cultural Features Name	Coordinates	Location	Distance from the Cable Line (Meter)
Boktarpur Kalitola Mandir	23°57'52.48"N 90°32'35.91"E	Boktarpur, Kaliganj	621
Boktarpur Uttorpara Jame Mosque	23°57'40.06"N 90°32'53.14"E	Boktarpur, Kaliganj	565
Jannatul Baki Jame Mosque	23°57'29.00"N 90°33'14.89"E	Mohani, Bokterpur, Kaliganj	202
Boktarpur Uttorpara Jame Mosque	23°57'27.31"N 90°33'0.94"E	Mohani, Bokterpur, Kaliganj	610
Boktarpur Jamidar Bari Dighi	23°57'25.46"N 90°32'54.78"E	Mohani, Bokterpur, Kaliganj	785
Begum Rokeya Academy School	23°56'11.82"N 90°33'30.07"E	Mohani, Kaliganj	98

Mohani Modhopara Jame Mosque	23°57'0.07"N 90°33'35.92"E	Mohani, Kaliganj	372
Mohani Government Primary School	23°57'3.98"N 90°33'36.43"E	Mohani, Kaliganj	407
Fuldi Baghpara Jame Mosque	23°58'13.12"N 90°32'58.62"E	Fuldi, Kaliganj	410

Source: EQMS, August 2025

Figure 4-23: Existing physical cultural feature map of LILO of Ghorashal-Tongi 230 kV Line to Kaliganj under Package 1



Source: EQMS, August 2025

4.3 Biological Environment

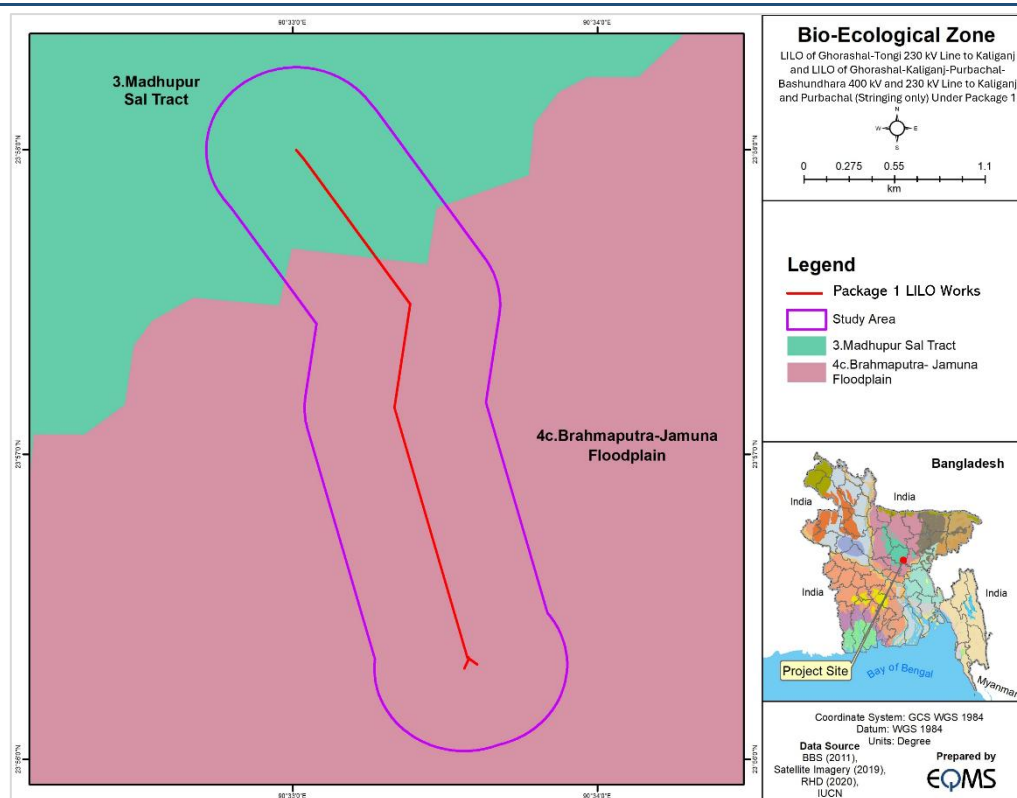
4.3.1 Bio-Ecological Zones

102. Within a relatively small geographic area, Bangladesh has a diverse array of ecosystems. Being a low-lying deltaic country, seasonal variation in water availability is the major factor, which generates different ecological scenarios in Bangladesh. Temperature, rainfall, physiographic variations in soil and different hydrological conditions play vital roles in the country's diverse ecosystems. The ecosystems of Bangladesh are categorized into two major groups: (i) land based and (ii) aquatic. The land-based ecosystems include forest and hill ecosystems, agro- ecosystems and homestead ecosystems, while seasonal and perennial wetlands, rivers, lakes, coastal mangroves, coastal mudflats and chars, and marine ecosystems fall into the aquatic category.

103. In 2002, the International Union for Conservation of Nature (IUCN) classified the country into 12 bio-ecological zones (25 sub-bio-ecological zones) according to factors such as fauna and flora, geographical characteristics, annual average rainfall, administrative regions, soil types, water level in Bangladesh.

104. The project site has fallen under bio-ecological zone 4c. Brahmaputra-Jamuna Floodplain and zone- 3. Madhupur Sal Tract (IUCN, 2002).

Figure 4-24: Bio-ecological Zones of the Site



Source: International Union for Conservation of Nature (IUCN)

4.3.2 Terrestrial Flora

105. A total of 42 terrestrial flora species were recorded under 29 families from the project area. Among these plant species, 21 species under 11 families of trees and 15 species of Herbs under 11 families and 6 species of shrubs were recorded from the project area. The most abundant family is Fabaceae which includes 6 (Six) plant species. A comparison of all flora species based on their family (taxonomic classification) has been shown in Figure 4-25. A checklist of all recorded tree and herbs and

shrubs species with their occurrence in three project area has been provided in Table 4-17 and Table 4-18.

Figure 4-25: Comparison of the Number of Floral Species by Family

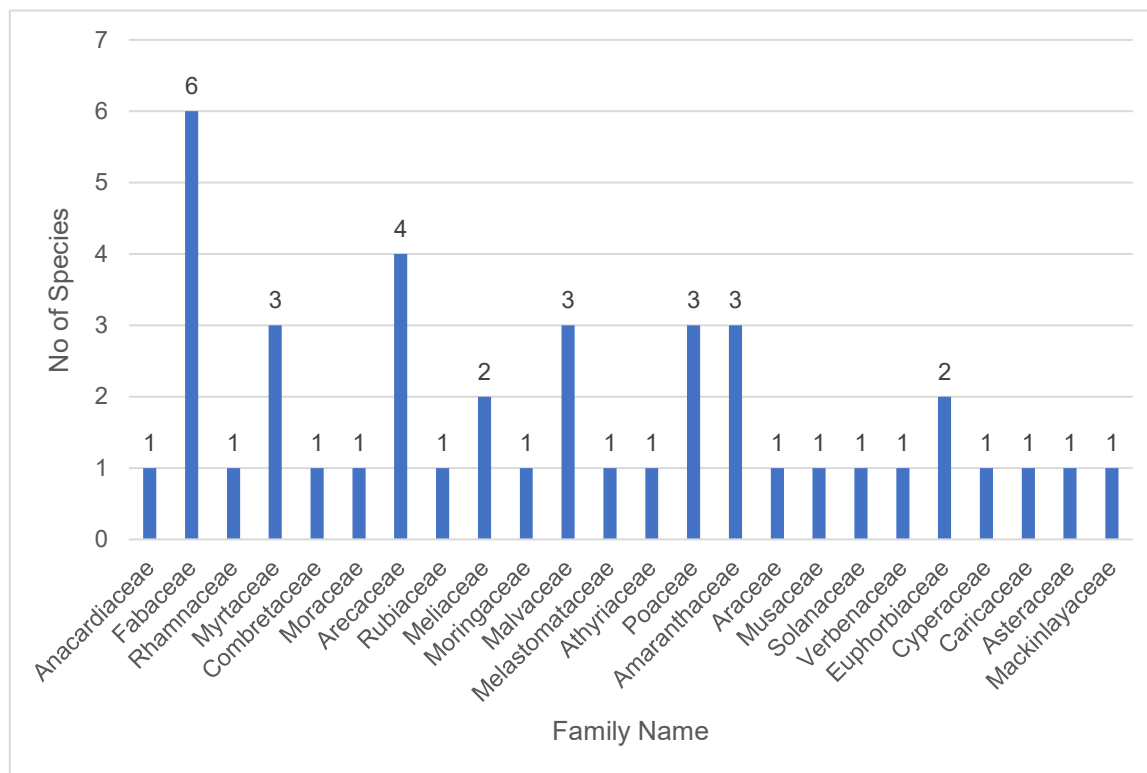


Table 4-17: Checklist of Terrestrial Floral (Tree) Species Recorded within the Project AOI

SI No	Local Name	Common Name	Scientific name	Family	Use	Occurrence*		
						1	2	3
1.	Aam	Mango	<i>Mangifera indica</i>	Anacardiaceae	Fruit	✓	✓	✓
2.	Akashmoni	Acacia	<i>Acacia auriculiformis</i>	Fabaceae	Timber	-	-	✓
3.	Boroi	Indian Jujube	<i>Ziziphus mauritiana</i>	Rhamnaceae	Medicinal	✓	✓	✓
4.	Bakul	Bokul	<i>Mimusops elengi</i>	Sapotaceae	Aesthetic	✓	✓	✓
5.	Eucalyptus	Eucalyptus	<i>Eucalyptus citriodora</i>	Myrtaceae	Timber	-	✓	-
6.	Ipil Ipil	River tamarind	<i>Leucaena leucocephala</i>	Fabaceae	Timber	-	✓	-
7.	Jam	Java Plum	<i>Syzygium cumini</i>	Myrtaceae	Fruit, Timber	✓	✓	✓
8.	Kath Badam	Indian Almond	<i>Terminalia catappa</i>	Combretaceae	Fruit	✓	✓	✓
9.	Kathal	Jackfruit	<i>Artocarpus heterophyllus</i>	Moraceae	Fruit	✓	✓	✓
10.	Khejur	Date palm	<i>Phoenix sylvestris</i>	Arecaceae	Fruit	-	✓	✓

SI No	Local Name	Common Name	Scientific name	Family	Use	Occurrence*		
						1	2	3
11.	Kodom	Burflower-tree	<i>Neolamarckia cadamba</i>	Rubiaceae	Aesthetic	✓	✓	✓
12.	Krishnochura	Royal poinciana	<i>Delonix regia</i>	Fabaceae	Aesthetic	✓	-	-
13.	Mahogany	Mahogoni	<i>Swietenia mahagoni</i>	Meliaceae	Timber	✓	✓	✓
14.	Narikel	Coconut	<i>Cocos nucifera</i>	Arecaceae	Fruit	✓	✓	✓
15.	Neem	Neem Tree	<i>Azadirachta indica</i>	Meliaceae	Medicinal	✓	✓	✓
16.	Peyara	Guava	<i>Psidium guajava</i>	Myrtaceae	Fruit	✓	✓	✓
17.	Sada Koroi	White Siris	<i>Albizia procera</i>	Fabaceae	Timber	✓	✓	✓
18.	Sajne	Moringa	<i>Moringa oleifera</i>	Moringaceae	Medicinal	-	✓	✓
19.	Shimul	Cotton tree	<i>Bombax ceiba</i>	Malvaceae	Timber	-	✓	-
20.	Supari	Areca palm	<i>Areca catechu</i>	Arecaceae	Fruit	✓	✓	✓
21.	Tal	Tal palm	<i>Borassus flabellifer</i>	Arecaceae	Fruit	-	✓	-
22.	Tetul	Tamarind tree	<i>Tamarindus indica</i>	Fabaceae	Fruit	✓	✓	✓

*Occurrence: 1- LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1

Table 4-18: Checklist of Terrestrial Herbs and Shrubs Species Recorded within the Project AOI

SI No	Local Name	Common Name	Scientific name	Family	Occurrence*		
					1	2	3
Herb							
1.	Berela	Cuban jute	<i>Sida rhombifolia</i>	Malvaceae	✓	✓	✓
2.	Dheki Shak	Vegetable fern	<i>Diplazium esculentum</i>	Athyriaceae	✓	✓	✓
3.	Durba	Bermuda Grass	<i>Cynodon dactylon</i>	Poaceae	✓	✓	✓
4.	Kashful	Wild Sugarcane	<i>Saccharum spontaneum</i>	Poaceae	-	✓	✓
5.	Khurakata	Spiny amaranth	<i>Amaranthus spinosus</i>	Amaranthaceae	-	✓	✓
6.	Kochu	Taro	<i>Colocasia esculenta</i>	Araceae	✓	✓	✓
7.	Kola	Banana	<i>Musa sapientum</i>	Musaceae	✓	✓	✓
8.	Lojjaboti	Mimosa plant	<i>Mimosa pudica</i>	Fabaceae	-	✓	✓
9.	Mati Konduri	Sessile Joy weed	<i>Alternanthera sessilis</i>	Amaranthaceae	✓	✓	✓
10.	Mukta Juri	Indian Nettle	<i>Acalypha indica</i>	Euphorbiaceae	✓	✓	✓

SI No	Local Name	Common Name	Scientific name	Family	Occurrence*		
					1	2	3
11.	Mutha	Java Grass	<i>Cyperus rotundus</i>	Cyperaceae	✓	✓	✓
12.	Nol khagra	Tall Reed	<i>Phragmites karka</i>	Poaceae	-	✓	✓
13.	Opango ful	Prickly Chaff Flower	<i>Achyranthes aspera</i>	Amaranthaceae	✓	✓	✓
14.	Rabon lata	American rope	<i>Mikania micrantha</i>	Asteraceae	✓	✓	✓
15.	Thankuni	Indian pennywort	<i>Centella asiatica</i>	Mackinlayaceae	✓	✓	✓
Shrub							
1.	Datranga	Malabar melastome	<i>Melastoma malabathricum</i>	Melastomataceae	-	✓	✓
2.	Joba	China Rose	<i>Hibiscus rosa-sinensis</i>	Malvaceae	✓	-	-
3.	Kontikari	Sticky Nightshade	<i>Solanum sisymbriifolium</i>	Solanaceae	-	✓	✓
4.	Lonthon ful	Sage	<i>Lantana camara</i>	Verbenaceae	✓	-	-
5.	Pepe	Papaya	<i>Carica papaya</i>	Caricaceae	✓	✓	✓
6.	Venna	Castor oil plant	<i>Ricinus communis</i>	Euphorbiaceae	-	✓	✓

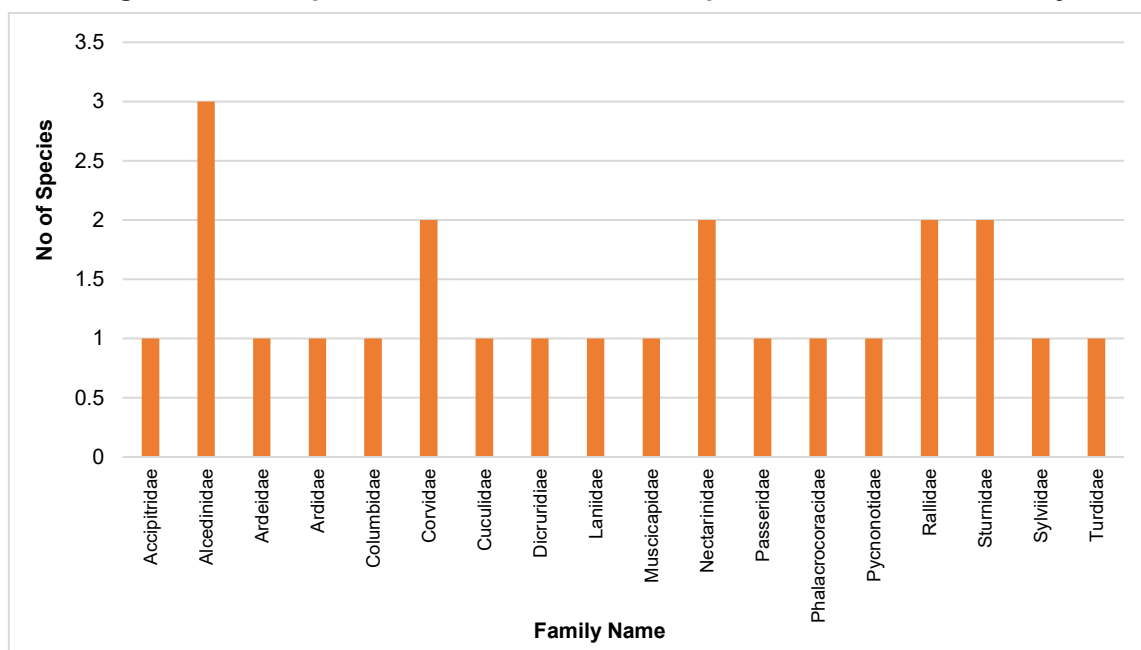
*Occurrence: 1- LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1

4.3.3 Fauna

106. The faunal biodiversity of the project AOI can be divided into five major classes - Avifauna, Herpetofauna (Amphibians and Reptiles), Mammal and Fisheries Resources.

4.3.3.1 Avifauna

107. A total of 24 species of birds under 16 families were recorded from the study area. The highest number of birds belong to the family Alcedinidae. All the bird species found in the study area are Least Concern (LC) both for Global IUCN Red List Status (Version 2024-1) and IUCN Bangladesh Red List (2015). A Comparison of Avian species based on family is presented in Figure 4-26. A checklist of all recorded avian species with their occurrence in three project area has been provided in Table 4-19.

Figure 4-26: Comparison of the number of bird species based on their Family

4.3.3.2 Herpetofauna (Amphibians and Reptiles)

108. A total of five (05) species of amphibians belonging to three (03) families and six (06) species of reptiles belonging to five (05) families were listed from the project area.

109. All the amphibian species are included in the Bangladesh Wildlife (Conservation and Security) Act, 2012, under Schedule-II, which protects them from hunting, killing, and capturing. Amphibians recorded or reported to be present in the AOI are found to be Least Concern (LC) species. According to the IUCN Bangladesh Red List (2015) and Global IUCN Red List Status (Version 2024-1), One (01) Near Threatened (NT) reptile species, Bengal Monitor Lizard (*Varanus bengalensis*) was found in the project area. Recorded herpetofauna species with their occurrence in three project area presented in Table 4-20.

4.3.3.3 Mammals

110. Seven (07) terrestrial Mammal species belonging to Five (05) families were recorded in the project area. Each mammalian species found are Least Concern (LC) both locally and globally, according to IUCN Red List. A detailed checklist of recorded mammals with their occurrence in three project areas has been provided in Table 4-21.

4.3.3.4 Fisheries Resources

111. The prime objective of the fisheries study is to examine and evaluate the overall fisheries status (capture and cultured fish species) in the study area. The project area of Ghorashal-Tongi 230 kV Line to Kaliganj has crossed a canal and three ponds. Usually there are no fishing activities in the project Aol of these waterbodies. However, lakes and ponds within the project area may serve as reservoirs for fish species. The fish species recorded within the project area are Indian major carp i.e., Rui (*Labeo rohita*) and Katla (*Catla catla*), Tilapia (*Oreochromis niloticus*), Sarputi (*Systomus sarana*), Punti (*Puntius chola*), Baila (*Awaous guamensis*), Taki (*Channa punctatus*), Tengra (*Mystus tengra*), etc.

Table 4-19: Checklist of Avifaunal species of the project AOI

SI No	Common Name	Local Name	Scientific name	Family	Local Status*	Global Status**	Occurrence***		
							1	2	3
1.	Asian koel	Kokil, Koel	<i>Eudynamys scolopacea</i>	Cuculidae	LC	LC	✓	✓	✓
2.	Asian pied starling	Pakra/Gubra shalik	<i>Sturnus contra</i>	Sturnidae	LC	LC	✓	✓	✓
3.	Black drongo	Kala Fingey	<i>Dicrurus macrocercus</i>	Dicruridae	LC	LC	✓	✓	✓
4.	Brahminy Kite	Shonkho Cheel	<i>Haliastur indus</i>	Accipitridae	LC	LC	✓	✓	✓
5.	Common Kingfisher	Choto Machranga	<i>Alcedo atthis</i>	Alcedinidae	LC	LC	✓	✓	✓
6.	Common myna	Bhat Salik	<i>Acridotheres tristis</i>	Sturnidae	LC	LC	✓	✓	✓
7.	Common tailor bird	Tuntuni	<i>Orthotomus sutorius</i>	Sylviidae	LC	LC	✓	✓	✓
8.	House crow	Pati Kak	<i>Corvus splendens</i>	Corvidae	LC	LC	✓	✓	✓
9.	House sparrow	Pati choro	<i>Passer domesticus</i>	Passeridae	LC	LC	✓	✓	✓
10.	Indian pond heron	Kani Bok	<i>Ardeola grayii</i>	Ardidae	LC	LC	✓	✓	✓
11.	Large-billed crow /Jungle crow	Dar kak	<i>Corvus macrorhynchos</i>	Corvidae	LC	LC	✓	✓	✓
12.	Little cormorant	Choto Pankowri	<i>Microcarbo niger</i>	Phalacrocoracidae	LC	LC	✓	✓	✓
13.	Little egret	Choto boga	<i>Egretta garzetta</i>	Ardeidae	LC	LC	✓	✓	✓
14.	Long-tailed shrike	Lenja Latora	<i>Lanius schach</i>	Laniidae	LC	LC	✓	✓	✓
15.	Orange-headed Thrush	Komla Dama	<i>Zoothera citrina</i>	Turdidae	LC	LC	-	✓	✓
16.	Oriental magpie robin	Doel	<i>Copsychus saularis</i>	Muscicapidae	LC	LC	✓	✓	✓
17.	Pied kingfisher	Pakra Machranga	<i>Ceryle rudis</i>	Alcedinidae	LC	LC	✓	✓	✓
18.	Purple sunbird	Niltuni	<i>Cinnyris asiaticus</i>	Nectarinidae	LC	LC	✓	✓	✓

SI No	Common Name	Local Name	Scientific name	Family	Local Status*	Global Status**	Occurrence***		
							1	2	3
19.	Purple-rumped sunbird	Moutusi	<i>Leptocoma zeylonica</i>	Nectarinidae	LC	LC	✓	✓	✓
20.	Red-vented bulbul	Bangla BHulbul	<i>Pycnonotus cafer</i>	Pycnonotidae	LC	LC	✓	✓	✓
21.	Rock dove	Gola Paira/Jalali Kabutor	<i>Columba livia</i>	Columbidae	LC	LC	✓	✓	✓
22.	Spotted dove	Tila Ghughu	<i>Streptopelia chinensis</i>	Rallidae	LC	LC	✓	✓	✓
23.	White-breasted kingfisher	Dhola Gola Machranga	<i>Halcyon smyrnensis</i>	Alcedinidae	LC	LC	✓	✓	✓
24.	White-breasted Waterhen	Dholabuk Dahuk	<i>Amaurornis phoenicurus</i>	Rallidae	LC	LC	✓	✓	✓

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 3: Birds; LC=Least Concern, NT=Near Threatened

**IUCN 2024. The IUCN Red List of Threatened Species. Version 2024-1. (<https://www.iucnredlist.org/>)

***Occurrence: 1- Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1

Table 4-20: A checklist on Herpetofauna recorded from the project AOI

SI No	Family	Common Name	Local Name	Scientific Name	Local Status*	Global Status**	Wildlife conservation and security Act, 2012	Occurrence***		
								1	2	3
Amphibians										
1.	Bufonidae	Asian Common Toad	Kuno Bang	<i>Duttaphrynus melanostictus</i>	LC	LC	Schedule II	✓	✓	✓
2.	Dicroglossidae	Indian Bullfrog	Kola bang	<i>Hoplobatrachus tigerinus</i>	LC	LC	Schedule II	✓	✓	✓
3.		Indian skipper frog	Kotkoti bang	<i>Euphlyctis cyanophlyctis</i>	LC	LC	Schedule II	✓	✓	✓
4.	Rhacophoridae	Common Tree Frog	Dorakata Gecho Bang	<i>Polypedates leucomystax</i>	LC	LC	Schedule II	-	✓	✓

SI No	Family	Common Name	Local Name	Scientific Name	Local Status*	Global Status**	Wildlife conservation and security Act, 2012	Occurrence***		
								1	2	3
5.		Tree Frog	Dui-dagi Khudey Gecho Bang	<i>Chiromantis vittatus</i>	LC	LC	Schedule II	-	✓	✓

Reptiles

1.	Varanidae	Bengal monitor Lizard	Gui Shap	<i>Varanus bengalensis</i>	NT	NT	Schedule II	✓	✓	✓
2.	Gekkonidae	House Gecko	Tiktiki	<i>Hemidactylus frenatus</i>	LC	LC	Schedule II	✓	✓	✓
3.	Agamidae	Common Garden Lizard	Roktochosa	<i>Calotes versicolor</i>	LC	LC	Schedule II	✓	✓	✓
4.	Scincidae	Keeled Grass Skink	Angina	<i>Eutropis carinata</i>	LC	LC	Schedule II	✓	✓	✓
5.	Colubridae	Checkered Keelback	Dhora Shap	<i>Xenochrophis piscator</i>	LC	LC	Schedule I	✓	✓	✓
6.		Indian Rat Snake	Darash Shap	<i>Ptyas mucosa</i>	LC	LC	Schedule I	✓	✓	✓

