

Initial Environmental Examination

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Bangladesh: Cluster Towns Water Supply and
Sanitation Project

Cumilla Cluster

CURRENCY EQUIVALENTS

(As of 15 June 2026)

Currency Unit	–	Bangladeshi Taka (BDT)
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\$ 1.00	=	BDT 122.5957

ABBREVIATIONS

ACM	-	Asbestos Containing Materials
ADB	-	Asian Development Bank
BCCSAP	-	Bangladesh Climate Change Strategy and Action Plan
BWDB	-	Bangladesh Water Development Board
CHS	-	Community Health and Safety
CTWSSP	-	Cluster Town Water Supply and Sanitation Project
CuCC	-	Cumilla City Corporation
CWIS	-	City-Wide Inclusive Sanitation
DED	-	Detailed Engineering Design
DMA	-	District Metering Area
DoE	-	Department of Environment
DPHE	-	Department of Public Health Engineering
EARF	-	Environmental Assessment and Review Framework
ECA	-	Ecologically Critical Area
ECC	-	Environmental Clearance Certificate
ECR	-	Environment Conservation Rules
EIA	-	Environmental Impact Assessment
EMoP	-	Environmental Monitoring Plan
EMP	-	Environmental Management Plan
ESMS	-	Environmental and Social Management System
FGD	-	Focus Group Discussion
FSM	-	Fecal Sludge Management
GIS	-	Geographical Information System
GoB	-	Government of the People's Republic of Bangladesh
GRC	-	Grievance Redress Committee
GRM	-	Grievance Redress Mechanism
GWTP	-	Groundwater Treatment Plant
IBAT	-	Integrated Biodiversity Assessment Tool
IEE	-	Initial Environmental Examination
INGO	-	Independent Non-Governmental Organization
KBA	-	Key Biodiversity Area
KII	-	Key Informant Interview
LCC	-	Location Clearance Certificate
LGD	-	Local Government Division
LGED	-	Local Government Engineering Department
MHM	-	Menstrual Hygiene Management
MSL	-	Mean Sea Level
NRW	-	Non-Revenue Water
O&M	-	Operation and Maintenance
OHS	-	Occupational Health and Safety

OHT	-	Over Head Tank
PAM	-	Project Administration Manual
PCR	-	Physical Cultural Resources
PIU	-	Project Implementation Unit
PMSC	-	Project Management and Supervision Consultant
PMU	-	Project Management Unit
PSC	-	Project Steering Committee
PTW	-	Production Tube Well
REA	-	Rapid Environmental Assessment
ROW	-	Right of Way
SCADA	-	Supervisory Control and Data Acquisition
SEAH	-	Sexual Exploitation, Abuse and Harassment
SEMP	-	Site-specific Management Plan
SEMR	-	Semi-Annual Monitoring Report
SPS	-	Safeguard Policy Statement
SWM	-	Solid Waste Management
SWTP	-	Surface Water Treatment Plant
ToR	-	Terms of Reference
UFW	-	Unaccounted for Water
UIIPF	-	Urban Infrastructure Improvement Preparatory Facility
UNDP	-	United Nations Development Program
WASA	-	Water Supply and Sewerage Authority
WB	-	The World Bank
WHO	-	World Health Organization of the United Nations
WSS	-	Water Supply and Sanitation

NOTE

In this report, "\$" refers to United States dollars.

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EXECUTIVE SUMMARY

Bangladesh is experiencing rapid urbanization, with the urban population rising from 31.1 million in 2001 to 53.8 million by 2022. This demographic growth has placed severe pressure on urban water supply and sanitation infrastructure, which remains significantly underdeveloped. As of 2024, only 32% of the urban population had access to piped water supply connections, and an equivalent proportion had access to safely managed sanitation facilities. Non-revenue water (NRW) across project towns is estimated to exceed 50%, attributable to aging infrastructure, absence of pressure management, inadequate metering, and poor asset management practices.

To address these challenges, the Government of Bangladesh has requested the Asian Development Bank (ADB) to support the Cluster Towns Water Supply and Sanitation Project (CTWSSP). This project employs a cluster approach to deliver safe, reliable, and climate-resilient water supply and sanitation services to one city and seven towns organized under two geographic clusters: the Cumilla Cluster, comprising Cumilla City Corporation (CuCC) and the Paurashavas of Haziganj, Chandpur, and Laksam; and the Ishwardi Cluster, comprising the Paurashavas of Ishwardi, Pabna, Nator, and Gopalpur. The combined population across all eight project towns was approximately 1.2 million in 2022 and is projected to reach 1.55 million by 2045.

This Initial Environmental Examination (IEE) covers the proposed water supply and sanitation subproject in the Cumilla Cluster only. The Department of Public Health Engineering (DPHE) will be the executing agency. The Cumilla City Corporation and Paurashavas of Laksam, Hajiganj and Chandpur will be the key implementing agencies for Cumilla Cluster. This IEE has been prepared in accordance with the ADB Safeguard Policy Statement (SPS) 2009, and applicable environmental laws and regulations of the Government of Bangladesh.

The overall objective of the CTWSSP is to improve the resilience, quality, sustainability, and coverage of urban water services in the Cumilla and Ishwardi clusters. The project's specific objectives are to (i) reduce non-revenue water by rebuilding and optimizing distribution networks through a District Metered Area (DMA) approach; (ii) enhance the availability and reliability of drinking water supply to achieve 24/7 service delivery; (iii) improve drinking water quality to comply with applicable Bangladesh and international standards; (iv) strengthen water service provider entities to achieve long-term, cost-effective lifecycle-based service provision; (v) enhance municipal capacity for revenue mobilization and financial sustainability; (vi) increase resilience to climate change risks including floods, droughts, and heatwaves by incorporating climate-resilient design measures into masterplans and infrastructure; (vii) promote gender equality by reducing women's unpaid water collection time, expanding access to safe and inclusive sanitation, and enabling women's participation in water governance.

Scope of the Cumilla Cluster Subproject. The Cumilla Cluster subproject covers four municipalities in south-central Bangladesh: Cumilla City Corporation (CuCC), Laksam Paurashava, Hajiganj Paurashava, and Chandpur Paurashava. These towns lie along and near the Dhaka–Chattogram high-value economic corridor, designated as a priority development area by the Government of Bangladesh. The total estimated population served by the proposed subproject area is approximately 883,382 people, as per the census of 2022. The project area of influence for environmental impact assessment is defined as a direct impact zone of up to 50 metres and an indirect impact zone of 50 to 100 metres from pipeline alignments, PTW sites, OHT sites, and other non-linear components.

The subproject will construct approximately 1,080 kilometers of secondary mains and distribution pipelines with metered household connections prioritizing low-income communities, slums, and

informal settlements where feasible to improve equitable access to safe water supply in the town and Paurashavas of Cumilla Cluster. Volumetric metering and district metered area (DMA) approaches will be introduced to improve operational efficiency and reduce nonrevenue water. A total of seventeen production tube wells (PTW) and three surface water treatment plants (SWTP) will be rehabilitated, while six OHTs and twelve PTW will be constructed and integrated into the overall water supply systems. Additional cross-cutting infrastructure under includes the installation of a Supervisory Control and Data Acquisition (SCADA) system for automation and operational monitoring, GIS-based digital asset management, and DMA-based pressure management systems across all four municipalities.

A phase-wise approach will be implemented to fully rehabilitate and improve the whole water supply system in Cumilla cluster due to budget constraints of the government. The government has limited funds that all construction and rehabilitation activities cannot be accommodated or implemented at the same time. Thus, the subproject will initially cover the improvement of existing water supply infrastructures as summarized in table below. Other rehabilitation activities such as the upgrading of surface water intake and main transmission lines will be considered in subsequent projects when additional government counterpart funding becomes available.

Regardless of this phase-wise approach, the subproject will have many small excavation and construction activities covering an approximately 130 sq km within the busy areas of CuCC, and the Paurashavas of Chandpur, Laksam and Hajiganj.

Town/City Corp	Sub-Components	Scope of the Works/Goods/Services under Package
Cumilla	Production Tube Well (PTW)	- Construction of new PTW: 6 nos. - Replacement of existing PTW: 10 nos. - Rehabilitation of existing PTW: 21 nos.
	Over Head Tank (OHT)	- Construction of new OHT: 2 nos. - Rehabilitation of existing OHT: 6 nos.
	Water Supply Distribution pipeline	- Construction of distribution network: 453 km - 10,000 metered water connections
Laksam Municipality	Groundwater Treatment Plant (GWTP)	- Rehabilitation of existing GWTP: 1 no.
	Production Tube Well (PTW)	- Construction of new PTW: 4 nos. - Rehabilitation of existing PTW: 6 nos.
	Construction of OHT	- Construction of new OHT: 2 Nos. - Rehabilitation of existing OHT: 1 no.
	Water Supply Distribution pipeline	- Construction of distribution network: 170 km - 6,000 metered water connections
Hajiganj Municipality	Surface Water Treatment Plant (SWTP)	- Rehabilitation of existing SWTP: 1 no. -
	Production Tube Well (PTW)	- Construction of new PTW: 2 nos. - Replacement of existing PTW: 4 nos. - Rehabilitation of existing PTW: 2 Nos
	Construction of OHT	- Construction of new OHT: 1 no.
	Water Supply Distribution pipeline	- Construction of distribution network: 147 km - 5,500 metered water connections
	Sanitation Facilities (H/H twin pit latrines and Public Toilets)	- Construction twin pit household latrine: 800 nos. - Construction of public toilet: 2 nos.
Chandpur Municipality	Over Head Tank (OHT)	- Construction of new OHT: 1 no. - Rehabilitation of existing OHT: 2 nos.
	Surface Water Treatment Plant (SWTP)	- Rehabilitation of SWTP: 3 nos.
	Water Supply Distribution pipeline	- Construction of distribution network: 278 km - 19,000 metered water connections

Environmental Categorization and Regulatory Requirements. The subproject has been screened in accordance with the ADB Safeguards Policy Statement (SPS) 2009, and Environmental Conservation Acts (ECA) 1995 (Amended in 2010) that govern the required applicable laws for preparation of the IEE report of the subproject. Pursuant to the SPS, the subproject has been screened and classified as Environmental Category B, meaning potential environmental impacts are site-specific, limited in number, none of which are irreversible, and can be readily addressed through mitigation measures. This classification requires the preparation of an IEE, including a comprehensive Environmental Management Plan (EMP). The subproject has also requirement to comply with statutory laws of Bangladesh, including ECA 1995 and Environmental Conservation Rules (ECR) 2023, the subproject is classified under Orange Category. This classification requires the preparation of an IEE, EMP, and issuance of an environmental clearance certificate (ECC) from the Department of Environment (DOE). DPHE will obtain one ECC that will cover all subprojects, which include the Cumilla Cluster subproject. No major gaps exist between GoB regulations and ADB SPS requirements for this subproject.

Baseline Environmental Conditions. The subproject area is predominantly built-up and densely urbanized. Field surveys and desktop assessments identified 68 terrestrial floral species (34 trees, 25 herbs, 9 shrubs) and 30 aquatic faunal species, including amphibians, reptiles, birds, mammals, and freshwater fish. Several species of conservation concern were identified in the broader project area, including the Ganges River Dolphin (*Platanista gangetica*, Endangered) near the Chandpur riverine zone, and several vulnerable freshwater fish species. No national parks, wildlife sanctuaries, game reserves, or Ecologically Critical Areas (ECAs) are located within or adjacent to the subproject sites.

The Cumilla Cluster lies within the floodplains of south-central Bangladesh, characterized by predominantly flat, low-lying terrain typical of the Bengal Delta. Cumilla City Corporation occupies a comparatively elevated position due to the adjacent Lalmai hills, while Chandpur, Hajiganj, and Laksam are situated within the lower Meghna river system floodplain. Soils are composed largely of alluvial deposits. Ambient air quality measurements confirm levels broadly consistent with national standards, though localized exceedances exist in high-traffic urban corridors. Noise levels in commercial zones approach or exceed permissible limits during peak hours. Groundwater quality assessments indicate low to moderate mineralization, with chloride concentrations of 28–212 mg/l and total dissolved solids of 68–609 mg/l, both within national standards; arsenic has not been identified as a dominant concern. Surface water quality across the Meghna-Dakatia river system ranges from poor to very poor according to the Water Quality Index, with elevated turbidity, fecal coliform levels, and organic loads, particularly during the dry season.

Current piped water supply service coverage across the cluster is approximately 17% of the total population, with NRW exceeding 50%. The distribution network is aging, with frequent leakages, poor pressure management, and inadequate metering. Water quality does not consistently meet national standards. Sanitation services, particularly fecal sludge management, remain underdeveloped. Women bear disproportionate burdens from inadequate water access, both in time expenditure for water collection and in increased caregiving responsibilities arising from waterborne illnesses.

Anticipated Environmental Impacts and Mitigation Measures. The IEE assessed potential impacts during design, pre-construction, construction, post-construction, and operation phases using a structured impact significance approach. The assessment considered magnitude, spatial extent, duration, reversibility, likelihood, and receptor sensitivity. Most anticipated impacts will

occur during construction and will be typical of urban water supply and sanitation works. These include temporary dust generation, noise and vibration, traffic disruption, access restrictions, spoil and construction waste generation, occupational health and safety risks, community health and safety risks, temporary disturbance to businesses and residents, and possible localized impacts on drains and nearby water bodies. These impacts are expected to be short-term, localized, and manageable through good construction practices, traffic management, spoil management, waste management, occupational and community health and safety measures, and strict implementation of the EMP.

Potential impacts to the physical environment. Impacts on air quality, acoustic environment, surface water and groundwater quality, waste disposal, and other forms of nuisance during construction phase are like impacts expected from other construction activities elsewhere, which can be mitigated through good international construction and engineering practices. Mitigation measures to avoid all potential impacts are included in the EMP. During the pre-construction phase, the Contractor/s will develop its/their respective site-specific EMPs (SEMPs) and other allied work plans (e.g. traffic management plan for the distribution network component), following applicable international best practices that will include World Bank's EHS Guidelines on Construction and Decommissioning Activities.¹

Potential impacts to physical cultural resources. None of the existing non-linear components (SWTP, OHTs, DTWs) are located near or adjacent to any internationally or nationally protected physical cultural resources (PCRs) or heritage sites. However, the alignments of the distribution network will pass through many roads in residential and commercial areas, including local PCRs that were identified during site surveys. Easements and rights of way separate the boundaries of these PCRs from the roads where civil works will be undertaken. These easements and rights of way have varying widths, which are deemed enough to ensure pipelaying during construction phase will not impact the PCRs. Typical and inherent in community setting in Bangladesh are properties or structures, such as mosques or prayer areas, built very near the boundaries of roads. For works in these relatively constricted or congested areas, the excavation protocols known in the construction industry to avoid or mitigate impacts to structures will be implemented and included in the EMP. Additionally, the horizontal directional drilling (HDD) method will be utilized as much as possible to avoid any impact particularly in the congested or busy areas. Where the HDD method is not suitable as per the site condition, then open trench excavation method shall be used, but with mitigation measures specified in the EMP. A detailed chance finds procedure has also been developed to ensure any heritage assets found along the excavation sites are preserved or handled properly per Bangladesh Department of Archaeology. These procedures and protocol are discussed and outlined in this IEE report.

Potential impacts on biodiversity. Despite being in a built-up and developed urban area, the subproject sites have been assessed in terms of biodiversity. The Integrated Biodiversity Assessment Tool (IBAT) screening confirmed no direct overlap with legally protected areas or World Heritage Sites within a 1-km buffer. The IBAT screening did not trigger an automatic Critical Habitat determination, though the presence of threatened species in the wider landscape warrants continued vigilance during implementation. Subproject sites are entirely within developed urban areas, and no component will be located within the Meghna-Padma confluence where sensitive aquatic species are known to habitat.

¹ IFC World Bank Group. 2007. [Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning](#).

The overall conclusion is that no critical or high-significance adverse impacts are anticipated after implementation of the proposed mitigation measures. All impacts are classified as site-specific, temporary or reversible, and manageable through good engineering and environmental management practices.

Environmental Management Plan. The EMP prescribes a comprehensive set of mitigation, management, and monitoring measures for each subproject phase, covering air quality, noise, surface and groundwater quality, solid waste, physical cultural resources, community and occupational health and safety, ecological resources, and socioeconomic parameters. Environmental monitoring activities include listing environmental samples (air quality, noise, and water quality) to be examined at least twice annually during pre-construction, construction and operation phases of the subprojects.

The indicative cost estimate for EMP implementation for the entire Cumilla Cluster has been prepared and will be incorporated into the contract documents as part of the contractor's obligations. The total estimated EMP implementation budget is USD968,585 (equivalent to BDT 119.136 million), and this estimate is indicative. Any shortfall identified during implementation shall be supplemented from the provisional sum of the Contractor's contract.

This IEE report will form part of bidding and contract documents and be verified by PMU. The contractors shall not commence or undertake any construction work until PMU confirms that the final IEE report has been cleared by ADB, and all statutory clearances, including the ECC is obtained. The contractors will be required to designate a full-time environment, health and safety (EHS) officer (or equivalent) to ensure implementation of EMP during construction works. The contractors will also be required to submit to PMU/PIU, for review and approval, their respective site-specific environmental management plans (SEMPs) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program per EMP; and (iv) budget for SEMP and EMP implementation. No work can commence until SEMP is approved by PMU/PIU.

Consultation, Disclosure and Grievance Redress. Consultations have been conducted throughout the study to ensure that the knowledge, experience, and views of stakeholders and the public are considered during the IEE work. Environmental and social safeguards consultants of ADB and DPHE conducted 25 stakeholder and public consultation meetings across the four Cumilla cluster towns during project preparation. These meetings engaged community members, local government officials and community women. The IEE report and associated environmental safeguard documents will be formally disclosed on both the ADB website and the DPHE website upon ADB clearance. Summary documents will be translated into Bangla and disseminated at Paurashava and ward offices, public notice boards, and contractor site offices throughout implementation. A structured three-tier Grievance Redress Mechanism (GRM) will be established to provide an accessible, inclusive, gender-sensitive, and culturally appropriate platform for receiving and resolving project-related complaints. All grievances will be fully documented, tracked, and reported in Semi-Annual Environmental Monitoring Report (SEMR) which will be submitted to ADB and disclosed publicly during the implementation phase.

Monitoring and Reporting. During the implementation phase, DPHE/PMU is required to prepare and submit SEMR to ADB. Each SEMR will describe progress in EMP implementation, document environmental compliance and non-compliance issues, record corrective actions taken, and report on GRM activities. After the implementation phase, annual reporting to ADB will continue until ADB issues a Project Completion Report.

Conclusions. It is envisaged that the proposed subproject will contribute to providing reliable and sustainable water supply services in the Cumilla Cluster. Once implemented, the subproject will have direct benefits to the people of the four municipalities in the cluster, with a reliable and sustainable piped drinking water supply.

The IEE for this subproject has been undertaken based on the location of the SWTPs, PTWs, OHTs, and distribution network; and on initial or preliminary design prepared for the rehabilitation and upgrading of these components. The baseline environmental conditions have been gathered with respect to the subproject locations and the cluster, and all potential impacts to the environment because of implementing the subproject have been identified. Based on these impacts, corresponding mitigation measures have been developed and compiled in the EMP.

Overall, the full IEE process confirms that the subproject is unlikely to cause significant adverse impacts considered as diverse, irreversible and unprecedented. All sustainability issues related to raw water quantity and quality will be resolved in the final detailed design ensuring that drinking water from the subproject will be sufficient and in compliance with the Bangladesh National Drinking Water Quality Standards.

During construction phase, the subproject will only involve straightforward civil works, and operation phase will only involve common or traditional maintenance works for water supply infrastructures, so impacts will be mainly localized. These impacts can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures in the EMP. On a positive note, the IEE process also confirms the beneficial impacts of the subproject over the long term, with a reliable and sustainable piped drinking water source for the people of Cumilla Cluster.

Recommendations. During the finalization of the design, the DPHE technical design team shall ensure sustainability of the subproject in terms of the supply and quality of raw water, including the quality of treated water which should comply with the Bangladesh National Drinking Water Quality Standards. In view of the environmental audit conducted on the existing facilities, the following corrective actions are recommended for consideration in conjunction with other environmental safeguard measures in the final detailed design and operations of the future water supply system.

Issue	Mitigation Measure	Responsible Agency
Unsustainable groundwater abstraction	• Introduce metering, tariffs, leakage reduction. • Establish recharge monitoring via observation wells. • Gradually transition to surface water sources.	City Corporation and Paurashavas, supported by DPHE
Non-compliance with national drinking water quality standards	• Upgrade treatment plants to meet Bangladesh National Drinking Water Quality Standards. • Introduce standard operating procedures for chemical dosing, monitoring, and emergency handling.	DPHE

Issue	Mitigation Measure	Responsible Agency
	Implement wellhead protection zones to prevent contamination.	
Sludge and backwash mismanagement	- Design sludge drying beds or lined lagoons for safe disposal. - Reuse treated sludge in non-agricultural applications where safe. - Install controlled backwash discharge systems connected to drains with sediment traps. - Ensure compliance with effluent standards.	DPHE
Distribution network leakage and non-revenue water	- Replace aging PVC pipelines with HDPE/ductile iron. - Implement DMAs. - Prioritize repair of high-leakage zones.	DPHE
Energy inefficiency in pumping systems	- Retrofit pumps with variable frequency drives (VFDs). - Replace diesel backup with solar-assisted/hybrid systems.	DPHE
Chemical handling and occupational risks	- Establish standard operating procedures for chemical storage/dosing. - Train operators on good international practices in water supply operations, including emergency preparedness.	City Corporation and Paurashava Paurashava, DPHE
Inadequate manpower and institutional capacity	- Provide consultant support in the interim. - Build staff capacity for monitoring, preventive maintenance, record-keeping. - Training on safeguards and occupational safety.	City Corporation and Paurashavas, supported by DPHE/ADB

During pre-construction phase, the contractor/s shall prepare the following required work plans and submit to PIU, through the PMU or PMSC, for approval. No work shall commence until any relevant or required work plan is approved, which includes, among others, the following:

- Site-Specific Environmental Management Plan (SEMP);
- Emergency Preparedness and Response Plan;
- Utility Protection and Relocation Plan;
- Spill Prevention and Response Plan;
- Camp Management Plan (if camps used);
- Traffic Management Plan;
- Spoil Management Plan;
- Waste Management Plan; and
- Health and Safety Management Plan (Community and Occupational).

This IEE needs to be updated during the detailed design phase to reflect the final design ensuring compliance with the design measures suggested in this document, including measures to ensure

sustainability of the drinking water supply system. The updated IEE shall be submitted to ADB for review, clearance and disclosure during detailed design phase but prior to start of construction. The cleared updated IEE shall be treated as the final IEE. No work can commence until (i) the final IEE cleared by ADB is provided to the contractor/s, and (ii) the SEMP, including other work plans, prepared by the contractor, is approved by PMU. If circumstances are required, the IEE will be further updated for ADB's review during the implementation period. In the event of unanticipated impact and/or any design change and/or non-compliance during subproject implementation period, the IEE shall be updated to include (i) assessment of the unanticipated impact and corresponding mitigation measures; and/or (ii) information on the design change and assessment of associated environmental impacts, if any; and/or (iii) corrective actions, associated cost and schedule; respectively. Further, the PMU shall:

- Include this IEE in the bidding and contract documents;
- Obtain all statutory clearances and ensure relevant conditions or requirements are incorporated in the detailed design;
- Update/revise this IEE based on final detailed design that ensures sustainability and/or if there are unanticipated impacts or significant change in scope in any component of the subproject;
- Conduct safeguards induction to the contractor/s after award of contract;
- Ensure contractor/s appoint/s qualified environment, health and safety (EHS) officer prior to start of works;
- Disclose information and establishment of GRM in a timely manner;
- Strictly supervise EMP implementation;
- Continue consultations with stakeholders; and
- Monitor and report status of implementation of the EMP on a regular basis as indicated in the IEE.

This IEE report has been prepared in accordance with ADB SPS requirements for projects classified as Category B for environment. With the above premises considered, the classification of Category B for environment is confirmed. Separately, per ECA, 1995 and ECR, 2023 of Bangladesh, the overall project is classified under "Orange" category. Hence, preparation of an IEE is required. Upon approval of the submitted IEE, ECC must be obtained from the DOE prior to award of contracts.

I. INTRODUCTION

A. Project Background

1. Bangladesh's urban population was 31.1 million in 2001, 35.1 million in 2011, and 53.8 million in 2022. Rapid urbanization is putting further pressure on already inadequate services and infrastructure. As of 2024, 32% of the urban population had a piped water supply connection to their home and the same amount (32%) had access to safely managed sanitation facilities. Inadequate urban services create significant public health risks and produce negative environmental impacts.

2. The Government of Bangladesh seeks to make quality urban infrastructure and services, underpinned by good urban governance, available to cater to rapid urbanization. The required urban sector investment is projected to grow from about 2.4% of gross domestic product (GDP) in fiscal year (FY) 2021 to 7.0% of GDP by FY2041. To cover increased investment needs, the government has set out three strategies: tax mobilization, private financing, and user-pays cost recovery for services such as water supply, sewerage, and solid waste disposal. For urban areas, plans include increasing tap-water connectivity from 40% to 100%, sewerage connectivity to 100% (no baseline), and water-sealed sanitary toilets from about 42% to 100% in the period 2018 to 2041, while also making solid waste and wastewater treatment plants available to all. The government has requested Asian Development Bank's (ADB) support to improve water supply and sanitation services in one city and seven towns (together the 'project towns') using a 'cluster approach'. The clusters are (i) Cumilla city corporation and the Paurashavas of Haziganj, Chandpur, and Laksam under the Cumilla cluster; and (ii) the Paurashavas of Ishwardi, Pabna, Nator, and Gopalpur under the Ishwardi cluster. The towns lie within or near the Dhaka-Chattogram and Dhaka-Rajshahi high-value economic corridors, identified as priority development areas by the government. The combined population in these clusters was about 1.2 million in 2022; with future population increases assumed to be 50% less than in the years 2011 to 2022, this would climb to 1.55 million by 2045. The towns have been selected based on their inadequate water supply services, geographic proximity, and location along major river systems.