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 4: Reptiles and Amphibians; LC=Least Concern; NT=Near Threatened; NE=Not Evaluated

**IUCN 2024. The IUCN Red List of Threatened Species. Version 2024-1. (<https://www.iucnredlist.org/>)

***Occurrence: 1- Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1

Table 4-21: Checklist of recorded mammals from the Study AOI

SI No	Common Name	Local Name	Scientific Name	Family	Local Status*	Global Status**	Wildlife Conservation and Security Act, 2012	Occurrence***		
								1	2	3
1.	Common Indian Field Mouse	Metho Idur	<i>Mus booduga</i>	Muridae	LC	LC	Schedule III	✓	✓	✓
2.	Small Indian Mongoose	Choto beji	<i>Urva auropunctata</i>	Herpestidae	LC	LC	Schedule I	✓	✓	✓
3.	Common House Rat	Idur	<i>Rattus rattus</i>	Muridae	LC	LC	-	✓	✓	✓

SI No	Common Name	Local Name	Scientific Name	Family	Local Status*	Global Status**	Wildlife Conservation and Security Act, 2012	Occurrence***		
								1	2	3
4.	House Mouse	Nengti Idur	<i>Mus musculus</i>	Muridae	LC	LC	Schedule III	✓	✓	✓
5.	Indian Flying Fox	Badur	<i>Pteropus giganteus</i>	Pteropodidae	LC	LC	Schedule I	✓	✓	✓
6.	Golden Jackal	Pati-Shiyal	<i>Canis aureus</i>	Canidae	LC	LC	Schedule I	-	✓	✓
7.	Irrawaddy Squirrel	Kathbirali	<i>Callosciurus pygerythrus</i>	Sciuridae	LC	LC	Schedule I	✓	-	-

*IUCN Bangladesh. 2015. Red List of Bangladesh Volume 2: Mammals; LC=Least Concern, NT= Near Threatened

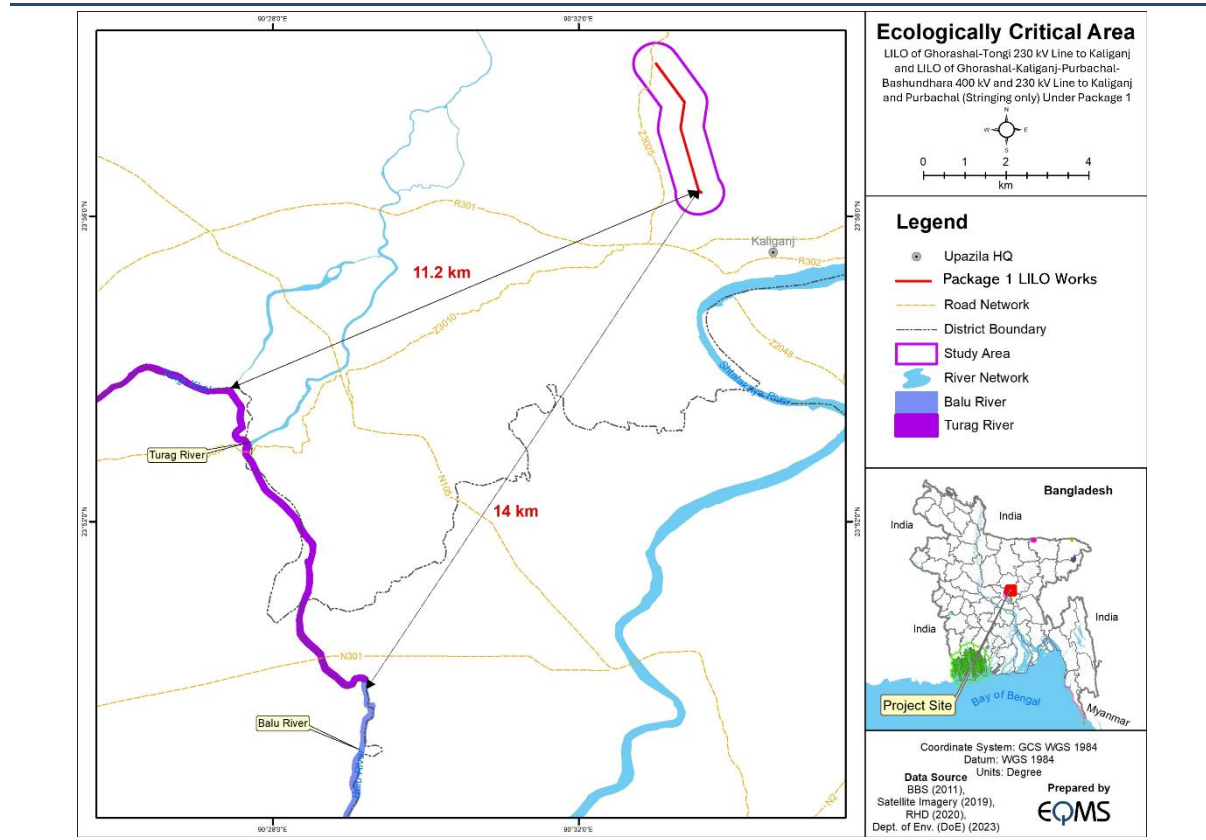
**IUCN 2024. The IUCN Red List of Threatened Species. Version 2024-1. (<https://www.iucnredlist.org/>)

***Occurrence: 1- LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1

4.3.4 Ecologically Critical Area (ECA)

112. The nearest ECA from the LILO of Ghorashal-Tongi 230 kV Line to Kaliganj under Package 1 are Turag River and Balu River which are 11.2 km and 14 km away respectively. The ECAs near the project site are shown in Figure 4-27.

Figure 4-27: ECAs near LILO of Ghorashal-Tongi 230 kV Line to Kaliganj under Package 1

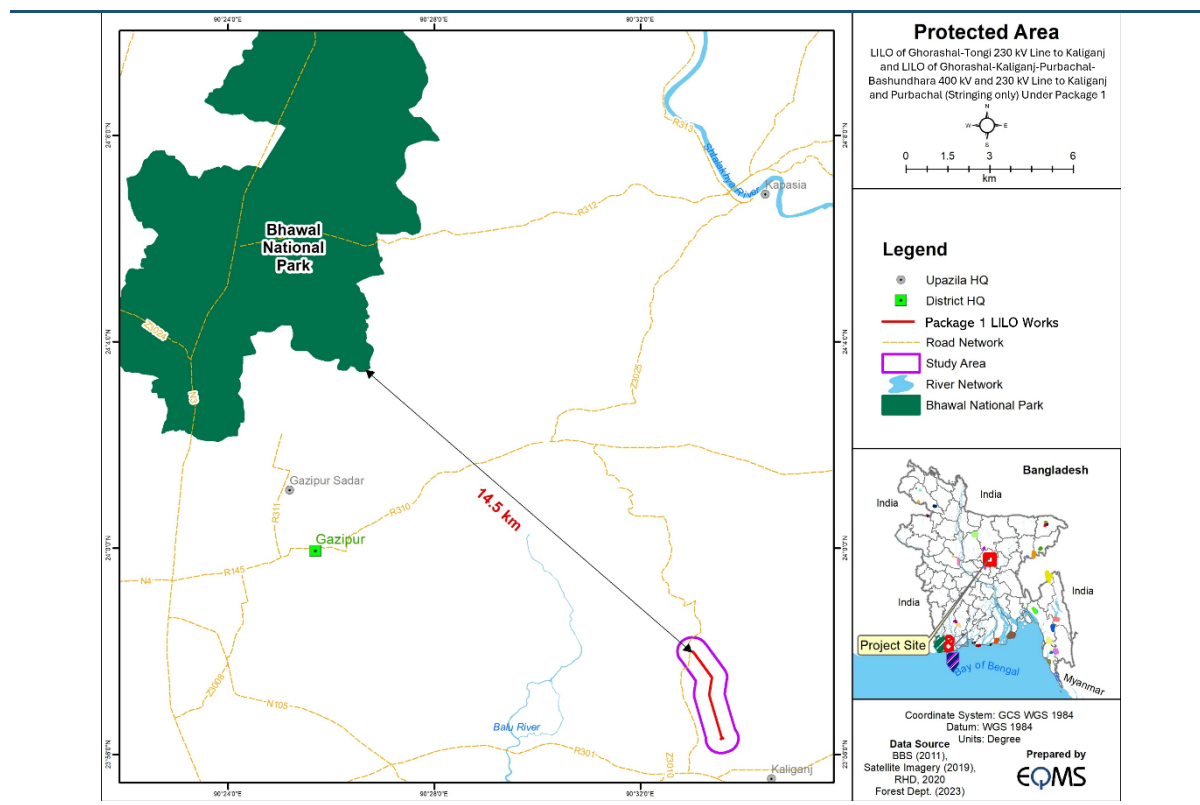


Source: Department of Environment (DOE), September 2024

4.3.5 Protected Areas

113. The nearest protected areas that are situated in the North-East corner from LILO of Ghorashal-Tongi 230 kV Line to Kaliganj under Package 1 is Bhawal National Park (14.5 Km). The nearest protected area near the LILO is shown in Figure 4-28.

Figure 4-28: Protected areas near LILO of Ghorashal-Tongi 230 kV Line to Kaliganj under Package 1



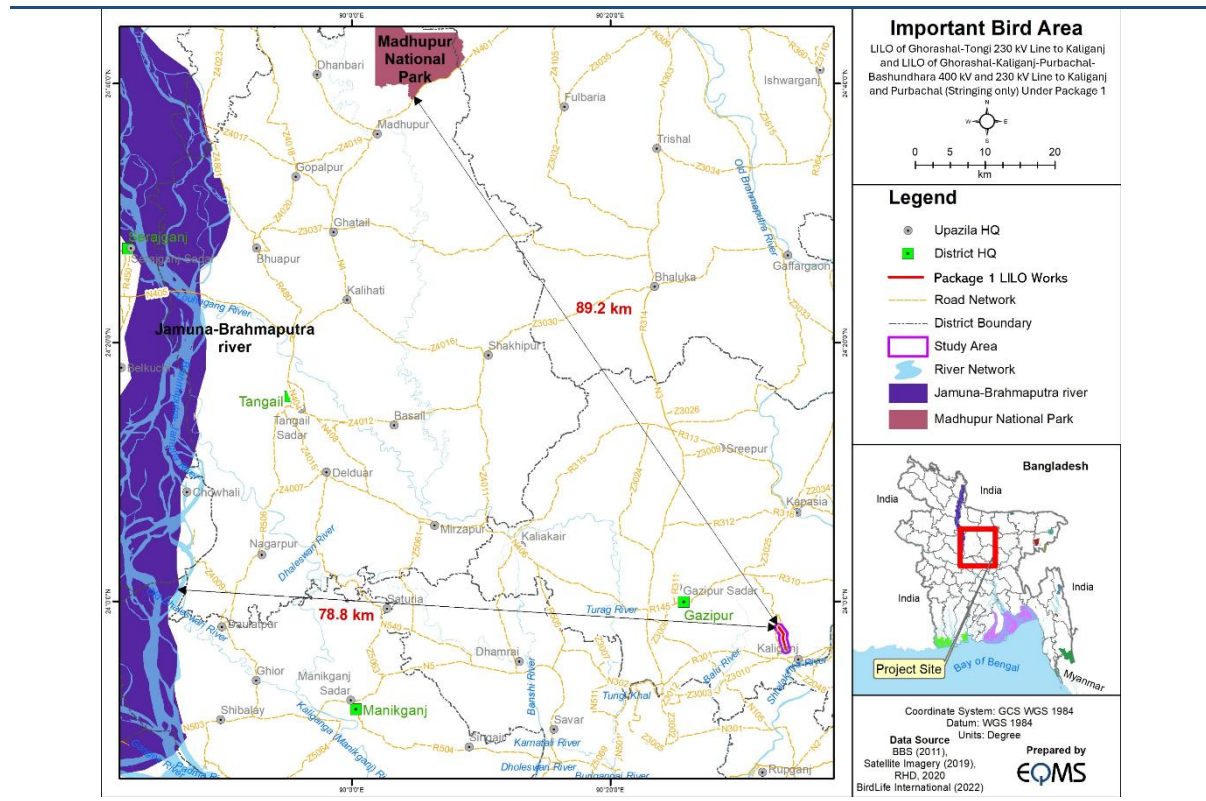
Source: Forest Department, September 2024

4.3.6 Important Bird Areas

114. Bangladesh's Important Bird Areas (IBAs) cover less than 4% of the total land area of the country, reflecting the great reduction and fragmentation of natural habitats. However, additional sites are likely to be added to this preliminary list of IBAs in the future. Of the 20 IBAs in Bangladesh, 11 support globally threatened species, 10 have biome-restricted species and nine qualify as IBAs because they hold large congregations of water birds. Ten IBAs (53%) contain examples of terrestrial forest ecosystems, which together cover all significant areas of forest known to remain in Bangladesh. They include the Indo- Malayan tropical dry forests in Madhupur National Park (IBA1) to the north of Dhaka, three IBAs in north-eastern Bangladesh where Indochinese tropical moist forest is the dominant biome, and six IBAs in the Chattogram hill tracts in the south-east of the country, where Indochinese tropical moist forest and Sino-Himalayan subtropical forest are the main habitats.

115. The nearest IBA, the Jamuna – Brahmaputra River and Madhupur National Park are located about 79 km and 89 km away from the LILO route, Figure 4-29 shows the nearest IBAs from transmission alignment.

Figure 4-29: Nearest Important Bird Areas (IBA) in LILO of Ghorashal-Tongi 230 kV Line to Kaliganj under Package 1

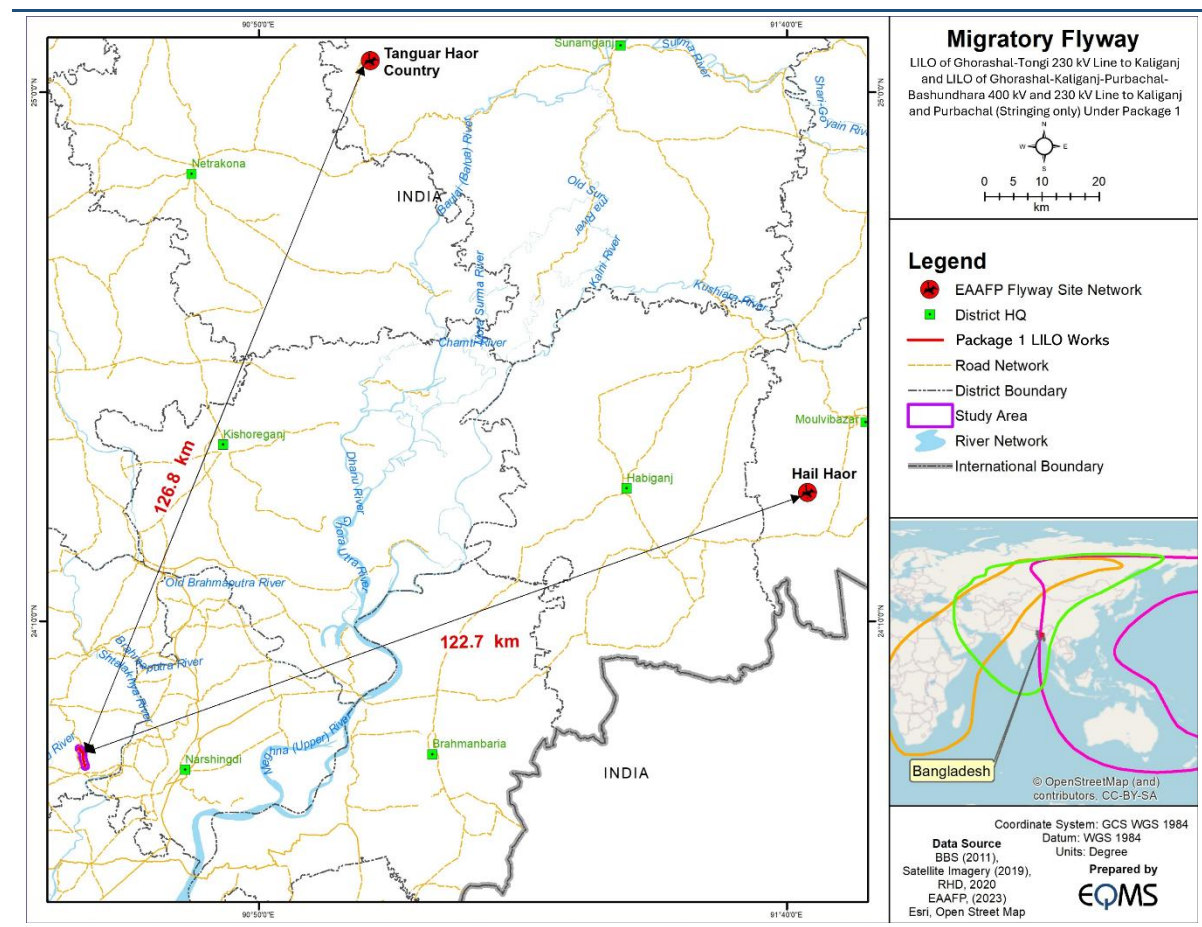


Source: BirdLife International, September 2024

4.3.7 Migratory Bird Flyway Network

The nearest migratory bird flyway network from the LILO is Hail Haor and Tanguar Haor which are more than 120 km away from the project site. Migratory flyway network map for the project sites is shown in Figure 4-30.

Figure 4-30: Migratory bird flyway network map for the project sites



Source: EAAFP, (2023)

4.4 Socio-economic Environment

The socio-economic conditions of the people of the project area in 2022 will provide sound reference and assess probable socio-economic impact of the proposed interventions. This will enable us to compare the changes and impacts of the project interventions in present. The socio-economic baseline scenario describes the socio-economic characteristics of project area on the basis of secondary data which was collected during Population and Housing Census of 2022. The socio-economic characteristics include administrative area, demographic, household size, education, occupation, housing, employment opportunity, access to water and sanitation status etc.

4.4.1 Administrative Area and Location

The proposed Solar Power Plant project is located in the Gazipur district under Dhaka division. Based on the assessment of the project, its surroundings and its environmental & social influence, a 9 kilometers radius is considered from the project boundary as the study area for social study. **Table 4-22** shows the study area of the project across Unions, Upazilas and Districts. The socio-economic features of the study area are discussed in this section.

Table 4-22: Administrative Boundary of the Study Area

District	Upazila	Union
Gazipur	Kaliganj	Baktarpur Union
		Ward No. 01
		Ward No. 06

The project study area lies within the administrative area of Kaliganj Upazila under Gazipur District under Dhaka division.

4.4.2 Demography

In the study area, there are about 11,206 households (HHs) including squatters with a total population of 45,685 that might be influenced by the implementation of the proposed project. The average sex ratio¹¹ is 96.32 and the average household size is 4.05. The demography of the study area is shown in the following **Table 4-23**.

Table 4-23: Demography of the Study Area

District	Upazila	Union	Total Pop	Total HHs	Avg. HH size	Sex Ratio
Gazipur	Kaliganj	Baktarpur Union	35060	8662	4.02	93.32
		Ward No. 01	4606	1095	4.07	97.43
		Ward No. 06	6019	1449	4.07	98.91
Total			45685	11206	4.05	96.55

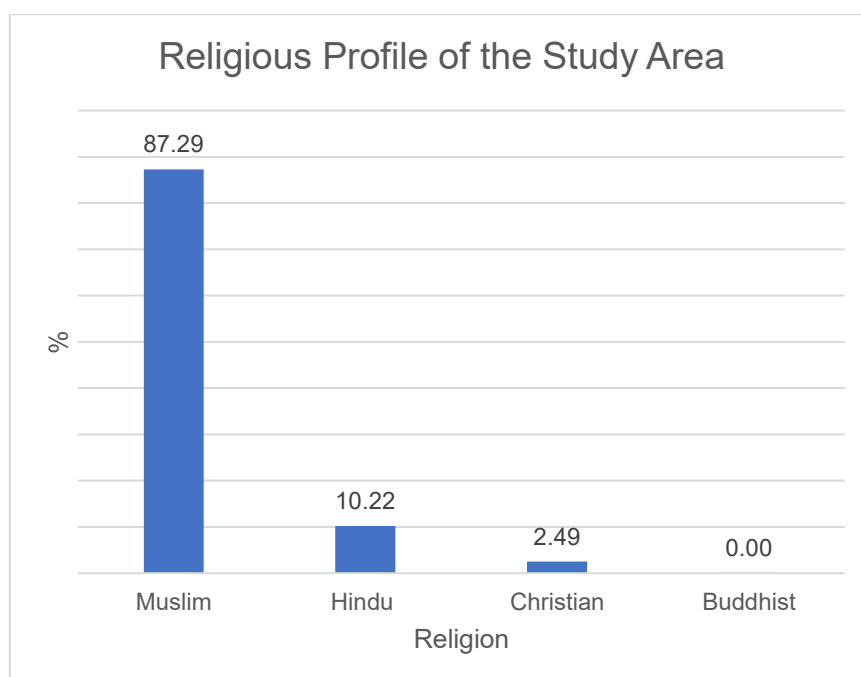
Source: Population and Housing Census, BBS, 2022

4.4.3 Religion

According to the Population and Housing Census (2022), the population of the study area is dominated by the Muslim community constituting almost 87.29% of the total population. The remaining 10.22% is

¹¹The sex ratio is the ratio of males to females in a population. (Source: Wikipedia)

Hindu and the rest belongs to Christian religion. The following **Figure 4-31** indicates the various religious profile of the project study area.



Source: Population and Housing Census, BBS, 2022

Figure 4-31: Religious Profile of the Study Area

4.4.4 Ethnic Composition

According to Population and Housing Census (2022), within the 9 kilometers radius from the project site total of 11,206 Households were found where 1 different ethnic people live. They belong to Garo ethnic group. The following **Table 4-24** indicates the various ethnic compositions of the project study area.

Table 4-24: Ethnic Profile of the Study Area

Upazila	Union	HH	Ethnic Population			Ethnic Population in main groups	
			Total	Male	Female	Garo	Others
Kaliganj	Baktarpur Union	8662	0	0	0	0	0
	Ward No. 01	1095	4	3	1	3	1
	Ward No. 06	1449	0	0	0	0	0
Total		11206	4	3	1	3	1

Source: Population and Housing Census, BBS, 2022

4.4.5 Education

According to the Population and Housing Census (2022), the overall literacy rate in Baktarpur Union of Kaliganj Upazila is 74.10 percent, with males (75.49%) slightly ahead of females (72.84%). Literacy is highest in Ward No. 01 (76.72%) and lowest in Ward No. 06 (71.17%). While the union shows good educational progress, a modest gender gap in favor of males remains. The following **Table 4-25** indicates the various ethnic compositions of the project study area.

Table 4-25: Education of the Study Area

Upazila	Union	Literacy 7+ (%)		
		Both	Male	Female
Kaliganj	Baktarpur Union	74.42	75.68	73.31
	Ward No. 01	76.72	78.69	74.91
	Ward No. 06	71.17	72.11	70.31
Total		74.10	75.49	72.84

Source: Population and Housing Census, BBS, 2022

4.4.6 Settlement and Housing

According to the Population and Housing Census (2022), Baktarpur Union of Kaliganj Upazila has a total of 8,611 households, while Ward No. 01 and Ward No. 06 have 1,082 and 1,430 households, respectively, bringing the combined total to 11,123 households.

In terms of housing structure, pucca houses account for 49.03 percent overall, semi-pucca 25.82 percent, kancha 49.15 percent, and jhupri structures only 0.46 percent. At the ward level, pucca houses are slightly higher in Ward No. 06 (24.62%) compared to Ward No. 01 (22.46%), while kancha houses dominate in both wards (49.82% in Ward No. 01 and 45.31% in Ward No. 06).

With respect to housing tenancy, the majority of households live in their own dwelling units (96.85%), while a small share is rented but has own dwelling elsewhere (1.99%), rented with no own dwelling (0.36%), rent free but with own dwelling elsewhere (0.47%), and rent free without any own dwelling (0.33%). Ward-level data reflect similar patterns, with over 95 percent of households in both wards residing in their own homes. The following **Source: Population and Housing Census, BBS, 2022**

shows the type of structure and housing tenancy in the project study area.

Table 4-26: Housing tenancy in the Study Area

Upazila	Union	Number of HHs	Type of Structure (%)				Housing Tenancy (%)				
			Pucca	Semi-pucca	Kancha	Jhupri	Own dwelling unit	Rented but having own dwelling unit elsewhere	Rented and having no own dwelling unit elsewhere	Rent free but having own dwelling unit elsewhere	Rent free and having no own dwelling unit elsewhere
Kaliganj	Baktarpur Union	8611	100	20.94	52.33	0.56	98.19	0.72	0.22	0.52	0.35
	Ward No. 01	1082	22.46	27.26	49.82	0.46	95.66	3.23	0.37	0.46	0.28
	Ward No. 06	1430	24.62	29.27	45.31	0.35	96.71	2.03	0.49	0.42	0.35
Total		11123	49.03	25.82	49.15	0.46	96.85	1.99	0.36	0.47	0.33

Source: Population and Housing Census, BBS, 2022

4.4.7 Public Utilities

4.4.7.1 Water Supply

In the project study area, the entire population (100%) relies on tube-wells as the primary source of drinking water. No households reported access to tap water or other alternative sources.

4.4.7.2 Electricity

Electricity is an important indicator for measuring the quality of life. In the study area, on average 99.61% of households have national grid electricity connection. Below shows the detailed electricity connection situation by union.

Table 4-27: Electricity connection situation by union

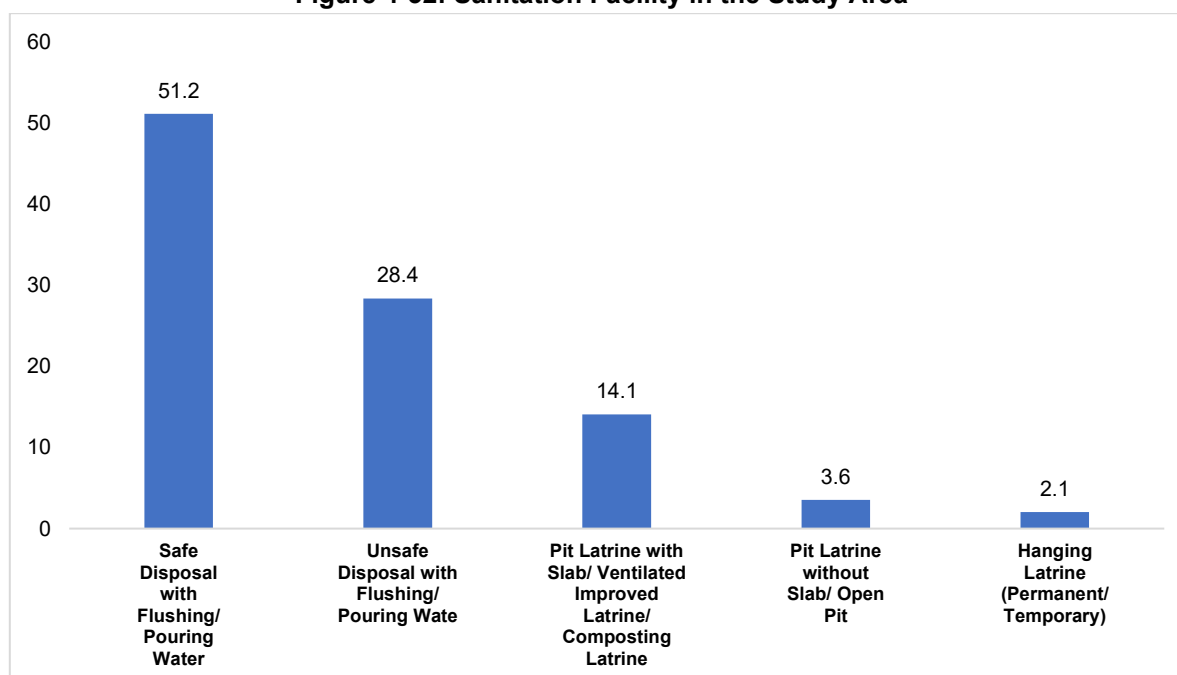
District	Upazila	Union	National Grid	Solar Power	Others	No Electricity
Gazipur	Kaliganj	Baktarpur Union	99.81	0.03	0.01	0.14
		Ward No. 01	99.45	0	0.09	0.46
		Ward No. 06	99.58	0.07	0.07	0.28
Total			99.61	0.03	0.06	0.29

Source: Population and Housing Census, BBS, 2022

4.4.7.3 Sanitation

In the project area, the majority of households practice safe disposal of excreta with flushing or pouring water (51.2%), followed by unsafe disposal with flushing/pouring (28.4%). About 14.1% of households use improved facilities such as pit latrines with slabs, ventilated improved latrines, or composting latrines. Meanwhile, 3.6% rely on pit latrines without slabs or open pits, and 2.1% still use raw, open, or hanging latrines, either permanent or temporary. The following **Figure 4-32** shows sanitation facility of the project area.

Figure 4-32: Sanitation Facility in the Study Area



Source: Population and Housing Census, BBS, 2022

4.4.7.4 Health Care Facility

According to the District Statistics (2011), there are 7 Private Hospitals in Upazila with 29 MBBS/ FCPS doctors in the study area. Also, 2 diagnostic centers are found in the proposed study area.

4.4.7.5 Solid Waste

Uncontrolled waste generation coupled with inadequate collection and disposal systems have the potential to give rise to pollution and environmental degradation as well as disease. While no specific data on local waste management was collected from the study area, it is likely that as with many other parts of rural Bangladesh the villages within the study area have no formal waste management facilities, and that in general people dispose of their waste in landfills or in fallow land.

4.4.8 Economy and Employment

Agriculture, comprising crop cultivation, fisheries, direct farming, sharecropping, agricultural laborers, and so on, is the most common source of employment in the study area, according to the Population and Housing Census (2022). Agriculture employs approximately 28.10% males and 23.91% females. Furthermore, a sizable proportion of the study area's population (44.87% male and 39.78% female) is employed in the service sector. In addition, the industrial sector employs 27.02% men and 36.31% women. The following **Table 4-28** shows the employment status of the project area.

Table 4-28: Employment status of the Study Area

Upazila	Union	Population Aged 5+, not attending school but employed			Field of Activity					
					Agriculture		Industry		Service	
		Total	Male	Female	Male	Female	Male	Female	Male	Female
Kaligonj	Baktarpur Union	9572	8117	1455	42.96	67.29	20.66	12.78	36.38	19.93
	Ward No. 01	1224	1074	150	23.09	1.33	26.91	53.33	50.00	45.33
	Ward No. 06	1818	1561	257	18.26	3.11	33.50	42.80	48.24	54.09
Study Area		12614	10752	1862	28.10	23.91	27.02	36.31	44.87	39.78

Source: Population and Housing Census, BBS, 2022

4.4.9 Traffic and Transport

According to the District Statistics (2022), in Kaliganj Upazila total metaled road is 276 km and there is 29 km semi metaled road. In this upazila total unmetalled (kacha) road is 417 km. There is total 1 railway station and 4 Bus stands in the study area. No steamer or launch station was found in this upazila. Water way in monsoon is 720 km and Water way round the year is 28 km found in the area. The following **Table 4-29** shows the traffic and transportation status of the project area.

Table 4-29: Traffic and Transportation of the Study Area

Length of metal, semi metaled and unmetalled road				Length of railway and water way			Stations		
Upazila	Metaled road	Semi metaled	Unmetalled Kacha Road	Total Railway	Water way in monsoon	Water way round the year	Railway Station	Steamer/ launch station	Bus Stand
Kaligonj	276	29	417	14	720	28	1	0	4
Total	276	29	417	14	720	28	1	0	4

Source: Population and Housing Census, BBS, 2011

5. IMPACT ASSESSMENT AND EVALUATION

116. Assessment of potential impacts are based on activities that will be involved in the implementation of the project, nature and extent of the proposed activities, and present environmental setting of the project area.

117. Section 5 of the original IEE (Table 5-3 of the original IEE) remains applicable for impact evaluation of the project.

118. This section evaluates additional potential impacts based on activities that will be involved in construction and operation phase of proposed LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1.

5.1 Impact Assessment Methodology

119. The impact assessment has involved the prediction, evaluation, and mitigation of impacts and report on impacts including residual impacts and cumulative impacts. The impact assessment methodology of this addendum follows the methodology of the original IEE (section 5.2 of the original IEE).

5.2 Impact Identification

120. The potential impacts have been identified through a systematic process whereby the activities (both planned and unplanned) associated with the project have been considered with respect to their potential to interact with environmental and social resources or receptors.

121. The interaction matrix enables a methodical identification of the potential interactions each project activity may have on the range of resources/receptors within the area of influence i.e., the study area of the project. The interaction matrix for the project activities and likely impacted resources/receptors is presented in Table 5-1.

Table 5-1: Potential environmental impacts on the IECs during the Phases and Comparison with Addendum-6

IECs/Issues	Potential Impacts	Sensitivity	Magnitude	Significance Prior to Mitigation	Potential Impacts during Addendum-6
Pre-construction Stage					
Physical Environment					
Ambient air quality	Vehicular emissions: dust from excavation works, land clearing, and material stockyards may affect ambient air quality.	Medium	Minor	Minor Adverse	Same as previous
Ambient noise	Noise level may increase due to mobilization of vehicles and unloading of materials.	Medium	Minor	Minor Adverse	Same as previous
Quality of surface and groundwater	The quality of surface water of the water bodies close to the project construction sites may deteriorate if erosion products and silt reach water bodies, especially during rains	Medium	Moderate	Moderate Adverse	Same as previous
Soil	During the pre-construction period, site clearance work will be done accordingly. Site clearance will impact on the fertile topsoil that are enriched with nutrients	Low	Minor	Minimal Adverse	Same as previous
Land and Agricultural Resources					
Land use	Would be partially impacted in RoW	Low	Minor	Minimal Adverse	Minimal Adverse/ Same as previous
Crop production	Would be highly impacted, at tower foundation areas and lands	Medium	Moderate	Moderate Adverse	Same as previous
Fisheries Resources					

IECs/Issues	Potential Impacts	Sensitivity	Magnitude	Significance Prior to Mitigation	Potential Impacts during Addendum-6
Fish habitat	No Fish habitat quantity and quality will be changed for a certain waterbody. Although the project site is low lying land that can be partially impact fish habitat temporarily.	Low	Minor	Minimal Adverse	Same as previous
Fish production	No waterbody will be lost or significantly impacted	Low	Minor	Minimal Adverse	Same as previous
Socioeconomic Resources					
Land price	Reduced near RoW of the LILO, increase away from LILO Lines due to availability of electricity	Low	Minor	Minimal Adverse	Same as previous
Employment opportunities	Temporary or minimal opportunities at this stage.	Medium	Moderate	Moderate Beneficial	Same as previous
Human health and safety	Ensure proper Health and safety for workers involved for site clearance. Road traffic safety with number of trucks for fill import.	Low	Minor	Minimal Adverse	Same as previous
Road/ river/ canal/ lake water body crossings	Minimal impacts	Low	Minor	Minimal adverse	Same as previous
Construction Stage					
Physical Environment					
Ambient air quality	SPM, PM2.5, PM10 from excavation works and land clearing, including vehicular emissions, may affect workers and community.	Medium	Moderate	Moderate Adverse	Baseline were found well within the limits of national standards for LILO route.

IECs/Issues	Potential Impacts	Sensitivity	Magnitude	Significance Prior to Mitigation	Potential Impacts during Addendum-6
Ambient noise	Mobilization of heavy equipment and machinery, use of construction vehicles, transport of materials, pile driving, and construction activities may increase ambient noise level. Exposure to high level ambient noise may cause anxiety and disturbance to workers and community.	Medium	Moderate	Moderate Adverse	Baseline results were found well within the limits of national standards.
Quality of surface and groundwater	Potential for siltation due to construction works near pond or river.	Medium	Moderate	Moderate Adverse	Except for the values of Iron and TC, all other parameters in surface water were found well within the limits of national standards. In two GW sample TC and FC were found and the COD level of all samples and BOD in GW5 were found very higher than the standard limit.
Soil	During construction, topsoil at the tower footings may be eroded during excavation. Construction waste like metal scraps and wooden packing material, and polythene may create a disturbance to the surrounding land, settlements, and the communities; Domestic waste from labor camp.	Medium	Major	Moderate Adverse	Same as previous
Land and Agricultural Resources					

IECs/Issues	Potential Impacts	Sensitivity	Magnitude	Significance Prior to Mitigation	Potential Impacts during Addendum-6
Land use	Would be partially impacted as agricultural land may be permanently lost due to the tower footings but still except footing point rest of the places can easily be cultivated as same as before.	Medium	Moderate	Moderate Adverse	Same as previous
Crop production	May be moderately affected due to crop loss at the tower footings and in the clearing for RoW.	Medium	Moderate	Moderate Adverse	Same as previous
Intercropping	Maybe affected due to the erection of towers	Low	Minor	Minimal Adverse	Same as previous
Change in topography/ terrain	Excavation and erection work for the transmission towers may affect topography.	Low	Minor	Minimal Adverse	Same as previous
Impairment of visual aesthetics	LILO towers partially visible on the skyline.	Low	Minor	Minimal Adverse	Same as previous
Fisheries Resources					
Fish habitat	Construction activities may temporarily affect nearby fish habitats.	Medium	Minor	Minor Adverse	Same as previous
Fish production	Construction activities may temporarily affect nearby fish production.	Medium	Minor	Minor Adverse	Same as previous
Terrestrial Resources (Flora and Fauna)					

IECs/Issues	Potential Impacts	Sensitivity	Magnitude	Significance Prior to Mitigation	Potential Impacts during Addendum-6
Terrestrial vegetation	Vegetation clearing/ tree cutting is required at the tower footings and RoW.	Medium	Moderate	Medium Adverse	In this alignment, tree cutting or trimming will be initiated due to LILO cabling activities.
Wildlife habitat and their disturbance	Route will be mainly in urban or peri-urban areas. Habitat in the areas affected may not host wildlife.	Medium	Moderate	Medium Adverse	Same as previous
Socioeconomic Resources					
Compensation for crop damage	Standing crops at the tower footings and RoW may be damaged.	Medium	Moderate	Moderate Adverse	Crop compensation is not available for this Transmission Line
Land price	Value of land may be temporarily affected.	Medium	Moderate	Moderate Adverse	Same as previous
Temporary employment opportunity	Both technical and non-technical laborers will be required	Medium	Moderate	Moderate Beneficial	Same as previous
Human health and safety	The safety and health of the public may be impacted due to the hazards created during the construction period, e.g., movement of heavy equipment, vehicles, and machineries. Damages to structure within RoW. Workers may be exposed to occupational health risks and safety hazards, mostly working with electricity and working at height.	Medium	Minor	Minor Adverse	Moderate Adverse.

IECs/Issues	Potential Impacts	Sensitivity	Magnitude	Significance Prior to Mitigation	Potential Impacts during Addendum-6
Road/ river/ canal/ lake water body crossings	Road use for construction activities as haulage of construction materials, spoil, and equipment, riverbank and Soil erosion	Medium	Moderate	Moderate Adverse	Same as previous
PCRs	Proper chance find procedures will also be implemented in case of a chance find.	Low	Minor	Minimal Adverse	Same as previous
Regional and national development	May create development opportunities in anticipation of stable power supply.	Medium	Moderate	Moderate Beneficial	Same as previous
Operation Stage					
Physical-Chemical Environment					
Ambient air quality	Climate change from fugitive emission (negligible) of SF6 Without any accidental leakage SF6 emission probability from switch gear is very low	Low	Minor	Minimal Adverse ¹²	Same as previous
Ambient noise	Noise in the form of buzzing or humming can often be heard around transformers or power lines producing corona. Outside of RoW will be negligible.	Low	Minor	Minimal Adverse	Same as previous

¹² Due to high global warming potential, SF6 may contribute to the man-made greenhouse-effect, if it is released into the atmosphere. However in electrical switchgear the SF6 gas is always used in gas-tight compartments, greatly minimizing leakage. This makes the real impact on greenhouse effect negligible. As per ECOFYS, Sina Wartmann, Dr. Jochen Harnisch, June 2005, "Reductions of SF6 Emissions from High and Medium Voltage Equipment in Europe" study, the contribution to the greenhouse effect in Europe is estimated to 0.05 %.

IECs/Issues	Potential Impacts	Sensitivity	Magnitude	Significance Prior to Mitigation	Potential Impacts during Addendum-6
Quality of surface and groundwater	Transformer oil spill and leakage	Low	Minor	Minimal Adverse	Same as previous
Soil/Land contamination	Potential for spill or improper disposal of mineral oil used as insulating oil in transformers. No use of PCB or PCB-containing material will be allowed.	Low	Minor	Minimal Adverse	Same as previous
Land and Agricultural Resources					
Land use	No impact (changes will have occurred in construction phase).	Low	Minor	Minimal Adverse	Same as previous
Crop production	Tower footings may have minor impact on crop production due to permanent loss of agricultural land.	Medium	Minor	Minor Adverse	Same as previous
Change in surface topography/ terrain	LILO towers will have minimal impact on topography.	Low	Minor	Minimal Adverse	Same as previous
Impairment of visual aesthetics	Transmission towers visible on the skyline.	Low	Minor	Minimal Adverse	Same as previous
Fisheries Resources					
Fish habitat	No change expected	Low	Minor	Minimal Adverse	Same as previous
Fish production	No change expected	Low	Minor	Minimal Adverse	Same as previous
Terrestrial Resources (Flora and Fauna)					
Terrestrial vegetation	Restriction of vegetation height below the LILO route.	Low	Minimal	Minimal Adverse	Same as previous

IECs/Issues	Potential Impacts	Sensitivity	Magnitude	Significance Prior to Mitigation	Potential Impacts during Addendum-6
Wildlife habitat and their disturbance	Natural forest, Protected areas or ecologically sensitive areas are not present in the proposed LILO routes	Low	Minimal	Minimal Adverse	Same as previous
Socioeconomic Resources					
Compensation	Ongoing permanent loss of land at the tower footings (but occurred at the construction stage).	Medium	Moderate	Moderate Adverse	Same as previous
Land price	No land value at the tower footings (compensation already paid); development restrictions below the Transmission Line and between towers may affect land value.	Medium	Moderate	Moderate Adverse	Same as previous
Employment opportunity	Jobs will be created directly due to the project and indirectly through businesses and development resulting from the availability of power supply.	Medium	Minor	Minor Beneficial	Same as previous
Human health and safety	- Occupational and community safety risks (project maintenance); - There is public and scientific concern over the potential health effects associated with exposure to EMF.	Medium	Minor	Moderate Adverse	- Same as previous - As per the final alignment and confirmation from Power Grid, there are no housing or school structures below LILO route. - Power Grid confirms that consultations with the nearby residents undertaken to discuss the health and safety implications, with education

IECs/Issues	Potential Impacts	Sensitivity	Magnitude	Significance Prior to Mitigation	Potential Impacts during Addendum-6
					program for residents and communities on how to minimize the risks involved.
Regional and national development	Availability of a stable and reliable power supply may improve productivity and national development.	Medium	Moderate	Moderate Beneficial	Same as previous

5.3 Potential Impacts during Addendum- 6

5.3.1 Terrestrial Resources (Flora and Fauna)

5.3.1.1 Clearing of Vegetation during Construction Phase

122. As per the original IEE, 2019, 121 (>5 m in height) big trees were estimated to be affected by Package 1, as project scope get reduced such as the revised scope now emphasizes the LILO of the Tongi- Ghorasal 230kV double circuit line at Kaliganj, covering approximately 3.33 km with four circuits and 240 m of LILO of Ghorasal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only). Therefore, the impact of Package 1 is negligible. However, as per the primary survey during this addendum, about 21 trees (16 trees were found more than 5m in height) were found among that about 7 trees were assumed to get uprooted in 5 m buffer of both sides of the Transmission Line alignment. The comparison of tree count is given in Table 5-2.

Table 5-2: Comparison of tree count

SN	Sub-projects	Counted during original IEE, 2019*	Counted during Addendum-6, 2025*
1.	LILO of Ghorasal-Tongi 230 kV Line to Kaliganj under Package 1	07 (>5 m in height)	16 (>5 m in height)

*Source: <https://www.adb.org/projects/documents/ban-51137-003-iee> and EQMS Survey August 2025

123. Most of the trees in the RoW of the LILO route need to be uprooted but still the number of trees that need to be uprooted has not been fixed yet as most of the trees were found in 5m buffer zone rather than the exact alignment. Therefore, the impact will be only moderately significant. LILO alignment falls over the low-lying agricultural land/ field, so there were not many trees were found under LILO route except tower 4/1- 3/1.

Mitigation Measures

- Vegetation clearance should be minimum within the designated areas.
- Indigenous vegetation in areas that will not be impacted by the project shall not be disturbed.
- Workers should be aware of the importance of natural resources and should not unnecessarily clear any area or break branches, twigs, flowers, etc. of adjacent vegetation.
- Crops and plant health monitoring should be conducted.
- Soil contamination by fuel and chemical storage shall be minimized by sitting them on an impervious base within an embanked area and secured by fencing.
- Site clearance, piling, excavation and construction should not be carried out during rainy season and scheduled accordingly to avoid extreme weather events such as heavy rainfall and high winds to minimize erosion and run-off.
- Workers should be aware of the importance of natural resources and should not unnecessarily clear any area or break branches, twigs, flowers, etc. of adjacent vegetation.
- Nighttime work should be limited, and lights at night should not disrupt the movement of nocturnal wildlife.
- Signage for speed limit, limiting sirens and horns, awareness for biodiversity conservation, etc. should be provided.
- Disturbance to wildlife should be monitored regularly.

- Rescue, rehabilitation and relocation should be done for terrestrial fauna of those forests when necessary.

124. As the project impact will be for long term in a local extent within the adjacent areas of the project site, potential impact on Terrestrial Flora can be reduced to Very Low by following proper mitigation measures.

5.3.2 Occupational health and safety during Construction Phase

125. The construction of civil works LILO pose an inherent risk of injury to workers from accidents and hazardous working environments. Unsafe working conditions could place workers at risk of injury or death. Such conditions could be caused by vehicles and equipment that do not meet safety standards (seat belts, horns, lights, tires, etc.), unprotected access to dangerous locations (unmarked excavations), poor practices and equipment for lifting operations, poor electrical safety (untrained workers, inadequate tools, etc.), inadequate safeguards on tools and equipment (unprotected saws, etc.), and other poor practices.

126. During construction poor management in availability of utilities; site selection for construction work camps, storage area selection of stockpile and excavated soil storage area and disposal areas; and site selection for equipment lay-down and storage area, land filling materials may induce the health risk of workers as well as environmental pollution and contamination.

127. During the survey of this addendum, it was observed that lack of general safety requirements and precautions prevails at LILO construction yards. This non-compliance will trigger the possibility of risk of injury to workers. Also, sanitation facilities of the workers were observed in poor conditions at the construction yards of the LILO line alignments.

128. Inadequate water and/or sanitation can affect workers' health, contaminate soil and surface water, and lead to worker illness or disease. Contractors will also have to provide sanitary facilities, including portable toilets in remote areas, and to enforce the Code of Conduct's prohibition on using the non-pit latrine.

Mitigation Measures for LILO route

- Provide preventive and protective measures, including modification, substitution, or elimination of hazardous conditions, with particular attention to live power lines, working at height, working above water, high noise levels.
- Provide measures for the management and appropriate disposal of hazardous wastes to ensure protection of the workforce and the prevention and control of releases and accidents.
- Provide the provision of appropriate fire extinguishers and fire response plans and appropriately trained first aid response staff.
- Provide for the provision of appropriately stocked first-aid equipment and stations at both work sites and temporary construction camps, including appropriately trained first-aid staff on site and provision of adequate transport facilities for moving injured person to the nearest hospital.
- Provide the provision of appropriate personal protective equipment (PPE) to minimize risks, such outerwear, boots, and gloves; eye protectors; ear plugs, safety helmets, etc.
- Provide training for workers and establish appropriate incentives to use and comply with health and safety procedures and utilize PPE; Include procedures for documenting and reporting occupational accidents, diseases, and incidents; Include emergency prevention, preparedness, and response arrangements in place.
- Secondary containers should be available for preventing oil and chemical spillage
- Management of utilities should be maintained in a way that reduces the consumption of resources and generation of waste (solid and liquid). 3R policy should be applied to reduce waste generation in the highest possible amount.

- Site selection for construction work camps and equipment lay-down and storage area should be established in a safe and well designated area with proper barricade and boundary that might not cause any risk of accidents and hindrance of movements
- Site selection of storage areas of stockpile and excavated soil should be maintained with proper boundaries that prevent piling mud and soil runoff to the nearest water bodies and cultivated land.
- Stockpile and excavated soil should be removed or dumped properly and immediately after the construction activities so that it might not contaminate water and top soil.

5.3.3 Impact due to Canal/ Lake Crossing

129. LILO of Ghorashal-Tongi 230 kV Line to Kaliganj one canals and three ponds in the length of the line. As per Power Grid and observation from survey, no disturbance will occur to the benthic zone of canals and lake during the project life cycle. Moreover, 500 m radius of the project location there is no river boundaries. Therefore, no significant impact is expected due to construction of LILO route at the river crossings. However, additional mitigation measures have been incorporated in the EMP.

5.3.4 Land Loss

130. A substantial loss of land of 2.06 acres is anticipated for the proposed LILO route. Natural habitats and water bodies are not found in any of the sites proposed for the LILO route. Waste management and site drainage will be important during construction of the LILO, to prevent soil and water pollution. All sites will also require secure fencing to maintain local community safety (no entry possible). Also, resettlement issues were found in LILO route. Moreover, most of the LILO location is agricultural land. Overall anticipated impact on land for construction of LILO is cumulatively low.