3. Water quality in the project towns generally fails to meet government standards, and overall piped service coverage remains low, reaching only about 17% of the total population across the eight project towns. Nonrevenue water (NRW) is estimated to exceed 50%, mainly due to inadequate metering, the absence of pressure management, poor asset operation and management, and the age of the distribution networks, i.e., deteriorated materials resulting in leakage. Revenues are insufficient for cost recovery because of poor billing systems and services that are not of sufficient quality to satisfy paying customers. Many treatment plants and overhead tanks require refurbishment or repair, and about half of groundwater production tube wells need refurbishment. Public toilets are limited and poorly maintained, while fecal sludge and solid waste services remain underdeveloped. In addition, the urban local bodies of the project towns lack sufficient technical and financial capacity to operate, maintain, and sustainably expand water supply and sanitation systems. The proposed project aims to address these challenges and deliver safe, reliable, and climate-resilient water supply and sanitation services for residents of high-growth secondary cities.

4. **Climate risks.** Bangladesh remains one of the most climate-vulnerable countries in the world, facing frequent hydro-meteorological hazards, such as monsoon flooding, tropical cyclones, and droughts, all of which are projected to intensify with climate change. Unplanned urbanization is occurring without due consideration of these and other emerging risks, such as heatwaves, leaving infrastructure and land use in a state of constant vulnerability. The capacity

of local governments to improve resilience is also limited by technical knowledge and financial resources. Although Paurashava and city corporation masterplans have been prepared to guide urban development, they are not legally binding and therefore lack enforceability for effective development control and climate adaptation. Strengthening climate resilience in the project towns will require technical training, updating of masterplans, and improving local government finances.

5. Proposed ADB funded CTWSSP will support safely managed, inclusive, and resilient drinking water and sanitation services in Cumilla Cluster comprising Cumilla City Corporation (CuCC), Laksam, Hajiganj and Chandpur Paurashava and in Ishwardi Cluster comprising Ishwardi, Pabna, Nator and Gopalpur Paurashava. Implementation of CTWSSP will be conducted in two phases, where Phase 1 will be of construction and rehabilitation of existing water supply infrastructures (PTWs, OHTs, SWTP and GWTP), DMA based water distribution networking, and institutional development and sanitation projects in Hajiganj Paurashava under Cumilla Cluster and Gopalpur Paurashava for Ishwardi Cluster. DPHE will be the executing agency of charge of these components. Respective city corporations and Paurashavas will be implementing agencies for water supply.

6. **Project objectives.** The proposed project aims to improve water, sanitation, and solid waste management services in the project towns, thereby improving public health, livability, and climate resilience. Specifically, the project will: (i) reduce NRW by rebuilding and optimizing distribution networks using a district metered area (DMA) approach; (ii) enhance availability of water; (iii) improve drinking water quality to comply with government standards; (iv) strengthen water service provider entities such that they achieve long-term cost-effective lifecycle-based service provision to set service standards; (v) strengthen municipal capacity for revenue enhancement; (vi) increase municipal capacity in incorporating climate resilience in masterplans, programs, projects, and operations; and (vii) promote gender equality by reducing women's unpaid water collection time, expanding access to safe sanitation, and enabling women's participation in water governance. The provision of reliable water supply will stimulate commercial activity in the project towns, stimulating private sector investment and job creation.

7. **Water supply development.** The project will rehabilitate and expand existing distribution networks to increase household connections and introduce volumetric metering to each household, along with a DMA approach. Overhead tanks and water treatment plants will be refurbished or upgraded as needed, while groundwater production tube wells will be refurbished or renewed and integrated into the overall system. In addition, where sustainable, additional utility-level water will be supplied through increased extraction from existing local surface sources, shifting groundwater extraction from private wells to public ones, development of possible rainwater harvesting systems, construction of surface water storage facilities, artificial aquifer recharge, savings from NRW reduction, and other innovative water sourcing methods. A supervisory control and data acquisition system will be installed to enhance automation, monitoring, and operational efficiency. To improve access and affordability in low-income communities and slum areas, the project will prioritize new connections to these areas. As new assets are constructed, the project will populate a digital asset management system to support strategic operations, investment planning, and improved O&M practices. Water quality will be improved by developing, implementing, and monitoring a robust water quality management system (e.g., adequate frequency of sampling, sufficient laboratories and equipment, testing, dissemination of test results, corrective actions on substandard results, etc.).

8. **Sanitation and solid waste management improvement.** The project will take a citywide inclusive sanitation (CWIS) approach to improving sanitation in the project towns to achieve a more comprehensive, effective, and sustainable services, as well as higher resource recovery.

This will include constructing 800 household level twin pit latrines and public toilets facilities with gender-segregated design and features for menstrual hygiene management (MHM), ensuring safety, accessibility, and dignity for women and girls. Where feasible, women's groups will manage these facilities, that will be run on a fee basis. This shall include digitalizing records of septic tank locations, introducing a digital system for ordering fecal sludge collections and tracking payments for collection, introducing payment options at local kiosks, and setting collection fees according to service cost.

9. The Department of Public Health Engineering (DPHE) will be the executing agency, while Cumilla City Corporation and the seven participating Paurashavas will act as implementing agencies. A project management unit will be established within DPHE, and project implementing units will be formed.

10. The project area is in selected 8 towns, including Cumilla City Corporation and Paurashavas of Laksham, Haziganj and Chandpur, Ishwardi, Pabna, Gopalpur and Nator. This IEE report is for the subproject covering Cumilla City Corporation and the Paurashavas of Laksham, Haziganj and Chandpur, hereinafter referred to as "Cumilla Cluster".

B. Project's Impact and Outcome

11. **Outcome statement:** Resilience, quality, sustainability, and coverage of urban water services improved in the Cumilla and Ishwardi clusters.

C. Project's Outputs

12. Anticipated outputs of the project are:

- (i) **Output 1: Resilient and inclusive urban water supply and sanitation infrastructure upgraded and expanded.** The project will rehabilitate and expand water supply systems through the construction, replacement, and rehabilitation of surface water and groundwater treatment plants, groundwater production tube wells, overhead storage tanks, and distribution networks. About 1,790 kilometers of water distribution network and 65,000 metered household connections will be installed, at least 10% of which will be for low-income communities, slums, and informal settlements.² A DMA approach will be introduced through the establishment of 78 DMAs to improve system monitoring, reduce nonrevenue water to below 20%, and support digital asset management. The project will rehabilitate 66 groundwater production tube wells, 15 overhead storage tanks and seven water treatment plants (four surface water-based and three groundwater-based) with a combined treatment capacity of 40 million liters per day (MLD), ensuring compliance with national drinking water quality standards.³ It will construct 15 new groundwater production tube wells and 11 overhead storage tanks, and replace 19 groundwater production tube wells to enable continuous water supply with a minimum residual pressure of 10 meters at the distribution network end. Integrated supervisory control and data acquisition (SCADA) systems will be established in the project towns and DPHE headquarters to

² The 65,000 household connections comprise 30,689 new household connections and 34,311 rehabilitated existing connections. Based on the holding (property) tax assessment records, on an average, each household connection is expected to serve 3.4 households.

³ The groundwater treatment plants comprise three iron and manganese removal plants and one arsenic and iron removal plant.

support real-time monitoring of water production, DMAs, customer services, and assets. The SCADA system will be implemented through a cluster approach that enables shared support services across project towns, strengthening operational efficiency and sustainable O&M.

The project will also construct about 1,200 twin-pit latrines and four public sanitation facilities with gender-responsive and disability-inclusive features, including menstrual hygiene management facilities in Hajiganj and Gopalpur.⁴ Locations for the public sanitation facilities will be selected in consultation with women from the communities to ensure safety and accessibility. The facilities will be leased to women, with priority given to sanitation workers and women from vulnerable communities, creating livelihood opportunities for women while supporting sustainable O&M.

- (ii) **Output 2: Sustainable water supply service delivery operationalized in project towns.** This output will strengthen the governance, institutional, operational, and financial capacity of DPHE, Cumilla City Corporation and local government authorities, and water supply service providers to improve the sustainability, performance, and climate resilience of urban water services through four areas of support:

- a. **Sustainable O&M of water supply systems.** A hybrid O&M model will combine the technical expertise of an O&M contractor with the local knowledge and community engagement of the water supply sections under DPHE oversight.⁵ The project will finance a 3-year O&M contract, with project towns expected to finance a subsequent 5-year O&M period. Formal agreements will define roles and responsibilities, staffing requirements, service standards, performance monitoring, and financing mechanisms, including tariffs and town budget allocations. The model will strengthen customer management, billing, DMA management, nonrevenue water reduction, water quality monitoring, and digital asset management.⁶
- b. **Capacity development and water service planning.** The project will strengthen technical, operational, financial, and managerial capacity of water supply sections through classroom and on-the-job training. Water safety plans, 5-year water supply service improvement plans, that include DMA management plans, and groundwater monitoring plans will be prepared and implemented in all the project towns, supported by cluster-level technical assistance and peer-to-peer learning.

⁴ Menstrual hygiene management facilities are toilets with privacy, water, soap, and appropriate facilities for changing and disposing of menstrual materials.

⁵ A hybrid O&M model is an approach in which operational responsibilities are shared between the public and private sectors and tailored to local institutional capacity and service delivery needs. The public utility typically retains responsibility for core utility functions, such as billing, customer management, and operational oversight, while the contractor undertakes specialized operational and technical functions, including DMA management, provides additional O&M personnel, and delivers on-the-job capacity enhancement. By balancing operational and commercial responsibilities, the model reduces implementation risk, strengthens local capacity, and improves the viability of private sector participation in water service delivery, making the approach appropriate for Bangladesh's evolving urban water supply sector.

⁶ The DMAs will be managed by the contractor through a dedicated DMA unit led by a DMA manager responsible for leakage control, pressure management, and flow monitoring.

- c. **Institutional strengthening.** The project and the attached TA will support the establishment of the Cumilla WASA and its mission to deliver efficient, customer-oriented, and financially sustainable water services. The TA will assist the government in preparing the WASA charter, service rules, organizational structure, and other institutional arrangements required to operationalize the utility. In the remaining project towns, the project will strengthen ring-fencing of water supply accounts and update staffing structures.
- d. **Community engagement and behavior change.** The project will strengthen community participation and behavior change to promote household water connections, acceptance of metering and tariffs, registration of private wells, sustainable groundwater use, and equitable access to water services, particularly for women, girls, and vulnerable groups, and awareness of gender equality, personal safety, legal rights.⁷

D. Purpose of the Initial Environmental Examination

13. The overall objective of the initial environmental examination (IEE) is to provide guidance to the Department of Public Health Engineering (DPHE) (as the executing agency), participating *Paurashavas* (as the implementing units), project consultants and contractors on how to plan, build and operate in an environmentally responsible manner the subprojects that will (i) construct drinking water distribution network, (ii) construct of new drinking water overhead storage tanks, (iii) rehabilitate existing production tube wells (PTWs), including refurbishment or augmentation of corresponding treatment units, (iv) construct new PTWs, and (v) construct public toilets and household twin-pit latrines. The IEE will help ensure that all potential negative effects of subproject implementation are avoided or mitigated, and all positive impacts are enhanced. A set of actions that will need to be implemented to eliminate or at least reduce the environmental impacts to a level acceptable to ADB and Government of Bangladesh (GOB) are identified and planned during the assessment.

E. Methodology

14. This IEE report has been prepared based on preliminary design information, field investigations, stakeholder consultations, and literature and research papers to meet the requirements for environmental assessment process and documentation per ADB SPS, 2009. Environmental assessment was conducted through the following:

- (i) Primary data collection during site visits and secondary data from various sources, socio-economic, hydrological, topographic, and engineering surveys at subproject sites, meaningful consultation with the stakeholders, including concerned government officials, project personnel and the public;
- (ii) Appropriate assessment of impact of the subproject implementation on cultural and heritage assets, including other public- and private-owned structures, that may likely be disturbed or damaged during pipelaying works for the distribution network;
- (iii) Gathering of baseline information from most recent secondary sources on environmental quality such as air quality, noise level, surface water quality, and groundwater quality within the corridor of impact of the subproject, and against which predictions of changes to these environmental media during the construction

⁷ The Integrated Urban Governance Improvement Project established town- and ward-level coordination committees and courtyard meetings to enhance community participation, strengthen governance, and improve service delivery.

- period will be compared in order to assess such changes, if any, and their significance; and
- (iv) Screening and assessing potential risks on the biological environment, which include the protected areas or critical habitats that may exist around the subproject sites.

15. Initial scoping and field reconnaissance visits were conducted at subproject sites, to establish the potential impacts and categorization of subproject activities. Formal and informal consultation activities were conducted with the community, and other stakeholders of the subproject. The methodology of the IEE study was then conveyed and elaborated to these stakeholders and discussed all potential impacts and corresponding mitigation measures to address or bring the magnitude of these impacts to acceptable levels.

F. Structure of the Report

16. The report has been structured in compliance with ADB SPS, 2009.

- (i) **Executive Summary.** This section describes concisely the critical facts, significant findings, and recommended actions.
- (ii) **Introduction.** Presents a brief overview of the overall project along with its background, objectives, and purpose and specific subproject scope of the IEE, among others.
- (iii) **Policy, Legal, and Administrative Framework.** This section discusses both ADB SPS and GOB's national and local legal and institutional framework within which the environmental assessment is carried out. It also identifies project-relevant international environmental agreements to which GOB is a party.
- (iv) **Description of the Subproject.** This section describes the proposed subproject in terms of its major components, geographic location, and interaction with the environment in terms of ecological, socio-cultural, and economic standpoint, etc., including any associated facility required by and for the subproject.
- (v) **Description of the Environment.** This section describes relevant physical, biological, and socio-economic conditions within the subproject area. It also looks at current and proposed development activities within the subproject area of influence, including those not directly connected to the subproject. It indicates accuracy, reliability, and sources of data.
- (vi) **Anticipated Environmental Impacts and Mitigation Measures.** This section predicts and assesses the subproject's likely positive and negative direct and indirect impacts to physical environment, biological environment or ecology, socioeconomic environment (including occupational health and safety, community health and safety, and impacts on livelihoods through environmental media), and physical cultural resources in the subproject's area of influence, in qualitative and quantitative terms to the extent possible; identifies mitigation measures and any residual negative impacts that cannot be mitigated; explores opportunities for enhancement; identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions and specifies topics that do not require further attention; and examines global, transboundary, and cumulative impacts as appropriate.

- (vii) **Information Disclosure, Consultation, and Participation.** This section (i) describes the process undertaken during subproject design and preparation for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders; (ii) summarizes comments and concerns received from affected people and other stakeholders and how these comments have been addressed in subproject design and mitigation measures, with special attention paid to the needs and concerns of vulnerable groups, including women; and (iii) describes the planned information disclosure measures (including the type of information to be disseminated and the method of dissemination) and the process for carrying out consultation with affected people and facilitating their participation during subproject implementation.
- (viii) **Grievance Redress Mechanism.** This section describes the grievance redress mechanism that will be adopted under the subproject, which includes the timeframe and mechanisms for resolving complaints about environmental performance.
- (ix) **Environmental Management Plan.** This section deals with the set of mitigation and management measures to be taken during subproject implementation to avoid, reduce, mitigate, or compensate for adverse environmental impacts (in that order of priority). It may include multiple management plans and actions (mitigation, monitoring, and performance indicators).
- (x) **Monitoring and Reporting.** Outlines the environmental monitoring program and reporting system, including the cost of implementing the EMP.
- (xi) **Conclusion and Recommendations.** Presents the conclusion and recommendations of the IEE study.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Safeguard Policy Statement

17. ADB SPS requires borrowers to meet a set of requirements (Safeguards Requirements 1) when delivering environmental safeguards for projects supported by ADB. The objectives are to ensure the environmental soundness and sustainability of projects, and to support the integration of environmental considerations into the project decision-making process. Hence, the project is required to comply with these requirements. Summary of the step-by-step process is discussed below in this section. Detailed discussions are provided in the ADB SPS.⁸

18. **Screening and categorization.** The proposed overall project will need to be assigned with one of the following environmental categories per ADB SPS:

- (i) **Category A.** The project is likely to have significant adverse environmental impacts that are diverse, irreversible, and unprecedented. Impacts may affect an area larger than the sites or facilities subject to physical work. A full-scale environmental impact assessment (EIA) must be undertaken, which includes an environmental management plan (EMP) that must be prepared, by the borrower/client.
- (ii) **Category B.** The project's potential environmental impacts are less adverse and fewer in number than those in category A. Impacts are site-specific, and only few of which, if any, are irreversible. Impacts can be readily addressed through mitigation measures. An initial environmental examination (IEE) must be undertaken, which includes an EMP that must be prepared by the borrower/client.
- (iii) **Category C.** The project is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, but a desk review of the project's environmental implications will need to be conducted.
- (iv) **Category FI.** The project involves the investment of ADB funds to or through a financial intermediary. An environmental and social management system is required.

19. The project will need to be screened for its expected environmental impacts and is assigned to a specific category as enumerated above. Screening and categorization are needed for each subproject or component. Final categorization for the overall project is to be based on the most environmentally sensitive subproject or component. ADB will officially confirm this final categorization prior to its approval of the project.

20. For the proposed subproject, initial screening using ADB REA checklist indicates that the subproject will not cause any significant negative environmental impacts and that most impacts are site specific, temporary, and therefore the subproject is classified as Category B for Environment per ADB SPS. See Appendix 1 for the REA checklist accomplished.

21. During the environmental assessment stage that one or more of the subproject's components can trigger Category A or with potentially significant adverse impacts that are diverse, irreversible, and unprecedented, the executing agency and/or implementing agency shall examine alternatives to the subproject's location, design, technology, and components that would avoid, and, if avoidance is not possible, minimize adverse environmental impacts and risks, and to meet Category B categorization. The rationale for selecting the subproject location, design,

⁸ ADB. 2009. [Safeguard Policy Statement](#). Manila.

technology, and components will be properly documented, including cost-benefit analysis, taking environmental costs and benefits of the various alternatives considered into account. The "no action" alternative will be also considered.

22. **Environmental Assessment.** The executing agency will conduct the appropriate environmental assessment based on the categorization of the project. Environmental assessment shall include description of environmental and social baselines to provide an understanding of current conditions forming the benchmark against which project impacts are assessed. Environmental impacts and risks will be analyzed for all relevant stages of the project cycle, including design and planning stage, construction, operations, decommissioning, and post-closure activities such as rehabilitation or restoration. The results of the environmental assessment including other activities per requirements of ADB SPS shall be translated into written report in the form of an IEE report, with suggested and typical outline in Appendix 2.

23. **Environmental Planning and Management.** The executing agency and/or implementing agency shall prepare environmental management plan (EMP) to be included in the IEE report. The EMP shall describe and address the potential impacts and risks identified by the environmental assessment. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks. The EMP shall include the proposed mitigation measures, environmental monitoring and reporting requirements, emergency response procedures, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.

24. **Public Disclosure.** The executing agency shall submit the following environmental safeguard documents to ADB for disclosure on ADB website so affected people, other stakeholders, and the public can provide meaningful inputs into the project design and implementation:⁹

- (i) final IEE upon receipt;
- (ii) a new or updated IEE and corrective action plan prepared during project implementation, if any; and
- (iii) environmental monitoring reports submitted during project implementation upon receipt.

25. The executing agency shall also disclose the same environmental safeguard documents on its website.

26. **Consultation and Participation.** Executing agency and implementing agency shall carry out meaningful consultation¹⁰ with affected people and other concerned stakeholders, including

⁹ Per ADB SPS, 2009, prior to disclosure on ADB website, ADB reviews the "borrower's/client's social and environmental assessment and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy principles and Safeguard Requirements 1-4."

¹⁰ Per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) 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.

civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

27. **Grievance Redress Mechanism.** The executing agency and implementing agency shall establish a mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the project. As of the ADB loan processing for the project, a Grievance Redress Mechanism covering the subproject has been established and discussed in detail in Section VI below.

28. **Monitoring and Reporting.** Executing agency and implementing agency shall monitor, measure and document the progress of implementation of the EMP. If necessary, the executing agency and/or implementing agency will identify the necessary corrective actions and reflect them in a corrective action plan. During implementation phase (i.e. from effectivity date of the project up to the applicable period of operation phase), executing agency will prepare and submit to ADB semi-annual environmental monitoring reports that describe progress with implementation of the EMP and compliance issues and corrective actions, if any. After the implementation phase, reporting to ADB will continue at the minimum on an annual basis until ADB issues a project completion report.

29. **Unanticipated Environmental Impacts.** Where unanticipated environmental impacts become apparent during project implementation, executing agency shall update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

30. **Pollution Prevention and Control Technologies.** During the design, construction, and operation of the project, the executing agency and implementing agency shall ensure that pollution prevention and control technologies and practices consistent with international good practices are applied. When the Government of Bangladesh regulations differ from these levels and measures, the project shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project or subproject circumstances, the executing agency will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

31. **Occupational Health and Safety.** The executing agency and/or implementing agency¹¹ shall ensure that workers¹² are provided with a safe and healthy working environment, taking into account risks inherent to the sector and specific classes of hazards in the project work areas, including physical, chemical, biological, and radiological hazards. Executing agency and/or implementing agency shall ensure to take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work by (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and

¹¹ In case where responsibility is delegated to project Contractors during construction phase, executing agency and/or implementing agency shall ensure that the responsibilities on occupational health and safety as described herein are included in the contract documents.

¹² Including nonemployee workers engaged by the borrower/client through Contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

reporting occupational accidents, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

32. Implementing agency shall ensure to apply preventive and protective measures consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's *Environmental, Health and Safety Guidelines*.¹³

33. **Community Health and Safety.** Executing agency and/or implementing agency shall ensure to identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the project, and will establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.

34. **Physical Cultural Resources.** The executing agency and/or implementing agency is responsible for siting and designing the project to avoid significant damage to physical cultural resources. Such resources likely to be affected by the project will be identified, and qualified and experienced experts will assess the project's potential impacts on these resources using field-based surveys as an integral part of the environmental assessment process. When the proposed location of a project component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the EMP.

35. **Environmental Audit.** When the project involves existing activities or facilities, executing agency and/or implementing agency is responsible to ensure that relevant external experts will perform environmental audits to determine the existence of any areas where the project may cause or is causing environmental risks or impacts. If the project does not foresee any new major expansion, the audit constitutes the environmental assessment for the project.

36. **Bidding and Contract Documents.** IEE report with EMP is to be included in bidding and contract documents and verified by the executing agency and/or implementing agency. The executing agency and/or implementing agency shall also ensure that bidding and contract documents include specific provisions requiring Contractors to (i) comply with all other conditions required by ADB,¹⁴ and (ii) to submit to the implementing agency, for review and approval, their respective site-specific environmental management plans (SEMPs), including (a) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (b) specific mitigation measures following the approved EMP; (c) monitoring program as per EMP; and (d) budget for EMP and SEMP implementation. No work can commence prior to approval of the corresponding SEMP. A copy of the EMP or approved SEMP will be always kept on site during the construction period. Non-compliance with, or any deviation from, the conditions set out in the EMP or SEMP constitute a failure in compliance and shall require corrective actions.

37. **Conditions for Award of Contract and Commencement of Work.** Executing agency shall not award any Works contract for the subproject until (i) relevant provisions from the EMP are incorporated into the Works contract; and (ii) the IEE is updated to reflect subproject's detailed

¹³ World Bank Group, 2007. *Environmental, Health, and Safety General Guidelines*. Washington, DC.

¹⁴ Contractors to comply with (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.

design and PMU has obtained ADB's clearance of such IEE. Executing agency and/or implementing agency shall ensure no works for the subproject which involves environmental impacts shall commence until (i) relevant provisions from the EMP are incorporated into the contract; and (ii) the IEE is updated if there is any change in subproject's detailed design, and that the executing agency has obtained ADB's clearance of such updated IEE.

B. Government of Bangladesh Environmental Laws and Regulations

1. Overview of the Environmental Approval Process

38. Key legislation governing the environmental approvals process for the proposed overall project (and hence the subproject) is the Bangladesh Environmental Conservation Act, 1995 (ECA, 1995) and the Environmental Conservation Rules (ECR, 2023). According to Rule 5 of ECR, 2023 proposed developments within Bangladesh are classified as one of four categories, as follows:

- (i) Green;
- (ii) Yellow;
- (iii) Orange; and
- (iv) Red.

39. The category of a project determines the procedure for issuance of an Environmental Clearance Certificate (ECC). All proposed industrial units and projects that are considered to be low polluting are classified under "Green" and shall be granted Environmental Clearance. For proposed industrial units and projects classified under the Yellow, Orange and Red Categories, a Location Clearance Certificate (LCC) and a subsequent ECC are required from the DOE depending on geographical location of project, extent of project activities and possible pollution load, human health and possible adverse impacts on environment. A detailed description of the approval process for the four categories of industry/projects are documented in Rules 9 – 19 of ECR, 2023.

40. Key milestones in the approvals process are outlined in Figure 1. These comprise:

- (i) **Location Clearance Certificate:** An LCC will be issued by DOE upon approval of all requirements, including compliance with the site selection requirements as minimum for Yellow category projects. In addition to this compliance with site selection requirements, IEE study is required for Orange category projects and EIA study for Red category projects; and
- (ii) **Environmental Clearance Certificate:** The ECC will be issued by DOE upon approval of requirements. ECC is issued to Green category project upon approval of the General Description of project; and to Yellow, Orange and Red category projects after issuance of LCC.