5.3.5 Environmental and Social Sensitive Receptors

In LILO lines no environmental and social sensitive receptors were found in 500 m buffer area. LILO route will not pose any major impact on existing canal portions as the cable will pass through the tunneling of pipe. Therefore, the impact of the LILO line on environmental and social receptors is very low.

6. ENVIRONMENTAL MANAGEMENT PLAN

131. The primary objective of the Environmental Management Plan (EMP) is to avoid or eliminate or reduce the negative environmental impacts by possible mitigation measures and to enhance the positive impacts by enhancement measures. It would also address any unexpected or unforeseen impacts that may arise during construction and operation stages of the subprojects.

132. The aim of the EMP is to ensure implementation of the recommended mitigation and enhancement measures effectively. The mitigation measures are designed either to prevent impacts or by mitigating those to reduce the negative impacts to an acceptable level that complies with the environmental guidelines of the DOE and ADB.

133. The section EMP of the original IEE (Table 9.1 of the original IEE) remains as applicable management plan that depicts possible mitigation measures to avoid or eliminate or reduce the negative impacts and to enhance the positive impacts.

134. The additional mitigation measures under this addendum for LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) are incorporated in the Table 6-1 and **Error! Reference source not found..**

Table 6-1: Mitigation Measures for the Impacts of Package 1 under Addendum-6

Environmental Issues/ Parameters	Environmental Impacts	Mitigation Measures	Implementation Agency	Supervision Agency
(a) Pre-construction Stage				
Tree cutting, Clearing of vegetation	16 trees (>5 m in height) were expected to be directly affected by uprooting along the RoW of LILO	• Prior to the start of clearing of vegetation, provide adequate compensation to the owners. • Tree cutting and vegetation clearance should be done within the designated areas. • A compensatory tree plantation program should be adopted. Tree plantation will be carried out with a ratio of 1:3. The contractor will be responsible for the plantation and maintenance (replacing losses) of the trees for at least 3 years under the supervision of Power Grid. • Trees should be checked by an ecologist for nests and holes before cutting. Active nests, eggs, hatchling must be safeguarded. • Indigenous vegetation in areas that will not be impacted by the project shall not be disturbed. • Workers should be aware of the importance of natural resources and should not unnecessarily clear any area or break branches, twigs, flowers, etc. of adjacent vegetation. • Soil contamination by fuel and chemical storage shall be minimized by sitting them on an impervious base within an embanked area and secured by fencing. • Workers should be aware of the importance of natural resources and should not unnecessarily	Contractor	DSC/ Power Grid

		clear any area or break branches, twigs, flowers, etc. of adjacent vegetation. • Nighttime work should be limited, and lights at night should not disrupt the movement of nocturnal wildlife. • Signage for speed limit, limiting sirens and horns, awareness for biodiversity conservation, etc. should be provided. • Disturbance to wildlife should be monitored regularly. • Rescue, rehabilitation and relocation should be done for terrestrial fauna of those forests when necessary.		
Community health and safety	Health and safety risks to the community	• Condition of access roads needs to be maintained in at least pre-project condition and in a state that does not pose a safety risk to project and other users. • Disturbed land where the condition has been changed because of construction to be tidied up, landscaped, and revegetated to the satisfaction of the borrower and the landowner before leaving the construction site. • Emergency procedures (e.g., names and contacts of persons responsible and emergency contact numbers like fire, police station, hospital) need to be visibly placed in a prominent location at all work sites and worker accommodation. • Posting of grievance box outside the worksite so that community people can drop grievance if they have any	Contractor	DSC/ Power Grid

Gender-Based Violence (GBV)	Risks of violence against women and vulnerable community.	- Contractors should prepare and implement the code of conduct on GBV and Sexual Exploitation and Abuse (SEA). - Contractor should conduct GBV/SEA awareness raising program with the workers.	Contractor	DSC/ Power Grid
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(a) Construction Stage

Land acquisition/ requisition	Loss of 2.06 acres of land for the construction of 3.3 km LILO route. Temporary loss of land (requisition) for construction camps etc.	Prior to commencement of construction activities, the owners of the affected lands must be notified and provided proper compensation in time as per the government and ADB guidelines. As per the government and ADB guidelines, RP should be prepared for land acquisition/ requisition/ compensation and follow it. Use GIS instead of AIS, in order to reduce land requirement.	DC	DSC/ Power Grid
Topsoil	As the lands, are paddy fields removal of topsoil might not be required before the land filling.	Site specific mitigation measures will be required in RoW of LILO Tower footing lands and areas	Contractor	DSC/ Power Grid
Cutting of trees/ Clearing of vegetation	Lands selected for the construction of LILO are paddy fields, including small extents of marshy lands and waterbodies. There were no trees found during the survey of LILO sites. Loss of standing crops (if any), grass and bushes at LILO sites and construction camp sites is anticipated.	Prior to the start of removal of trees/ clearing of vegetation, provide adequate compensation to the owners.	Contractor	DSC/ Power Grid

Fauna (Wildlife)	Disturbance of wildlife due to project activities such as earthworks, moving of project equipment and transports, especially during nighttime.	Prepare construction management plan (CMP, by the contractor) to be approved by Power Grid before access to site is permitted and follow it properly. Follow the government rules and regulations, EHS guidelines and WHO noise guidance whichever is more stringent on noise. Project workers should not disturb or kill any wildlife. Fishing is not allowed.	DC Contractor	DSC/ Power Grid
Construction Waste	Generation of construction wastes from the construction materials.	Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time. Provision of facilities for handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements. Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials. Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste. Use of construction materials containing recycled content when possible and in accordance with accepted standards. Adequate collection, separation, and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated, licensed, engineered and sanitary landfills shall be provided.	Contractor	DSC/ Power Grid

Noise level	Noise pollution due to construction activities, generators and construction vehicle movement.	Use of noise reducers in heavy construction equipment. It is required that no construction should be allowed during nighttime (9 PM to 6 AM). As per EHS guidelines, avoid prolonged exposure to noise (produced by equipment) by workers. Regulate use of horns and avoid use of hydraulic horns in project vehicles. Generators should be placed within rooms (concrete walls with roof). Noise levels will continue to be monitored in pre-construction and construction, and if there is exceedance at the village edges, noise baffles will be constructed.	Contractor	DSC/ Power Grid
Air quality and dust	Air pollution and dust generation due to construction activities especially due to the LILO cabling, generators and construction vehicle movements.	All vehicles (e.g., trucks, equipment, and other vehicles that support construction works) shall be well maintained and not emit dark or smoky emissions in excess of the limits described in the EQS. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Drivers of vehicles used during construction will be under strict instructions to minimize unnecessary trips and minimize idling of engines. Dust suppression facilities (water sprayer) shall be available where earth and cement works are required. Spray water on dry and loose surfaces of the construction sites regularly.	Contractor	DSC/ Power Grid

		Maintain adequate moisture content of soil to minimize dust during transportation, compaction and handling. Construction materials (sand, gravel, and rocks) and spoil materials will be transported in trucks covered with tarpaulins.		
		Sprinkle and cover stockpiles of loose construction materials (e.g., fine aggregates, sand). Avoid use of equipment such as stone crushers at the sites, which produce significant amount of particulate matter. N95 masks should be provided to all personnel in areas prone to dust emissions throughout the period of construction.		
Soil quality	Soil pollution	Laboratory analysis of the river bed materials to be confirmed prior to starting collection from the river by existing licensed suppliers. Prevention of spillage and leakage of liquids at construction sites and camp. Ensure no use of transformers containing PCB to avoid soil and air pollution. Oil storage in drums stored on impermeable surface with 110% bunded capacity.	Contractor	DSC/ Power Grid
Siting of construction camps	Removal of vegetation such as grass, standing crops (if any) shrubs and trees. Environmental pollution (such as air/dust, noise, water, wastes,	Prior to the start of clearing of vegetation, provide adequate compensation to the owners in time. Locate construction camps away from residential settlements, cultural sites, water bodies, etc. (minimum 0.5 km). Try to use fallow land to avoid crop damage.	Contractor	DSC/ Power Grid

	excess soil) affecting nearby the settlements.	Just after completion of the construction, hand over the camp sites to the owners as in earlier condition.		
Traffic congestion/ road accident	Traffic congestion and road accidents due to movement of construction vehicles.	Follow Bangladesh Road Traffic Authority (BRTA) traffic rules and regulations to develop a traffic plan. Schedule deliveries of materials/ equipment during off-peak hours. Engage flagmen especially at the entry of the LILO Construction sites and construction camps for traffic control. Engage experienced drivers to drive project vehicles. Arrange for signal lights at night. Prepare and follow proper traffic management to be approved by Power Grid before access to site granted. Avoid stockpiling of materials, especially at the roadsides, that could disturb traffic movement.	Contractor	DSC/ Power Grid
Pollution due to wastes	Pollution due to wastes (construction wastes from construction activities and general wastes from workers' camps)	Solid wastes collection system will be essential, which should include separation and collection of solid wastes in the dustbins/waste containers throughout the work sites, construction yard/ labour camps. Wastes such as pieces of rods and wood, newspapers, containers etc. can be sold to the vendors and the rest of the waste must be taken to the licensed, engineered sanitary landfill by the contractor or licensed third party.	Contractor	DSC/ Power Grid

		A log of the disposal of toxic and other waste materials is to be kept by the Contractors. Prior to the start of construction, contractor should prepare waste management plan (WMP) based on the EMP, for approval by Power Grid before access to site reflecting national and EHS guideline requirements.		
Community health and safety (H&S)	Community H&S near the construction site could be affected.	Safety barriers and warning signs surrounding the construction site. Generators should be placed in closed rooms. Formulate and implement an emergency risk management plan, for approval by Power Grid before access to site reflecting national and EHS Guideline requirements.	Contractor	DSC/ Power Grid
Occupational health and safety (H&S)	Health and safety risks of construction workers.	An experienced Health and Safety (H&S) Manager must be engaged on each works package with appropriate qualifications and experience and not doubling up on any other job by the contractor prior to start of construction. Before access to site granted, contractor to prepare H&S plan based on risk assessment for approval by Power Grid following national and EHS guideline requirements. Only permit trained and certified workers to work with any electrical equipment. Safety induction by the H&S Manager should be provided for the workers and visitors before they will be allowed to access the site.	Contractor	DSC/ Power Grid

		Prior to starting work, a toolbox meeting should be arranged by the H&S Manager for the workers. First Aid Box and personal protective equipment, PPE (such as safety helmets, safety shoes, eye protection glasses, ear plugs/muffs, waist belts, masks, hand gloves, body protective aprons and insulating boots) must be provided to the workers and ensure their use by the workers. Safety signs, health signs, prohibition signs, warning signs, mandatory signs, emergency escape signs, first-aid signs, information signs, signboards, supplementary signboards, safety collar, symbol, pictogram, illuminated signs, acoustic signals, verbal communication and hand signals must be fitted at the designated sites of the subproject areas.		
Physical, Cultural Resources	Possibility of damage to Physical Cultural Resources.	Chance Find Procedure to be developed following the IFC Guidance Note 8 and BAN regulations	Contractor	DSC/ Power Grid
Employment generation/ income	Employment opportunities for the local people, especially for PAPs.	Employ local people, especially PAPs, for the project activities (as much as possible).	Contractor	DSC/ Power Grid

(b) Operation Stage

Tree replantation	A total of 42 indigenous tree species (three times the number of affected trees from LILO construction can be planted in home gardens and govt. lands	Planting of 42 saplings to replace felled trees, on the side slopes of the access roads, during the monsoon period. The number of saplings which die within 3 years of planting should be replaced by new saplings. Nursing period of planted saplings should not less than 3 years.	FD	Power Grid
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Drainage congestion	Drainage congestion could occur in the surface drains within the construction area, if proper O&M is not done regularly.	Clean the drains, especially during the monsoon, regularly. Ensure adequate monitoring.	Power Grid	Power Grid
Community health and safety	Community H&S nearby the construction site.	Safety barriers and warning signs surrounding the construction sites with awareness raising program. Generators should be placed in the closed rooms. operational H&S risk assessment to be undertaken.	Power Grid	Power Grid
Safety and security of workers	Risk to continuous power supply and even damage of LILO.	Ensure security of LILO in collaboration with law enforcement agencies. Keep complaint book in the respective substation for recording of people's complaints. Ensure availability of adequate safety gear for respective substation operations.	Power Grid	Power Grid
Power Supply	Due to adequate reliability of power supply, social life and economic condition of the people will be improved.	O & M of the LILO should be done in time for adequate power generation.	Power Grid	Power Grid
Short Circuit/ Accident	Due to a possible short circuit of the LILO, disruption of power and accident could occur.	O & M of LILO should be done in time by experienced personnel.	Power Grid	Power Grid

6.1 Environmental Monitoring

135. The environmental and social monitoring plan for LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) has been incorporated in Table 6.3.

Table 6-2: Environmental Monitoring Plan for LILO of Ghorashal-Tongi 230 kV Line to Kaliganj under Addendum 6

Environmental Issues/Parameters	Monitoring Parameters	Standards/Guidelines	Means of Monitoring	Frequency	Location	Implementation Agency	Supervision Agency	Update until Addendum-6
Pre-construction/ Construction Stage								
Requirement of land	Ensure that PAPs get compensation as per RP	As per RP	Inspection	As per RP	RoW of the Cable lines	DC	DSC/ Power Grid	No information received yet
Uprooting of trees within RoW and clearing vegetation from the tower bases of the LILO lines.	Checking whether proper compensation as mentioned in RP is received by PAPs.	DoE/FD	Inspection	Regular during tree felling and site clearing operations	Trimming of trees within RoW and clearing vegetation from the tower bases of the Cable lines	FD	DSC/ Power Grid	No trees uprooted yet
Ambient Air Quality Parameters	SPM, PM10, PM2.5, SOx, NOx, CO and Pb	DoE standards	Sampling/ laboratory analysis	Before construction, then quarterly	At representative LILO construction sites	Contractor	Power Grid	Monitoring conducted in LILO route
Noise Pollution	Ambient noise level	DoE standards	Measurement	Regularly during construction at the locations with sensitive receptors and during piling works if any.	At adjacent subproject cultural sites and construction camps	Contractor	DSC/ Power Grid	Same as previous
Pollution due to Wastes	Checking storage, transportation, handling, and disposal of waste. Wastes from construction sites and camps to be disposed properly at the designated waste dumping sites.	DoE guidelines	Inspection	Regular	Construction sites and camps	Contractor	DSC/ Power Grid	Waste inventory and waste collection are well maintained
Surface Water Quality	pH, BOD5, COD, NH3-N, PO4, TPH and coliforms	DoE Standards	Sampling and Laboratory Analysis	At all river crossings within 500m of waterbodies before and after works	River and surface waterbodies near towers construction sites	Contractor	DSC/ Power Grid	Monitoring (testing) conducted from surface water bodies near the LILO route
Groundwater/ Drinking Water Quality	pH, Mn, Fe, As, TC, FC, TPH	DoE Standards	Sampling and Laboratory Analysis	Quarterly at all tube wells within 500m	At representative tower construction sites	Contractor	DSC/ Power Grid	Monitoring (testing) conducted from ground water bodies near the LILO route
Traffic congestion/ Road Accident	Checking road crossing points, roads adjacent to towers.	BRTA	Inspection	Regular	At road/railway crossing points and roads adjacent to Cable line	Contractor	DSC/ Power Grid	Nearby roads of the construction site

Environmental Issues/Parameters	Monitoring Parameters	Standards/Guidelines	Means of Monitoring	Frequency	Location	Implementati on Agency	Supervision Agency	Update until Addendum-6
Cultural sites (such as a mosque)	Checking whether cultural sites are affected by the project activities such as noise, wastes, etc.	DoE guidelines	Inspection	As and when required	In the project AoI	Contractor	DSC/ Power Grid	Nearby sites of the construction site
Physical Cultural Resources	Chance finds procedure to be developed	DoE/IFC guidelines	Inspection	Regular	At construction site	Contractor	DSC/ Power Grid	Monitoring conducted regularly
Occupational health and safety	Use of PPE, general health, water supply and sanitation. Record of all occupational H&S incidents, any people lost time or fatal must be reported to ADB within 48hrs with corrective action plan.	DoE/IFC guidelines	Inspection	Regular	At construction sites and camps	Contractor	DSC/ Power Grid	Monitoring conducted regularly
Community health and safety	Awareness of local people. Record of all community H&S incidents, any people lost time or fatal must be reported to ADB within 48hrs with corrective action plan.	DoE/IFC guidelines	Inspection	Regular	At LILO Line construction sites and crossing of roads	Contractor	DSC/ Power Grid	Monitoring conducted regularly
Operation Stage								
Tree replantation	Replanting saplings and checking replacement of dead saplings, and watering and fertilizing of saplings for 3 years	FD	Inspection	Quarterly	Access roadside slopes	FD	Power Grid	Monitoring will be conducted regularly
Tall trees	Trimming of tall trees under the LILO Line	FD	Inspection	Once every year and as directed by the Relevant engineer of Power Grid	Along the LILO Lines	Power Grid	Power Grid	Monitoring will be conducted regularly
EMF	Checking of clearance of LILO Line and tops of houses (for housing structures) and for river crossing clearance from HFL to TL	Australian Standard for the safety of power lines (No BD standard and no device available in BD)	Inspection	As and when required	At populated/ housing areas where LILO Lines pass over	Power Grid	Power Grid	Monitoring will be conducted regularly
Short circuit/ accident	Safety	DoE guidelines	Inspection	Regular	Along the LILO Line	Power Grid	Power Grid	Monitoring will be conducted regularly
Occupational and Community Health and Safety	Use of PPE. Record of all occupational and community H&S incidents, any people lost time or fatal must be reported to ADB within 48hrs with corrective action plan.	As required	Inspection	Regular	Along the LILO Line	Power Grid	Power Grid	Monitoring will be conducted regularly
Power Supply	Access to electricity in the rural area on priority basis.	DoE/PDB guidelines	Inspection	Whole project period	Along the LILO Line	Power Grid	Power Grid	Monitoring will be conducted regularly

As = arsenic, BD = Bangladesh, BOD5 = five-day biochemical oxygen demand, BRTA= Bangladesh Road Traffic Authority, COD = chemical oxygen demand, DC = Deputy Commissioner, DoE = Department of Environment, DSC = Design and Supervision Consultants, EMF = electromagnetic field, FC = fecal coliform, Fe = iron, HFL = highest flood level, IFC = International Finance Corporation, m = meter, Mn = manganese, NH3-N = ammonia nitrogen, OHS = Occupational Health and Safety, PAP = project affected person, PDB = Power Development Board , Power Grid = Power Grid Company of Bangladesh, PO4 = phosphate, PPE = personalprotective equipment, RoW = right of way, RP = Resettlement Plan, TC = total coliform, LILO = Line In Line Out

6.2 Tree Plantation Plan

136. As per the original IEE, 2019, seven (07) of trees were estimated to be cleared in LILO route, where no trees were felled during the land development of LILO route. However, as per the primary survey during this addendum, about 16 trees (more than 5m in height) were found assumed to get uprooted in 5 m buffer of both sides of the LILO alignment. Most of the trees in the RoW of the LILO need to be uprooted but still the number of trees that need to be uprooted have not been fixed yet as many trees were found in 5 m buffer zone rather than the exact alignment. The study assuming that 14 trees can be uprooted which is found mostly between one to four meter (1- 4m) buffer of the alignment. The comparison of tree count is given in Table 5-2 .

Table 6-3: Total Tree Count for Compensation

SN	Sub-projects	Counted during original IEE, 2019*	Counted during Addendum-6, 2025*
1.	LILO of Ghorashal-Tongi 230 kV Line to Kaliganj	07 (>5 m in height)	16 (>5 m in height)

*Source: <https://www.adb.org/projects/documents/ban-51137-003-ieee> and EQMS Survey Aug 2025

Table 6-4: Tree Plantation Plan for LILO of Ghorashal-Tongi 230 kV Line to Kaliganj

Trees Species estimated to be cut	Scientific Name	Number of Trees to be cut	Number of Trees to be Planted	Location	Responsibilities
Jam	Java Plum	3	9	Homestead Forest and Government Forest	Power Grid
Kath Badam	Indian Almond	3	9	Homestead Forest and Government Forest	Power Grid
Jackfruit	<i>Artocarpus heterophyllus</i>	3	9	Homestead Forest and Government Forest	Power Grid
Akashmoni	Acacia	3	9	Homestead Forest and Government Forest	Power Grid
Boroi	Indian Jujube	4	12	Homestead Forest and Government Forest	Power Grid
Grand Total Trees		16	48		

6.3 Budget For EMP

137. Budget for EMP implementation for LILO of Ghorashal-Tongi 230 kV Line to Kaliganj are mentioned in Table 6-5. EMP/IEE implementation along with necessary budget allocation is already included in the contract document.

Table 6-5: Budget for EMP implementation Cost for Package 1

Item	Quantity	Rate	Total Amount (BDT)	Clarification/ Remarks
Tree planting (three times of trees removed for project interventions)	48 seedlings/saplings in home gardens & government lands; maintenance for three years	60 BDT per seedling/sapling (Average)	2,520	Cost reflects compensatory plantation at 1:3 ratio for 16 affected trees, including procurement of saplings and basic maintenance for three years as required under EMP and Forest Department guidance
Environmental Quality				
Surface Water	5 samples/year	8,000	40,000	Unit rate covers laboratory analysis, sample collection, transport, and reporting to meet ECR-2023 and ADB SPS monitoring requirements
Ground Water	5 samples/year	12,000	60,000	Higher unit cost reflects tube-well sampling, advanced laboratory testing (COD, TC, FC, etc.), and certified reporting
Air	5 samples/year	6,000	30,000	Rate includes instrument deployment, field technicians, data processing, and comparison with national air-quality standards
Noise	5 samples/year	1,200	6,000	Lower unit cost justified due to short-duration measurements using portable sound-level meters at selected receptors
Waste management and dust suppression	LILO route	Lump sum	16,400	Lump-sum provision for waste segregation, transport to approved disposal sites, water spraying for dust control,

Item	Quantity	Rate	Total Amount (BDT)	Clarification/ Remarks
				and housekeeping across all work fronts
Drainage Management	LILO route	Lump sum	18,300	Covers temporary drains, silt traps, periodic cleaning, and erosion control near tower pads and access roads
Traffic Management	LILO route	Lump sum	7,650	Includes traffic signage, barricades, flagmen, and coordination with local authorities during material transport
OHS	LILO route	Lump sum	17,050	Cost allocated for PPE supply, safety harnesses, first-aid kits, toolbox meetings, and site safety signage under EPC obligations
Community Health and Safety	LILO route	Lump sum	8,850	Budget supports fencing of hazardous areas, warning boards, community awareness sessions, and emergency contact systems
Total Cost			206,770	Consolidated EMP budget for Package-1 reflecting site-specific risks and finalized EPC scope

7. GRIEVANCE REDRESS MECHANISM

138. A Grievance Redress Mechanism (GRM), consistent with the requirements of ADB's Safeguard Policy Statement (SPS, 2009), was established under the original IEE to prevent and address community concerns, reduce risks, and assist the project in maximizing environmental and social benefits. The GRM follows a three-tier structure comprising (i) site-level Grievance Redress Committees, (ii) Project-level Grievance Redress Committee within the Project Management Unit (PMU), and (iii) escalation to higher authorities as required, to resolve complaints efficiently and enhance project performance in environmental and social management. The detailed grievance mechanism and resolution procedures are described in the original IEE (2019) and remain fully applicable to the LILO activities covered under Addendum-6, without any modification to the established system.

139. For the period August–December 2025, covering the preparation and implementation of the Addendum-6 scope under Package-1, no environmental or social grievances were recorded. This status was verified through review of site-level grievance registers and contractor records (Appendix I).

8. PUBLIC CONSULTATION AND DISCLOSURE

140. The public consultations were conducted LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1 in August 2025 through stakeholder consultations, and individual meetings during the environmental study of the proposed project in conformity with the DoE's environmental guidelines to achieve the following objectives:

- To share information on the subprojects (LILO Lines) of the proposed project.
- To understand stakeholders, including PAPs, concerns regarding various aspects of the proposed project including existing power supply facilities/system and expected potential environmental impacts along with possible mitigation measures during the construction and operation stages of the proposed project.
- To identify the conflict issues in advance and to find acceptable solutions; and,
- To gather local knowledge before decision making on the proposed project.

141. Also, the consultations followed the below requirements of ADB SPS 2009 requirements for meaningful consultations.

- The consultation begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle.
- The consultation provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people.
- The consultation is undertaken in an atmosphere free of intimidation or coercion.
- The consultation is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and
- Consultation enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

8.1 Focus Group Discussions

142. Focus group Discussion (FGD) is a small, but demographically diverse group of people whose reactions are studied about a proposed project or something else to determine the reactions that can be expected from a larger population. It is a form of qualitative study consisting of interviews in which groups of people are asked about their perceptions, opinions, beliefs, and attitudes towards the project, service, concept, advertisement, idea, or packaging. Questions are asked in an interactive group setting where participants are free to talk with other group members. During the study, six FGDs with various groups including women and affected people were conducted using local language (Bengali) for easy understanding of the opinions for both the LILO Lines.

143. Discussion was held with the local people near the proposed project site. **Table 8-1** shows the date, location, and the number of participants in each discussion.

Table 8-1: Location and number of participants at FGDs

SN	LILO Route Area	Venue	No. of Male (M)/ Female(F)		Total Participants	Date
			M	F		
1.	Kaliganj	Boktarpur bazar	5	3	8	Aug 2025
2.		Khaikara	6	2	8	Aug 2025
3.		Bokterpur Jame Msoque	6	2	8	Aug 2025
4.	Purbachal	Mothbari bazar	3	3	6	Aug 2025
5.		Nagari	6	2	8	Aug 2025
6.		Tumulia	6	-	6	Aug 2025

8.1.1 Summary of Focus Group Discussion with Local Community and Affected Persons (LILO Line)

- Prior to project initiation, participants were informed through public advertisements. After learning that the objective of the Kaliganj to Purbachal LILO Project is to improve electricity supply, most people expressed their appreciation.
- The main crops in this region include rice (Irri and Amon varieties), which are cultivated twice a year, along with vegetables and corn, which are also widely grown.
- Construction of the LILO Line will require clearing some natural forest areas, raising concerns about potential deforestation.
- Community members acknowledged the possibility of temporary environmental impacts during the construction phase. However, the survey team explained that these impacts would be short-term and could be minimized through proper mitigation measures.
- The use of locally available materials during construction is expected to contribute positively to the local economy and to the national GDP.
- Local people believe the project will improve electricity supply in the area and help attract new industries and factories, thereby generating employment opportunities and supporting economic growth.
- Residents strongly emphasized that local people should be given priority in both labor and skilled employment opportunities, depending on their qualifications, during the construction phase.
- Despite these challenges, women expressed their support for the project, recognizing that while some agricultural land may be lost, the community and the nation would benefit from improved electricity supply. They also noted that new industries in the area could create employment opportunities for women, helping to improve their economic condition.
- Electricity supply in the project area is currently unreliable, with only 2- 4 hours of power available during peak seasons. Residents expressed dissatisfaction with this situation and demanded uninterrupted power supply from Power Grid.
- Community members highlighted that uninterrupted electricity would benefit children's education and improve overall economic activities in the area.
- Concerns were raised about potential noise and vibration during construction. The community suggested that contractors must ensure proper maintenance of machinery and take measures to minimize such disturbances.
- No households reported owning land parcels within the proposed project alignment.

- Finally, participants stressed the importance of preventing gender-based violence, including sexual harassment, that could arise from labor influx. They recommended limiting external labor and giving preference to local workers to reduce such risks.

9. CONCLUSION AND RECOMMENDATIONS

144. The LILO of Ghorashal-Tongi 230 kV Line to Kaliganj and LILO of Ghorashal-Kaliganj-Purbachal-Bashundhara 400 kV and 230 kV Line to Kaliganj and Purbachal (Stringing only) under Package 1 Project is expected to generate significant positive impacts by enhancing the reliability of electricity supply and supporting socio-economic development in the region. Improved access to uninterrupted electricity will foster industrial growth, create employment opportunities, and enhance the quality of life for local communities.

145. The environmental baseline studies indicate that most parameters remain within acceptable limits under the Environmental Conservation Rules (ECR 2023). Groundwater and surface water assessments showed that pH and ammonia concentrations are within permissible ranges, though Total Coliform (TC), Fecal Coliform (FC), and COD levels exceeded standards in specific sites, pointing to localized contamination concerns. These exceedances are not attributed to project activities but highlight the need for continuous monitoring.

146. Potential environmental impacts during the construction phase include deforestation, noise and vibration, and localized disturbances to land and water resources. However, these impacts are temporary, site-specific, and manageable through proper mitigation measures. Social consultations revealed strong community support for the project, with local people recognizing the long-term benefits of improved electricity supply despite some concerns regarding temporary disturbances, forest clearance, and land use changes.

147. Importantly, there are no indications that ongoing construction activities have caused significant deterioration of environmental quality. The project is therefore considered environmentally feasible, provided that the proposed mitigation and monitoring measures are strictly implemented.

9.1 Recommendations

To ensure sustainable implementation and compliance with national standards, the following recommendations are made:

A. Environmental Monitoring and Compliance

- Conduct regular monitoring of air, water, soil, and noise parameters in line with ECR 2023.
- Pay particular attention to TC, FC, and COD levels in water sources and adopt corrective actions where exceedances are detected.

B. Forest and Vegetation Management

- Minimize tree clearance along with the project alignment to the extent possible.
- Implement a compensatory plantation program with native species at a ratio higher than the number of trees felled, ensuring long-term ecological balance.

C. Pollution Control Measures

- Maintain construction equipment properly to control noise, vibration, and air emissions.
- Ensure appropriate disposal of solid and liquid waste generated during construction, avoiding contamination of nearby land and water bodies.

D. Community Engagement and Employment

- Prioritize the employment of local labor during construction to strengthen community benefits and reduce the risks associated with external labor influx.
- Provide skill development opportunities to enhance local participation in semi-skilled and skilled roles.

E. Social Safeguards

- Conduct regular awareness programs to address social issues, particularly the prevention of gender-based violence and harassment.
- Encourage women's involvement in employment opportunities created by the project, directly or indirectly.

F. Stakeholder Engagement

- Maintain continuous communication with community members and stakeholders through regular public consultations.
- Ensure transparency regarding project impacts, mitigation measures, and grievance redress mechanisms to build trust and ownership.

148. With the above mitigation and monitoring measures in place, the Package 1 Project is environmentally and socially acceptable. The project is recommended for implementation under the conditions that strict compliance with ECR 2023 is maintained, environmental impacts are carefully managed, and community concerns are addressed through inclusive engagement and benefit-sharing mechanisms.

APPENDIX

APPENDIX A: Photographs of the Existing Environment and Public Consultations

Existing Environment



T 1B/0 (Durbati East Para)



T 2/1 (Durbati Modhopara)



T 1A/0 (Durbati East Para)



T 4/0 (Bokterpur Modhopara)



T3/1 (Bokterpur Dokhinpara)



Durbati East Para and Modhopara



Bokterpur Modhopara



Bokterpur- Mohani Dokhinpara

Appendix B: Attendance of Consultations

Dhaka & Western Zone Grid Expansion Project

Location: 400 kV and 230 kV LILO lines at Kaliganj and Purbachal Substations

Date: ১৫/০৭/২০২০

Time: ১০:০০ (সন্ধ্যা)

Sl.	Name of Participants	Occupation	Signature
1.	১৯৯৭৭	১৯৯৭৭	১৯৯৭৭
2.	১৯৯৭৭	১৯৯৭৭	১৯৯৭৭
3.	১৯৯৭৭	১৯৯৭৭	১৯৯৭৭
4.	১৯৯৭৭	১৯৯৭৭	১৯৯৭৭
5.	১৯৯৭৭	১৯৯৭৭	১৯৯৭৭
6.	১৯৯৭৭	১৯৯৭৭	১৯৯৭৭
7.	১৯৯৭৭	১৯৯৭৭	১৯৯৭৭
8.	১৯৯৭৭	১৯৯৭৭	১৯৯৭৭
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Dhaka & Western Zone Grid Expansion Project

Location: 400 kV and 230 kV LILO lines at Kaliganj and Purbachal Substations

Date: ১৬/৬/২০২০

Time: ১২:০০ (১২:০০)

Sl.	Name of Participants	Occupation	Signature
1.	১০০০ (১০০০)	১০০০	১০০০
2.	১০০০	১০০০	১০০০
3.	১০০০ (১০০০)	১০০০	
4.	১০০০ (১০০০)	১০০০	
5.	১০০০	১০০০	১০০০
6.	১০০০	১০০০	১০০০
7.	১০০০	১০০০	১০০০
8.	১০০০	১০০০	১০০০
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14.			
15.			

Dhaka & Western Zone Grid Expansion Project

Location 400 kV and 230 kV LIL/O lines at Kaliganj and Purbachal Substations

Date ২৭/৬/২০২০

Time ২:০০ (৬৪০)

Sl.	Name of Participants	Occupation	Signature
1.	ডানিম	শ্রমিক	
2.	করিব	কাজ	
3.	সিমা	দুশী	Lema
4.	কায়স	দুশী	২০/১১
5.	সামস	কাজ	
6.	বাবিল	কাজ	
7.	কায়স	দুশী	
8.	কায়স	দুশী	Kamun
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Dhaka & Western Zone Grid Expansion Project

Location: 400 kV and 230 kV LILO lines at Kaliganj and Purbachal Substations

Date: ১০/৬/২০২০

Time: ১০:০০ (১৪১৩)

Sl.	Name of Participants	Occupation	Signature
1.	জিৎ মন্ডল	জিৎ	Jit
2.	জিৎ মন্ডল	জিৎ	
3.	জিৎ মন্ডল	জিৎ	Bigli
4.	জিৎ মন্ডল	জিৎ	
5.	জিৎ মন্ডল	জিৎ	
6.	জিৎ মন্ডল	জিৎ	Saki'b
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15.			

Dhaka & Western Zone Grid Expansion Project

Location: 400 kV and 230 kV LILO lines at Kaliganj and Purbachal Substations

Date: ১০/৭/২০২৩

Time: ১২:০০ (১২:০০)

Sl.	Name of Participants	Occupation	Signature
1.	সাহিত্যিক	লেখক	[Signature]
2.	কম্পিউটার (মাস্টার)	কম্পিউটার	
3.	নাইম (মাস্টার)	নাইম	Naim
4.	মেহিদুল (মাস্টার)	মেহিদুল	Mehidul
5.	ফিলিস্তিনি (মাস্টার)	ফিলিস্তিনি	
6.	কুমার মাস্টার	কুমার মাস্টার	[Signature]
7.	সাহিত্যিক (মাস্টার)	লেখক	Sonika
8.	কম্পিউটার (মাস্টার)	কম্পিউটার	কম্পিউটার
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Dhaka & Western Zone Grid Expansion Project

Location: 400 kV and 230 kV LILO lines at Kaliganj and Purbachal Substations

Date: ১০/০৪/২০২০

Time: ২:০০ (২য়)

Sl.	Name of Participants	Occupation	Signature
1.	চান্দা নর	কর্মী	Chanda
2.	আব্বাস	কর্মী	Arit
3.	কমল নর	কর্মী	Topu
4.	জাহাঙ্গীর আলী	কর্মী	J
5.	জাহাঙ্গীর	কর্মী	
6.	জাহাঙ্গীর	কর্মী	Jan
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Appendix C: Environmental Monitoring (Lab sheet)

Air Quality

**Ambient Air Quality Test Report**

Sl. No.	Date	Coordinates	Period	Parameters (µg/m³)						
				PM _{2.5}	PM ₁₀	SO _x	NO _x	CO (mg/ m³)	O ₃	SPM
AAQ-01	08.02.25	23°58'0.906"N 90°33'3.408"E	8-hours	55	67	62	72	372	30	87
			24-hours	36	44	40.4	46.9			
AAQ-02	09.02.25	23°57'28.528"N 90°33'23.954"E	8-hours	59	71	66	73	380	33	77
			24-hours	38	46	43.0	47.6			
AAQ-03	10.02.25	23°57'10.977"N 90°33'18.231"E	8-hours	57	81	70	68	376	37	82
			24-hours	37	53	45.6	44.3			
AAQ-04	11.02.25	23°56'50.084"N 90°33'25.961"E	8-hours	62	70	71	70	367	30	74
			24-hours	36	44	46.3	45.6			
AAQ-05	12.02.25	23°56'20.567"N 90°33'34.481"E	8-hours	59	69	63	69	362	32	75
			24-hours	38	45	41.0	45.0			
Air Pollution Control Rules-2022				65	150	-	-	5000	100	NYS
Standard Time Period as per APCR-2022				24hr.	24hr.	NYS	NYS	8hr.	8hr.	NYS

Noise Quality

**Ambient Noise Quality Test Report**

Sl. No.	Code	Period	Tower	Co-ordinates	Ambient Noise Level [dB(A)]		Bangladesh Standard ¹		Category of Area/Receptor
					Leq _{day}	Leq _{night}	Day	Night	
1.	NL-1	08.02.25	TT-1/0	23°58'1.116"N 90°33'1.59"E	48.59	37.80	55	45	Residential Area
2.	NL-2	09.02.25	T-4/0	23°57'30.075"N 90°33'23.303"E	46.30	37.84	55	45	Residential Area
3.	NL-3	10.02.25	T-3/0	23°57'9.805"N 90°33'19.510"E	45.71	36.23	55	45	Residential Area
4.	NL-4	11.02.25	T-2/3	23°56'49.083"N 90°33'25.387"E	41.86	37.77	55	45	Residential Area
5.	NL-5	12.02.25	T-2/1	23°56'18.556"N 90°33'33.555"E	42.95	37.86	55	45	Residential Area

Method of Sampling:

The air sample has been collected by using High Volume Sampler (Model No: GTI-FPS-375) with Impinger attachment for 8-hours of sampling period.

Method of Analysis:

The following methods were used to analyze the air quality parameters:

No.	Parameter	Methodology	Device/Equipment	Sampling Period
1	SPM	Gravimetric	GTI-FPS-375	8hours
2	PM ₁₀	Gravimetric	GTI-FPS-375	8hours

¹ Noise Pollution (Control) Rules, 2006, Schedule 1: Area-wise Noise Standards.

Surface Water



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 14A, Level: 14, Building No: 02
 Confidence Center, Kha-09, Shahjadpur
 Gulshan, Dhaka-1212

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 ✉ info@greenbudbd.com
 ☎ +88 0255048399, 01977047336
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Test Report

Reference No	SW 10411	Test Name	Surface Water Test
Sample Receiving Date	12/02/2025	Sample ID	SW-(1-2-3-4-5)
Date of Analysis	12/02/2025 to 05/03/2025	Date of Submission	12/03/2025
Client Name	Handbaek Co. Ltd. Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LIL0 at Kaliganj and Purbachal Substation on Turnkey Basis	Sample Type	Surface Water from water bodies

Methodology

S/I	Water Quality Parameters	Unit	Bangladesh Standard for Surface Water (ECR'2023)	Method of Analysis
1	Arsenic (As)	mg/L	0.05	AAS
2	Iron (Fe)	mg/L	0.3-1	AAS
3	Manganese (Mn)	mg/L	0.1	AAS
4	pH	-	6.5-8.5	pH Meter
5	Total Coliform (TC)	CFU/100mL	-	Membrane Filtration
6	Faecal Coliform (FC)	CFU/100mL	-	Membrane Filtration

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Test Result

Sample No.	As (mg/L)	Fe (mg/L)	Mn (mg/L)	pH	TC (N/100 ml)	FC (N/100 ml)
SW-1	0.003	3.10	0.03	7.0	200	56
SW-2	0.001	8.59	0.03	6.9	308000	232000
SW-3	0.006	4.53	0.03	6.7	5200	3300
SW-4	0.001	0.99	0.06	6.7	1600	600
SW-5	0.001	4.41	0.30	7.0	500	315
ECR'2023 Standards	0.5	0.3-1	0.1	6.5-8.5	-	-

Comments:

1. Most of the parameters are within the acceptable limit set for the Inland Surface Water in ECR 2023 except Iron in (SW-1, SW-2, SW-3 & SW-5).
2. Samples were collected by Site Inspector.
3. Samples were sent to authorize laboratory in sealed condition.
4. Lab Test Report has been added to the annexure.



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 Gulshan, Dhaka-1212

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 +88 0255048399, 01977047336
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Annexure A

	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: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030022	Sample Receiving date: 12-02-2025
Ref. Memo No: HCL/2025/Nill & Dated: 12-02-2025	Sample Source: Surface Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample: SW-1, TT-1/0)	Union, Vill:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

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	Iron (Fe)	0.3-1	3.10	mg/L	AAS	0.05
3	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
4	pH	6.5-8.5	7.0	-	pH Meter	-

Comments:

Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by: 1.) Name: S.M. Parves Talukder Designation: Sample Analyzer Signature: <i>S.M. Parves Talukder</i> 06.03.2025 2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>Md. Saiful Alam Khosru</i> 06.03.2025	Countersigned/Approved by: 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 06.03.2025 2.) Name: Md. Biplab Hossain Designation: Chief Chemist Signature: <i>Md. Biplab Hossain</i> 06.03.2025 Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka
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Gulshan, Dhaka-1212

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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	
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Lab Memo: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030023	Sample Receiving date: 12-02-2025
Ref. Memo No: HCL/2025/Nill & Dated: 12-02-2025	Sample Source: Surface Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample : SW-2, T-4/0)	Union:, Vill.:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

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	Iron (Fe)	0.3-1	8.59	mg/L	AAS	0.05
3	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
4	pH	6.5-8.5	6.9	-	pH Meter	-

Comments:

Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by: 1.) Name: S.M. Parves Talukder Designation: Sample Analyzer <i>Signature</i> <i>06/03/2025</i> 2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer <i>Signature</i> <i>06.03.2025</i>	Countersigned/Approved by: 1.) Name: Mita Sarker Designation: Senior Chemist <i>Signature</i> 2.) Name: Md. Biplab Hossain Designation: Chief Chemist <i>Signature</i> <i>06/03/2025</i> Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Monakhali, Dhaka
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Lab Memo: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030024	Sample Receiving date: 12-02-2025
Ref. Memo No: HCL/2025/Nill & Dated: 12-02-2025	Sample Source: Surface Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample : SW-3. T-3/0)	Union:, Vill.:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Arsenic (As)	0.05	0.006	mg/L	AAS	0.001
2	Iron (Fe)	0.3-1	4.53	mg/L	AAS	0.05
3	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03
4	pH	6.5-8.5	6.7	-	pH Meter	-

Comments:

Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer		1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer		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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--	--	--

Lab Memo: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030025	Sample Receiving date: 12-02-2025
Ref. Memo No: HCL/2025/Nill & Dated: 12-02-2025	Sample Source: Surface Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample : SW-4, T-2/3)	Union, Vill.:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

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	Iron (Fe)	0.3-1	0.99	mg/L	AAS	0.05
3	Manganese (Mn)	0.1	0.06	mg/L	AAS	0.03
4	pH	6.5-8.5	6.7	-	pH Meter	-

Comments:

Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer		1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer		2.) Name: Md. Biplob Hossain Designation: Chief Chemist	

Md. Biplob Hossain
Chief Chemist
Department of Public Health Engineering
Central Laboratory Mohakhali, Dhaka

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--	--	--

Lab Memo: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030026	Sample Receiving date: 12-02-2025
Ref. Memo No: HCL/2025/Nil & Dated: 12-02-2025	Sample Source: Surface Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample : SW-5, T-2/1)	Union:, Vill.:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

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	Iron (Fe)	0.3-1	4.41	mg/L	AAS	0.05
3	Manganese (Mn)	0.1	0.30	mg/L	AAS	0.03
4	pH	6.5-8.5	7.0	-	pH Meter	-

Comments:

Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: S.M. Parves Talukder Designation: Sample Analyzer	<i>P. Talukder</i> 06.03.2025	1.) Name: Mita Sarker Designation: Senior Chemist	<i>M. Sarker</i>
2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer	<i>A. Khosru</i> 06.03.2025	2.) Name: Md. Biplob Hossain Designation: Chief Chemist	<i>Md. Biplob Hossain</i> Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka

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Surface Water Test Report of the project corridor from DPHE

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www.greenbudbd.com

Annexure B

icddr,b		Health Systems and Population Studies Division Mohakhali, Dhaka - 1212 Phone: +8809666771100, or 16340, Ext: 2405 Web: http://www.icddr.org		Laboratory of Environmental Health
Lab. ID No. 2025020718 (V1)		Receipt No: SRA25021200480		Date of Reporting: 17.02.2025
Particular of Sample: Water				
Client Address: Handbaek Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to TT-10) (SW-01).				
Sl. No.	Water Quality Parameters	Unit	Results	Method
1	Total coliforms	CFU /100mL	200	Membrane Filtration
2	Faecal coliforms	CFU /100mL	56	Membrane Filtration

Prepared By: EM.FM.007.01 Effective Date 30/03/2016

Checked By: End of the Report

Dr. Zahid Hossain Mahmud
Scientist and Head
Laboratory of Environmental Health, HSPSD, icddr,b
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Head Office
14A, Level: 14, Building No: 02
Confidence Center, Kha-09, Shahjadpur
Gulshan, Dhaka-1212

Contact Us
info@greenbudbd.com
+88 0255048399, 01977047336
www.greenbudbd.com

icddr,b		Health Systems and Population Studies Division Mohakhali, Dhaka - 1212 Phone: +8809666771100, or 16340, Ext: 2405 Web: http://www.icddr.org		Laboratory of Environmental Health
Lab. ID No. 2025020719 (V1)		Receipt No: SRA25021200481		Date of Reporting: 17.02.2025
Particular of Sample: Water				
Client Address: Handbaek Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to T-40) (SW-02).				
Sl. No.	Water Quality Parameters	Unit	Results	Method
1	Total coliforms	CFU /100mL	308000	Membrane Filtration
2	Faecal coliforms	CFU /100mL	232000	Membrane Filtration

Prepared By: EM.FM.007.01 Effective Date 30/03/2016

Checked By: End of the Report

Dr. Zahid Hossain Mahmud
Scientist and Head
Laboratory of Environmental Health, HSPSD, icddr,b
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Gulshan, Dhaka-1212

Contact Us _____
info@greenbudbd.com
+88 0255048399, 01977047336
www.greenbudbd.com

icddr,b Health Systems and Population Studies Division
Mohakhali, Dhaka - 1212
Phone: +8809666771100, or 16340, Ext: 2405
Web: http://www.icddr.org

Laboratory of Environmental Health

Test Report
Lab. ID No. 2025020715 (V1) Receipt No: SRA25021200483 Date of Reporting: 17.02.2025
Particular of Sample: Water Date of Sample Received: 12.02.2025
Client Address: Handbak Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to T-3/0) (SW-03).

Sl. No.	Water Quality Parameters	Unit	Results	Method
1	Total coliforms	CFU /100mL	5200	Membrane Filtration
2	Faecal coliforms	CFU /100mL	3300	Membrane Filtration

Prepared By:  EMLFM.007.01 Effective Date 30/03/2016

Checked By:  End of the Report

Dr. Zahid Hayat Mahmud
Scientist and Head
Laboratory of Environmental Health, HSPSD, icddr,b
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Gulshan, Dhaka-1212

Contact Us _____
info@greenbudbd.com
+88 0255048399, 01977047336
www.greenbudbd.com

icddr,b Health Systems and Population Studies Division
Mohakhali, Dhaka - 1212
Phone: +8809666771100, or 16340, Ext: 2405
Web: http://www.icddr.org

Laboratory of Environmental Health

Test Report
Lab. ID No. 2025020716 (V1) Receipt No: SRA25021200485 Date of Reporting: 17.02.2025
Particular of Sample: Water Date of Sample Received: 12.02.2025
Client Address: Handbak Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to T-2/3) (SW-04).

Sl. No.	Water Quality Parameters	Unit	Results	Method
1	Total coliforms	CFU /100mL	1600	Membrane Filtration
2	Faecal coliforms	CFU /100mL	600	Membrane Filtration

Prepared By:  EMLFM.007.01 Effective Date 30/03/2016

Checked By:  End of the Report

Dr. Zahid Hayat Mahmud
Scientist and Head
Laboratory of Environmental Health, HSPSD, icddr,b
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Gulshan, Dhaka-1212

Contact Us

info@greenbudbd.com
+88 0255048399, 01977047336
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Health Systems and Population Studies Division
Mohakhala, Dhaka - 1212
Phone: +880966771100, or 16340, Ext: 2405
Web: http://www.icddr.org

Laboratory of Environmental Health

Test Report

Lab. ID No: 2025020717 (V1) Receipt No: SRA25021200487 Date of Reporting: 17.02.2025

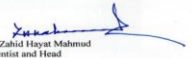
Particular of Sample: Water Date of Sample Received: 12.02.2025

Client Address: Handbaek Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to T-2/1) (SW-05).