2. Procedure for Obtaining Location Clearance Certificate and Environmental Clearance Certificate

41. The environmental assessment process consists of three stages: screening, IEE, and detailed EIA per ECR, 2023. The ECR also contains the procedures for obtaining the LCC and ECC from the DOE for different categories of proposed industrial units or projects. Any person or organization wishing to establish an industrial unit or project must obtain an LCC and ECC from

the Director General of DOE. The application for such certificate must be in the prescribed forms provided together with the prescribed fees laid down in Schedule 6 and Schedule 7, through the deposit of a Treasury Chalan in favor of the Director General of DOE. The procedure of getting the LCC and ECC of four categories of project are briefly described as follows and the process flow outlined in Figure below:

- (i) **Green:** Projects categorized as Green projects are listed in Schedule 1. The proponent has to submit an application in a prescribed format Form 3: Location Clearance / Environmental Clearance Certificate Application, Rule 9 Sub-Rule (1), Rule 10 Sub-Rule (1), Rule 11 Sub-Rule (1), Rule 12 Sub-Rule (1), Rule 14 Sub-Rule (1), and Rule 23 Sub-Rule (4) along with specified documents;

In addition, as per Schedule 9: Industry or Project Site Selection Guideline, Rule 8 Sub-Rule (kha), Rule 9 Sub-Rule (2), Rule 10 Sub-Rule (2), Rule 12 Sub-Rule (2), and Rule 14 Sub-Rule (2) must be followed by the proponent; and

The Client must Deposit/Pay the mentioned amount of fees to DOE per Schedule 7: Location Clearance or Environmental Clearance Certificate Received and its Renewal Fee; Rule 9 Sub-Rule (3), Rule 10 Sub-Rule (3), Rule 12 Sub-Rule (6), Rule 84 Sub-Rule (3), Rule 21 Sub-Rule (14), Rule 22 Sub-Rule (1), and Rule 23 Sub-Rule (4).

DOE will provide the ECC to the applicant within seven (7) days of application subject to their site investigation and satisfaction on the submitted documents. The ECC needs to be renewed every 5 years.

- (ii) **Yellow:** Projects categorized as Yellow are listed in Schedule 1. The proponent has to submit an application in a prescribed format Form 3: Location Clearance / Environmental Clearance Certificate Application, Rule 9 Sub-Rule (1), Rule 10 Sub-Rule (1), Rule 11 Sub-Rule (1), Rule 12 Sub-Rule (1), Rule 14 Sub-Rule (1), and Rule 23 Sub-Rule (4) along with specified documents;

Deposit/pay the mentioned amount of application processing fee to DOE per Schedule 6: Location Clearance or Environmental Clearance Certificate Application Process Fee, Rule 10 Sub-Rule (2), Rule 12 Sub-Rule (2), Rule 14 Sub-Rule (2), and related documents and detail information per Schedule 9: Industry or Project Site Selection Guideline, which shall be followed;

The relevant DOE office will conduct a site visit to the project and prepare a report with justification and opinion. Within 8 working days of receiving the application, the concerned DOE office will notify the applicant to pay the fee specified in Schedule-7, provided the information in the application is satisfactory and the on-site inspection is completed;

The Client must Deposit/Pay the mentioned amount of location clearance fee to DOE per Schedule 7: Location Clearance or Environmental Clearance Certificate Received and its Renewal Fee; Rule 9 Sub-Rule (3), Rule 10 Sub-Rule (3), Rule 12 Sub-Rule (6), Rule 84 Sub-Rule (3), Rule 21 Sub-Rule (14), Rule 22 Sub-Rule (1), and Rule 23 Sub-Rule (4); and

After issuance of LCC, the Client submits its application for issuance of ECC to DOE. DOE will provide the ECC to the applicant within seven (7) days of application subject to their site investigation and satisfaction with the submitted documents. The ECC needs to be renewed every 2 years.

- (iii) **Orange:** Projects categorized as Orange require proponents to submit an application in a prescribed format Form 3: Location Clearance / Environmental Clearance Certificate Application for Location Clearance, along with Deposit /Payment of the mentioned amount of fees for the project to DOE per Schedule 6, submission of related documents and detailed information, an Initial Environmental Examination (IEE) Study report, and compliance with Schedule 9: Industry or Project Site Selection Guideline. After approval from the Authority, the Client must Deposit/Pay the mentioned amount of fees for the project to DOE per Schedule 7 for obtaining the Location Clearance for the project.

The relevant DOE office will visit the project site and prepare a report. This report, along with the application, will be sent to the appropriate ECC committee based on the project's serial number listed in Schedule 1. The ECC committee will review the application and the report and decide. The applicant will then be notified to pay the fee listed in Schedule 7 for the LCC issuance;

Within 21 days from payment of fees per Schedule 7, DOE issues the LCC. Upon obtaining the LCC, the Proponent/Client will apply for an ECC from the DOE. The DOE office will then perform a site visit to ensure LCC compliance and review relevant issues. A report justifying the issuance or rejection of the ECC will be prepared and forwarded, along with the application, to the appropriate ECC committee. The committee will decide within 20 working days of the application date and issue the ECC. If an initial environmental examination of an Orange Category project reveals significant pollution impacts, the ECC Committee may recommend an Environmental Impact Assessment (EIA). With approval from the Director General, the proponent must conduct the EIA. The ECC needs to be renewed every year.

- (iv) **Red:** Projects categorized as Red Projects require proponents to submit an application in a prescribed format Form 3: Location Clearance / Environmental Clearance Certificate Application for Location Clearance, along with Deposit /Payment of the mentioned amount of fees for the project to DOE per Schedule 6, related documents, detail information, draft Terms of Reference (ToR) of Environmental Impact Assessment (EIA) and compliance with Schedule 9: Industry or Project Site Selection Guideline;

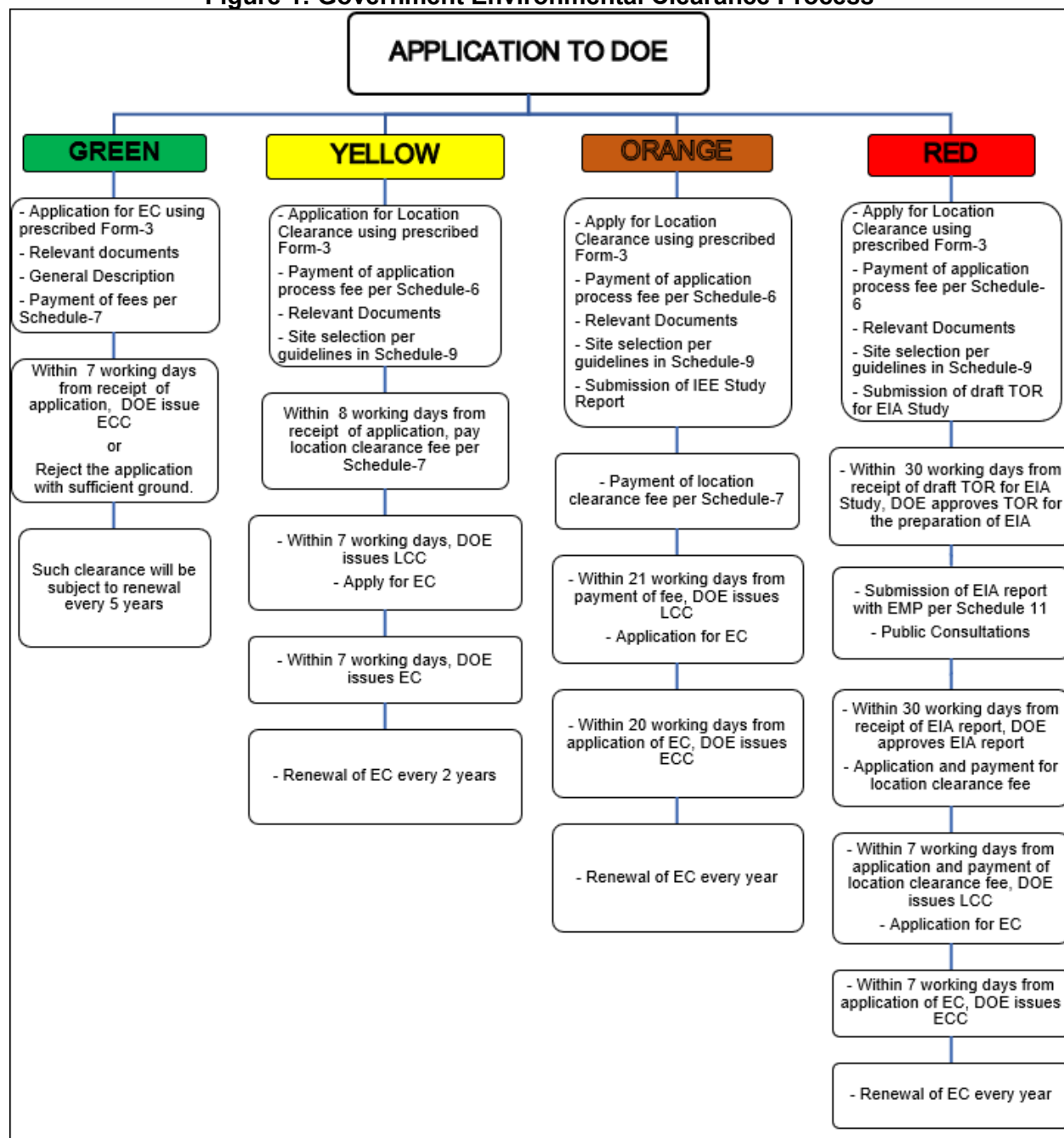
Per Schedule 10: Environmental Impact Assessment Scope of Works Guidelines, Rule 14 Sub-Rule (3), a draft Terms of Reference (TOR) will be prepared for the conduct of an Environmental Impact Assessment and submitted to the DOE for approval;

The relevant DOE office will visit the project site to review the documents and all pertinent issues. A report with justifications and findings on the rationale for issuing the location clearance certificate and draft ToR for the EIA will be forwarded to the ECC Committee. Upon receiving the documents, the ECC Committee will review and evaluate them, then submit a report to the Director General (DG) for approval. With the DG's approval, the concerned office will approve the ToR for the EIA within 30 working days;

An EIA study shall be prepared based on DOE's approved TOR. An Environmental Management Plan should be prepared as an integral part of the EIA study according to Schedule 11: Industry or Project Environmental Impact Assessment Study Preparation Guidelines, and Rule 15 Sub-Rule (3). Public consultations for the EIA study shall be carried out;

The proponent must submit the EIA report to the ECC Committee as per Schedule 11. If the EIA is approved by the DG, the proponent has to pay the fee specified in Schedule-7 within a maximum of 7 working days and the LCC will be issued within 7 working days of submission of fee to the concerned DOE office; and

After issuance of the LCC, proponent/client will submit the application for issuance of ECC. The relevant DOE office will conduct a site visit to verify the conditions of the LCC and the recommendations of the EIA etc. A report will be prepared and forwarded to the ECC committee. Upon reviewing the reports and documents, the ECC Committee will make recommendations to the DG regarding the issuance of the ECC. Once the DG approves these recommendations, the concerned office will issue the ECC within 30 working days. The ECC needs to be renewed every year.

Figure 1: Government Environmental Clearance Process

DOE = Department of Environment, EC = Environmental Clearance, ECC = Environmental Compliance Certificate, EIA = environmental impact assessment, EMP = environmental management plan, IEE = initial environmental examination, LCC = Location Clearance Certificate, TOR = terms of reference.

3. Government Environmental Categorization

42. Environmental Conservation Rules 2023 clearly defines the classification of all industrial and project schemes into four broad categories. The categorization considers all the physical interventions in implementation of those projects or industries and operational procedures and risk associated therein. Susceptibility of the location where the projects would be implemented

also determines the categories; sometimes stringent management issues are levied on the project implementation and operation.

43. Urban development projects often comprise multiple segments and varied types of interventions implemented under a single project umbrella. Each component or subproject is assessed and environmentally categorized on an individual basis, and the highest-risk category among them is applied to the overall project to ensure enhanced environmental protection and risk mitigation. Accordingly, while the nature of works of individual subprojects may fall under different environmental categories, the overall project is required to comply with the requirements of the most stringent classification, which in this case is the Orange Category. DPHE will therefore obtain a single ECC for the entire project, covering all subprojects. At present, DPHE is coordinating with the DOE and undertaking preparatory activities to comply with the requirements applicable to the Orange Category, including completion of the required IEE. The application for the ECC will be submitted once the IEE is approved, and the LCC is issued by the DOE.

Table 1: Categorization of the Subproject

Subproject/ Component	Interventions	ECR Category
Drinking Water Supply System	Construction and rehabilitation of production tube wells and overhead tanks and laying of water pipelines along the existing road network, including crossing water bodies and railway systems.	Orange
Sanitation Facility	Construction of Twin pit latrines and public toilets	Orange

C. Other National Environmental Act and Laws

44. Table below provides a summary of policies, plans and strategies which deal with the drinking water supply sector, including climate change.

Table 2: Summary of Relevant National Environmental Acts and Laws

Laws, Regulations, and Standards	Details	Relevance to the Subproject
The Constitution of the People's Republic of Bangladesh	The constitution of the country was adopted in 1972, but the 15th amendment to this constitution made in 2011 included the concept of the protection and improvement of environment and biodiversity under fundamental principles of state policy (part II). To this end, Article 18A clearly states that the state shall endeavor to protect and improve the environment and to preserve and safeguard the natural resources, biodiversity, wetlands, forests and wildlife for the present and future citizens. Inclusion of this clause into the constitution underscores the requirement for the protection and improvement of environment and biodiversity and also has influenced to develop and promulgate further environmental laws,	The clauses stated in the constitution clearly put directives to protection and improvement of natural environment and biodiversity, social justice and conservation of monuments, objects or places having special artistic or historical importance, during the planning, construction and O&M phases of the subproject.

Laws, Regulations, and Standards	Details	Relevance to the Subproject
	rules and directives in Bangladesh. The constitution also proclaims that the state shall adopt effective measures to remove social and economic inequality between man woman and to ensure the equitable distribution of wealth among citizens endeavor to ensure equality of opportunity and participation of women in all spheres of national life. The same also emphasizes adopting measures for the protection against disfigurement, damage or removal of all monuments, objects or places of special artistic or historic importance or interest.	
Environmental Conservation Act (ECA), 1995 (and subsequent amendments)	Provides for the conservation of environment, improvement of environmental standards and control and mitigation of environmental pollution. In line with these provisions of the Act, the Environmental Conservation Rules have been framed with various amendments. This Act provides for (i) remedial measures for injury to ecosystem; (ii) provides for any affected person due to environmental pollution to apply to Department of Environment (DOE) for remediation of the damage; (iii) discharge of excessive environmental pollutants; (iv) inspection of any activity for testing any equipment or plant for compliance to the environment act, including power to take samples for compliance; (v) power to make rules and standards with reference to environment; and (vi) penalty for non-conformance to environment act under the various sections. The main strategies of the Act can be summarized as: • Declaration of ecologically critical areas (ECAs), and restriction on the operation and process, which can be carried out or cannot be initiated in the ecologically critical areas. • Regulation in respect of vehicles emitting smoke harmful to the environment. • Environmental clearance. • Regulation of the industries and other development activities – discharge permits.	According to this law, no industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by rules, an Environmental Clearance Certificate (ECC) from the Director General. The subproject forms part of the overall project that is required to obtain ECC. The subproject's distribution network pipelines will also likely pass through areas adjacent receiving bodies of water. No subproject component activities should be allowed that could further pollute these bodies of water.

Laws, Regulations, and Standards	Details	Relevance to the Subproject
	• Promulgation of standards for quality of air, water, noise and soil for different areas for different purposes • Promulgation of standard limit for discharging and emitting waste. • Formulation and declaration of environmental guidelines. Amendment 2000 of the Bangladesh Environmental Conservation Act focuses on: (i) ascertaining responsibility for Compensation in cases of damage to ecosystems, (ii) increased provision of punitive measures both for fines and imprisonment, and (iii) fixing authority on cognizance of offences. The next amendment in 2002 emphasizes: (i) restriction on polluting automobiles, (ii) restriction on the sale and production of environmentally harmful items like polythene bags, (iii) assistance from law enforcement agencies for environmental actions, (iv) break up of punitive measures, and (v) authority to try environmental cases. The latest amendment in 2010 declares demarcation of wetlands and water bodies, and imposes restrictions on hazardous waste import, transportation, storage etc.; and activities on cutting of hills and/or mountains along with Ecologically Critical Areas. Failure to comply with any part of the Environment Conservation Act 1995 may result in punishment to a maximum of 5 years' imprisonment or a maximum fine of BDT 100,000, or both.	
Environment Conservation Rules, 2023	The Environment Conservation Rules, 2023 (ECR, 2023) provide the set of rules under the Environment Conservation Act, 1995. These provide, amongst other items, standards and guidelines for: • Categorization of industries and development projects; • Procedure for obtaining environmental clearance; and • Environmental quality standards in relation to inland surface water, coastal water, drinking water, sewage water, and industrial	In accordance with the ECR, 2023, the overall project is classified under Orange Category, requiring an IEE for the issuance of ECC from DOE. This ECC must be obtained prior to commencement of the project and thus with the subproject.

Laws, Regulations, and Standards	Details	Relevance to the Subproject
	wastewater quality parameters are mentioned under schedule 2, 3, 4 and 5. Whereas standards for air pollution and noise are referenced to the Air Pollution Control Rules, 2022 and Noise Pollution Control Rules, 2006, respectively. ECR, 2023 classifies industrial units and development projects into four categories for the purpose of issuance of Environmental Clearance Certificate (ECC). These categories are: Green; Yellow; Orange; and Red. Per ECR 2023, all existing and new industries and projects in Orange and Red category require an Environmental Management Plan (EMP) to be prepared (after conducting an IEE or EIA) and submitted along with other necessary papers while applying for environmental clearance.	
Bangladesh Climate Change Strategy and Action Plan 2009	The Government of Bangladesh prepared the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in 2008 and revised in 2009. This is a comprehensive strategy to address climate change challenges in Bangladesh. It is built around the following six themes: • Food security, social protection and health to ensure that the poorest and most vulnerable in society, including women and children, are protected from climate change. All programs focus on the needs of this group for food security, safe housing, employment and access to basic services, including health. Comprehensive disaster management to further strengthen the country's already proven disaster management systems to deal with increasingly frequent and severe natural calamities. • Infrastructure to ensure that existing assets (e.g., coastal and river embankments) are well maintained and fit for purpose and that urgently needed infrastructures (cyclone shelters and urban drainage) is put in place to deal with the likely impacts of climate change.	This strategy and action plan is relevant to the subproject. Accordingly, the subproject is required to integrate appropriate climate change mitigation and adaptation measures into its design to ensure that key infrastructure components, such as the quality and durability of concrete and steel reinforcement structures, pipe materials, elevation of infrastructure, and depths of production tube wells, are resilient to the projected impacts of future climate change. Incorporating these climate-resilient design measures will enhance the long-term sustainability of the subproject and contribute to the effective implementation and achievement of the objectives of the strategy and action plan.

Laws, Regulations, and Standards	Details	Relevance to the Subproject
	• Research and knowledge management to predict that the likely scale and timing of climate change impacts on different sectors of economy and socioeconomic groups; to underpin future investment strategies; and to ensure that Bangladesh is networked into the latest global thinking on climate change. Mitigation and low carbon development to evolve low carbon development options and implement these as the country's economy grows over the coming decades. • Capacity building and Institutional strengthening to enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change.	
National Water Policy 1999	The National Water Policy was promulgated in 1999 with the intention of guiding both public and private actions to ensure optimal development and management of water to benefit both individuals and the society at large. The policy aims to ensure progress towards fulfilling national goals of economic development, poverty alleviation, food security, public health and safety, a decent standard of living for the people, and protection of the natural environment. According to the policy, all agencies and departments entrusted with water resource management responsibilities (regulation, planning, construction, operation, and maintenance) will have to enhance environmental amenities and ensure that environmental resources are protected and restored while executing their activities. Environmental needs and objectives will be treated equally with the resources management needs. The policy has several clauses related to the protection and conservation of the natural environment to ensure sustainable development.	Clause 4.6(b) of this policy stipulates that natural depressions and water bodies in major urban areas must be preserved to facilitate groundwater recharge and effective rainwater management. Furthermore, Clause 4.9(b) requires that measures be implemented to minimize disruption to the natural aquatic environment, including streams and water channels. In addition, the policy mandates that all water resources development projects and rehabilitation programs consider environmental protection, restoration, and enhancement measures consistent with the National Environmental Management Action Plan and the National Water Management Plan, and adhere to a formal environmental impact assessment process where required by the Government (Clauses 4.12(a) and 4.12(b)). These policy requirements are directly relevant to the nature and scope of the subproject. The policy is also applicable due to the subproject's potential to cause pollution of surface water bodies and groundwater during both construction and operation phases. Accordingly, the subproject is

Laws, Regulations, and Standards	Details	Relevance to the Subproject
		required to comply with the provisions of this policy and integrate the relevant requirements into its design and implementation.
National Safe Drinking Water Supply and Sanitation Policy 1998	The National Safe Drinking Water Supply and Sanitation Policy were adopted in 1998 and sets out the basic framework for the improvement of public health quality and to ensure an improved environment, together with a set of broad sectoral action guidelines. The policy has the following objectives: (i) To manage water supply and sanitation related basic needs for all; (ii) To bring about a positive change of peoples' attitude towards water and sanitation; (iii) To reduce the outbreak of water-borne diseases; (iv) To increase the efficiency of the Local Government and associated communities for handling the problems related to water supply and sanitation; (v) To improve sustainable water supply and sanitation system; (vi) To promote proper conservation, management and use of surface water and to control water pollution considering the scarcity of groundwater; and (vii) To take necessary steps to capture and use rainwater.	This policy is applicable to the subproject with respect to the management and provision of water supply. The subproject serves as one of the key interventions to support the achievement of the policy's objectives, particularly those related to improving the efficiency and reliability of the water supply system and addressing challenges associated with water scarcity. As such, the subproject is aligned with and contributes directly to the implementation of the policy's intended outcomes.
The Forest Act (1927) and the Forest (Amendment) Act (2000)	The Forest Act (1927) was enacted to control trespass, illegal resources extraction from forests, and to provide a framework for the forestry revenue collection system. It is the main legislative context for forestry protection and management in Bangladesh. The Act allows for the notification of forest reserves in which the government, through the Forest Department, regulates the felling, extraction and transport of forestry produce in Bangladesh. The Act grants the government several basic powers, largely for conservation and protection of government forests, and limited powers for private forests.	Although no forested areas are located within the subproject sites or along the proposed alignments, this Act remains relevant due to the potential need for cutting individual trees in certain areas affected by the subproject. Accordingly, the subproject will be required to obtain the necessary permits and approvals from the relevant authorities prior to the cutting or removal of any trees and before the commencement of civil works.
Wildlife (Conservation and Security) Act, 2012	This Act provides for the conservation and safety of biodiversity, forest, and wildlife of the country by repealing the previous laws, i.e., Wildlife	This Act is relevant to the subproject as certain proposed alignments may traverse areas where wildlife species and their

Laws, Regulations, and Standards	Details	Relevance to the Subproject
	(Preservation) Act of 1973. The Department of Forest (BFD) has the primary responsibility for implementing this Act. The key features of this Act are: i) Prohibition made in relation to wild animals and plants that no person can hunt any wild animal without a license or willfully pick, uproot, destroy or collect any plant; ii) Determination of vulnerable, endangered and critically endangered species of wild animals and plants; iii) Declaration of sanctuary for the conservation of forest and habitat of wildlife and prohibitions made on such sanctuary; iv) Requirement of license to cultivate, extract, manufacture, rear, export or import any wild animal or part of its body, meat, trophy, uncured trophy or any plant; and v) Restriction on import, export and re-export of wild animals and plants.	habitats could potentially be disturbed or damaged. Such disturbances may arise during site preparation, construction, or ancillary activities. Accordingly, appropriate mitigation and management measures will be required to avoid, minimize, and manage potential impacts on wildlife and their habitats, and to ensure the conservation, protection, and security of affected species in accordance with the provisions of the Act.
Bangladesh Public Procurement Rule (PPR), 2008	This rule applies to the Procurement of Goods, Works or Services by any government, semi-government or any statutory body established under any law. The rule includes the adequate measure regarding the ‘Safety, Security and Protection of the Environment’ in the construction works. This clause includes contractor responsibility to take all reasonable steps to (i) safeguard the health and safety of all workers working on the site and other persons entitled to be on it, and to keep the site in an orderly state and (ii) protect the environment on and off the site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of the Contractors methods of operation.	DPHE, as a government entity, is required to comply with the environmental requirements stipulated under this Rule. Compliance is mandatory, as explicitly specified in the provisions of the Rule, and applies to all activities undertaken by DPHE in the planning, design, and implementation of the subproject.
National Environmental Policy, 2018	The central theme of the policy is to ensure protection and improvement in the environment. The policy gives a thrust to sustainable development and long-term use of natural resources. The National Environment Policy contains policy statements and strategic options about population and land-use management, management and utilization of natural resources and other socio-economic sectors, as well	The subproject is expected to result in site-specific environmental impacts and will therefore require the implementation of appropriate mitigation measures to avoid, minimize, and manage potential adverse effects, and to ensure the protection and improvement of the surrounding environment.