Sl. No.	Water Quality Parameters	Unit	Results	Method
1	Total coliforms	CFU /100mL	500	Membrane Filtration
2	Faecal coliforms	CFU /100mL	315	Membrane Filtration

Prepared By : 
EM.FM.007.01 Effective Date 30/03/2016

Checked By : 
End of the Report


Dr. Zahid Hayat Mahmud
Scientist and Head
Laboratory of Environmental Health, HSPSD, icddr,b
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Surface Water Test Report of Handbaek from icddr, b

Ground Water



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Test Report

Reference No	GW 10410	Test Name	Ground Water Test
Sample Receiving Date	12/02/2025	Sample ID	GW-(1-2-3-4-5)
Date of Analysis	12/02/2025 to 05/03/2025	Date of Submission	17/03/2025
Client Name	Handbaek Co. Ltd. Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LILO at Kaliganj and Purbachal Substation on Turnkey Basis	Sample Type	Ground Water from Adjacent Point

Methodology

S/I	Water Quality Parameters	Unit	Bangladesh Standard for Ground Water (ECR'2023)	Method of Analysis
1	Ammonia	mg/L	0.5	UVS
2	Chemical Oxygen Demand (COD)	mg/L	4	CRM
3	pH	-	6.5-8.5	pH Meter
4	Phosphate	mg/L	6.0	UVS
5	Total Coliform	CFU/100 ml	0	Membrane Filtration
6	Fecal Coliform	CFU/100 ml	0	Membrane Filtration
7	Biochemical Oxygen Demand (BOD)	mg/L	-	5-Day BOD Test

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Test Results

Sample No.	Ammonia (mg/L)	COD (mg/L)	TC (CFU/100 ml)	FC (CFU/100 ml)	pH	Phosphate (mg/L)	BOD (mg/L)
GW-1	0.40	56	0	0	7.1	2.0	2.0
GW-2	0.32	312	0	0	6.7	1.0	2.0
GW-3	0.23	36	17	13	7.0	0.66	2.0
GW-4	0.30	48	0	0	6.4	0.70	2.0
GW-5	0.35	56	48	21	6.8	1.2	1410
ECR'2023 Standards	0.5	4	0	0	6.5-8.5	6	-

Comments:

1. All the parameters are within the acceptable limits set for the Drinking Water in ECR 2023 except TC & FC in (GW-3 & GW-5) & COD in all water.
2. Samples were collected by Site Inspector.
3. Samples were sent to authorize laboratory in sealed condition.
4. Lab Test Report has been attached to Annexure.

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Annexure A

	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	
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Lab Memo: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030017	Sample Receiving date: 12-02-2025
Ref. Memo No: HCL/2025/Nilil & Dated: 12-02-2025	Sample Source: Ground Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample : GW-1, TT-1/0)	Union:, Vill.:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.40	mg/L	UVS	0.10
2	Chemical Oxygen Demand (COD)	4.0	56	mg/L	CRM	4.0
3	pH	6.5-8.5	7.1	-	pH Meter	-
4	Phosphate	6.0	2.0	mg/L	UVS	0.10

Comments:

Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by: 1.) Name: S.M. Parves Talukder Designation: Sample Analyzer <i>Signature: Parves Talukder 06/03/2025</i> 2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer <i>Signature: Alam 06.03.2025</i>	Countersigned/Approved by: 1.) Name: Mita Sarker Designation: Senior Chemist <i>Signature: Mita Sarker 06/03/2025</i> 2.) Name: Md. Biplab Hossain Designation: Chief Chemist <i>Signature: Md. Biplab Hossain 06/03/2025</i> Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka
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Lab Memo: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030018	Sample Receiving date: 12-02-2025
Ref. Memo No: HCU/2025/Nil & Dated: 12-02-2025	Sample Source: Ground Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample : GW-2, T-4/0)	Union:, Vill.:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.32	mg/L	UVS	0.10
2	Chemical Oxygen Demand (COD)	4.0	312	mg/L	CRM	4.0
3	pH	6.5-8.5	6.7	-	pH Meter	-
4	Phosphate	6.0	1.0	mg/L	UVS	0.10

Comments:

Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.

Test Performed by: 1.) Name: S.M. Parves Talukder Designation: Sample Analyzer Signature: <i>S.M. Parves Talukder</i> Date: 06/03/2025 2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature: <i>Saiful Alam Khosru</i> Date: 06.03.2025	Countersigned/Approved by: 1.) Name: Mita Sarker Designation: Senior Chemist Signature: <i>Mita Sarker</i> 2.) Name: Md. Biplob Hossain Designation: Chief Chemist Signature: <i>Md. Biplob Hossain</i> Date: 06/03/2025 Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka
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Lab Memo: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030019	Sample Receiving date: 12-02-2025
Ref. Memo No: HCL/2025/Nill & Dated: 12-02-2025	Sample Source: Ground Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample : GW-3, T-3/0)	Union:, Vill.:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.25	mg/L	UVS	0.10
2	Chemical Oxygen Demand (COD)	4.0	36	mg/L	CRM	4.0
3	pH	6.5-8.5	7.0	-	pH Meter	-
4	Phosphate	6.0	0.66	mg/L	UVS	0.10

Comments:

Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, 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		1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer		2.) Name: Md. Biplab Hossain Designation: Chief Chemist	

Md. Biplab Hossain
Chief Chemist
Department of Public Health Engineering
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Lab Memo: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030020	Sample Receiving date: 12-02-2025
Ref. Memo No: HCL/2025/Nill & Dated: 12-02-2025	Sample Source: Ground Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample : GW-4, T-2/3)	Union:, Vill.:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.30	mg/L	UVS	0.10
2	Chemical Oxygen Demand (COD)	4.0	48	mg/L	CRM	4.0
3	pH	6.5-8.5	6.4	-	pH Meter	-
4	Phosphate	6.0	0.70	mg/L	UVS	0.10

Comments:

Sample was collected & supplied by client.

N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, 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		1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer		2.) Name: Md. Biplab Hossain Designation: Chief Chemist	

Md. Biplab Hossain
Chief Chemist
Department of Public Health Engineering
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Lab Memo: 873/ CC, DPHE, CL, Dhaka

Date: 06-03-2025

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2025030021	Sample Receiving date: 12-02-2025
Ref. Memo No: HCL/2025/Nill & Dated: 12-02-2025	Sample Source: Ground Water
Sent by: Md. Rahad Hossain, Manager (Engineering), Hanbaek Co. Ltd.	Dist: Gazipur, Upa:
Care Taker: Hanbaek Co. Ltd. (Sample : GW-5, T-2/1)	Union:, Vill.:
Sample Collection date: 12-02-2025	Date of Testing: 12/02/2025-05/03/2025

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	0.35	mg/L	UVS	0.10
2	Chemical Oxygen Demand (COD)	4.0	56	mg/L	CRM	4.0
3	pH	6.5-8.5	6.8	-	pH Meter	-
4	Phosphate	6.0	1.2	mg/L	UVS	0.10

Comments:

Sample was collected & supplied by client.

N.B. AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, 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		1.) Name: Mita Sarker Designation: Senior Chemist	
2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer		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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Ground Water Test Report of the project corridor from DPHE

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Annexure B

icddr,b		Health Systems and Population Studies Division Mohakhali, Dhaka - 1212 Phone: +8809666771100, or 16340, Ext: 2405 Web: http://www.icddr.org		Laboratory of Environmental Health		
Lab. ID No. 2025020712 (V1)		Receipt No: SRA25021200458		Date of Reporting: 24.02.2025		
Particular of Sample: Drinking Water (Ground Water)						
Client Address: Handback Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to TT-1/0) (Ground Water).						
Sl. No.	Water Quality Parameters	Unit	Results	Bangladesh Standard for Drinking Water (ECR23)	WHO Guideline for Drinking Water, 2008	Method
1	Total coliforms	CFU /100ml.	0	0	0	Membrane Filtration
2	Faecal coliforms	CFU /100ml.	0	0	0	Membrane Filtration
3	Biochemical Oxygen Demand (BOD ₅ ; 20°C)	mg/L	<2.0	-	-	5-Day BOD Test

Prepared By: EM.FM.007.01 Effective Date 30/03/2016

Checked By: End of the Report

Dr. Zahid Hayat Mahmud
Scientist and Head
Laboratory of Environmental Health, HSPSD, icddr,b
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Gulshan, Dhaka-1212

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icddr,b		Health Systems and Population Studies Division Mohakhali, Dhaka - 1212 Phone: +8809666771100, or 16340, Ext: 2405 Web: http://www.icddr.org		Laboratory of Environmental Health		
Lab. ID No. 2025020713 (V1)		Receipt No: SRA25021200460		Date of Reporting: 24.02.2025		
Particular of Sample: Drinking Water (Ground Water)						
Client Address: Handback Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to T-4/0) (Ground Water).						
Sl. No.	Water Quality Parameters	Unit	Results	Bangladesh Standard for Drinking Water (ECR23)	WHO Guideline for Drinking Water, 2008	Method
1	Total coliforms	CFU /100ml.	0	0	0	Membrane Filtration
2	Faecal coliforms	CFU /100ml.	0	0	0	Membrane Filtration
3	Biochemical Oxygen Demand (BOD ₅ ; 20°C)	mg/L	<2.0	-	-	5-Day BOD Test

Prepared By: EM.FM.007.01 Effective Date 30/03/2016

Checked By: End of the Report

Dr. Zahid Hayat Mahmud
Scientist and Head
Laboratory of Environmental Health, HSPSD, icddr,b
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Mohakhali, Dhaka - 1212
Phone: +8809666771100, or 16340, Ext: 2405
Web: http://www.icddr.org

Laboratory of Environmental Health

Lab. ID No. 2025020714 (V1)

Test Report
Receipt No: SRA25021200467

Date of Reporting: 24.02.2025

Particular of Sample: Drinking Water (Ground Water)

Date of Sample Received: 12.02.2025

Client Address: Handback Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to T-3/0) (Ground Water).

Sl. No.	Water Quality Parameters	Unit	Results	Bangladesh Standard for Drinking Water (ECR'23)	WHO Guideline for Drinking Water, 2008	Method
1	Total coliforms	CFU/100mL	17	0	0	Membrane Filtration
2	Faecal coliforms	CFU/100mL	13	0	0	Membrane Filtration
3	Biochemical Oxygen Demand (BOD ₅ ; 20°C)	mg/L	<2.0	-	-	5-Day BOD Test

Comment: The supplied water sample is contaminated with total coliforms and faecal coliforms.

Prepared By:
EM.FM.007.01 Effective Date 30/03/2016

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Scientist and Head
Laboratory of Environmental Health, HSPSD, icddr,b
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Phone: +8809666771100, or 16340, Ext: 2405
Web: http://www.icddr.org

Laboratory of Environmental Health

Lab. ID No. 2025020720 (V1)

Test Report
Receipt No: SRA25021200474

Date of Reporting: 24.02.2025

Particular of Sample: Drinking Water (GW)

Date of Sample Received: 12.02.2025

Client Address: Handback Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to T-2/3) (GW).

Sl. No.	Water Quality Parameters	Unit	Results	Bangladesh Standard for Drinking Water (ECR'23)	WHO Guideline for Drinking Water, 2008	Method
1	Total coliforms	CFU/100mL	0	0	0	Membrane Filtration
2	Faecal coliforms	CFU/100mL	0	0	0	Membrane Filtration
3	Biochemical Oxygen Demand (BOD ₅ ; 20°C)	mg/L	<2.0	-	-	5-Day BOD Test

Prepared By:
EM.FM.007.01 Effective Date 30/03/2016

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Dr. Zahid Hayat Mahmud
Scientist and Head
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Gulshan, Dhaka-1212

Contact Us _____

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icddr, b

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Mahakhali, Dhaka - 1212
Phone: +8809666771100, or 16340, Ext: 2405
Web: http://www.icddr.org

Laboratory of Environmental Health

Lab. ID No. 2025020711 (V1)

Test Report
Receipt No: SRA25021200478

Date of Reporting: 24.02.2025

Particular of Sample: Water (GW) Date of Sample Received: 12.02.2025

Client Address: Handbaek Co. Ltd., Dhaka and Western Zone Transmission Grid Expansion Project (Adjacent to T-2/1) (GW 5).

Sl. No.	Water Quality Parameters	Unit	Results	Method
1	Total coliforms	CFU /100ml.	48	Membrane Filtration
2	Faecal coliforms	CFU /100ml.	21	Membrane Filtration
3	Biochemical Oxygen Demand (BOD ₅ ; 20°C)	mg/L.	1410.0	5-Day BOD Test

Prepared By : 

EM.FM.007.01 Effective Date 30/03/2016

Checked By : 

End of the Report


Dr. Zahid Hayat Mahmud
Scientist and Head
Laboratory of Environmental Health, HSPSD, icddr, b
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Ground Water Test Report of Handbaek from icddr, b

Soil Quality Test



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 Gulshan, Dhaka-1212

Contact Us _____
 info@greenbudbd.com
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Test Report

Reference No	ST 10113	Test Name	Soil Quality Test (Chemical Properties)
Sample Receiving Date	17/03/2025	Sample ID	SQ-(1-2-3-4-5)
Date of Analysis	06/04/2025 to 27/04/2025	Date of Submission	30/04/2025
Client Name	Handbaek Co. Ltd. Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LILo at Kaliganj and Purbachal Substation on Turnkey Basis	Sample Type	Soil Sample from site

Methodology

S/I	Soil Quality Parameters	Unit	Bangladesh Standard (ECR'23)	Method of Analysis
1	pH	-	-	1:2.5 Glass Electrode Method
2	Total Nitrogen (TN)	%	-	Micro-Kjeldahl Method
3	EC	ppm	-	FAO-UNESCO, 1973
4	Zinc (Zn)	ppm	-	DTPA Extraction Method
5	Phosphorus (P)	ppm	-	Olsen Method and Bray & Kurtz Method
6	Potassium (K)	ppm	-	NH ₄ OAc Extraction Method
7	Iron (Fe)	%	-	DTPA Extraction Method
8	Lead (Pb)	ppm	-	Nitric Acid Digestion Method
9	Copper (Cu)	ppm	-	DTPA Extraction Method
10	Calcium (Ca)	ppm	-	NH ₄ OAc Extraction Method

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Soil Quality Monitoring Result:

Sample Code	pH	Total Nitrogen	EC	Zinc	Phosphorous	Potassium	Iron	Lead	Copper	Calcium
	-	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
Code:1	5.4	0.26	4.43	184.40	3.15	0.26	1.74	34.08	56.90	15.36
Code:2	4.8	0.28	2.55	90.82	2.10	0.31	1.57	35.65	45.11	14.24
Code:3	4.7	0.21	1.36	54.18	1.53	0.26	1.70	36.01	30.68	8.56
Code:4	7.8	0.09	10.69	36.01	2.53	0.68	1.57	0.05	22.17	18.75
Code:5	4.5	0.50	4.70	90.94	2.18	0.30	1.68	33.59	45.11	11.70

Comments:

1. No Standard has been set yet for Soil Quality Tests.
2. Samples were collected by Site Inspector.
3. Samples were received in sealed condition

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Annexure

TEST REPORT
Government of the People's Republic of Bangladesh
Soil Resource Development Institute (SRDI)
Central Laboratory
Mrityika Bhabon, Krishi Khamar Sarak, Dhaka-1215

Report ID : 12.03.0000.034.57.005.25-68 Ref. F01(7.8/01)

Name of Client : Md. Rahad Hossain

Address : Manager (Engineering) Hanbaek Co., Ltd. 23, Bia-ro, Gwangsan-gu- Gwangju -si, KOREA PH:82-62-954-1122,

Mobile/ Email : global@hanbaek.com

Description with Ref. : Personal Application.

Sampling Method : Not Applicable

Sample Received Date : 17th March, 2025

Test Starting Date : 06th April, 2025

Result Delivery date : 27th April, 2025

Testing Method : pH (1:2.5 Glass Electrode Method), EC [(FAO-UNESCO, 1973), TN (Micro-Kjeldahl Method), P (Olsen Method and Bray & Kurtz Method), K, Ca (NH₄OAc Extraction Method), Zn, Cu, Fe (DTPA Extraction Method), Pb (Nitric Acid Digestion Method).

Test Temperature : Average 23.3^o C

Analytical Result

Lab No.	Sample Name & Code	Tested Items			Govt. Specification/ Maximum Allowable Limit	Remarks
		Element	Result	Unit		
S2025-209	Name: Soil Sample Code: 01	pH	5.4	-	Not applicable (N/A)	
		Total Nitrogen (TN)	0.26	%	N/A	
		EC	4.43	ppm	N/A	
		Zinc (Zn)	184.40	ppm	N/A	
		Phosphorus (P)	3.15	ppm	N/A	
		Potassium (K)	0.26	ppm	N/A	
		Iron (Fe)	1.74	%	N/A	
		Lead (Pb)	34.08	ppm	N/A	
		Copper (Cu)	56.90	ppm	N/A	
		Calcium (Ca)	15.36	ppm	N/A	
S2025-210	Name: Soil Sample Code: 02	pH	4.8	-	N/A	
		Total Nitrogen (TN)	0.28	%	N/A	
		EC	2.55	ppm	N/A	
		Zinc (Zn)	90.82	ppm	N/A	
		Phosphorus (P)	2.10	ppm	N/A	
		Potassium (K)	0.31	ppm	N/A	
		Iron (Fe)	1.57	%	N/A	
		Lead (Pb)	35.65	ppm	N/A	
		Copper (Cu)	45.11	ppm	N/A	
		Calcium (Ca)	14.24	ppm	N/A	

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Head Office
14A, Level: 14, Building No: 02
Confidence Center, Kha-09, Shahjadpur
Gulshan, Dhaka-1212

Contact Us
✉ info@greenbudbd.com
☎ +88 0255048399, 01977047336
🌐 www.greenbudbd.com

Lab No.	Sample Name & Code	Tested Items			Govt. Specification/ Maximum Allowable Limit	Remarks
		Element	Result	Unit		
S2025-211	Name: Soil Sample Code: 03	pH	4.7	-	Not applicable (N/A)	
		Total Nitrogen (TN)	0.21	%	N/A	
		EC	1.36	ppm	N/A	
		Zinc (Zn)	54.18	ppm	N/A	
		Phosphorus (P)	1.53	ppm	N/A	
		Potassium (K)	0.26	ppm	N/A	
		Iron (Fe)	1.70	%	N/A	
		Lead (Pb)	36.01	ppm	N/A	
		Copper (Cu)	30.68	ppm	N/A	
		Calcium (Ca)	8.56	ppm	N/A	
S2025-212	Name: Soil Sample Code: 04	pH	7.8	-	N/A	
		Total Nitrogen (TN)	0.09	%	N/A	
		EC	10.69	ppm	N/A	
		Zinc (Zn)	36.01	ppm	N/A	
		Phosphorus (P)	2.53	ppm	N/A	
		Potassium (K)	0.68	ppm	N/A	
		Iron (Fe)	1.57	%	N/A	
		Lead (Pb)	0.05	ppm	N/A	
		Copper (Cu)	22.17	ppm	N/A	
		Calcium (Ca)	18.75	ppm	N/A	
S2025-213	Name: Soil Sample Code: 05	pH	4.5	-	N/A	
		Total Nitrogen (TN)	0.50	%	N/A	
		EC	4.70	ppm	N/A	
		Zinc (Zn)	90.94	ppm	N/A	
		Phosphorus (P)	2.18	ppm	N/A	
		Potassium (K)	0.30	ppm	N/A	
		Iron (Fe)	1.68	%	N/A	
		Lead (Pb)	33.59	ppm	N/A	
		Copper (Cu)	45.11	ppm	N/A	
		Calcium (Ca)	11.70	ppm	N/A	

Shammi
27.4.25
(Asst. Technical Manager)

শামী আবতার তিনা
বৈজ্ঞানিক কর্মকর্তা
কেন্দ্রীয় পরীক্ষাগার
পুত্রিকা সপ্তদশ উন্নয়ন ইনস্টিটিউট
খানাবাড়ি সড়ক, ঢাকা-১২১৫

27.4.25
(Technical Manager)

ড. মোঃ হুমায়ুন কবীর শিরাজী
উপকেন্দ্রীয় বৈজ্ঞানিক কর্মকর্তা
পুত্রিকা সপ্তদশ উন্নয়ন ইনস্টিটিউট
কেন্দ্রীয় পরীক্ষাগার
পুত্রিকা সপ্তদশ উন্নয়ন ইনস্টিটিউট
খানাবাড়ি সড়ক, ঢাকা

27.4.25
(Quality Manager)

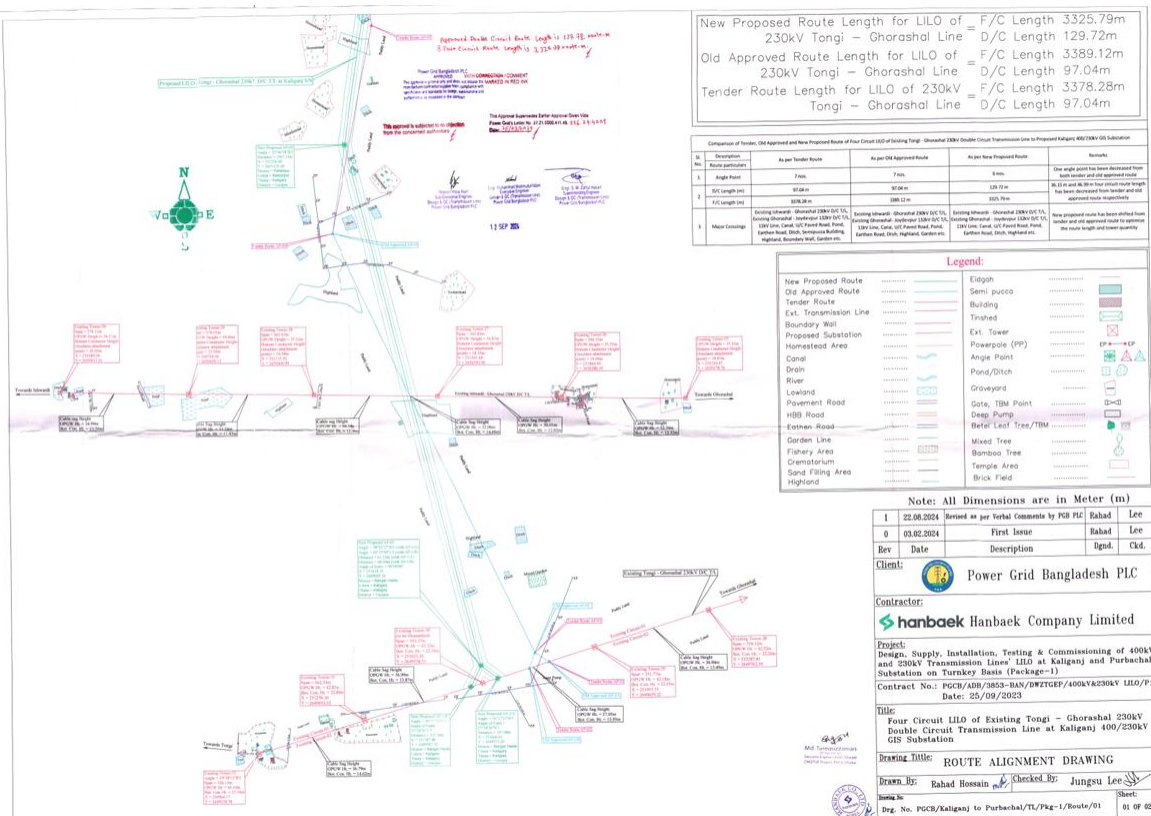
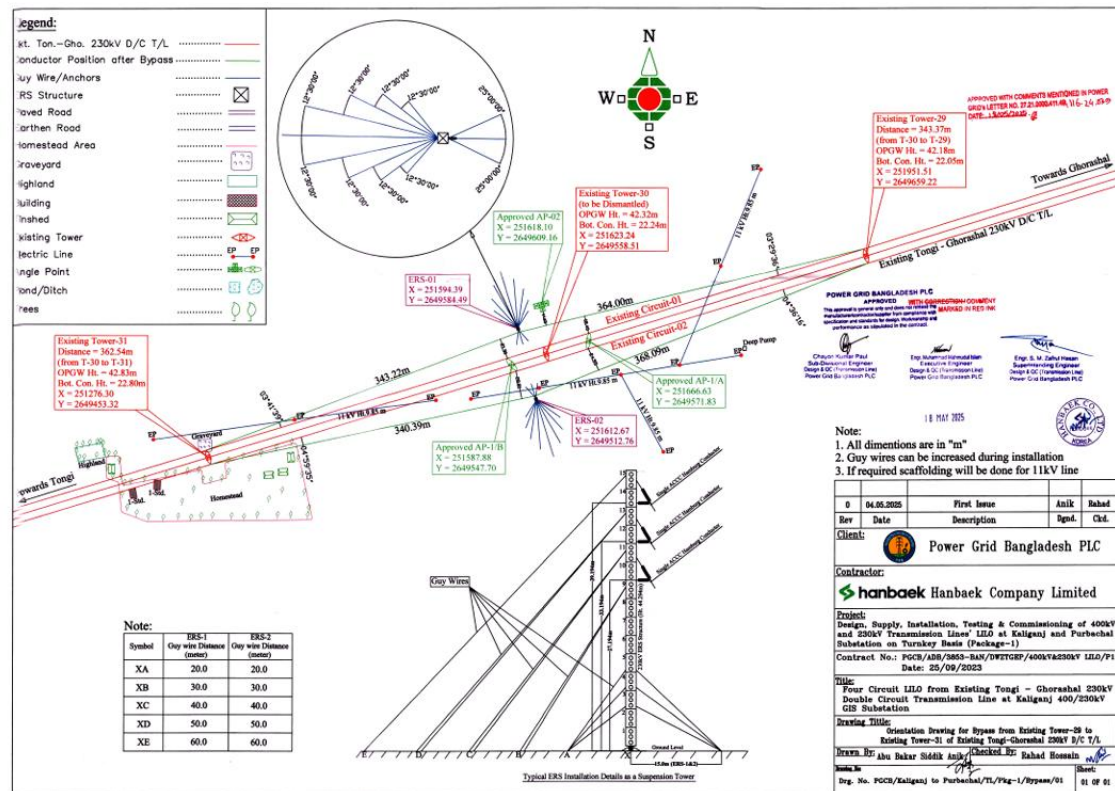
শ্রীঃ জয়নাল আবেদিন
প্রধান বৈজ্ঞানিক কর্মকর্তা
কেন্দ্রীয় পরীক্ষাগার
পুত্রিকা সপ্তদশ উন্নয়ন ইনস্টিটিউট
কমিঃ খানাবাড়ি সড়ক, ঢাকা