Laws, Regulations, and Standards	Details	Relevance to the Subproject
	as the necessary arrangements for the implementation of the policy.	
Environmental Court Act, 2000	Enacted to establish Environment Courts and make rules for protection of environmental pollution. Environment Courts are situated at the district level, but Government may by notification in the official Gazette, establish such courts outside the districts. Environment Courts were given the power to directly take cognizance of any offence relating to environmental pollution. The proceedings of this Court will be like criminal courts. One important feature of this Act is that it has been given retrospective effect of any crime committed under environment laws and thus any crime previously committed but is not taken before any court can be taken before the Environment Court or any special Magistrate.	This Act is relevant to the subproject, as its implementation may give rise to environmental complaints or disputes that could potentially be elevated to the Environmental Court. The Environmental Court has jurisdiction over all subproject-related environmental cases, litigations, or complaints formally brought before it. Accordingly, the subproject is subject to the provisions of this Act and the jurisdiction of the Environmental Court for the resolution of any environmental issues or grievances arising from its implementation
National Water Act 2013 National Water Rules 2018	Ensures Bangladesh water sources are free from any type of pollution. Pollution from water in urban outfalls and reservoirs, e.g., lakes, canals, ponds and ditches may result in amenity losses, fisheries depletion, health problems and fish and aquatic species of contamination.	The subproject is required to implement appropriate preventive and mitigation measures during the design and construction phases to avoid pollution of water sources, particularly surface water bodies used as raw water sources and intake locations or which could receive runoff or discharges along the alignments of the water supply subproject.
Wetland Protection Act 2000	Advocates protection against degradation and resuscitation of natural waterbodies such as lakes, ponds, <i>beels</i> , <i>khals</i> , tanks, etc. affected by man-made interventions or other causes. Prevents the filling of publicly owned water bodies and depressions in urban areas for preservation of the natural aquifers and environment. Prevents unplanned construction on riverbanks and indiscriminate clearance of vegetation on newly accreted land.	The subproject is required to implement appropriate design, construction, and site management measures to ensure that nearby water bodies are not adversely affected by subproject activities. This requirement is particularly relevant for subproject sections located near riverbanks, streams, drainage channels, or natural depressions, where there is a higher risk of sedimentation, runoff, or accidental pollution. Effective mitigation measures will be necessary to prevent impacts on these water bodies and maintain their ecological and hydrological functions.
The Embankment and Drainage Act (1952)	This Act describes the protection of embankments and drainage facilities	Disposal of construction material may create drainage obstruction.

Laws, Regulations, and Standards	Details	Relevance to the Subproject
		So, adherence to relevant section of the Act must be addressed in the environmental assessment.
The Bangladesh Water Development Board Act, 2000	The Bangladesh Water Development Board Act, 2000 was enacted for the development and efficient management of water resources. The Water Development Board is established under the Act, with the power to control the flow of water in all rivers, channels and underground aquifers.	This Act is relevant to the subproject, as portions of the proposed alignments may be located near waterways. Accordingly, the subproject will be required to implement appropriate design and construction measures to ensure that natural water flows in adjacent <i>khals</i> , canals, and other drainage channels are not obstructed or disrupted.
National Disaster Management Act 2012	The National Disaster Management Act 2012 recognized the impacts of climate change and provides guidance for setting up an institutional mechanism for disaster management, reducing vulnerabilities, rehabilitation, and providing humanitarian assistance to the victims of both disasters and climate change impacts.	This Act is relevant to the subproject, as potential disaster risks may arise during the construction phase, necessitating the implementation of appropriate preparedness, prevention, and response measures to avoid or effectively manage adverse impacts. While the design of the water supply infrastructure will incorporate disaster-resilient features to withstand foreseeable hazards, there remains a residual risk of impacts from natural disasters and climate-related events. Accordingly, the Act underscores the need for clear guidance on the establishment and operation of an institutional mechanism for disaster risk management, including defined roles and responsibilities, coordination arrangements, and emergency response procedures. Such institutional arrangements, together with sound operation and maintenance practices, will ensure that risks associated with disasters and climate change are proactively managed and minimized throughout the lifecycle of the subproject.
National 3R Strategy for Waste Management, 2010	The 3Rs are meant to be a hierarchy, in order of importance – ‘reduce’ followed by ‘reuse’ and then ‘recycle’, which classify waste management strategies according to their desirability. The National 3R goal for waste management is to achieve	This strategy is relevant to the subproject, as the implementation of the subproject may result in the generation of waste, particularly during the construction phase. Accordingly, proper management, handling, and disposal of

Laws, Regulations, and Standards	Details	Relevance to the Subproject
	eliminate waste disposal on open dumps, rivers and floodplains and promote recycling of waste through mandatory segregation at source as well as create a market for recycled products and provide incentives for recycling.	construction wastes will be required to prevent adverse environmental impacts. The subproject is therefore required to comply with the provisions of this strategy to ensure that construction waste is managed in an environmentally sound manner and that potential negative impacts on the surrounding environment are avoided.
National Land Use Policy, 2001	Sets out guidelines for improved land-use and zoning regulations. The main objective of this policy is to ensure criteria-based uses of land and to provide guidelines for usage of land for the purpose of agriculture, housing, afforestation, commercial and industrial establishments, rail and highway and for tea and rubber gardens.	Sitting of subproject components need to comply with land use and zoning regulations.
The <i>Paurashava</i> Act 2009 / Ordinance issued for the amendment of local government (municipality) ordinance, 2009 and 2010; The <i>Paurashava</i> Ordinance, 1977; Municipal Administration Ordinance, 1960	Provides guidance for subproject integrated community and workers' health and hygiene at the construction and operation and maintenance stages of the project.	The subproject will comply with the provisions of this Act throughout all phases of implementation. The institutional arrangements for the subproject include the involvement of the relevant <i>Paurashava</i> administration at the local level. As such, mandated coordination with the appropriate <i>Paurashava</i> committees will be established and maintained to ensure the effective implementation of disaster management measures, as well as other environmental safeguard measures developed for the subproject.
Air Pollution Control Rules, 2022	APCR, 2022 contains air quality standards based on WHO Guidelines (Interim Goals); emissions limits and technical specifications for key sectors; mandates and coordination mechanisms among relevant line ministries to control both household and outdoor air pollution. The rules elevated the air quality management dialogue and leadership beyond the environment sector; by establishing the National Committee on Air Pollution Control, a multi-sector decision-making body presided by the Cabinet Secretary to coordinate the APCR implementation and instruct relevant	Subproject construction activities are expected to generate air emissions, including dust and smoke. Accordingly, the subproject will be required to implement appropriate mitigation measures and comply with the applicable air emission and ambient air quality standards specified under the Rules in order to prevent adverse impacts on air quality and public health.

Laws, Regulations, and Standards	Details	Relevance to the Subproject
	agencies on specific interventions to comply with the new rules.	
Noise Pollution (Control) Rules, 2006	The Noise Pollution Rules, 2006 addresses that the sound levels to be no more than 50dB in Silent Zones ^a during daytime (6 am to 9 pm) and 40 dB at night-time (9 pm to 6 am). In residential areas these levels are 55 dB and 45 dB, in mixed area ^b 60 dB and 50 dB, in commercial and industrial areas 70 dB and 60 dB and in industrial areas 75 dB and 70 dB for daytime and night-time respectively.	Subproject activities, particularly linear construction works, will be undertaken across multiple locations characterized by varying land uses. Accordingly, the subproject is required to comply with the applicable noise level standards corresponding to the specific land use classifications at each site, in order to prevent adverse impacts on surrounding communities and sensitive receptors.
Solid Waste Management Rules 2021	The Rules provides a comprehensive set of rules based on national 3R strategy and other national and international policies and guidelines pertaining to solid waste management. It defines the roles and responsibilities of relevant government ministries and agencies, including local government authorities and other stakeholders in implementing solid waste management undertakings. It also includes the environmental requirements necessary for these undertakings, provision of incentives for the promotion of sustainable waste management practices, etc.	The subproject will generate solid wastes during its implementation and will therefore be required to implement appropriate waste minimization, handling, storage, and disposal measures in accordance with the provisions of the Rules.

^a The area within 100 meters from hospital, academic institutions or places identified/identifiable by the government

^b An area, which is primarily a residential area with either or both commercial and industrial parts in it

D. Legislation Relating to Occupational Health and Safety

45. Relevance of occupational health and safety are presented in the below Table.

Table 3: Relevance of Occupational Health and Safety Legislation

Title of Laws and Rules	Relevance
Social Security under the Act, 1923 and an amendment in 1980	The Act is relevant to the subproject as it applies to project workers engaged during construction and operation. The Act governs provisions related to workers' welfare, social protection, benefits, and labor-related safeguards, which must be complied with to ensure adequate social security coverage and protection of all eligible workers under the subproject.
Bangladesh Labor Law of 2006	The Law is relevant to the subproject as it governs the employment of project workers and requires compliance with provisions on employment standards, occupational safety and health, workers' welfare and social protection, labor relations and social dialogue, and enforcement mechanisms, including the strict prohibition of child and adolescent labor in all subproject activities.

Title of Laws and Rules	Relevance
Bangladesh Labor Rules, 2015	The Rules are relevant to the subproject as it serves as the implementing rules of the Bangladesh Labor Law. The Rules require contractors to implement appropriate occupational health and safety measures and establish contractor liability for compensation arising from work-related injuries, accidents, or occupational illnesses affecting project workers.
The Employer's Liability Act, 1938	The Act is relevant to the subproject due to the engagement of project workers, as it establishes employer liability for employment-related injuries and disallows the use of the doctrines of common employment and assumed risk as defenses in claims for damages. In addition, in conjunction with applicable maternity benefit laws and their implementing rules, the provisions ensure that female workers engaged under the subproject are entitled to maternity benefits, including maternity leave before and after delivery, which must be observed during project implementation.
Public Health (Emergency Provisions) Ordinance, 1994	The Ordinance is relevant to the subproject as it mandates special measures to protect public health in emergency situations. In the event of an outbreak or risk of the spread of human disease, the Ordinance requires the adoption of appropriate actions to prevent disease transmission, safeguard public health, and ensure the provision of adequate medical and other essential services. These requirements are particularly applicable during construction activities, where both project workers and surrounding communities may face increased public health risks.
The Employees State Insurance Act, 1948	The Act is relevant to the subproject as it requires the provision of health care, injury, sickness, and related social security benefits to eligible project workers at the workplace. Compliance with the Act ensures that workers engaged under the subproject are adequately protected against employment-related illness, injury, or health contingencies during subproject implementation.
Bangladesh Factory Act, 1979	The Act is relevant to the subproject as it requires workplaces, including small- and large-scale construction sites where women are employed, to provide appropriate childcare facilities. The Act also mandates the provision of adequate medical facilities, first-aid services, and accident and emergency response arrangements at workplaces, which must be complied with to safeguard the health, safety, and welfare of project workers during subproject implementation.

E. Relevant International Conventions, Treaties

46. Relevant International Conventions, Treaties and Protocols (ICTPs) are given in the following Table.

Table 4: International Environmental Conventions Relevant to the Subproject Activities

Sl. No.	International Treaties	Ratified/ Accessed (AC)/ Accepted (AT)/ Adaptation (AD)	Relevance
1	International Plant Protection Convention (Rome, 1951) & Plant Protection Agreement for SE Asia and Pacific (1999 Revision)	01.09.1978 04.12.1974 (AC)	This Convention is relevant to the subproject as it requires that all construction materials, equipment, and component work used in project implementation are managed and sourced in a manner that prevents the introduction and spread of plant pests, thereby protecting local agriculture and ecosystems.
2	Convention on Wetlands of International Importance, 1971 (Ramsar Convention)	20.04.1992 (ratified)	This Convention is relevant to the subproject as it provides for the protection of significant wetlands and prohibits their draining, filling, or degradation during construction activities. Compliance with this Convention ensures that construction works are planned and implemented in a manner that avoids adverse impacts on wetland ecosystems within or adjacent to subproject areas.
3	Convention Concerning the Protection of World Cultural and Natural Heritage (Paris, 1972)	03.11.1983 (ratified)	This Convention is relevant to the subproject as it requires the protection of culturally and historically significant sites, monuments, and heritage resources, and prohibits any damage, destruction, or disturbance to such assets during construction and related project activities. Compliance with this Convention ensures that physical cultural resources are identified, preserved, and managed appropriately throughout subproject implementation.
4	Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal 1987)	02.08.90 31.10.90 (AC) (entry into force)	This Protocol is relevant to the subproject as it requires the use of environmentally friendly equipment and facilities, such as refrigeration and air-conditioning units that utilize ozone-friendly chemicals or substances. Compliance with this requirement helps prevent ozone layer depletion and ensures that project implementation aligns with applicable environmental protection standards.

Sl. No.	International Treaties	Ratified/ Accessed (AC)/ Accepted (AT)/ Adaptation (AD)	Relevance
5	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, Switzerland, 1989)	01.04.93 (AT) 30.06.93 (entry into force)	This Convention is relevant to the subproject as it regulates and restricts the transboundary movement of hazardous wastes, including potential asbestos-containing materials that may be associated with construction activities, construction equipment and machinery, or labor camp facilities. The Convention allows such movements only when they comply with the principles of environmentally sound management, thereby ensuring that hazardous materials are handled, transported, and disposed of in a manner that protects human health and the environment during subproject implementation.
6	Convention on Biological Diversity, 1992 (Rio de Janeiro)	03.05.1994	This Convention is relevant to the subproject as it requires the protection of biodiversity during both construction and operational phases. Compliance with the Convention ensures that project activities are planned and implemented in a manner that avoids, minimizes, or mitigates adverse impacts on flora, fauna, and natural habitats within and around the subproject area.
7	Cartagena protocol on Biosafety to the Convention on Biological Diversity	In the process of Ratification	Protection of biodiversity during construction and operation.
8	Convention on Persistent Organic Pollutants, 2001	In process	This Convention is relevant to the subproject as it regulates and restricts the use of pesticides and herbicides during construction and operation activities. Compliance with the Convention ensures that any use of such chemicals is controlled, minimized, and conducted in an environmentally sound manner to prevent adverse impacts on human health, soil, water resources, and biodiversity within and around the subproject area.
9	United Nations Framework Convention on Climate Change, 1997	22.10.2001 13.11.2003 (amended)	This Convention is relevant to the subproject as it aims to reduce greenhouse gas concentrations in the atmosphere to levels that prevent dangerous anthropogenic interference with the climate system. Compliance with the Convention requires the subproject to integrate climate-responsive measures in its design, construction, and operation, including improving energy efficiency, minimizing emissions, and adopting

Sl. No.	International Treaties	Ratified/ Accessed (AC)/ Accepted (AT)/ Adaptation (AD)	Relevance
			practices that contribute to climate change mitigation.

F. Gaps in Legal and Guiding Instruments

47. Comparative analysis of Environmental Safeguard principles is shown in the following Table.

Table 5: Comparative Analysis of Environmental Safeguard Policy

Sl. No.	ADB SPS, 2009		GOB Principles	Gaps (if any)
	Principles	Delivery Process		
1	Use of screening process to determine the appropriate environmental assessment	Uses sector-specific rapid environmental assessment checklist for screening and assigns categories based on potential impacts: A- EIA required (irreversible, diverse or unprecedented adverse environmental impacts); B- IEE required; C- No environmental assessment required but a review of environmental implications; FI - ESMS required.	ECA 1995 and ECR 2023 set screening criteria to classify industries/ projects based on potential environmental impacts as follows: Green, Yellow, Orange and Red (cause significant environmental impacts). The screening criteria is based on the project or industry type and do not consider the scale and location. The category determines the level of environmental assessment.	No major gaps
2	Conduct an environmental assessment	EIA and IEE - Identify potential impacts on physical, biological and socioeconomic aspects in the context of project's area of influence (i.e., primary project site and associated facilities) ESMS for FIs	Industry/project category Green- no environmental assessment required. Yellow – compliance with site selection criteria. Orange – compliance with site selection criteria and conduct of IEE required; Red – compliance with site selection criteria, and both IEE and EIA required.	No major gaps
3	Examine alternatives	Analyze alternatives to the project's location, design, and technology. Document rationale for selecting the particular project location, design, and technology Consider "no project" alternative	Regulations (i.e., ECA 1995 and ECR 2023) do not require specifically the identification and analysis of alternatives	Not required by law for projects classified as Green, Yellow or Orange under the national regulation. But the ToR for any EIA

Sl. No.	ADB SPS, 2009		GOB Principles	Gaps (if any)
	Principles	Delivery Process		
				(Red Category) to be approved by the DOE now includes a discussion on analysis of alternatives.
4	Prepare an environmental management plan (EMP)	EMP to include monitoring, budget and implementation arrangements.	EMP and procedures for monitoring included in the IEE and EIA (i.e., Yellow, Orange, and Red category projects)	No major gaps
5	Carry out meaningful Consultation	Starts early and continue during implementation; Undertaken in an atmosphere of free intimidation Gender inclusive and responsive tailored to the needs of vulnerable groups Allows for the incorporation of all relevant views of stakeholders Establish a grievance redress mechanism	For projects classified under Red Category, public consultation is required based on ECR 2023 Grievance redress mechanism is not mentioned in ECA 1995 and ECR 2023; EIA format required by DOE includes stakeholders' consultation.	Not required by law for projects classified as Green, Yellow or Orange under the national regulation. But approval of the ToR of EIA (Red Category) by DOE includes mandatory consultation with stakeholders.
6	Timely disclosure of draft environmental assessment (including the EMP)	Draft EIA report posted on ADB website at least 120 days prior to Board consideration; Draft EA/EARF prior to appraisal. Final or updated EIA/IEE upon receipt. Environmental monitoring report submitted by borrowers upon receipt.	No requirement for public disclosure of environmental reports but DOE posts the minutes of the meeting on the application for environmental clearance certificate to its website, http://www.doebd.org/minutes.php	Still no requirement for public disclosure of environmental Assessment.
7	Implement EMP and monitor effectiveness	Prepare monitoring reports on the progress of EMP Retain qualified and experienced external experts or NGOs to verify monitoring	For project classified under Orange and Red Categories, ECC is subject to annual renewal based on compliance of the conditions set by DOE.	No major gaps

Sl. No.	ADB SPS, 2009		GOB Principles	Gaps (if any)
	Principles	Delivery Process		
		information for Category A projects Prepare and implement corrective action plan if noncompliance is identified Requires submission of quarterly, semi-annual, and annual reports to ADB for review		
8	Avoid areas of critical habitats (use of precautionary approach to the use, development and management of renewable natural resources)	Provides guidance on critical habitats.	ECA 1995 and ECR 2023 identifies ecologically-critical areas and the rules to protect them.	No major gaps
9	Use pollution prevention and control technologies and practices consistent with international good practices	Refers to World Bank's Environmental Health and Safety (EHS) General Guidelines 2007 (or any update). If national regulations differ, more stringent will be followed. If less stringent levels are appropriate in view of specific project circumstances, provide full and detailed justification	Effluent standards, ambient and emission standards included in ECA 1995 and ECR 2023. Ambient noise levels included in Noise Pollution Control Rules 2006.	No major gaps
10	Provide workers with safe and healthy working conditions	Refers to WB EHS General Guidelines 2007 (or any update).	Occupational health and safety standards included in the Factories Act 1965, the Bangladesh Labour Act 2006, and its 2013 amendment.	No major gaps
11	Conserve physical cultural resources (PCR) and avoid destroying or damaging them	Use of field-based surveys and experts in the assessment. Consult affected communities on PCR findings Use chance find procedures for Guidance.	Preservation and protection of cultural resources are within the Antiquities Act 1968.	No major gaps

G. Permits and Clearance

48. Per ECA, 1995 (amended 2010) and ECR, 2023, it is mandatory for each type of industry and project to obtain ECC from the DOE. For the issuance of ECC, any proponent should follow the steps described above in Section B of this chapter.

49. The application and requirement for issuance of ECC are described in the ECR, 2023 and summarized in Section B above. This involves the completion and submission of an application using a form available from the DOE website,¹⁵ which is revised from time to time. The accomplished application form is submitted to DOE together with requirements as enumerated in Section B above. The proponent is also required to pay equivalent application fee prescribed in ECR, 2023.

50. For the project classified under the Orange Category, the ECC is issued within 20 working days from the day of approval of the IEE report by DOE, provided that LCC has been issued prior. LCC is normally issued within approximately 7 working days from the application along with summary report of initial environmental report and payment of fees. Once issued, ECC is required to be renewed every year from the date of its effectivity for Orange category project. For the overall project, DPHE, is responsible for application for ECC. This ECC will cover all subprojects identified under the overall project. Completion of the IEE is ongoing, and application for ECC will be submitted once LCC is issued by DOE, and the IEE is approved.

51. Per National Water Act 2013, and National Water Rules 2018, the project will also require no objection certificate (NOC) from the Water Resources Planning Organization (WARPO) for ground water extraction.

H. Applicable Environmental Standards

52. The ECR, 2023 prescribes the applicable national environmental quality standards relevant to the subproject, as presented in this chapter. In accordance with the requirements of the ADB SPS, the subproject will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in the World Bank Group EHS Guidelines. Where discrepancies exist between national regulations and the EHS Guidelines, the more stringent standards and measures shall be applied. In cases where less stringent standards or alternative measures are considered appropriate due to specific project circumstances, DPHE will provide a full and detailed justification, demonstrating consistency with the requirements of the ADB SPS. The tables below present a comparison of applicable national standards and internationally recognized guidelines.

Table 6: Bangladesh National Drinking Water Quality Standards

Parameter	Unit	Standard
1,1 Dichloroethane (1,1 C ₂ H ₄ Cl ₂)	mg/l	0.030
1,2 Dichloroethane (1,2 C ₂ H ₄ Cl ₂)	mg/l	0.030
2,4,6 Trichlorophenol	mg/l	0.200
Aldrin/Dieldrin	mg/l	0.030
Aluminium (Al)	mg/l	0.200
Ammonia (NH ₃)	mg/l	1.500
Anionic Detergents	mg/l	0.200
Arsenic (As)	mg/l	0.050
Barium (Ba)	mg/l	0.700

¹⁵ Government of Bangladesh. Department of Environment.

Parameter	Unit	Standard
Benzene (C ₆ H ₆)	µS/cm	0.010
Boron (B)	mg/l	1.000
Cadmium (Cd)	mg/l	0.003
Calcium (Ca)	mg/l	75.000
Carbon Tetra Chloride (CCl ₄)	mg/l	0.005
Chloride	mg/l	250.000*
Chloroform (CHCl ₃)	mg/l	0.090
Color	Hazen Unit	15.000
Copper (Cu)	mg/l	1.500
Cyanide (CN)	mg/l	0.050
Fecal Coliform	NFU/100ml	0
Fluoride (F ⁻)	mg/l	1.000
Free Residual Chlorine	mg/l	0.20
Hardness as CaCO ₃	mg/l	500.000
Iron (Fe)	mg/l	0.3-1.0
Lead (Pb)	mg/l	0.010
Magnesium (Mg)	mg/l	30-35
Manganese (Mn)	mg/l	0.400
Mercury (Hg)	mg/l	0.001
Nickel (Ni)	mg/l	0.050
Nitrate (NO ₃ ⁻)	mg/l	45
Nitrite (NO ₂ ⁻)	mg/l	1.000
Odor	---	Odorless
Oil and Grease	mg/l	0.010
Overall Beta variance	BQU/L	1.000
Pentachlorophenol	mg/l	0.009
pH	---	6.5-8.5
Phenols	mg/l	0.002
Potassium	mg/l	12.000
Radioactive Materials Emitting Alpha Radiation	BQU/L	0.100
Selenium (Se)	mg/l	0.010
Silver (Ag)	mg/l	0.020
Sodium (Na)	mg/l	200.000
Sulfate (SO ₄ ²⁻)	mg/l	250.000
Sulfide as H ₂ S	mg/l	0.050
Suspended Solid (SS)	mg/l	10.000
Temperature	°C	20-30
Tetrachloroethane (C ₂ H ₄ Cl ₄)	mg/l	0.040
Tin (Sn)	mg/l	2.000
Total Chromium (Total Cr)	mg/l	0.050
Total Coliform	NFU/100ml	0
Total Dissolved Solids (TDS)	mg/l	1000.000
Total Kjeldal Nitrogen	mg/l	1.000
Trichloroethane (C ₂ H ₃ Cl ₃)	mg/l	0.020
Turbidity	NTU	5.000
Zinc (Zn)	mg/l	5.000

* 1,000 mg/l in coastal areas

Source: ECR, 2023

Table 7: Bangladesh Inland Surface Water Standards

Best Practice Based classification	pH	DO mg/l	BOD mg/l	NO ₃ -N mg/l	NH ₄ -N mg/l	PO ₄ -P mg/l	Total Cr mg/l	Pb mg/l	Hg mg/l	Total Coliform cfu/100 ml	TDS mg/l	COD mg/l
Source of drinking water for supply only after disinfecting:	6.5-8.5	≥6	≤2	7.0	0.1	0.1	0.02	0.03	0.001	≤100	1000	10
Water usable for recreational activity	6.5-8.5	≥5	≤3	7.0	0.3	0.5	0.2	0.05	0.001	≤50	1000	10
Source of drinking water for supply after conventional treatment	6-9	≥5	≤3	7.0	0.3	0.5	0.02	0.03	0.001	≤5000	1000	25
Water usable by fisheries	6-9	≥5	≤6	7.0	0.3	0.5	0.05	0.1	0.004	≤5000	1000	50
Water usable by various process and cooling industries	6.5-8.5	≥1	12	-	2.7	-	0.1	0.1	0.05	-	1000	100
Water usable for irrigation	6.5-8.5	-	≤12	5.0	1.5	2.0	0.1	0.1	0.002	≤50000	1000	100

Note: Electrical conductivity for irrigation water 2250 -μS/cm (at a temperature of 250C); Sodium less than 26%; boron less than 0.2%.

Source: ECR, 2023

Table 8: Applicable Ambient Air Quality Standards for Bangladesh Projects

Parameter	Bangladesh Ambient Air Quality Standard (µg/m ³) and Averaging Time ^a	WHO Air Quality Guidelines (µg/m ³)
		Global Update ^b 2021
PM10	50 (1-year) 150 (24-h)	15 (1-year) 45 (24-h)
PM2.5	35 (1-year) 65 (24-h)	5 (1-year) 15 (24-h)
SO ₂	80 (24-h) 250 (1-h)	40 (24-h)
NO _x	40 (1-year) 80 (24-h)	10 (1-year) 25 (24-h)
CO	5,000 (8-h) 20,000 (1-h)	4 (24-h)
Lead	0.25 (1-year) 0.50 (24-h)	
Ozone (O ₃)	180 (1-h) 100 (8-h)	60 (peak season) 100 (8-h)
NH ₃	100 (1-year) 400 (24-h)	

ADB = Asian Development Bank, CO = carbon oxide, h = hour, µg/m³ = microgram per cubic meter, min = minute, NO_x = oxides of nitrogen, PM2.5 = particulate matter 2.5, PM10 = particulate matter 10, SO₂ = sulfur dioxide, WHO = World Health Organization.

^a Air Pollution Control Rules 2022

^b Recommended 2021 WHO Global Air Quality Guidelines. <https://www.who.int/>

Table 9: Applicable Noise Levels for Bangladesh Projects

Receptor/ Source	National Noise Standard Guidelines ^a (dB)		WHO Guidelines Value For Noise Levels Measured Out of Doors ^b (One Hour LA _q in dBA)	
	Day (06:00-21:00)	Night (21:00-6:00)	07:00 – 22:00	22:00 – 07:00
Industrial area	75	70	70	70
Commercial area	70	60	70	70
Mixed Area	60	50	55	45
Residential Area	55	45	55	45
Silent Zone ^c	50	40	55	45

^a Noise Pollution Control Rules, 2006

^b WHO. 1999. Guidelines for Community Noise; World Bank Group. 2007. Environmental, Health and Safety General Guidelines. Washington, D.C.

^c Area up to a radius of 100 meters around hospitals or educational institutions or special institutions/establishments identified/to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

Table 10: Applicable Effluent Discharge Standards

Sl. No	Parameter	Unit	Maximum Tolerable Limit at Discharge point except pH		
			Internal Surface Water	2nd Stage process of public sewage	Coastal Areas
	Nitrogen (N)	mg/l	50	50	50
	Ammonia (NH ₃)	mg/l	5	5	5

Sl. No	Parameter	Unit	Maximum Tolerable Limit at Discharge point except pH		
			Internal Surface Water	2nd Stage process of public sewage	Coastal Areas
	Arsenic (As)	mg/l	0.2	0.2	0.2
	BOD5 at 20°C	mg/l	30	250	100
	Boron (B)	mg/l	2	2	4
	Cadmium (Cd)	mg/l	2	1	2
	Chlorine (Cl-)	mg/l	600	600	---
	Total Chromium	mg/l	0.5	1	1
	COD	mg/l	200	400	250
	Hexavalent Cr	mg/l	0.1	2	1
	Copper (Cu)	mg/l	3	3	3
	Fluoride (F)	mg/l	2	15	15
	Sulphide (S)	mg/l	1	--	5
	Iron (Fe)	mg/l	3	3	3
	Total Kjeldal nitrogen	mg/l	100	--	100
	Lead (Pb)	mg/l	0.1	1	2
	Manganese (Mn)	mg/l	2	2	2
	Mercury (Hg)	mg/l	0.01	0.01	0.01
	Nickel (Ni)	mg/l	1	2	5
	Nitrite (N)	mg/l	10	--	20
	Oil & Grease	mg/l	10	20	20
	Phenol (C6H5OH)	mg/l	1	5	5
	Phosphorus (P)	mg/l	5	--	--
	Radioactive Material Alpha Particle Beta Particle	Micro Curie/L	Standard Set by Bangladesh Atomic Energy Commission	---	----
	pH	---	6-9	6-9	6-9
	Selenium (Se)	mg/l	0.05	0.05	0.05
	Zinc (Zn)	mg/l	5	15	15
	Temperature	°C	Not more than 5°C of reservoir water temperature	--	Not more than 5° C of reservoir water temperature
	Suspended Solids	mg/l	100	500	100
	Cyanide	mg/l	0.1	2.0	0.2
	Total Residual Chlorine	mg/l	1.0	--	1.2
	Bio Assay Test		90% fishes remain alive after 96 hours in the treated liquid waste	90% fishes remain alive after 96 hours in the treated liquid waste	90% fishes remain alive after 96 hours in the treated liquid waste

Source: ECR, 2023

III. PROJECT DESCRIPTION

53. The Cluster Towns Water Supply and Sanitation Project (CTWSSP) will improve safe, reliable, inclusive, and climate-resilient urban water supply and sanitation services in selected secondary towns of Bangladesh. The project is organized under two clusters: the Cumilla Cluster and the Ishwardi Cluster. This IEE covers only the Cumilla Cluster subproject, comprising Cumilla City Corporation and the Paurashavas of Laksam, Hajiganj, and Chandpur.

54. The Cumilla Cluster subproject will rehabilitate and expand existing water supply infrastructure and construct selected new assets to improve service coverage, reliability, operational efficiency, water quality management, and climate resilience. The main interventions include production tube wells, overhead tanks, surface water treatment plant rehabilitation, secondary mains, rising mains, distribution networks, household metered connections, district metered areas, SCADA, GIS-based asset management, and selected sanitation facilities.

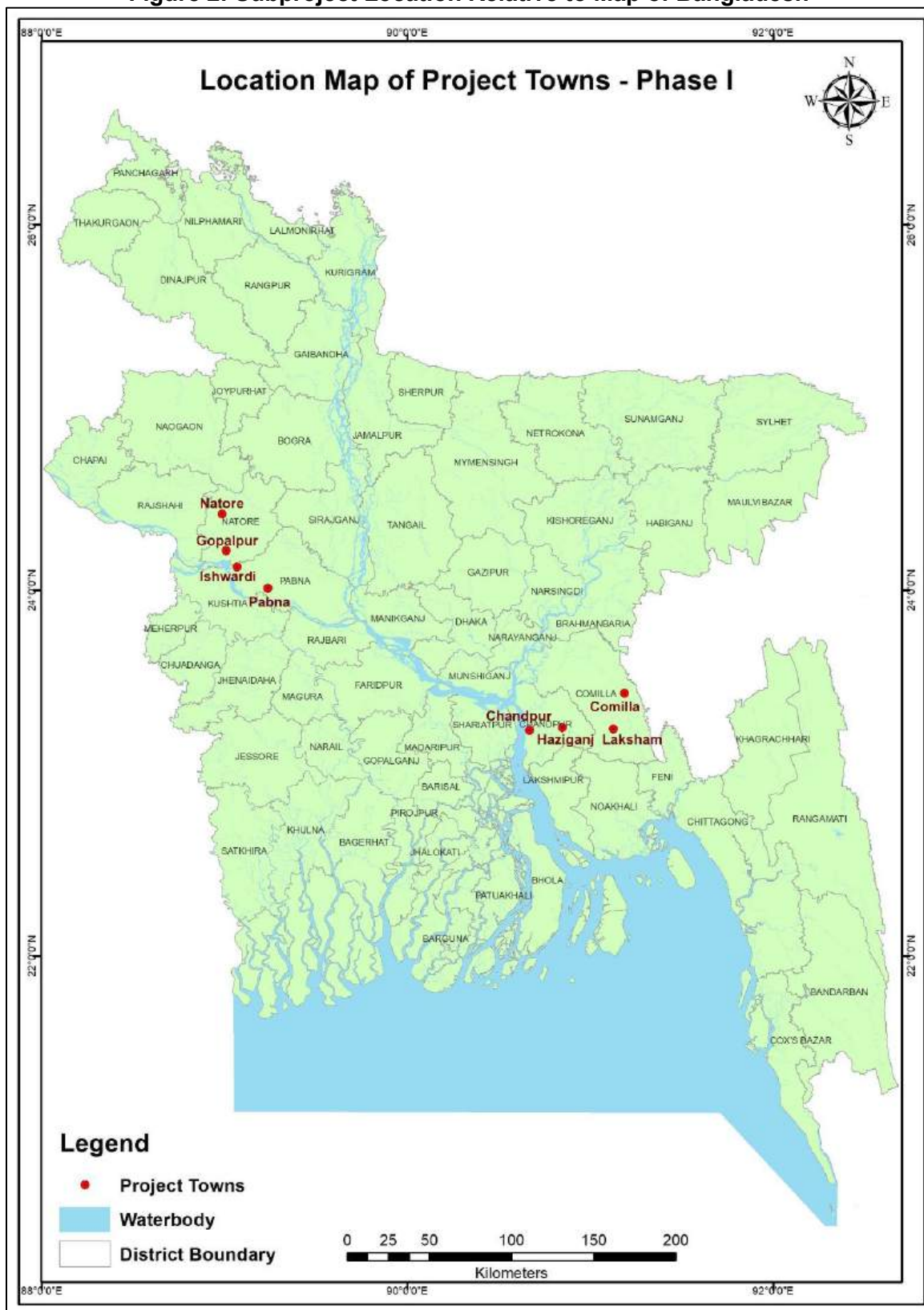
55. The subproject is designed to address low piped-water coverage, high non-revenue water, aging and leaking distribution networks, inadequate metering, poor pressure management, intermittent supply, weak water quality surveillance, and underdeveloped sanitation services. The subproject will prioritize service improvements in low-income communities, slums, and informal settlements where technically feasible and socially appropriate.

56. The CTWSSP, funded by the Asian Development Bank (ADB), seeks to improve sustainable urban water supply and sanitation services in above mentioned targeted *Paurashavas* in Bangladesh. The proposed subproject is to construct the drinking water distribution network and small sanitation components in the Cumilla cluster, which composed of Cumilla City Corporation, Laksam, Hajiganj, and Chandpur Municipalities. The coverage areas are described in the following table:

Table 11: Covered Municipalities by Subproject

Cluster	Municipalities or <i>Paurashavas</i>	Wards	Population
Cumilla Cluster	Cumilla City Corporation	27Wards and 5 Unions	478,903
	Laksam Pourashva (A – Category)	9 Wards	102,964
	Hajiganj Paurashava (A – Category)	9 Wards	84,248
	Chandpur Paurashava (A – category)	15 Wards	217,267

Figure 2: Subproject Location Relative to Map of Bangladesh



A. Scope Covered by this IEE

57. This IEE covers the environmental assessment of the Cumilla Cluster subproject components proposed for implementation under the current project phase. These include civil works and rehabilitation activities within Cumilla City Corporation and the Paurashavas of Laksam, Hajiganj, and Chandpur. The IEE covers the design, pre-construction, construction, post-construction, and operation phases of these components.

58. The IEE does not constitute environmental clearance for future project phases that are not yet designed or financed, including any future expansion of major surface water intake, bulk transmission, or additional treatment infrastructure not included in the present scope. Such future works, if proposed, shall be screened and assessed separately or through an updated IEE in accordance with ADB SPS 2009 and applicable Government of Bangladesh requirements.

59. Existing facilities to be rehabilitated under the subproject, including production tube wells, surface water treatment plants, overhead tanks, and existing distribution networks, are covered by this IEE and by the environmental audit of existing facilities. Audit findings shall be reflected in the final design, EMP, and corrective action measures.

B. Subproject Components¹⁶

60. Specific components of each package are enumerated in the table below. The component quantities presented below are preliminary until confirmed during detailed engineering design. The final IEE and EMP will be updated to reflect confirmed quantities, locations, alignments, construction methods, land requirements, and package boundaries. Any discrepancy between the Executive Summary, Project Description, EMP, and bidding documents will be resolved before disclosure and before award of civil works contracts.

Table 12: Description of Town/City wise proposed Project Components

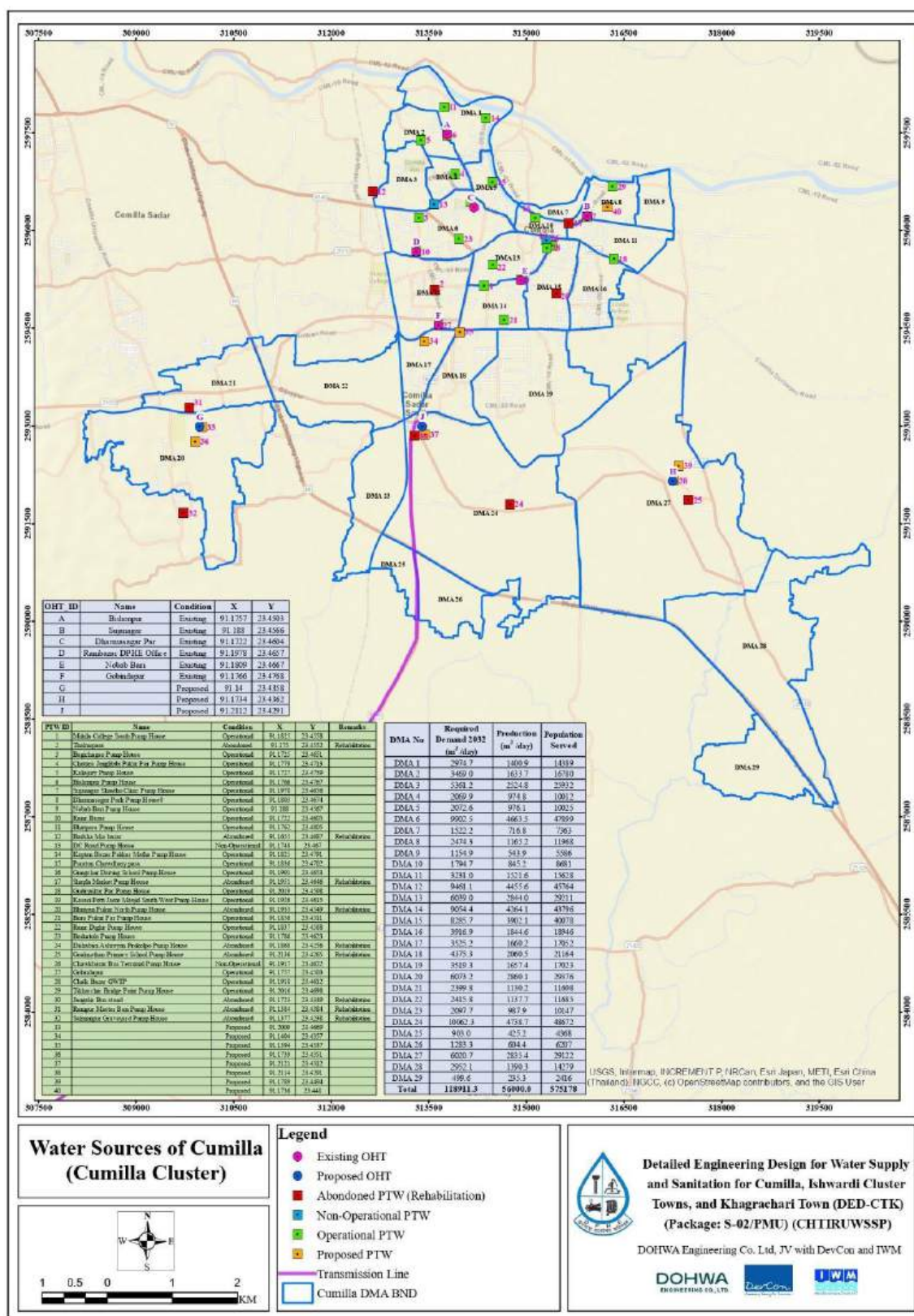
Town/City Corp	Sub-Components	Scope of the Works/Goods/Services under Package
Cumilla	Production Tube Well (PTW)	- Construction of new PTW: 6 nos. - Replacement of existing PTW: 10 nos. - Rehabilitation of existing PTW: 21 nos.
	Over Head Tank (OHT)	- Construction of new OHT: 2 nos. - Rehabilitation of existing OHT: 6 nos.
	Water Supply Distribution pipeline	- Construction of distribution network: 453 km - 10,000 metered water connections
Laksam Municipality	Groundwater Treatment Plant (GWTP)	- Rehabilitation of existing GWTP: 1 no.
	Production Tube Well (PTW)	- Construction of new PTW: 4 nos. - Rehabilitation of existing PTW: 6 nos.
	Construction of OHT	- Construction of new OHT: 2 Nos. - Rehabilitation of existing OHT: 1 no.
	Water Supply Distribution pipeline	- Construction of distribution network: 170 km - 6,000 metered water connections
Hajiganj Municipality	Surface Water Treatment Plant (SWTP)	- Rehabilitation of existing SWTP: 1 no.
	Production Tube Well (PTW)	- Construction of new PTW: 2 nos.

¹⁶ For other subproject aspects, quantification of labor work force, water requirements and construction materials have not been determined as of the assessment period. These sets of information will be determined during the detailed design and included in the updating of the IEE and SEMP.

Town/City Corp	Sub-Components	Scope of the Works/Goods/Services under Package
		- Replacement of existing PTW: 4 nos. - Rehabilitation of existing PTW: 2 Nos
	Construction of OHT	- Construction of new OHT: 1 no.
	Water Supply Distribution pipeline	- Construction of distribution network: 147 km - 5,500 metered water connections
	Sanitation Facilities (H/H twin pit latrines and Public Toilets)	- Construction twin pit household latrine: 800 nos. - Construction of public toilet: 2 nos.
Chandpur Municipality	Over Head Tank (OHT)	- Construction of new OHT: 1 no. - Rehabilitation of existing OHT: 2 nos.
	Surface Water Treatment Plant (SWTP)	- Rehabilitation of SWTP: 3 nos.
	Water Supply Distribution pipeline	- Construction of distribution network: 278 km - 19,000 metered water connections

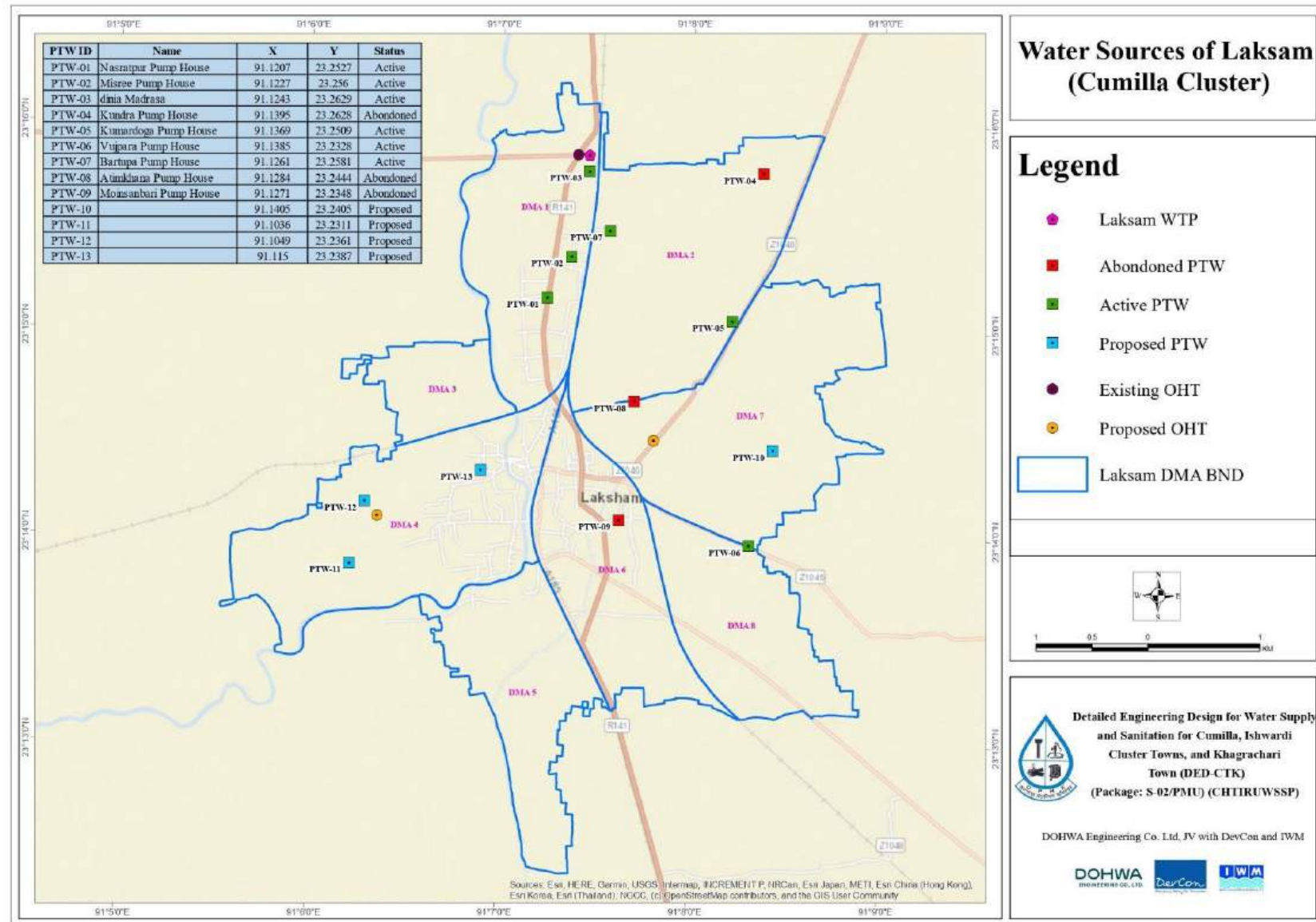
Sources: Detailed Engineering Design, DPHE

Figure 3: Water Sources Cumilla (Cumilla Cluster)



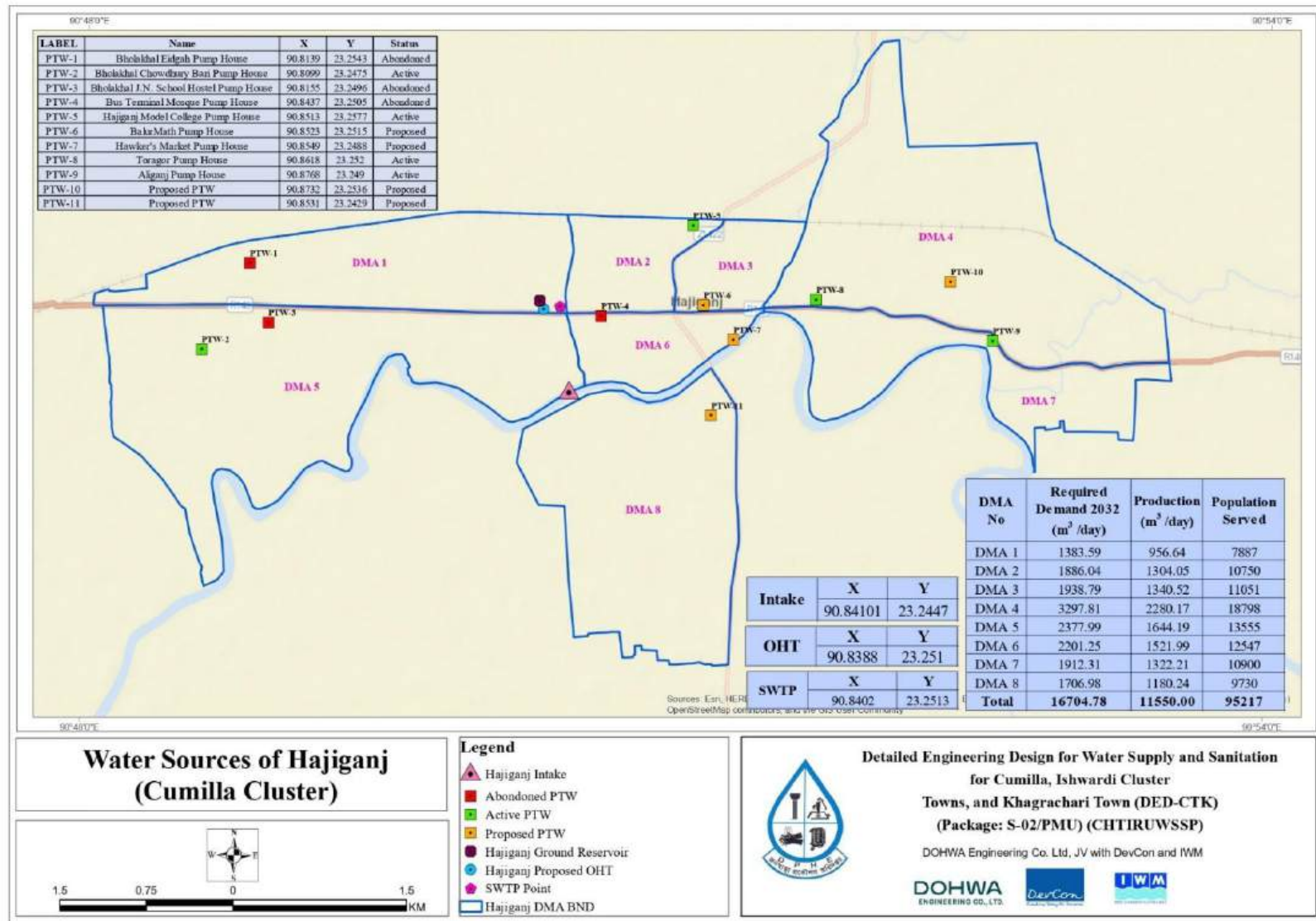
Source: DPHE

Figure 4: Water Sources of Laksam



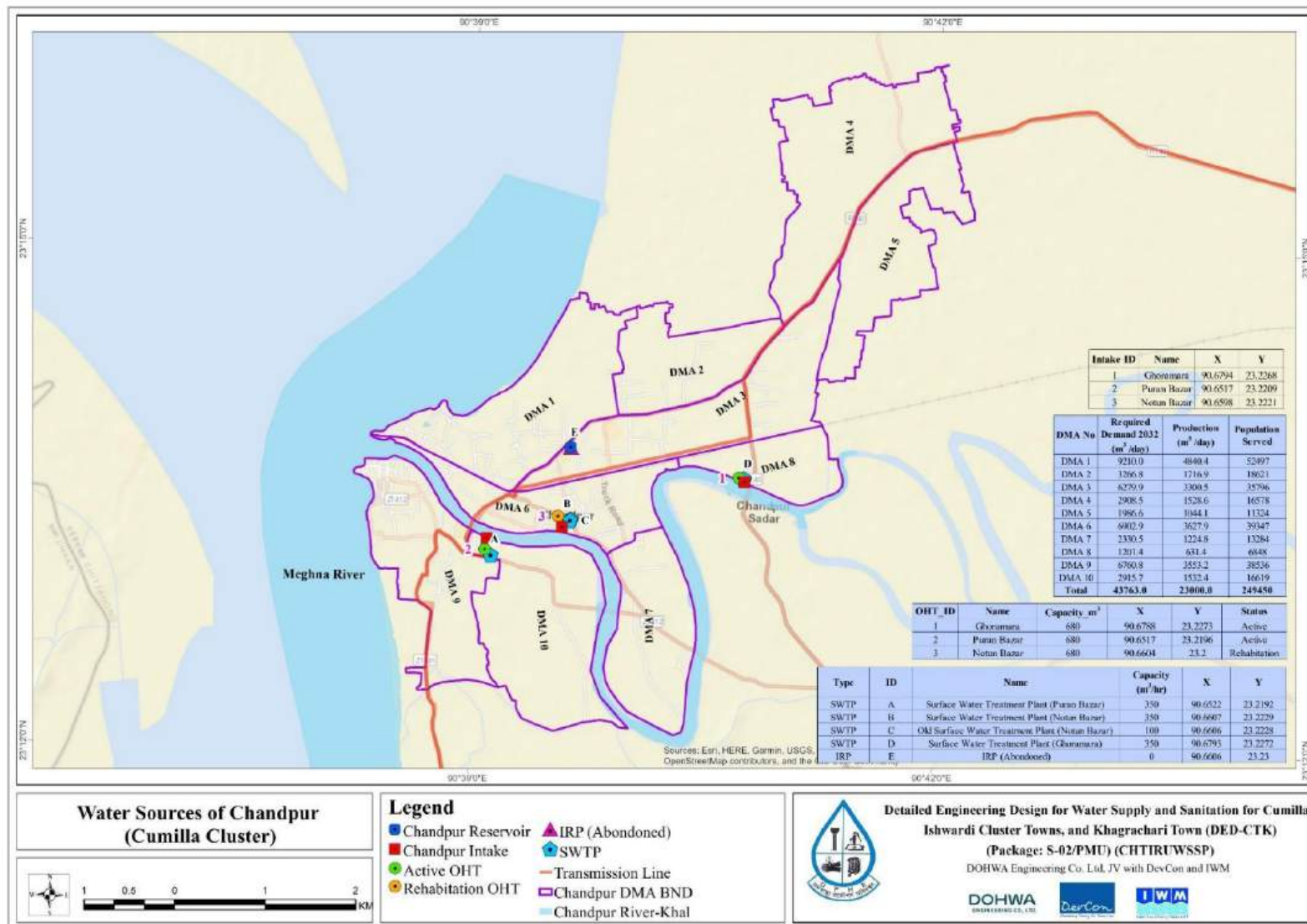
Source: DPHE

Figure 5: Water Sources of Hajiganj



Source: DPHE

Figure 6: Water Sources of Chandpur



Source: DPHE

C. Existing Facilities and Rehabilitation Scope

61. The Cumilla Cluster water supply systems include existing production tube wells, surface water treatment plants, overhead tanks, and distribution networks that are currently operating with varying levels of performance. These facilities are characterized by low service coverage, intermittent supply, high non-revenue water, aging pipes, leakage, weak pressure management, and inconsistent water quality monitoring.