Soil Test Report for Handbaek from srdi

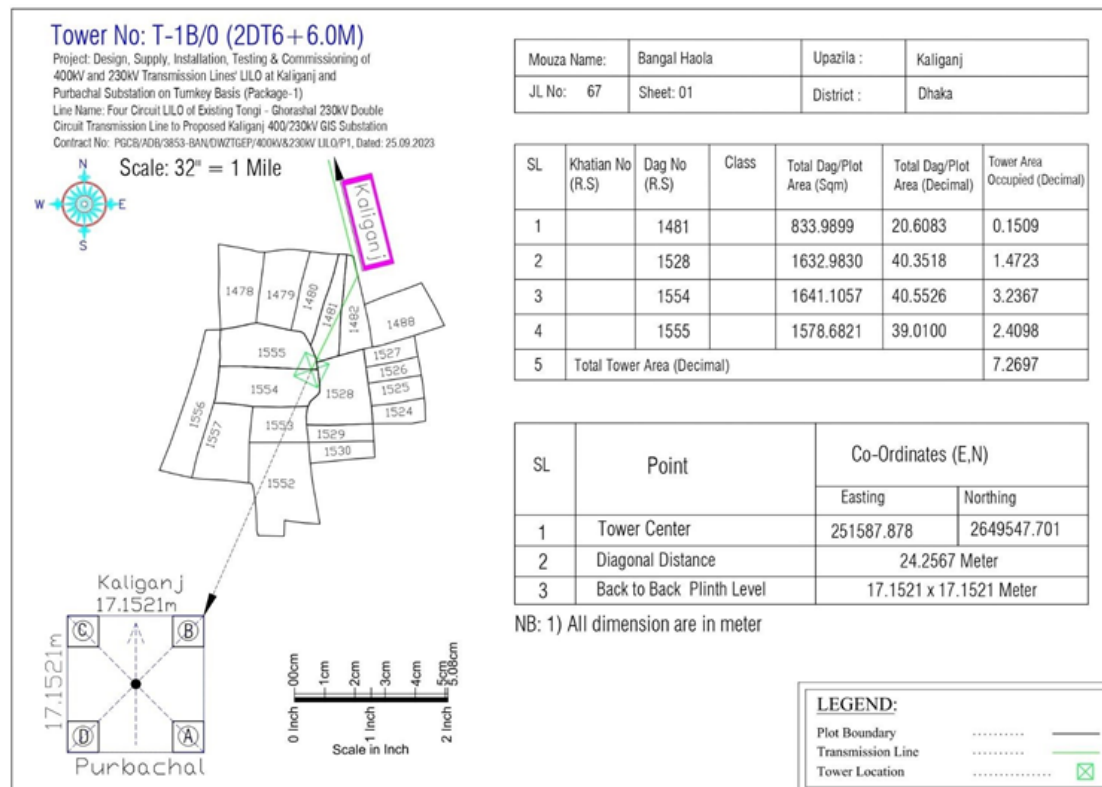
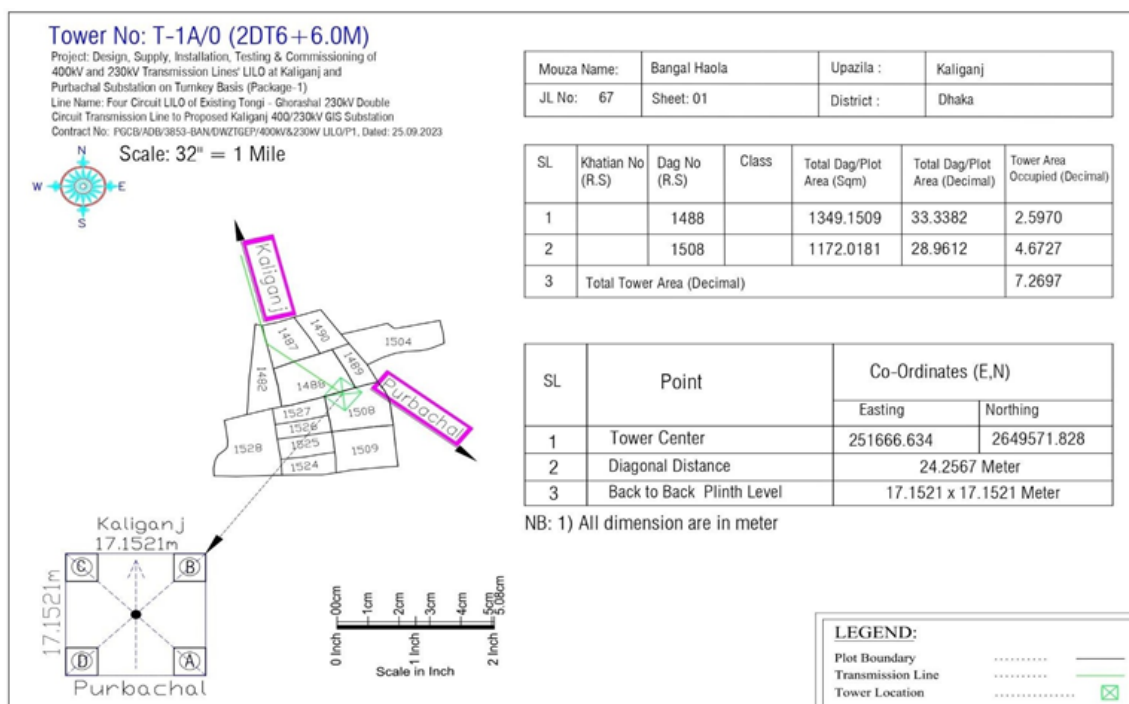
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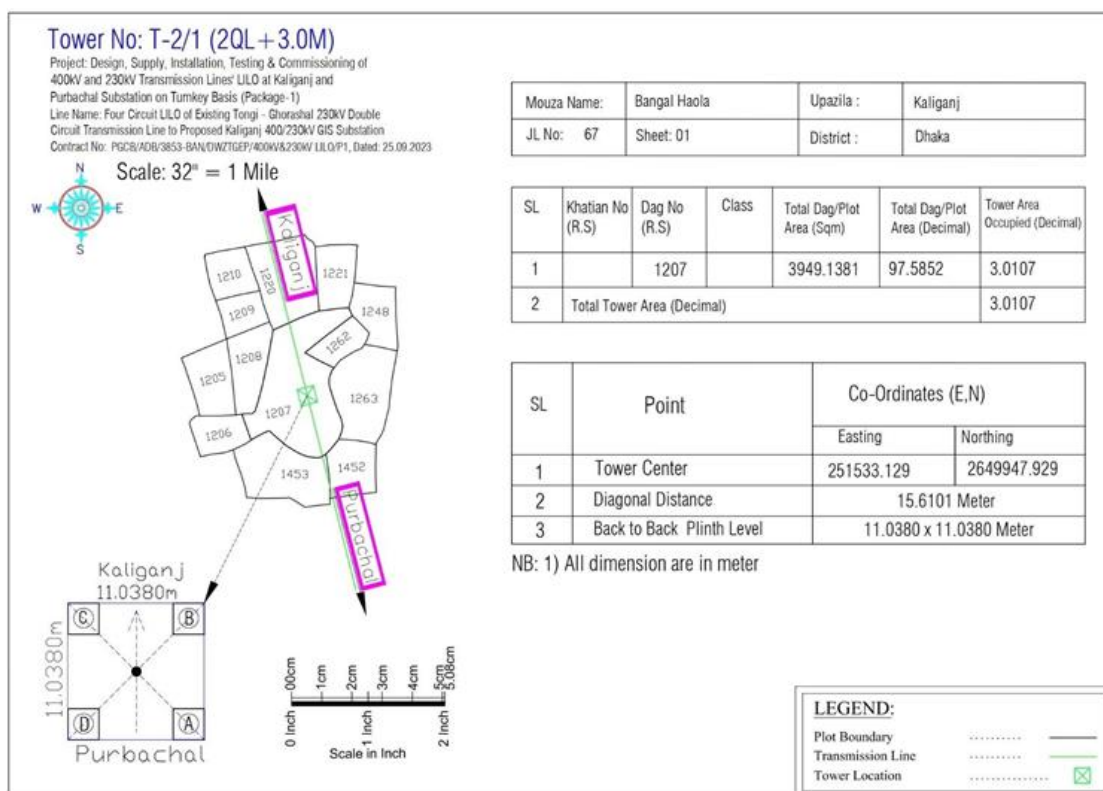
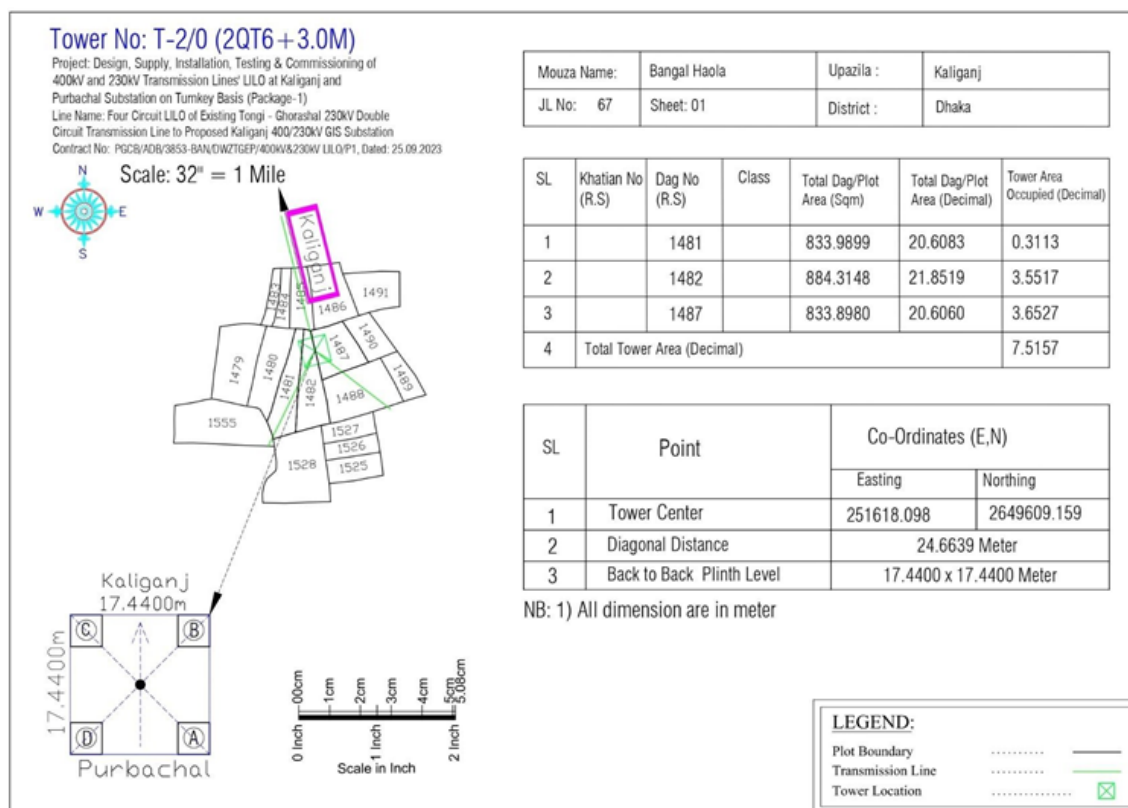


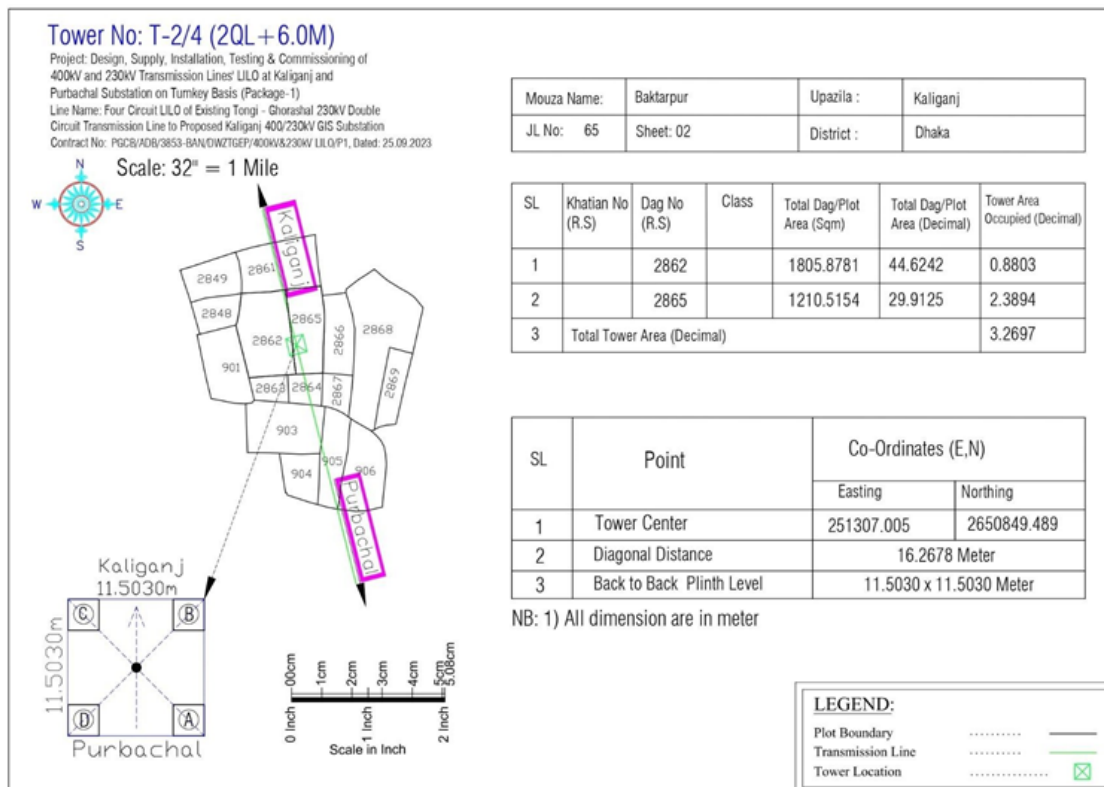
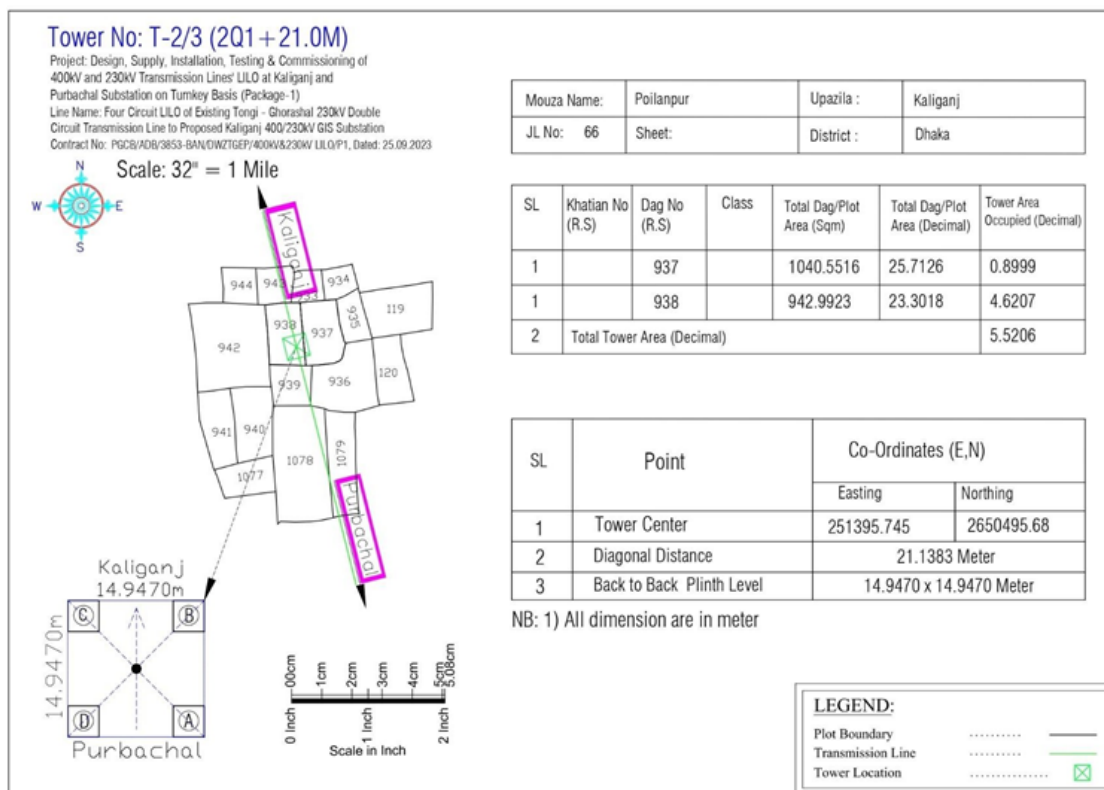
Appendix D: Layout Plan and Design Drawing

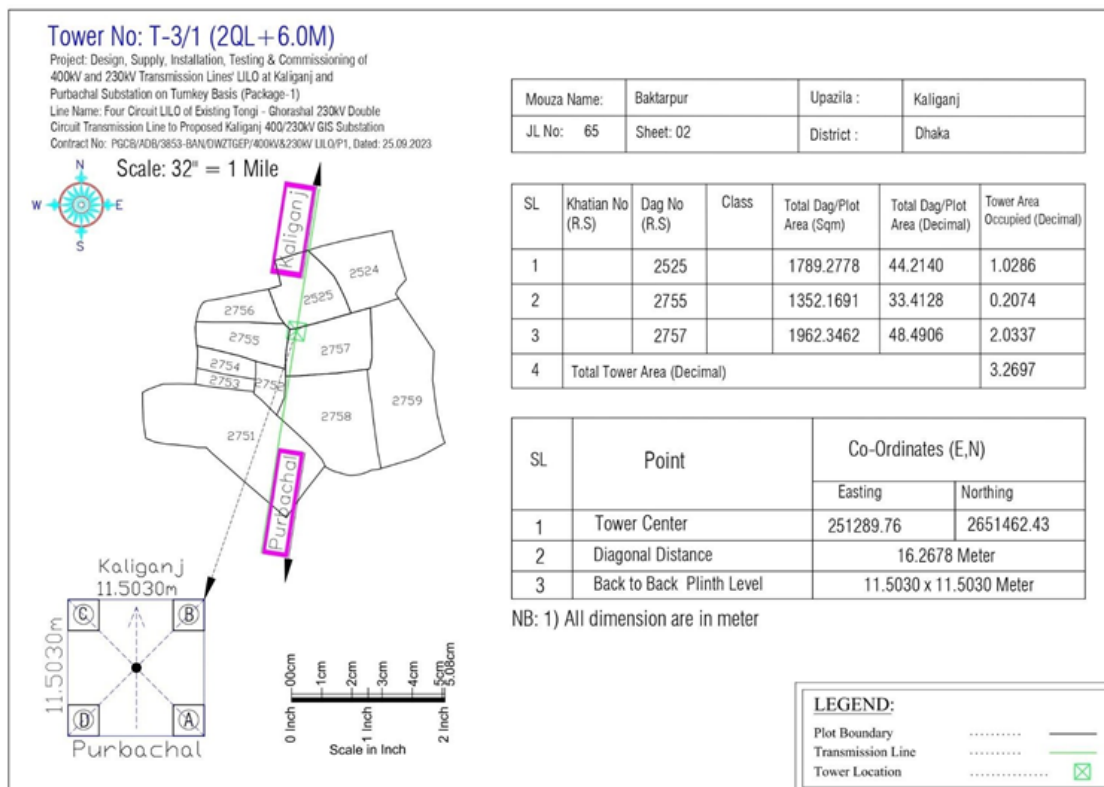
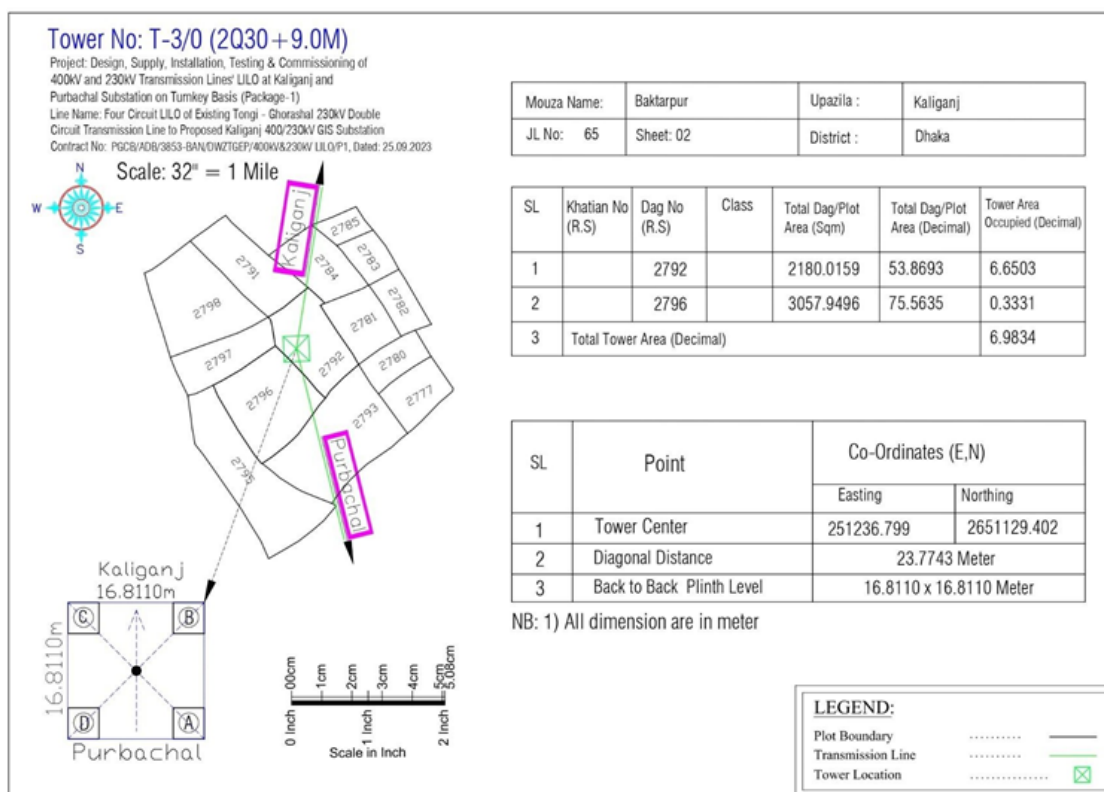