62. Rehabilitation of existing facilities is a core part of the subproject. The rehabilitation scope will include selected production tube wells, surface water treatment plants, overhead tanks, and associated distribution infrastructure. The purpose of rehabilitation is to improve operational reliability, water quality, hydraulic performance, safety, energy efficiency, and service delivery.

63. Because the subproject involves existing facilities, an environmental audit has been prepared as part of this IEE. The findings of the environmental audit will be used to inform final design, rehabilitation priorities, corrective action measures, and the EMP. Any existing facility retained for continued use will be rehabilitated and operated in accordance with the mitigation measures and monitoring requirements in this IEE and EMP.

D. Water Source and Sustainability Considerations

64. The Cumilla Cluster subproject will use a combination of groundwater and surface water sources, depending on municipality-specific system configuration and final design. Existing and new production tube wells will provide groundwater supply, while surface water treatment plants in Hajiganj and Chandpur will continue to treat raw water from the Dakatia River system.

65. The final design will confirm the sustainability of each water source before construction. For groundwater sources, the design shall confirm sustainable yield, abstraction rates, water-level trends, source protection requirements, and water quality compliance. For surface water sources, the design shall confirm dry-season and monsoon-season raw-water quality, treatability, treatment process adequacy, sludge and backwash handling, and operational response to high turbidity or contamination events.

66. The project's long-term strategy should reduce unsustainable reliance on groundwater where feasible and strengthen conjunctive use of surface water and groundwater. Any future shift to larger-scale surface water abstraction or bulk transmission facilities shall be assessed separately if not included in the present detailed design.

E. Construction Methods and Sequencing

67. The distribution network will be constructed largely along existing roads and rights-of-way within built-up urban areas. Construction methods may include open-cut trenching and trenchless methods, such as horizontal directional drilling, depending on road width, underground utility constraints, traffic conditions, sensitive receptors, physical cultural resources, drainage crossings, and site-specific engineering conditions.

68. Open-cut trenching may generate dust, noise, spoil, temporary access disruption, utility interference, and community safety risks. Horizontal directional drilling or other trenchless methods should be prioritized in congested or sensitive areas where open trenching would create unacceptable disruption or risk. The final selection of construction methods shall be confirmed during detailed design and further specified in the contractor's SEMP and method statements.

69. Construction shall be sequenced to minimize cumulative disturbance across wards and municipalities. Active work fronts should be limited in length, reinstatement should be completed promptly, and simultaneous works on parallel access routes serving the same communities should be avoided. Traffic management, pedestrian access, emergency access, utility protection, and community notification will be implemented before construction begins at each location.

F. Subproject Area of Influence

70. The area of influence was defined based on the nature, location, and expected impacts of each subproject component. For linear works, including secondary mains, rising mains, and distribution pipelines, the direct impact zone includes the active construction corridor and adjacent areas up to 50 metres from the alignment. The indirect impact zone extends from 50 to 100 metres, particularly where traffic diversion, access disruption, noise, dust, utility disturbance, or community health and safety risks may extend beyond the immediate work front.

71. For non-linear facilities such as production tube wells, overhead tanks, surface water treatment plants, public toilets, and other site-specific infrastructure, the direct impact zone includes the facility footprint, construction work area, access route, material storage area, and immediately adjacent receptors. The indirect impact zone includes surrounding residential, commercial, institutional, cultural, and ecological receptors that may be affected by noise, dust, traffic, drainage disruption, visual impacts, or safety risks.

72. The area of influence will be refined during detailed design based on final alignments, confirmed facility locations, construction methods, sensitive receptor mapping, utility surveys, and site-specific environmental and social screening. The contractor's SEMP shall identify the area of influence for each active work site and specify the mitigation and monitoring measures required for that site.

Table 13: Area of Influence

Component Type	Direct Impact Zone	Indirect Impact Zone	Key Receptors / Risks
Distribution pipelines and secondary mains	Active work corridor and up to 50 m from alignment	50–100 m or wider where traffic diversion occurs	Houses, shops, schools, health facilities, mosques, utilities, roads, drains, markets, pedestrians
Production tube wells	Facility footprint, drilling area, access, and storage area	Nearby receptors within 50–100 m	Groundwater, noise, drilling waste, chemical/oil storage, workers, nearby residents
Overhead tanks	Site footprint, laydown area, access road, crane/scaffolding zone	Nearby receptors within 100 m or as determined by work-at-height risk	Residents, traffic, work-at-height safety, dust, noise, spoil, visual impact
SWTP rehabilitation	Existing plant footprint and discharge/backwash handling area	Nearby river/drainage receptors and communities	Raw-water source, backwash, sludge, chemicals, operator safety, water quality

Component Type	Direct Impact Zone	Indirect Impact Zone	Key Receptors / Risks
Public toilets and twin-pit latrines	Facility footprint and immediate construction area	Nearby households, wells, drains, and public users	Groundwater contamination, odor, access, desludging, flood risk, inclusive design

73. **Pipelines.** Including secondary mains, there will be 1,080 km long distribution networks across Cumilla cluster to be laid along the existing urban road networks, including, sensitive receptors, (school, hospital, mosque, shrines etc.), water bodies and railway crossings. Because of the leaner shape activities, the physical corridor of impact shifts dynamically as a moving workspace.

74. **Production Tube Wells (PTWs).** There exists 43 PTWs of which 17 will be rehabilitated, and a total of 12 new PTWs will be constructed under the CTWSSP Phase I in Cumilla cluster. These constructions will have stationary point-source impacts. Unlike the linear pipeline corridor, their influence is concentrated on specific sites allocated for rehabilitation or new construction.

75. **Overhead Tanks (OHTs).** Six new overhead drinking water storage facilities will be constructed in the newly selected sites in four towns of Cumilla cluster. Although proposed new sites are away from populated areas, there will be a requirement of managing civil construction debris, high noise, safe operation and handling of construction equipment and scaffolding.

76. **Surface Water Treatment Plant (SWTP).** There is 5 existing SWTPs operating in Cumilla cluster, including 4 units in Chandpur and 1 in Hajiganj *Paurashava*. These plants are performing poor due to improper dosing of chemicals, flow management, malfunctioning of sand filters, and quality of intake waters. Also, there are opportunities to manage backwash sludge and wastewater treatment before disposal. Rehabilitation works are to be conducted at these sites, while little impacts are projected as these are confined within boundaries and structures. However, chemical handling, storage, and dosing should consider proper precautionary measures to prevent health hazards. A standard operating procedure (SOP) is to provide for SWTP operation and maintenance.

77. **Sanitation Facilities.** The subproject considers the construction of 800 household level twin pit latrines and 2 public toilets in Hajiganj *Paurashava*. The area of influence during the construction of these public toilets and household latrines is highly localized within community hubs and low-income neighborhoods. The immediate focus is managing temporary sub-soil disruptions and ensuring work takes place without compromising household privacy. The baseline records of groundwater and surface water will be of importance to understand contamination due to these infrastructures to be constructed in Hajiganj *Paurashava*.

78. Direct environmental impacts associated with the subproject are anticipated to include temporary effects on ambient air quality due to dust generation and equipment emissions; noise and vibration from construction activities; and localized disruption to traffic flow and pedestrian access within the immediate vicinity of work areas. Indirect impacts from pipelaying activities may extend beyond 100 m, particularly in relation to traffic conditions, and could affect a wider area depending on the location, scale, and timing of construction works.

79. **Crossings and Utilities.** The distribution network and secondary mains may cross or run parallel to existing utilities, drains, roads, railways, and water bodies. Such locations present

higher construction risks, including utility damage, service interruption, traffic disruption, drainage blockage, sedimentation, and safety hazards. During detailed design, DPHE and the design consultant will prepare a crossings and utility inventory. This inventory shall identify all major road crossings, railway crossings, drainage crossings, water body crossings, and known underground or overhead utilities. The inventory shall be used to finalize construction methods, traffic management plans, utility protection measures, permit requirements, and site-specific method statements. No excavation or drilling will commence at crossing locations until utilities are identified, relevant authorities are consulted, required permits are obtained

G. Proposed Transmission Network & Components in Cumilla Cluster

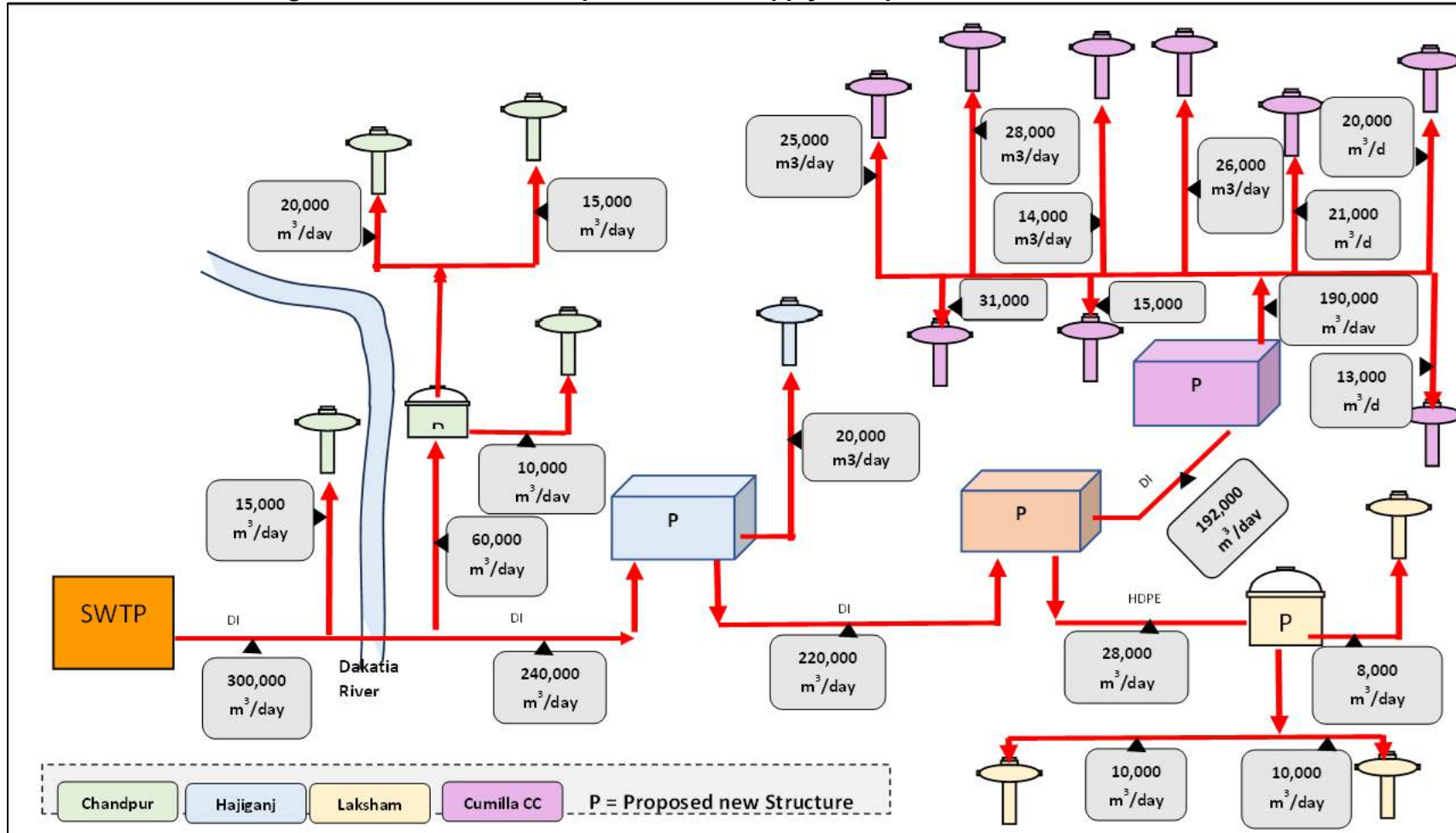
80. Water supply subproject for Cumilla cluster is planned to be covered by the surface water from the Meghna River in Chandpur, as the schematic shows (Figure 7). A phase-wise approach will be implemented to fully rehabilitate and improve the whole water supply system due to budget constraints of the government. The government has limited funds that all rehabilitation activities cannot be accommodated or implemented all at the same time. Thus, the project will initially cover the improvement of existing water supply infrastructures as discussed and summarized in Table 12 above, including the laying of secondary mains to distribution water networks, which will be completed from 2026 to 2032. This also includes establishment of pressure-based metered water supply by 100%. The rehabilitation of surface water intake and main transmission lines will be considered in subsequent projects when additional government counterpart funding becomes available. Regardless of this phase-wise approach, the subproject will have many small excavation and construction activities covering an approximately 130 sq km within the busy areas of CuCC, and the Paurashavas of Chandpur, Laksam and Hajiganj. The cumulative environmental and social impacts of these activities will be significant unless specific mitigation measures are implemented following the EMP.

H. Climate-Resilient Design Features

81. The subproject will incorporate climate-resilient design measures appropriate to the floodplain and urban context of the Cumilla Cluster. These measures will include flood-resilient siting and elevation of critical infrastructure, drainage provisions around facilities, durable pipe and construction materials, protection of water supply assets from waterlogging, emergency access, backup power where required, and operational arrangements to maintain service continuity during extreme weather events.

82. The final detailed design will confirm how climate risks, including flooding, waterlogging, drought, heat stress, erosion, and extreme rainfall, have been considered in component siting, structural design, material selection, drainage design, source protection, and O&M planning.

Figure 7: Schematic of Proposed Water Supply Components of Cumilla Cluster



IV. DESCRIPTION OF THE ENVIRONMENT

83. The existing environmental condition of the subproject area is described based on a combination of primary and secondary baseline environmental data, including reliable online sources, established literatures, and maps, among others. This section presents the bases for the prediction of potential environmental issues and impacts of the subproject which are necessary to assess.

84. The proposed subproject has 19 civil works packages focusing on four distinct area under Cumilla Cluster.

A. Land Environment

1. Topography

85. The topography of Cumilla District is primarily a low-lying flat plain with an average elevation of 16 meters ranging from a minimum 4 meter to a maximum 88 meters at higher areas, also characterized by alluvial soil, except for the centrally located Lalmai Hills. CuCC falls with an average elevation of 11 meters above MSL. The district's landscape is shaped by the Gomti River and features a mix of recent Meghna floodplain deposits, higher-elevation older alluvial terraces, and shallow, productive agricultural land. Cumilla is bordered to the east by the Tripura Hills of India, which influences the runoff and river patterns in the area. While the Laksam topography is naturally plain. The elevation is average 8 meters above MSL. According to the Bangladesh Geological Survey map, River Dakatia flows through the Upazila. This is a low laying area though embankment is constructed to protect this area from flooding. Despite those serious natural calamities, this area causes floods. There is no sufficient drainage system for discharge of water. As a result, water logging occurs regularly during rainy seasons.

86. Chandpur district, located in the Chattogram Division of Bangladesh, is defined by a flat, low-lying alluvial plain created by the Padma and Meghna rivers. The district elevation ranges from 6-10 meters above sea level, with a generally flat terrain prone to erosion. The landscape is dominated by the confluence of the Padma, Meghna, and Dakatia Rivers. The land is largely formed by alluvial deposits. It is characterized by active floodplains, including sandy lands (chars) created by shifting river paths, resulting in common riverbank erosion. Like Chandpur, Hajiganj is characterized by a flat, low-lying, and fertile alluvial plain, with an average elevation of around 5-6 meters. Hajiganj landscape is dominated by the Dakatia River, which flows through its central part, shaping its hydrology.

87. The areas of Cumilla district which are above 4 meters fall within Mainamoti and Lalmai hills. These areas are outside CuCC and will not affect the construction of water transmission and distribution lines. Also, the subproject which will develop DMA based pressurised water supply will not be affected by the gradient ranging from 5 to 7 meters throughout the coverage areas in four towns of Cumilla cluster.

2. Land Use

88. Major Land Use categories of the subproject area particularly Cumilla district, include agricultural land, urban/semiurban area, waterbodies, vegetation/mixed forest, etc. However, land uses of some part of Cumilla, such as CuCC, *Paurashava* areas under Upazila are rapidly transforming, characterized by increasing urbanization. While agriculture remains a key component, high urbanization pressures are converting agricultural land and water bodies into

residential and commercial structures. A significant reduction in water bodies and vegetation has been reported – built up areas have nearly been doubled from 556 km² in 2013 to over 1000 km² by 2017. In Cumilla Sadar South mixed forest cover has been reduced from 2.26% to 0.69% in the period of 2009 to 2019.

89. Land use of Chandpur district with an area of about 1,704 sq km, is characterized by its unique location at the confluence of the Padma, Meghna, and Dakatia rivers. The land use is dominated by semiurban and urban settlements in the Pourashva area and the majority is agriculture and rural settlements, with significant impacts from river erosion and alluvial deposits. Urban areas, such as Chandpur *Pourashva*, are expanding but still occupy a relatively small percentage of the total district area. Chandpur district in Bangladesh has experienced rapid environmental transformations. Over the last three decades, water bodies expanded by over 19% of the land area, largely due to active riverbank erosion, sedimentation, and shifts in the Padma and Meghna River channels. Roughly 23% of vegetated areas were lost. Dense forests degraded into sparse and moderate vegetation.

90. Rapid urban expansion, transitioning from predominantly agricultural areas to semi-urban and industrialized spaces, have caused land use change in Laksam and Hajiganj upazila. Significant loss of wetlands and crop fields were observed declining with an increase of urban and semi built-up environments.

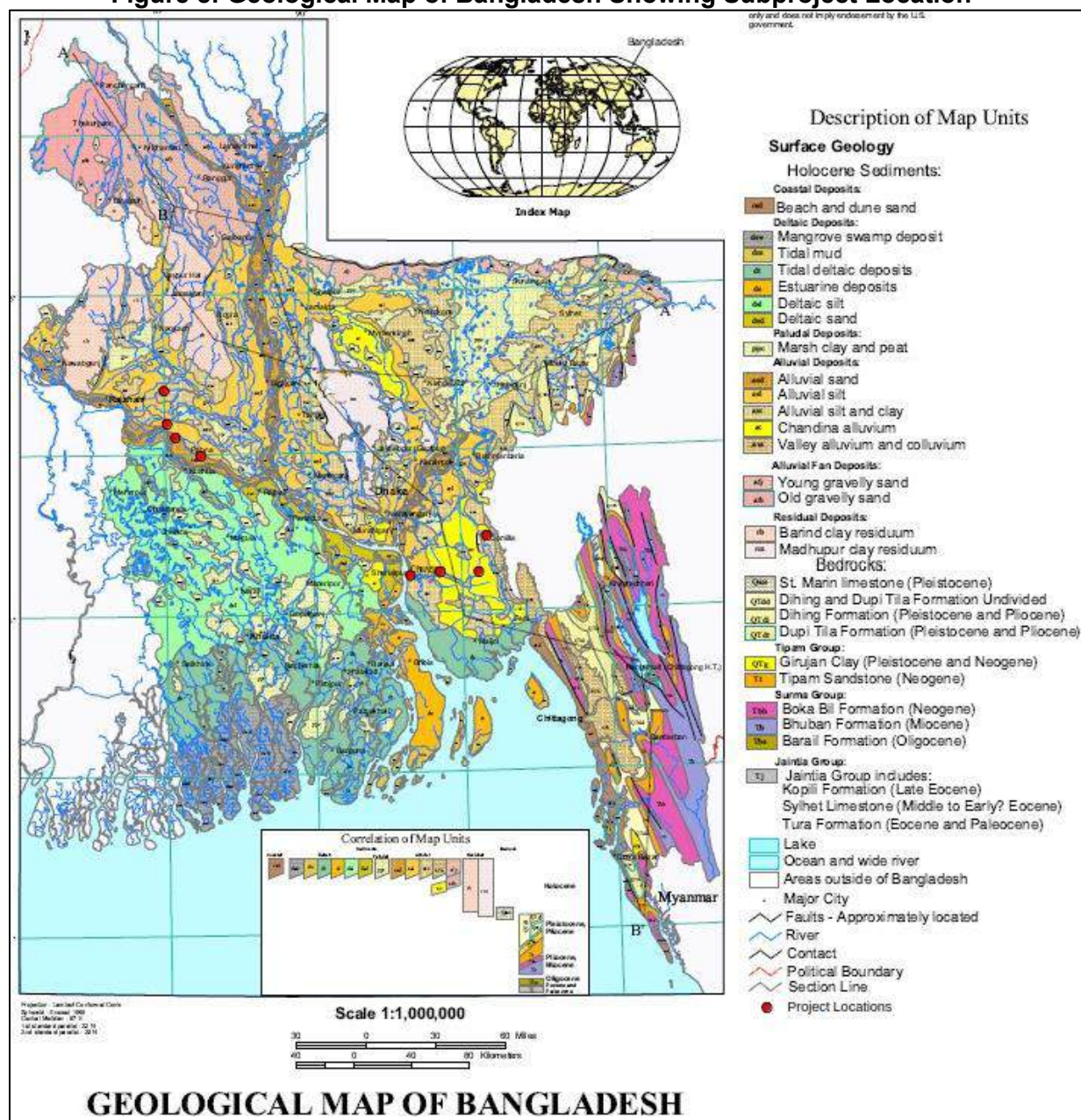
3. Geology, Geomorphology and Soil

91. The subproject area Cumilla cluster is in the eastern region of Bangladesh, are primarily composed of Holocene alluvial deposits and Pleistocene sediments from the Lalmai-Mainamati range. The geomorphology consists of flat to gently sloping floodplains, with the Meghna River influencing its dynamic land formation and the eastern part having some hillocks. Soils are generally light to medium grey, sandy to clayey silts, with acidic and non-saline characteristics often found, providing a fertile base for agriculture.

92. Sediments of the area are primarily formed by unconsolidated fluvial and estuarine sediments of the Meghna river system. A prominent geological feature of the subproject area is Lalmai-Mainamati hill range which are elevated hillocks consisting of older Pleistocene sediments located in the Comilla district. The Meghna River is the primary force, creating intense channel migration, erosion, and deposition, particularly affecting the estuary of Chandpur and Hajiganj.