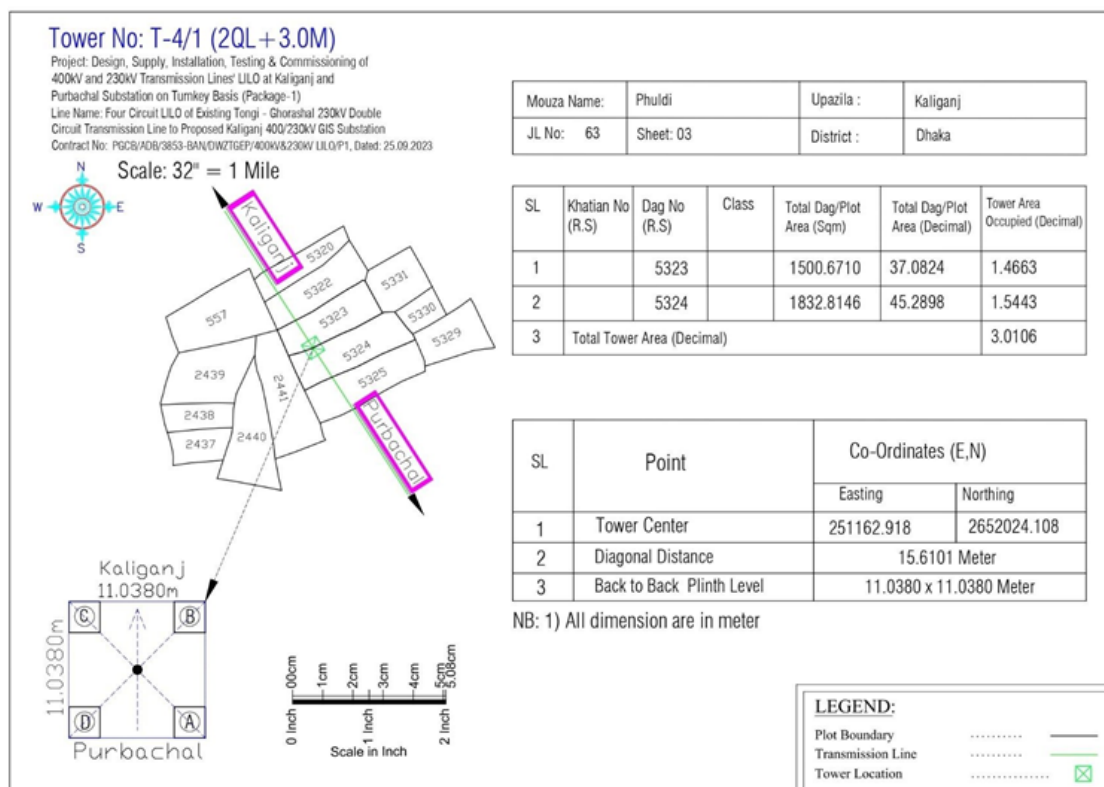
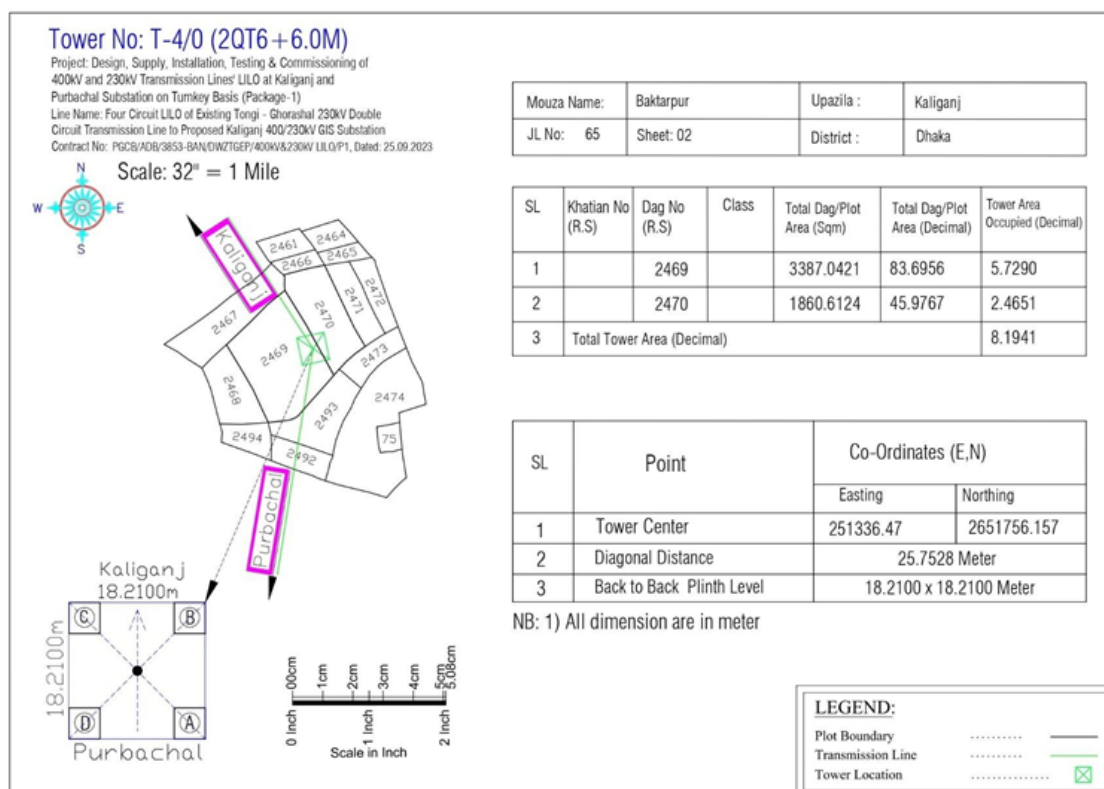
Appendix E: Tower Wise Mouza Maps

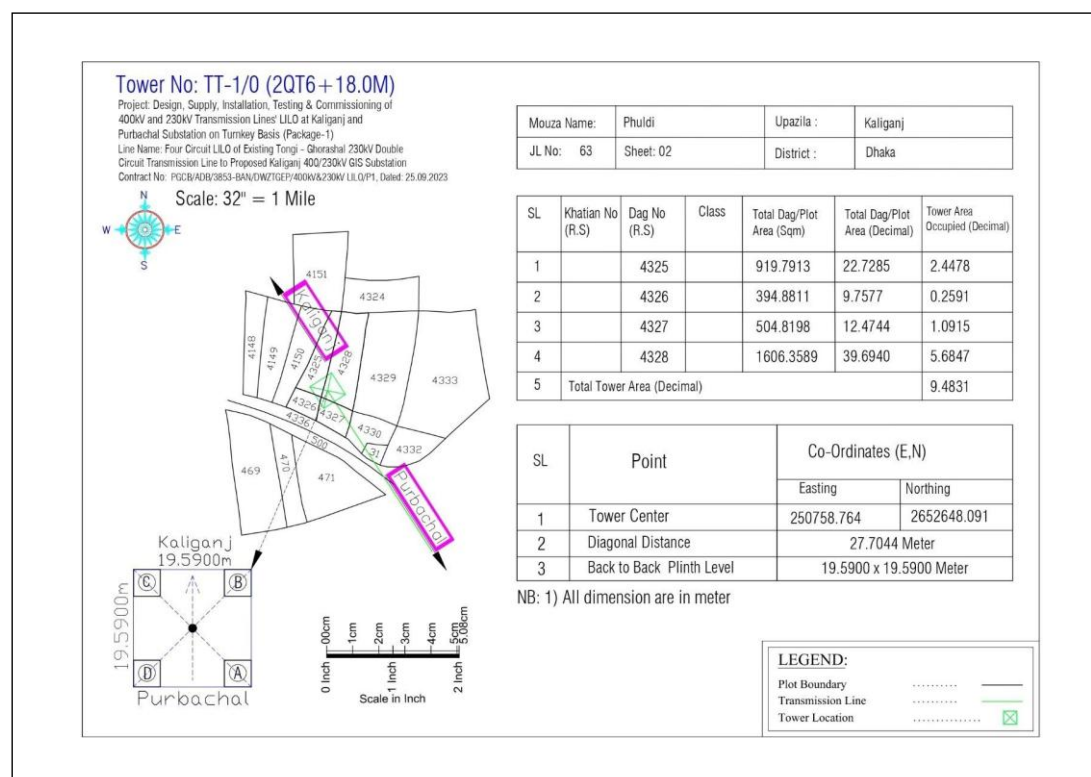
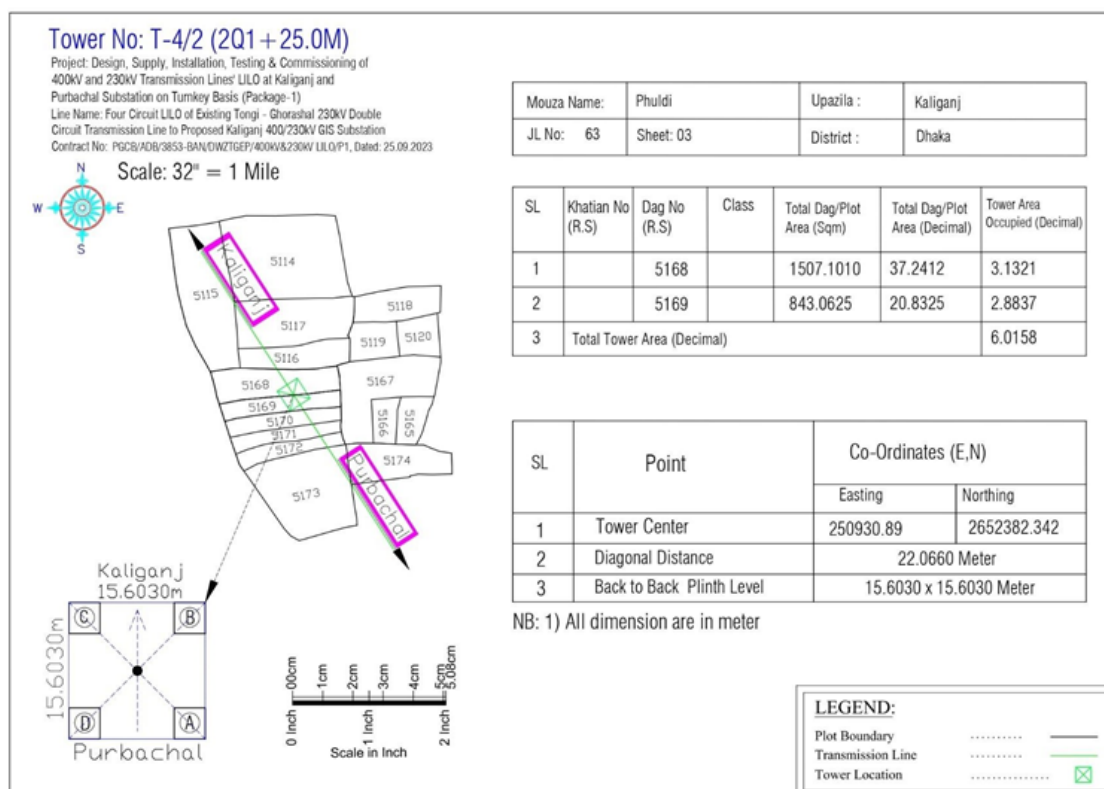


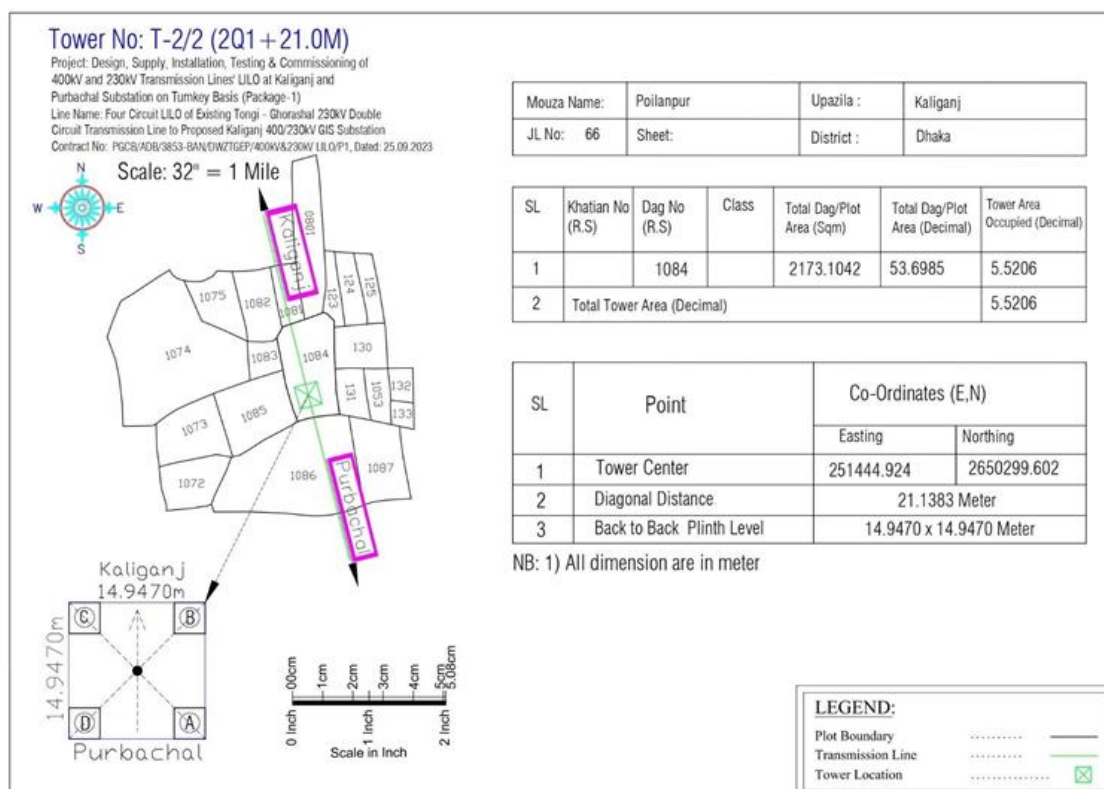












Appendix F: ECC Certificate

Government of the People's Republic of Bangladesh
 Department of Environment
 Head Office
 Poribesh Bhaban, E-16, Agagaon, Sher-E-
 Banglanagar, Dhaka-1207
www.doe.gov.bd

Environmental Clearance (Renewal)

Clearance No: 22.02.0000.018.072.007.25.145

This Environmental clearance of the following the Industry/Project named below has been renewed under the terms and conditions specified herein:

Name of Industry/Project	: Dhaka and Western Zone Transmission Grid Expansion Project
Name of the Entrepreneur	: Md. Abul Kashem
Identification No	: 161012
Industry/Project Activities	: ২ কি.মি. ৪০০ কেভি সঞ্চালন লাইন নির্মাণ; ১৪৪ কি.মি. ২৩০ কেভি সঞ্চালন লাইন নির্মাণ; ২৪২ কি.মি. ১৩২ কেভি সঞ্চালন লাইন নির্মাণ; ২ টি ৪০০ কেভি, ৩টি ২৩০কেভি এবং ১০ টি ১৩২ কেভি জিআইএস গ্রিড উপকেন্দ্র নির্মাণ; বিদ্যমান ৯টি ১৩২/৩৩ কেভি উপকেন্দ্রে ২০ টি ১৩২ কেভি বে-এক্সটেনশন।
Industry/Project Category	: Red
Industry/Project Address	: Grid Bhaban, Level-9, Avenue-3, Jahurul Islam City, Aftabnagar, Dhaka-1212
Date of Issue	: 05 October 2025
Date of Expiry	: 26 July 2026



The terms and conditions attached separately with this Clearance must be complied. Failure to comply with any condition of this clearance may result in penalties, suspension or revocation of the Clearance.

Appendix G: SEMP of the Project

**Site Specific Environmental
Management Plan (SEMP)**

Of

**Dhaka and Western Zone Transmission Grid
Expansion Project (DWZTGEP)**

CLIENT:



POWER GRID BANGLADESH PLC



HANBAEK COMPANY LIMITED

PROJECT: Design, Supply, Installation, Testing & Commissioning of
400kV and 230kV Transmission Lines' LILO at Kaliganj and Purbachal
Substation on Turnkey Basis (Package-1)

Contract No.: POWER GRID/ADB/3853- BAN/DWZTGEP/400kV&230kV
LILO/P1

Date: 25/09/2023

Submitted to

Power Grid Bangladesh PLC

Submitted By

Hanbaek Company Limited

*Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LILO
at Kaliganj and Purbachal Substation on Turnkey Basis (Package-1)*

May 2025

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Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LILo at Kaliganj and Purbachal Substation on Turnkey Basis (Package-1)

Executive Summary

➤ Project Overview

1. This Executive Summary provides an overview of the Site-Specific Environmental and Social Management Plan (SSEMP) developed for the Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGEF), particularly focusing on the 400kV and 230kV Transmission Lines' LILo at Kaliganj and Purbachal Substation on Turnkey Basis (Package-1). The SSEMP integrates ADB's Safeguard Policy Statement (2009), national environmental regulations (ECA 1995 and ECR 2023), and good international industry practices (GIIP). It is designed to identify, mitigate, and monitor environmental and social impacts throughout the pre-construction and construction phases of the project.

➤ Environmental Baseline

2. Baseline assessments were conducted across the transmission route covering:
 - **Air Quality:** PM2.5, PM10, SO₂, NO_x levels – all within permissible limits.
 - **Noise Levels:** Measured day/night noise for 5 tower sites.
 - **Water Quality:** Groundwater and surface water tested for DO, pH, TDS, COD, etc.
 - **Soil & Sediment Quality:** Benchmarked against Danish EPA standards (HH ANNEX).

Baseline data is compiled in FF ANNEX with raw monitoring data in GG ANNEX.

➤ Management & Mitigation Plans

3. Detailed thematic management plans were developed and aligned with project risks:

Area	Annex	Key Focus
Camp, Worker Safety	H	Housing, sanitation, PPE, GRM, labor conditions
Waste Management	I, O	Construction waste, hazardous waste, e-waste, medical waste
Public & Occupational Safety	J	Electrical risks, traffic, noise, EMF, community safety
Transportation & Storage	K	Material logistics, traffic control, sensitive areas
Emergency & Disaster Risk	L, Z	Fire, flood, earthquake, accident SOPs
Biodiversity & Bird Safety	F	Migratory routes, buffer zones, invasive species
Tree Plantation & Restoration	M	3:1 compensatory planting, native species, fencing

➤ Monitoring, Reporting & SOPs

4. A full monitoring and reporting mechanism has been institutionalized:
 - **Monthly Environmental Monitoring:** Covers air, noise, water, and waste (Annex T).
 - **Training Logs and Attendance:** Maintained per topic and frequency (Annex JJ).
 - **Raw Data and Test Results:** Available for third-party verification (Annex FF, EE).
 - **Documentation Requirements:** Detailed list of contractual and regulatory deliverables (V ANNEX).

Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LILO at Kaliganj and Purbachal Substation on Turnkey Basis (Package-1)

➤ **Training & Awareness**

5. A field-ready Training Implementation Plan (Annex Y) is in place targeting:
- EHS induction & toolbox talks
 - Emergency response drills
 - PPE use & fire training
 - Cultural sensitivity near mosques
 - Ecological protection (migratory birds, invasive species)

Trainings are reviewed bi-annually by POWER GRID, contractors, and consultants.

➤ **Emergency & Risk Response**

6. The SEP (Annex KK) outlines:
- 10 types of emergencies including fire, flood, electrocution
 - First responder teams trained in fire safety, spill response, and evacuation
 - Coordination with hospitals, fire services, and local authorities

➤ **Community Engagement & Grievance Mechanism**

7. Community liaison roles are defined across 12 impact areas (Annex S):
- Engagement schedules, reporting templates, and responsibilities
 - GRM access via trained community liaison officers
 - Transparent disclosure of project updates and mitigation

➤ **Implementation Schedule**

8. The project's SSEMP implementation is phased (Annex T), including:
- Environmental testing schedule (air, noise, soil, water)
 - Mitigation timelines for dust suppression, camp sanitation, solid waste
 - Monthly training and continuous monitoring activities

➤ **Conclusion**

9. This SSEMP integrates comprehensive environmental safeguards, proactive risk management, and participatory stakeholder engagement to ensure that the project meets all environmental and social obligations while upholding community health, ecological balance, and sustainable construction practices.

Appendix H: SEMP Implementation Schedule

Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LILO at Kaliganj and Purbachal Substation on Turnkey Basis (Package-1)

T ANNEX: SEMP IMPLEMENTATION SCHEDULE

NOTES	
Continuing Activity	
Activity Implementation Period	

SL. No.	Activities	Aug 2023	Sep 23	Apr 24	Oct 24	Apr 25	Oct 25	Apr 26
1.	Baseline Environmental Quality Testing							
1.1	Air Quality Monitoring	1 Nos						
1.2	Noise Level Monitoring	1 Nos						
1.3	Soil Quality Monitoring	1 Nos						
1.4	Water Quality Monitoring (Ground Water and Surface Water)	2 Nos						
2.	Monthly Environmental Monitoring	Monthly Monitoring and Reporting						
3.	Environmental Quality Testing							
3.1	Air Quality Monitoring		1 Nos	1 Nos	1 Nos	1 Nos	1 Nos	1 Nos
3.2	Noise Level Monitoring		1 Nos	1 Nos	1 Nos	1 Nos	1 Nos	1 Nos
3.3	Soil Quality Monitoring		1 Nos	1 Nos	1 Nos	1 Nos	1 Nos	1 Nos
3.4	Water Quality Monitoring (Ground Water and Surface Water)		2 Nos	2 Nos	2 Nos	2 Nos	2 Nos	2 Nos
4.	Environmental Mitigation Measures ¹⁹							
4.1	Dust suppression in haul roads and material storage location							

¹⁹ The Mitigation Measures have been developed following the Mitigation measures from Package-1 and Package-2 of Component 1.

Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LILo at Kaliganj and Purbachal Substation on Turnkey Basis (Package-1)

SL. No.	Activities	Aug 2023	Sep 23	Apr 24	Oct 24	Apr 25	Oct 25	Apr 26
4.2	Providing sewage tank/soak well in construction camps							
4.3	Installation of Tube well and safe drinking water supply							
4.4	Providing solid waste management facility in construction camp medium and small size dustbins							
4.5	Disposal of construction debris and other waste materials and transportation							
4.6	Protection of ponds							
4.7	Traffic management		As per EHS Plan					
4.8	Occupational safety appliances and PPE for workers	As per EHS Plan						
4.9	Informatory Signage for safety near sensitive locations and built-up sections							
5.	Training for Workers and Institutional Strengthening							
5.1	Training to workers and Project Personnel on occupational health and safety	Monthly Basis Training (Each 1 Nos/ Month)						
6.	Uninterrupted Operational Activities							
6.1	Power Supply	As per Requirement						
6.2	Short Circuit/ Accident	As per Requirement						
6.3	EMF	As per Requirement						

Appendix J: Special Conditions

Section 8: Special Conditions of Contract

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mented. Such acceptance by the Project Manager shall not relieve the Contractor of any of his obligations or responsibilities under the Contract.

The Contractor shall (a) establish an operational system for managing environmental impacts, (b) comply with the approved SSEMP and any corrective or preventative actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor the implementation of the project EMP through the SSEMP, (c) allocate the budget required to ensure that such measures, requirements and actions are carried out, (d) submit semi-annual reports on the compliance of such measures to the Employer.

Where unanticipated environmental risks or impacts become apparent during the Contract, the Contractor is required to update the SSEMP to outline the potential impacts to site works and associated mitigation measures for the Project Manager's approval.

A New Clause 9.9 is added

The Contractor shall supply any raw materials, utilities, lubricants, chemicals, catalysts, facilities, services and other matters in an amount sufficient to carry out the pre-commissioning, commissioning and guarantee tests as prescribed and required in the Scope of Works under the Contract.

A new Clause 9.10 is added

The Contractor, immediately after notification of award, shall provide the Employer free of charge with 8 (eight) hardcopies of all engineering data, drawings and descriptive materials submitted with the bid, which will form part of the contract.

A new Clause 9.11 is added

The Contractor shall obtain temporary rights-of-way for the mobilization of materials for the purpose of construction of transmission lines which are necessary for the Works in accordance with the Resettlement Plan (RP). The Employer shall monitor Contractor's activity, secure necessary budget, pay actual compensation cost and ensure timely disbursement of compensation and other entitlements to the Contractor in accordance with the RP and the Development Project Proposal (DPP) as updated from time to time. The Contractor shall obtain, at his risk and cost, any additional rights of way or facilities outside the Site which he may require for the purposes of the Works in accordance with the RP.

A new Clause 9.12 is added

The Contractor, at his own cost, at within 30 (thirty) days after contract signature, shall provide the Employer with fifteen (15) hard copies of the CONTRACT DOCUMENT.

10. Employer's Responsibilities

- 10.2 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, as specified in the Appendix (Scope of

Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LILO at Kaliganj and Purbachal Substation on Turnkey Basis (Package-1)



45.2 Appointment (if not agreed) to be made by:

Head, Department of Electrical & Electronics Engineering, Bangladesh University of Engineering & Technology, Bangladesh

The appointing entity or official must not, in any way, be related or connected to the Employer or Contractor.

45.5 Rules of procedure for arbitration proceedings:

(a) Contracts with foreign Contractors:

International arbitration shall be conducted in accordance with the Rules of the Singapore International Arbitration Centre (SIAC).

Arbitration shall be administered by the Singapore International Arbitration Centre (SIAC).

The place of arbitration shall be the place of the institution administering the arbitration.

(b) Contracts with Contractors being nationals of the Employer's country:

Arbitration shall be conducted in accordance with the "Bangladesh Arbitration Act 2001".

The place of arbitration shall be Dhaka, Bangladesh

46. Environmental Management Plan

The Contractor shall comply with all applicable national, provincial and local environmental laws and regulations.

The Contractor shall (a) establish an operational system for managing environmental impacts, (b) carry out all of the monitoring and mitigation measures set forth in the [Initial Environmental Examination ("IEE")] or [Environmental Management Plan ("EMP")] and (c) allocate the budget required to ensure that such measures are carried out. The Contractor shall submit semi-annual reports on the carrying out of such measures to the Employer.

More particularly, the Contractor shall comply with (i) the measures and requirements set forth in the initial environmental examination and the environmental management plan attached hereto as Appendix [2,3]; and (ii) any corrective or preventative actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor implementation of the initial environmental examination and the environmental management plan.

The Contractor shall allocate a budget for compliance with these measures, requirements and actions."

Appendix to SCC (will be provided in PDF form) with the bidding document):

1. Resettlement Plan (RP)
2. Initial Environment Examination (IEE)
3. Environment management Plan (EMP)
4. Corrective Action Plan (CAP)

Design, Supply, Installation, Testing & Commissioning of 400kV and 230kV Transmission Lines' LILO at Kaliganj and Purbachal Substation on Turnkey Basis (Package-1)



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