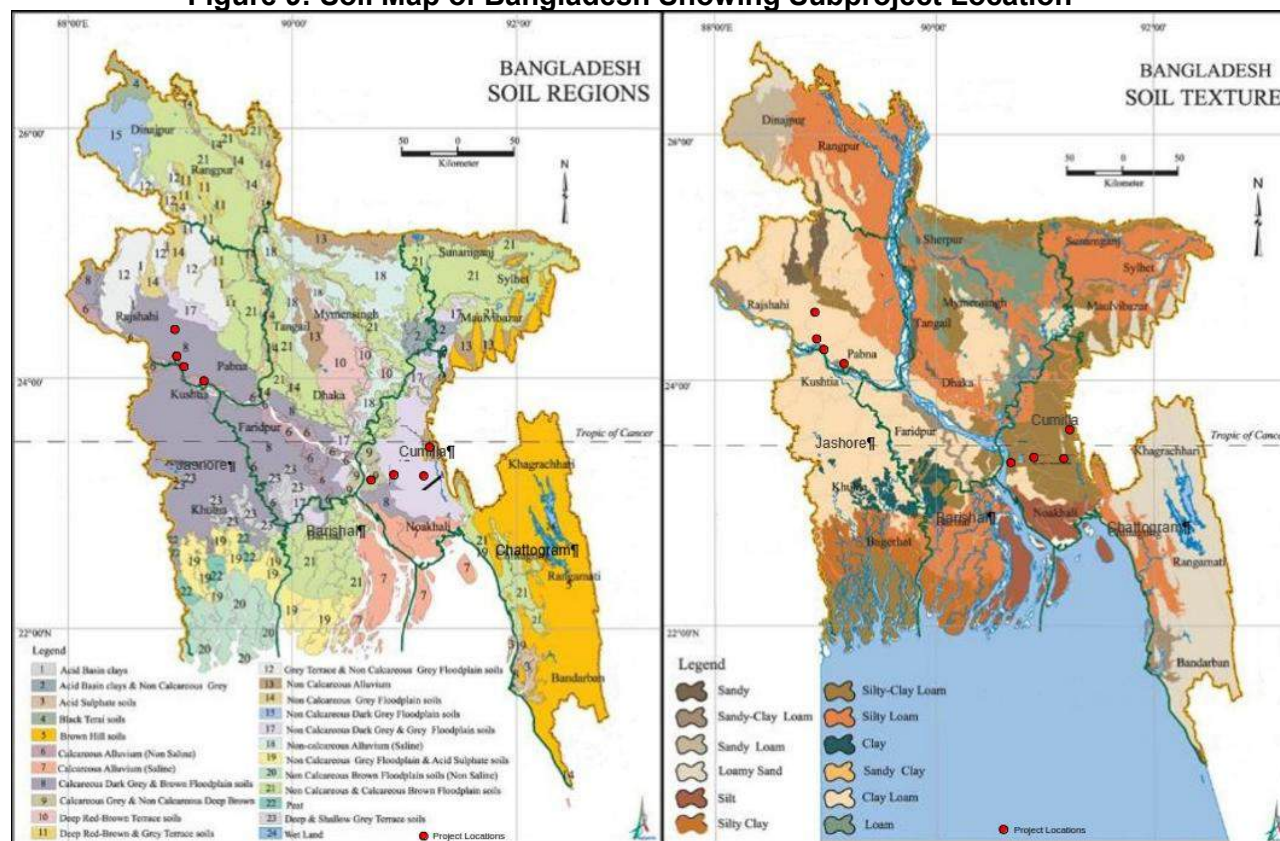
93. Soil is dominated by alluvium, including grey silty loams and clayey silts. Chemical Properties of soils are generally acidic to strongly acidic and organic matter content is around 2.62%. Subsoil characterized with medium to fine sand, silt, and clay (30 to 130 meters deep). Texture is poorly stratified, sandy to clayey silts and soils are fertile and suitable for farming.

Figure 8: Geological Map of Bangladesh Showing Subproject Location^a



^a Disclaimer: Boundaries, colors, denominations or any other information shown on this map do not imply, on the part of ADB, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

Figure 9: Soil Map of Bangladesh Showing Subproject Location^a



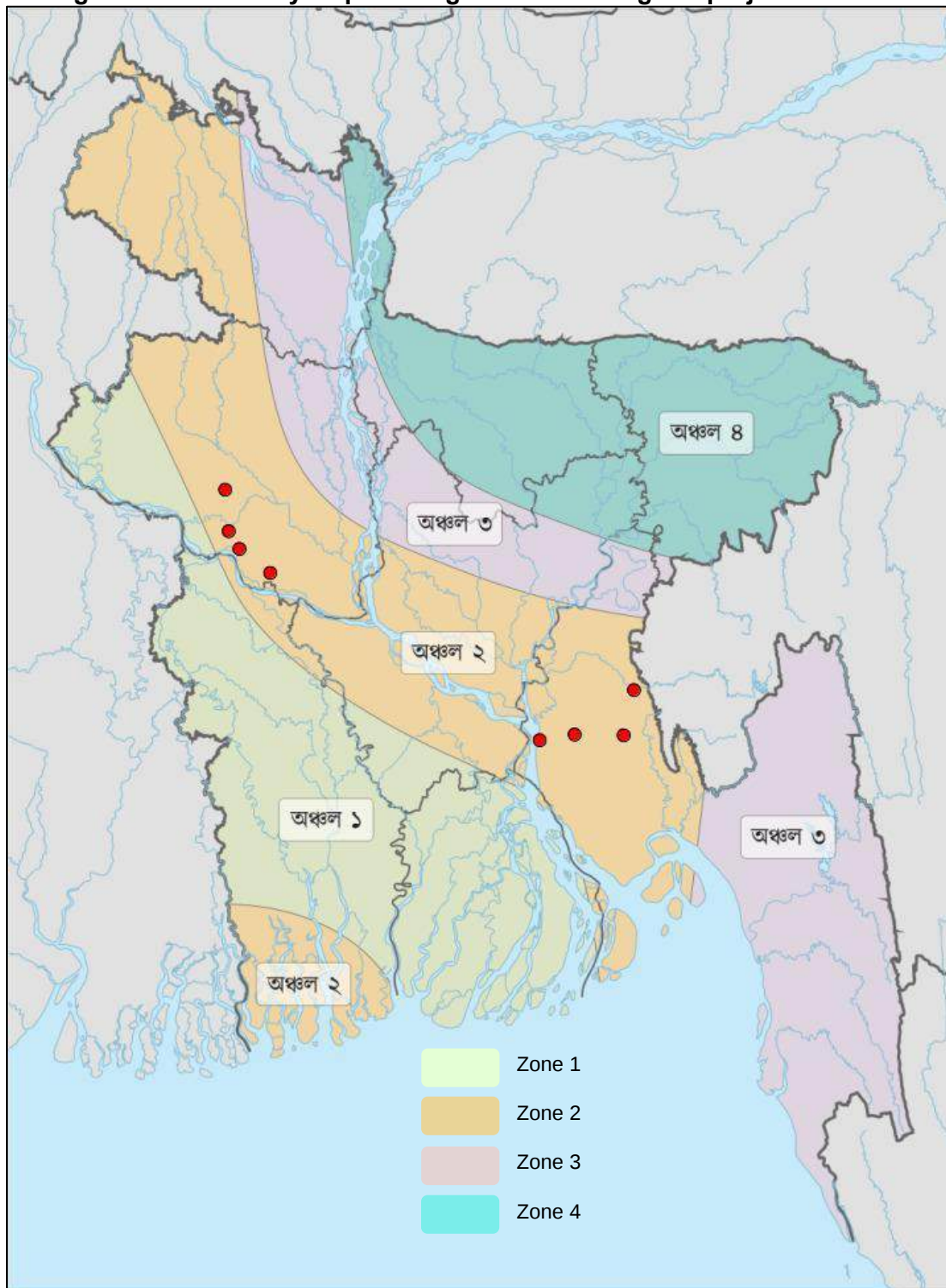
Source: FAO 1988 and Banglapedia

^a Disclaimer: Boundaries, colors, denominations or any other information shown on this map do not imply, on the part of ADB, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

4. Seismology

94. Bangladesh has been classified into three seismic zones, with Zone-I the most severe and Zone-III the least. The study area falls in the Zone II. So, the activities should be undertaken considering the risks of zone II.

Figure 10: Seismicity Map of Bangladesh Showing Subproject Location^a



Source: Geological Survey of Bangladesh. <https://gsb.portal.gov.bd/>

^a Disclaimer: Boundaries, colors, denominations or any other information shown on this map do not imply, on the part of ADB, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

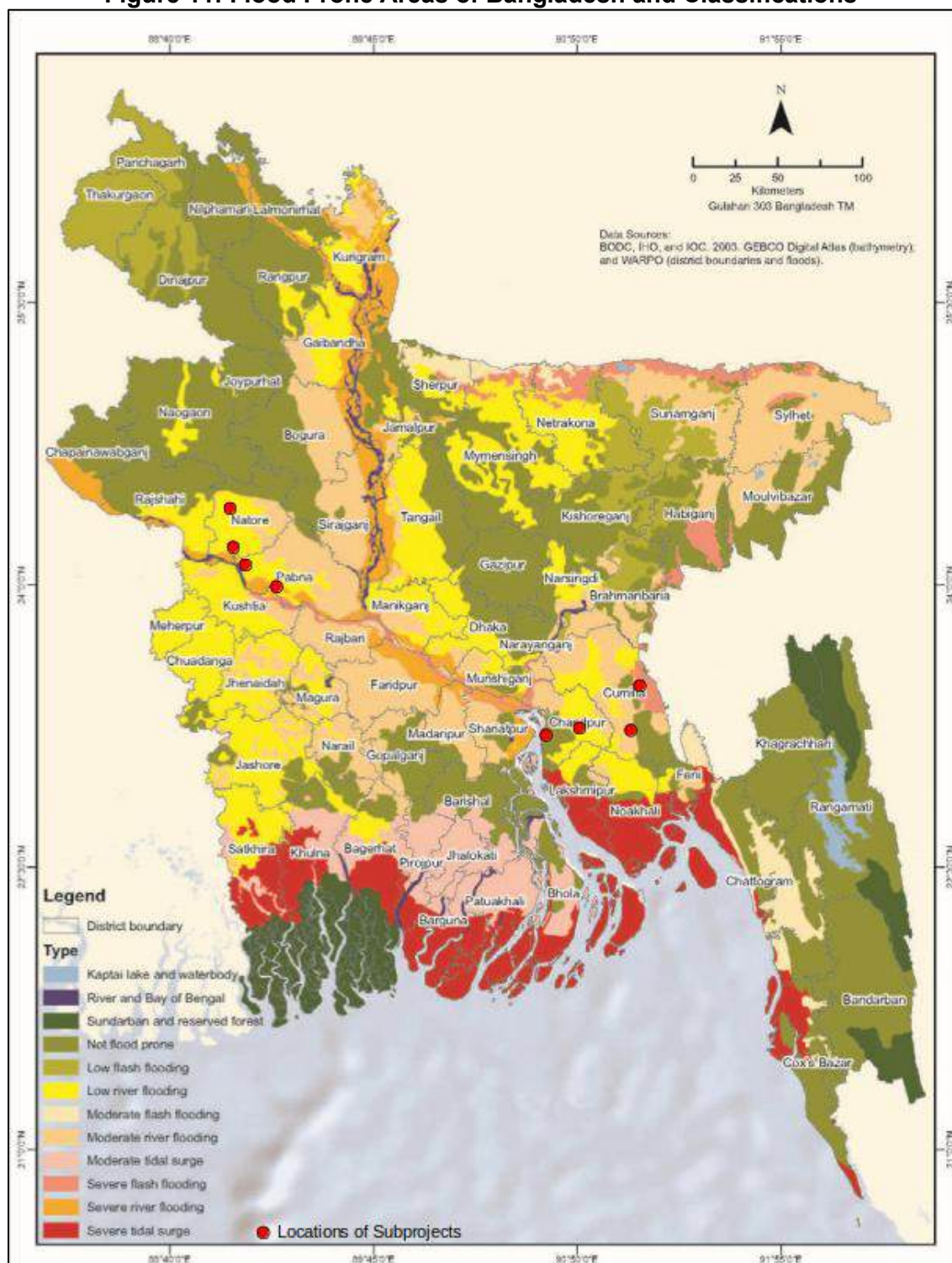
5. Other Natural Hazards

95. **Flood.** Bangladesh is the most flood-prone country in the world, with approximately 60% of its population exposed to high flood risk. The geographical location of Bangladesh is at the base of the Ganges-Brahmaputra-Meghna (GBM) delta measuring about 80% of its landmass characterized as low-lying floodplains. In general, normal monsoon rains submerge 20% to 25% of the country, while severe catastrophic cycles can inundate up to 80% of the landmass.

96. Based on flooding pattern and inundation level, flood in Bangladesh may be below types:

- (i) **Riverine/Monsoon Floods:** Caused by massive seasonal river discharges overflowing banks from June to September of the year. It primarily impacts central and northern river basins like the Jamuna and Padma. However, seasonal flooding may also occur in the Meghna floodplain from June to October. This area experiences severe annual inundation driven by excessive rainfall in the Indian catchment, affecting regions like Sylhet, Sunamganj and also the lower riparian regions.
- (ii) **Flash Floods:** Characterized by rapid, high-velocity runoff stemming from torrential rain in the steep adjacent Indian hills. This severely hits northeastern wetland ecosystems (Haor regions like Sylhet and Sunamganj). The subproject area is less susceptible to flooding by flash flood by the Meghna River, however the Gomti River basin faces recurring, highly destructive flash floods triggered by extreme, transboundary rainfall. These events severely impact eastern Bangladesh (particularly Comilla and Feni).
- (iii) **Coastal Floods & Storm Surges:** Driven by tropical cyclones and tidal fluctuations in the southern districts bordering the Bay of Bengal. Although Chandpur is considered one of the 21 coastal districts of Bangladesh, there is less likelihood that coastal floods and storm surges may flood Chandpur *Paurashava*.
- (iv) **Urban Floods:** Resulting from intense local downpours colliding with inadequate, clogged drainage networks in dense megacities like Dhaka and Chattagram. Urban floods may have temporary inundations in some parts Cumilla *Paurashava* and Chandpur due to choking of covered drains and pipes.

Figure 11: Flood Prone Areas of Bangladesh and Classifications^a

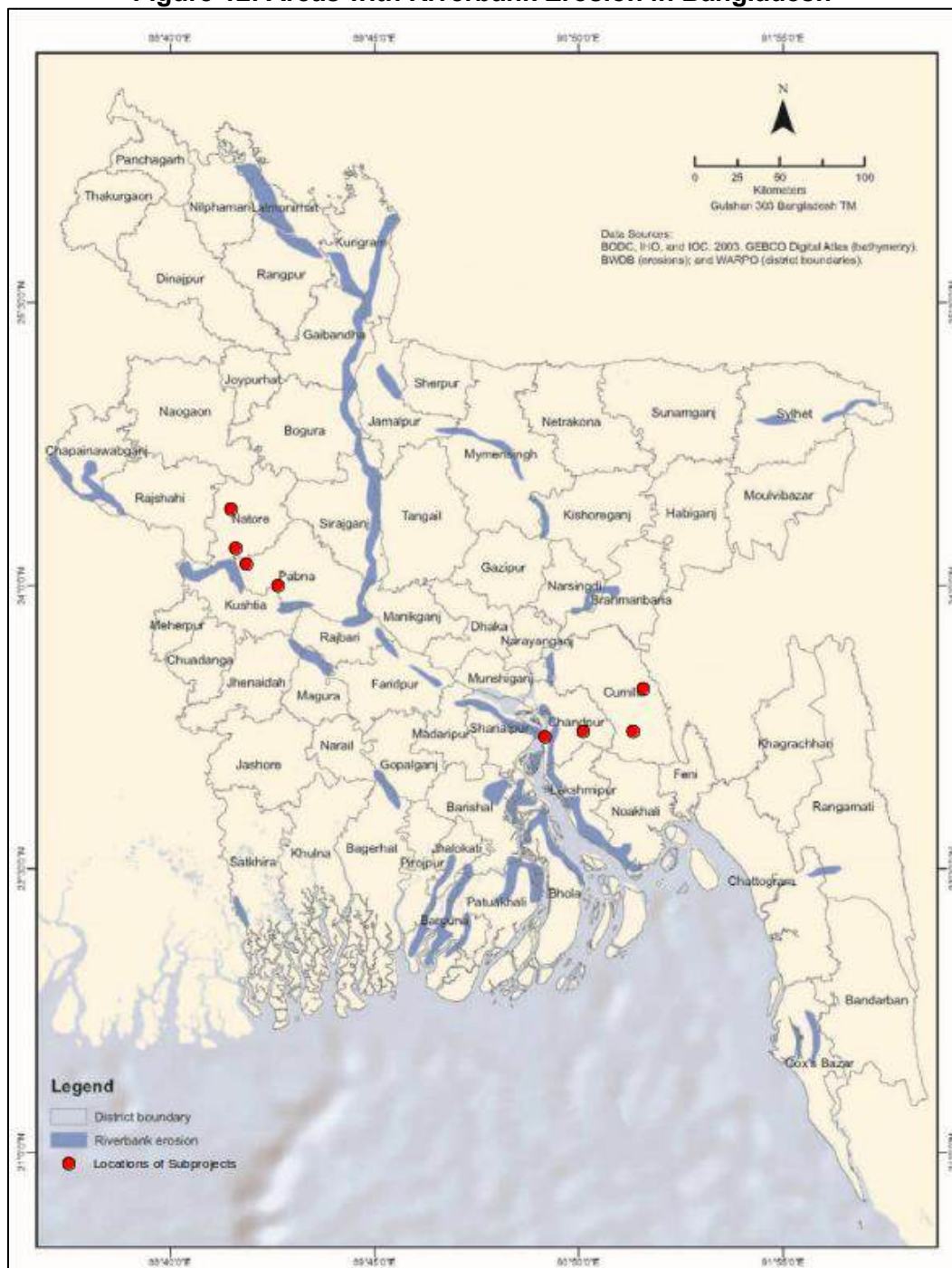


Source: Bangladesh Climate and Disaster Risk Atlas. ADB. December 2021

^a Disclaimer: Boundaries, colors, denominations or any other information shown on this map do not imply, on the part of ADB, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

97. **Soil Erosion.** Riverbank erosion in Bangladesh is a severe, chronic natural disaster, particularly along the Padma, Jamuna, and Meghna rivers caused due to high-velocity monsoon flows and braided river structures. Nearly 20 out of 64 districts face erosion, with major impacts in Kurigram, Gaibandha, Jamalpur, Sirajganj, Shariatpur and Chandpur. Annually 10,000 hectares of land are eroded that displaces around 200,000 people from homes and livelihoods. Riverbank erosion destroys agricultural land, homes, and infrastructure, contributing heavily to rural-to-urban migration.

Figure 12: Areas with Riverbank Erosion in Bangladesh^a



Source: Bangladesh Climate and Disaster Risk Atlas. ADB. December 2021

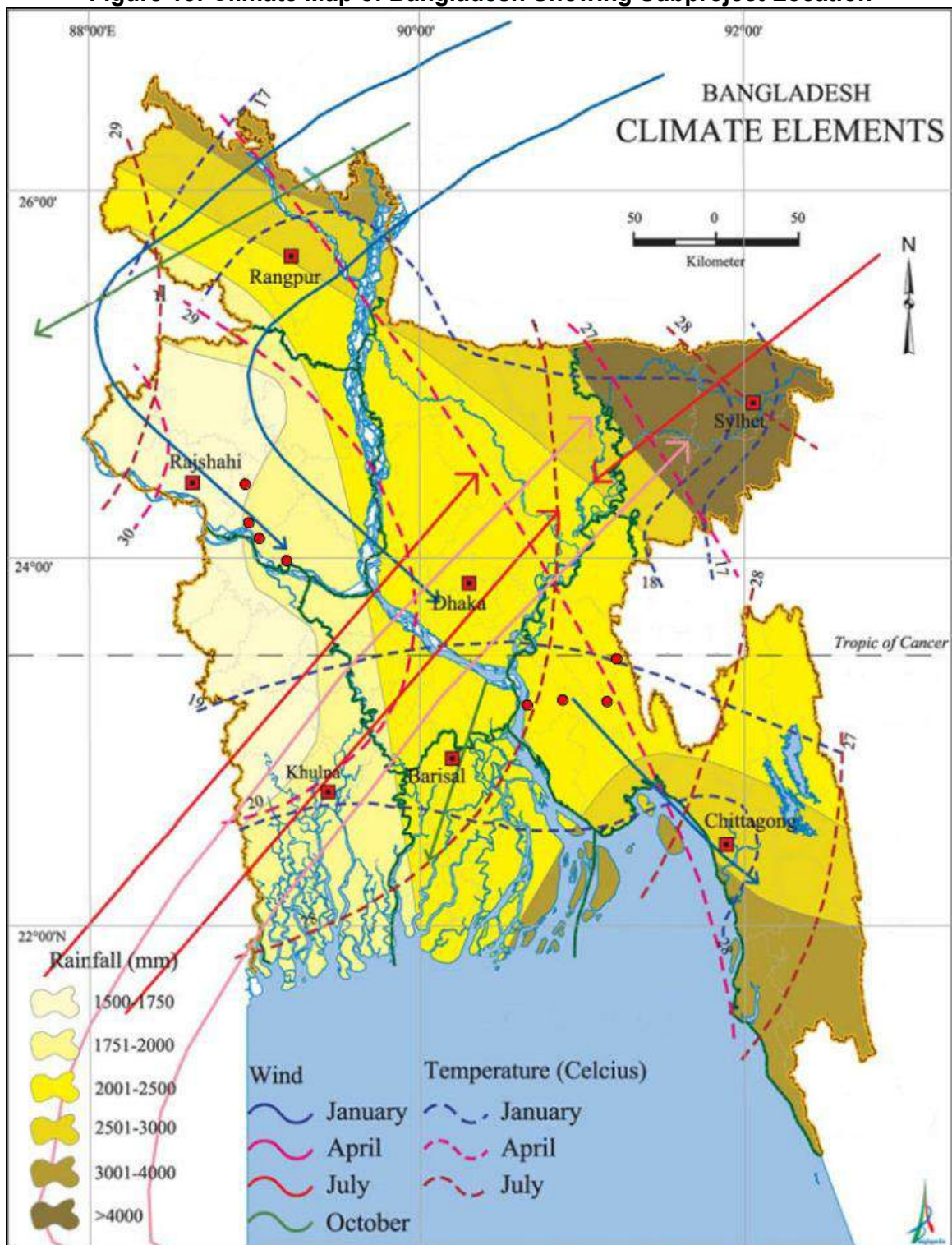
^a Disclaimer: Boundaries, colors, denominations or any other information shown on this map do not imply, on the part of ADB, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information.

B. Atmospheric and Acoustic Environment

1. Climate

98. **Climatic conditions:** Bangladesh is in the tropical monsoon region, and its climate is characterized by high temperature, heavy rainfall, often excessive humidity, and fairly marked seasonal variations. The climate is mostly determined by location of town in the tropical monsoon region, with attributes of high temperature, heavy rainfall, often excessive humidity, and distinct seasonal variations. The most important feature of the climate of Bangladesh is the reversal of the wind circulation between summer and winter. Monsoon is the most prominent season prevailing from June to October with heavy rainfall. The cooler and drier winter starts from the end of November and prevails until the beginning of February. Typically, the weather is rough during pre- monsoon and monsoon seasons. The climate of Chandpur, Laksam, Cumilla and Hajiganj are mostly similar to the rest of the country (Table 14).

Figure 13: Climate Map of Bangladesh Showing Subproject Location



Source: Banglapedia – Encyclopedia of Bangladesh, <https://en.banglapedia.org/index.php/Climate>

Table 14: Average Climatic Data – Temperature, Rainfall, Transpiration, and others

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chandpur												
Average maximum °C	24.7	28.0	31.7	33.1	33.2	32.0	31.4	31.6	31.8	31.4	29.4	26.0
Average minimum °C	13.5	16.1	20.6	23.7	24.8	25.8	25.9	26.0	25.8	24.2	20.0	15.3
Rainfall, mm	6	16	58	133	263	376	414	338	259	146	33	6
Potential evapo transpiration (ET), mm	63.9	53.7	133	142.8	160.6	143.1	141	138.9	134.7	123.1	84.0	59.8
Cumilla												
Average maximum °C	25.2	27.9	31.1	32.5	32.7	31.6	31.1	31.5	31.7	31.4	29.6	26.5
Average minimum, °C	12.1	15.3	19.7	22.9	24.2	25.3	25.5	25.5	25.2	23.5	18.8	13.6
Rainfall, mm	6	18	59	135	297	374	401	320	249	155	37	9
Potential ET, mm	63.9	55.4	133.3	141.6	159.3	140.7	141	137.3	133.5	119	78.3	58.9
Relative Humidity,% (9 AM & 6 PM)	80 64	75 54	74 55	75 65	79 75	84 83	86 84	86 83	84 82	80 80	77 75	80 70
Wind speed km/hr	2.6	3.5	7.2	11.1	11.9	11.3	11.7	10.4	6.7	3.9	2.3	2.1

Source: Land Resources Appraisal of Bangladesh for Agricultural Development, Technical Report No.2.UNDP/FAO

2. Air Quality

99. Ambient air quality measurement at key locations of the subproject area has been completed, and the results are shown in Table 15-18. Air quality depends on substances which are present in the atmosphere in such concentrations that they produce undesirable effects on human beings, animals as well as plant life. These components include gases (SO_x, NO_x, CO, O₃, etc.), Suspended Particulate Matter (PM_{2.5} and PM₁₀), etc. The air quality parameters were analysed from samples collected over twenty-four (24) hour period at each sampling site. In all cases, the minimum, average, and maximum concentration of all the parameters is below the standard value at all locations.

Table 15: Ambient air monitoring report of Cumilla City Corporation

Sl. No	Parameters for Analysis	Unit	Location of AQ Testing, CuCC		DOE Standard
			Jangalia Bus Stand at CuCC	Tikkarchar Bridge Point Pump House at CuCC	
1	SPM	mg/m ³	85.88	14	-
2	PM _{2.5}	mg/m ³	19.25	5.00	65
3	PM ₁₀	mg/m ³	53.38	5.50	150
4	SO _x	mg/m ³	17.07	15.74	80
5	NO _x	mg/m ³	14.59	16.22	80
6	CO	mg/m ³	1.85	1.95	5

Table 16: Ambient air monitoring report of Laksam Paurashava

Sl. No	Parameters for Analysis	Unit	Location of AQ Testing at Laksam Paurashava		DOE Standard
			Doulatgonj Atimkhana PTW	Dinia Madrasha	
1	SPM	mg/m ³	23.33	45.33	-
2	PM _{2.5}	mg/m ³	15.33	15.00	65
3	PM ₁₀	mg/m ³	19.00	23.67	150
4	SO _x	mg/m ³	18.60	18.26	80
5	NO _x	mg/m ³	16.34	16.24	80
6	CO	mg/m ³	1.83	2.0	5

Table 17: Ambient air monitoring report of Hajiganj Paurashava

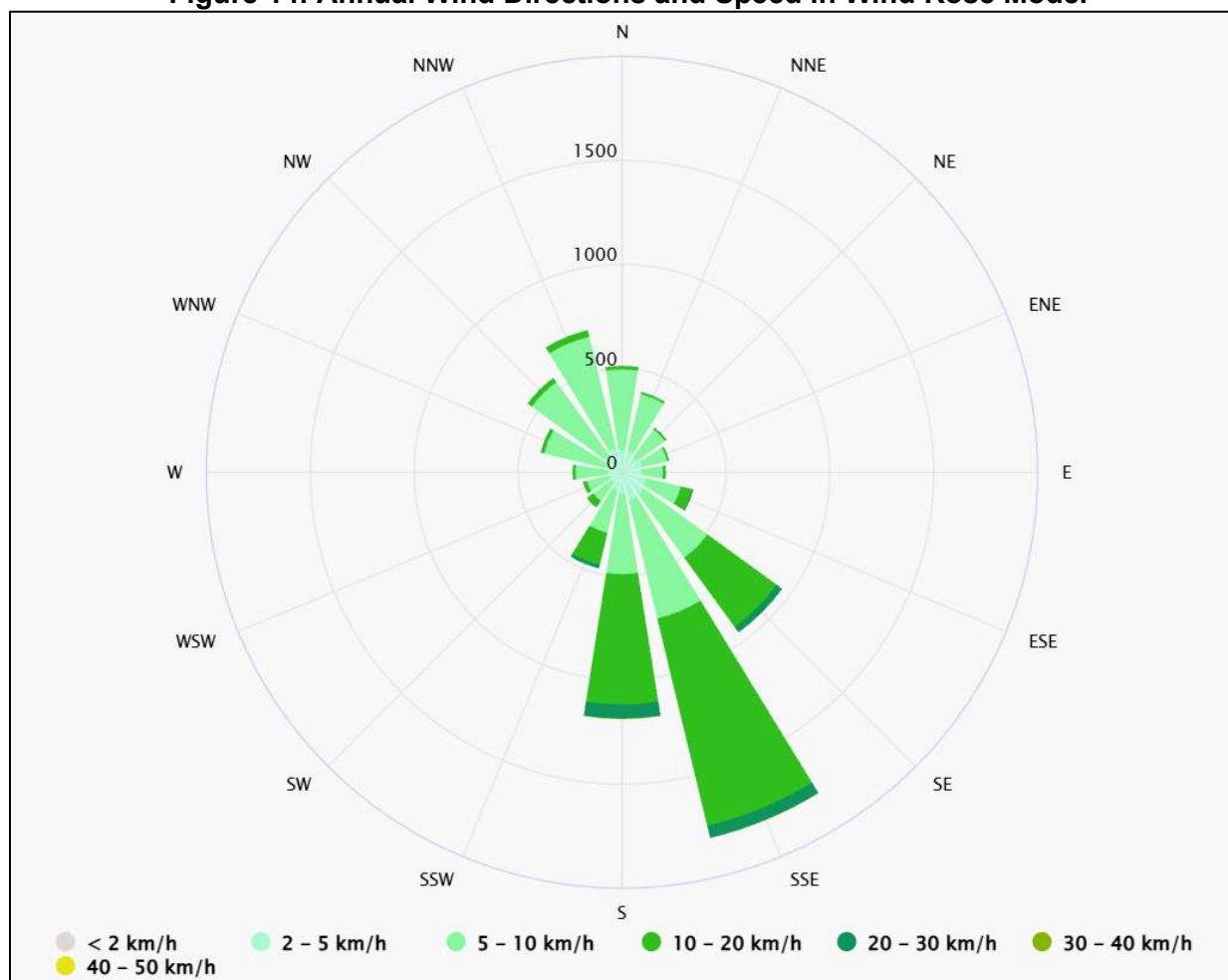
Parameters for Analysis	Unit	Location of AQ Testing at Hajiganj Paurashava		DOE Standard
		Bus Terminal Mosque	Hawkers Market Pump House	
SPM	mg/m ³	60.25	74.00	-
PM _{2.5}	mg/m ³	6.75	10.50	65
PM ₁₀	mg/m ³	32.50	50.00	150
SO _x	mg/m ³	16.81	19.21	80
NO _x	mg/m ³	15.35	18.21	80
CO	mg/m ³	1.93	1.94	5

Table 18: Ambient air monitoring report of Chandpur Paurashava

Parameter for Analysis	Unit	Location of AQ Testing at Chandpur Paurashava		DOE Standard
		Notun Bazar Water Treatment Plant	Ghoramara Water Treatment	
SPM	mg/m ³	41.75	25.50	-
PM _{2.5}	mg/m ³	6.67	7.75	65
PM ₁₀	mg/m ³	23.00	13.25	150
SO _x	mg/m ³	18.82	15.85	80
NO _x	mg/m ³	17.28	16.15	80
CO	mg/m ³	2.06	1.96	5

3. Wind

100. The seasonal wind pattern in Cumilla shifts between two primary directions. During the summer monsoon (March to October), winds predominantly blow from the South and Southeast. During the winter (late October to February), they shift to blow from the North and Northwest. Average wind speed is higher during monsoon with a peak 7-14 km/hr in July and the lowest in November (5-10 km/hr) being the calmest month of the year. The Wind Rose model (Figure 14) shows wind directions and speed for reference.

Figure 14: Annual Wind Directions and Speed in Wind Rose Model

Source: Simulated historical climate & weather data for Comilla.

https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/comilla_bangladesh_1185186

4. Groundwater

101. Groundwater samples were collected on April 28, 2026 from the hand tube wells of the subproject area of Cumilla cluster. Sample collection and storage followed standards protocol. This period of sampling may be considered as dry season for groundwater level and water quality testing. The samples were submitted to the DPHE laboratory for testing pH, TDS, EC, Hardness, Iron, Manganese, Arsenic, Fluoride, Chloride, Fecal Coliform, and Total Coliform from stations. The results show high level (beyond DOE standards) of Fe, FC and TC for most of the groundwater samples, and high levels of Arsenic and Mn for the groundwater samples of Laksam and Chandpur *Paurashavas*. For representativeness of water quality, it is suggested to collect and test groundwater samples from the same tubewells during monsoon period (July/August).

Table 19: Groundwater Monitoring Report of Cumilla City Corporation

Sl. No.	Parameter for Laboratory Analysis	Jangalia Bus Stand at CuCC	Tikkarchar Bridge Point Pump House at CuCC	Bangladesh Standard (Drinking Water)
1	pH	7.02	6.92	6.5 -8.5
2	EC	137	151	- micromho/cm
3	TDS	68	76	1000 mg/l
4	Chloride	28	212	250 mg/l
5	Fluoride	0.067	0.081	1.0 mg/l
6	Hardness	138	87	500 mg/l
7	Arsenic	<0.001	<0.001	0.05 mg/l
8	Iron	0.03	0.62	0.3 – 1.0 mg/l
9	Manganese	<0.01	0.89	0.4 mg/l
10	FC	480	108	0 cfu/100ml
11	TC	950	230	0 cfu/100ml

Table 20: Groundwater Monitoring Report of Laksam Paurashava

Sl. No.	Parameter for Laboratory Analysis	Doulatgonj Atimkhana Pump House at Laksam Paurashava	Dinia Madrasha at Laksam Paurashava	Bangladesh Standard (Drinking Water)
1	pH	7.52	7.50	6.5 -8.5
2	EC	782	4.34	- micromho/cm
3	TDS	389	217	1000 mg/l
4	Chloride	124	46	250 mg/l
5	Fluoride	0.045	0.145	1.0 mg/l
6	Hardness	427	230	500 mg/l
7	Arsenic	0.197	0.062	0.05 mg/l
8	Iron	2.62	3.59	0.3 – 1.0 mg/l
9	Manganese	0.56	0.37	0.4 mg/l
10	FC	0	128	0 cfu/100ml
11	TC	0	260	0 cfu/100ml

Table 21: Groundwater Monitoring Report of Hajiganj Paurashava

Sl. No.	Parameter for Laboratory Analysis	Bus Terminal Mosque at Hajiganj Paurashava	Bangladesh Standard (Drinking Water)
1	pH	7.27	6.5 -8.5
2	EC	228	- micromho/cm
3	TDS	114	1000 mg/l
4	Chloride	37	250 mg/l
5	Fluoride	0.115	1.0 mg/l
6	Hardness	93	500 mg/l
7	Arsenic	<0.001	0.05 mg/l
8	Iron	1.37	0.3 – 1.0 mg/l
9	Manganese	<0.01	0.4 mg/l
10	FC	108	0 cfu/100ml
11	TC	120	0 cfu/100ml

Table 22: Groundwater Monitoring Report of Chandpur Paurashava

Sl. No.	Parameter for Laboratory Analysis	Notun Bazar Water Treatment Plant at Chandpur Paurashava	Ghoramara Water Treatment Plant at Chandpur Paurashava	Bangladesh Standard (Drinking Water)
1	pH	7.16	7.53	6.5 -8.5
2	EC	328	1219	- micromho/cm
3	TDS	164	609	1000 mg/l
4	Chloride	64	46	250 mg/l
5	Fluoride	0.071	0.521	1.0 mg/l
6	Hardness	132	108	500 mg/l
7	Arsenic	0.069	0.006	0.05 mg/l
8	Iron	8.23	1.70	0.3 – 1.0 mg/l
9	Manganese	0.20	0.15	0.4 mg/l
10	FC	488	248	0 cfu/100ml
11	TC	980	485	0 cfu/100ml

5. Noise Level

102. Noise level monitoring was conducted from 29 April to 09 May 2026 at the 4 towns of Cumilla Cluster. Two noise monitoring sites have been selected considering both commercial and mixed zone of ambience noise level in the towns of the subproject area. As result obtained, noise level of none of the sampling areas irrespective of day and night times of CuCC, Laksam, Hajiganj Paurashavas has been found compliant with the noise standards of the DoE. Exception has been observed for Chandpur Paurashava where noise level has been found compliant for nighttime standards, however it has been found non-compliant with the daytime noise standards.

Table 23: Noise level monitoring report

Sl.	Point	Bangladesh Standard	Test Time	Result	Land Use Category
	Cumilla City Corporation				
1	Jangalia Bus Stand at CuCC	Day Time 70dBa	Day	75.20 dBa	Commercial
		Night Time 60 dBa	Night	61.21 dBa	
2	Tikkarchar Bridge Point Pump House at CuCC	Day Time 60dBa	Day	76.43 dBa	Mixed
		Night Time 50 dBa	Night	56.30 dBa	
	Laksam Paurashava				
3	Doulatgonj Atimkhana Pump House at Laksam Paurashava	Day Time 60dBa	Day	72.08 dBa	Mixed
		Night Time 50 dBa	Night	56.60 dBa	
4	Dinia Madrasha at Laksam Paurashava	Day Time 60dBa	Day	73.10 dBa	Mixed
		Night Time 50 dBa	Night	56.80 dBa	
	Hajiganj Paurashava				
5	Bus Terminal Mosque at Hajiganj Paurashava	Day Time 70dBa	Day	78.10 dBa	Commercial
		Night Time 60 dBa	Night	56.60 dBa	
6	Bus Terminal Mosque at Hajiganj Paurashava	Day Time 70dBa	Day	78.80 dBa	Commercial
		Night Time 60 dBa	Night	58.20 dBa	
	Chandpur Paurashava				
7	Notun Bazar Water Treatment Plant at Chandpur Paurashava	Day Time 60dBa	Day	70.30 dBa	Mixed
		Night Time 50 dBa	Night	48.20 dBa	

Sl.	Point	Bangladesh Standard	Test Time	Result	Land Use Category
8	Notun Bazar Water Treatment Plant at Chandpur <i>Paurashava</i>	Day Time 60dBa	Day	69.90 dBa	Mixed
		Night Time 50 dBa	Night	45.70 dBa	

C. Water Environment

1. Drainage and Hydrology

103. The subproject area, encompassing Cumilla, Laksam, Chandpur, and Hajiganj, lies within the lower Meghna River basin and is characterized by a complex network of rivers (the Gomti, Dhanagada and Dakatia rivers), *khals*, floodplain depressions, and seasonal wetlands. The hydrological regime is governed primarily by the southwest monsoon, which contributes approximately 70–80% of the annual rainfall between May and October. Surface drainage is generally directed toward the Meghna River system through interconnected natural channels, while groundwater stored in alluvial aquifers provides an important source of domestic, agricultural, and industrial water supply.

104. Cumilla is located on the transition zone between the Meghna floodplain and the Tripura-Comilla uplands. Laksam occupies a relatively flat alluvial plain intersected by natural drainage channels, irrigation canals, and seasonal wetlands. The area experiences significant monsoon runoff from adjacent upland regions, resulting in temporary flooding of low-lying agricultural lands. Surface water retention in *beels* and depressions contributes to local groundwater recharge. Hajiganj, located within Chandpur District, is drained principally by the Dakatia River and its associated network of *khals*, canals, and floodplain drainage channels. The area exhibits a predominantly flat topography that facilitates seasonal flooding and surface water accumulation during the monsoon season. Hydrological conditions are strongly influenced by rainfall-runoff processes and fluctuations in river discharge.

105. Chandpur District is situated near the confluence of the Padma, Meghna, and Dakatia river systems, making it one of the most hydrologically active regions of Bangladesh. The drainage network is dominated by large rivers, tributary channels, tidal floodplains, and extensive wetlands. Seasonal flooding occurs regularly during the monsoon period due to high river discharge and intense rainfall. The region is also influenced by sediment transport, riverbank erosion, and floodplain deposition processes. Surface water resources are abundant throughout the year, while groundwater is stored within thick alluvial aquifer systems.

106. Records of discharge from the hydrological station of the Bangladesh Water Development Board (BWDB) at Hajiganj show a significant seasonal fluctuation in flow in the Dakatia River (Table 24). Mean monthly discharge ranges from approximately 4.01 m³/s in February, representing the dry-season minimum, to 6.85 m³/s in August, corresponding to the peak monsoon period. River flows start to rise from April, increasing from an average discharge of 4.52 m³/s in April to 6.03 m³/s in June, and reaching between 6.57 and 6.85 m³/s in July and August. High flows continue throughout September (6.76 m³/s) and October (6.24 m³/s). The long-term record (2011–2020) shows maximum monthly discharges reaching 7.62 m³/s in August, while minimum recorded flows were 2.55 m³/s in February. Increased river flows during the monsoon enhance drainage capacity but may also contribute to localized flooding and inundation in adjacent low-lying areas. Reduced dry-season flows can limit surface water availability and increase dependence on groundwater resources.

Table 24: Discharge of Dakatia River at Hajiganj Point

Year	River Flow (m ³ /s)											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2020	2.70	2.55	2.73	3.30	4.13	4.86	5.66	-	-	-	-	-
2019	2.68	2.83	3.13	3.32	3.88	4.08	5.38	5.44	5.05	5.15	4.15	3.11
2018	4.10	3.47	3.63	4.01	4.97	5.38	4.99	5.09	5.03	4.54	3.32	3.09
2017	3.82	3.29	4.07	4.62	4.91	5.49	6.53	6.90	6.68	5.91	5.50	4.32
2016	3.90	4.05	4.17	4.91	4.96	5.74	6.68	6.81	6.45	6.11	5.53	4.92
2015	5.07	4.92	4.09	4.16	4.87	6.20	6.67	6.90	7.08	6.57	5.40	4.35
2014	4.30	4.73	4.73	4.83	5.86	6.66	7.32	7.62	7.24	6.97	6.16	5.06
2013	4.73	4.43	4.43	4.43	5.99	6.60	7.32	7.48	7.69	7.05	6.25	5.16
2012	4.97	4.27	4.27	5.63	5.67	7.35	7.35	7.17	7.32	5.99	5.99	5.19
2011	4.42	4.67	5.04	4.91	4.56	6.32	6.98	7.43	7.40	7.06	5.62	4.57
Mean	4.16	4.01	4.12	4.52	5.07	6.03	6.57	6.85	6.76	6.24	5.42	4.50
Min	2.68	2.55	2.73	3.3	3.88	4.08	4.99	5.09	5.03	4.54	3.32	3.09
Max	5.07	4.92	5.04	5.63	5.99	7.35	7.35	7.62	7.69	7.06	6.25	5.19

Source: Bangladesh Water Development Board, Hydrological Station Database

2. River Systems and Water Quality

107. Surface water in the subproject region is primarily sourced from the Meghna, Gomti, and Dakatia rivers, characterized by seasonal variability, high fecal coliform contamination due to inadequate sanitation, and moderate to high mineral turbidity, especially in the Middle Meghna River Floodplain. Surface water quality of the Dakatia River suffers from seasonal deterioration due to industrial effluent, agricultural runoff, dumping of residues of seasonal fruits and domestic sewage, particularly near the Paurashavas of Chandpur and Hajiganj. However, surface water quality during monsoon (July to October) would be better due to the dilution factor. This subproject does not have scope to monitor monsoon water quality status due to time constraint.

108. Key parameters tested show that the BOD level in the Dakatia river at Chandpur and Hajiganj points which are presently the main sourcing areas of the surface water supply through SWTP are slightly acidic and facing high level of BOD, turbidity, FC and TC; i.e. samples represent high pollution concentration particularly in Chandpur and Hajiganj area (Table 25 and 26). Surface water quality for Gomti river near CuCC and Dakatia at Laksam show similar results (Table 27 and 28), however surface water of these points is not used for water supply purpose. These reports correspond to dry season low flow and pollution caused by dumping seasonal fruits (such as, water melon) in the river. The test results of the samples taken from the various surface water sources on 28.04.2026 are provided in Table 25 – 28:

Table 25: Surface water quality analysis report at Hajiganj Paurashva

Sl. No	Parameter for Laboratory Analysis	Dakatia River Water Near Bus Terminal Mosque at Hajiganj Paurashva	Bangladesh Standard (Inland Surface Water)
1	pH	7.24	6.5 - 8.5
2	DO	5.1	>6 mg/l

Sl. No .	Parameter for Laboratory Analysis	Dakatia River Water Near Bus Terminal Mosque at Hajiganj Paurashava	Bangladesh Standard (Inland Surface Water)
3	BOD	40	<2 mg/l
4	COD	-	10 mg/l
5	TDS	315	1000 - mg/l
6	Turbidity	10	NTU
7	Salinity	0.30	mg/l
8	Nitrate	-	7 mg/l
9	Phosphate	12.94	- mg/l
10	Sulphate	-	- mg/l
11	Fecal Coliform	176	- cfu/100ml
12	Total Coliform	350	>100 cfu/100ml
13	Oil & Grease	-	- mg/l

Table 26: Surface water quality analysis report at Chandpur Paurashava

Sl. No .	Parameter for Laboratory Analysis	Dakatia River Water Near Notun Bazar Water Treatment Plant at Chandpur Paurashava	Dakatia River Water Near Ghoramara Water Treatment Plant at Chandpur Paurashava	Bangladesh Standard (Inland Surface Water)
1	pH	7.42	7.57	6.5 - 8.5
2	DO	5.8	5.1	>6 mg/l
3	BOD	10.5	6.9	<2 mg/l
4	COD	-	-	10 mg/l
5	TDS	61	84	1000 - mg/l
6	Turbidity	22	24	NTU
7	Salinity	0.07	0.08	mg/l
8	Nitrate	-	-	7 mg/l
9	Phosphate	2.03	1.70	- mg/l
10	Sulphate	-	-	- mg/l
11	Fecal Coliform	280	288	- cfu/100ml
12	Total Coliform	550	570	>100 cfu/100ml
13	Oil & Grease	-	-	- mg/l

Table 27: Surface water quality analysis report at Cumilla City Corporation

Sl. No .	Parameter for Laboratory Analysis	Surface Water Near Jangalia Bus Stand at CuCC	Gomti River Water Near Tikkarchar Bridge Point Pump House at Cumilla City Corporation	Bangladesh Standard (Inland Surface Water)
1	pH	7.19	7.34	6.5 - 8.5
2	DO	5.5	5.5	>6 mg/l
3	BOD	-	-	<2 mg/l
4	COD	-	-	10 mg/l
5	TDS	120	43	1000 - mg/l

Sl. No .	Parameter for Laboratory Analysis	Surface Water Near Jangalia Bus Stand at CuCC	Gomti River Water Near Tikkarchar Bridge Point Pump House at Cumilla City Corporation	Bangladesh Standard (Inland Surface Water)
6	Turbidity	18	469	NTU
7	Salinity	0.12	0.04	mg/l
8	Nitrate	-	-	7 mg/l
9	Phosphate	1.89	3.32	- mg/l
10	Sulphate	-	-	- mg/l
11	Fecal Coliform	168	110	- cfu/100ml
12	Total Coliform	320	206	>100 cfu/100ml
13	Oil & Grease	-	-	- mg/l

Table 28: Surface water quality analysis report at Laksam *Pourashva*

Sl. No .	Parameter for Laboratory Analysis	Dakatia River Water Near Doulatgonj Atimkhana Pump House at Laksam <i>Paurashava</i>	Dakatia River Water Near Dinia Madrasha at Laksam <i>Paurashava</i>	Bangladesh Standard (Inland Surface Water)
1	pH	7.24		6.5 - 8.5
2	DO	5.1		>6 mg/l
3	BOD	-		<2 mg/l
4	COD	-		10 mg/l
5	TDS	315		1000 - mg/l
6	Turbidity	10		NTU
7	Salinity	0.30		mg/l
8	Nitrate	-		7 mg/l
9	Phosphate	12.94		- mg/l
10	Sulphate	-		- mg/l
11	Fecal Coliform	176		- cfu/100ml
12	Total Coliform	350		>100 cfu/100ml
13	Oil & Grease	-		- mg/l

D. Ecological Environment

109. The ecological features of areas within and surrounding the sites/locations of the proposed project include both flora, fauna, and fish of the proposed project sites. An ecological survey was conducted to determine the diversity and distribution of the flora and fauna as baseline, and the extent to which that may be impacted due to the proposed project activities. The water distribution pipeline of the proposed project in the Cumilla Cluster may cross some water bodies, and therefore, possible impact of construction activities on aquatic environment of these water bodies is of particular interest in the environmental assessment. A team led by the environmental expert of the IEE team visited the proposed project sites in April and May 2026 to collect first-hand data on floral and faunal diversity. The study was conducted only in the daytime. Herpeto-faunal and mammalian survey was done through visual search and also through discussion with local people and literature review. Aural and visual searching was the main survey method for ornithological survey. Information on fisheries was collected through interviewing the Department of Fisheries

(DoF) as well as survey of local fish market. Rapid field survey and discussion with local people was the main method for floral survey. The collected data were cross-checked through literature review. The areas that were surveyed for this ecological assessment are: Cumilla City Corporation, Hajiganj Municipality, Chandpur Municipality and Laksam Municipality under Cumilla Cluster of this project. This baseline information has been used in the relevant section of this report to identify and assess impact of the proposed project on the ecological resources, and finally, to suggest mitigation measures.

110. To this study, the macro ecological features of the study area are considered that primarily consists of floral and faunal diversity including fish species. Descriptions of these ecological features are presented in this Section.

111. **Cumilla City Corporation and Laksam Municipality.** Both Cumilla and Laksam are situated within the Middle Meghna Floodplain Zone characterized by the influence of the Meghna river system and the Gomti River.

- (i) Landscape: This zone consists of a fertile, low-lying alluvial plain. The area is subject to seasonal flooding, which brings nutrient-rich silt, making it one of the most productive agricultural regions in the country.
- (ii) Flora: The vegetation is dominated by homestead forests and aquatic plants. Common species include:
 - a. Fruit trees: Mango (*Mangifera indica*), Jackfruit (*Artocarpus heterophyllus*), and Guava.
 - b. Timber: Rain tree (*Samanea saman*) and Mahogoni.
 - c. Aquatic plants: Water hyacinth (*Eichhornia crassipes*) and various species of lilies found in the "beels" (low-lying depressions).
- (iii) Fauna: The region supports a variety of wetland birds, such as Little Egrets and Kingfishers. In the rural outskirts of Laksam and Cumilla, small mammals like the Golden Jackal and Common Mongoose are frequently observed.

112. **Chandpur Municipality and Hajiganj Municipality.** These areas fall within the Lower Meghna River Floodplain Zone located further west and south, moving closer to the confluence of the Padma and Meghna rivers.

- (i) Landscape: This is a transition zone where the river systems become massive. The landscape is dominated by riverine features, including "chars" (river islands) and significant silt deposition. The water levels fluctuate significantly with the seasons and tidal influences.
- (ii) Flora: The vegetation is adapted to riverbank conditions having slightly turbid and turbulent water flow.
 - a. Riparian vegetation: Dhol Kalmi (*Ipomoea carnea*) and various reeds are common along the riverbanks to prevent erosion.
 - b. Crops: This zone is famous for its intensive betel nut (*Areca catechu*) and coconut plantations, which thrive in the moist, silty soil.
- (iii) Fauna: This zone is a critical corridor for fish, most notably the Hilsa (*Tenualosa ilisha*), which migrates through the Chandpur region. The riverine environment also supports the Ganges River Dolphin (*Platanista gangetica*), particularly near the deep channels of the Meghna.

Table 29: Ecological Features in the Subproject Area

Feature	Cumilla & Laksam	Chandpur & Hajiganj
Primary River	Gomti / Dakatia	Meghna / Dakatia
Soil Type	Non-calcareous Dark Grey Floodplain soil	Calcareous Alluvium and Silty soils
Key Vegetation	Mixed homestead fruit trees	Betel nut, Coconut, and Riparian reeds
Aquatic Focus	Inland Beels and Ponds	Major Riverine channels
Dominant Fauna	Terrestrial birds and small mammals	Hilsa fish and River Dolphins

113. Urbanization in Cumilla and Chandpur has led to the filling of many natural water bodies. In the city corporations and municipalities, the ‘homestead forest’ model is being replaced by paved surfaces, which impacts local microclimates and reduces the habitat for indigenous bird species. Conservation efforts in these zones typically focus on protecting the remaining wetlands and managing the riverbank erosion that is common in the Chandpur and Hajiganj areas.

1. Terrestrial Fauna

114. Terrestrial environment dependent wildlife is known as terrestrial fauna. They fully or partially depend on terrestrial environment to live or to get food, shelter, nest, breed, and produce offspring. Several species of amphibia, reptile, bird and mammal are the main component of terrestrial fauna. The project areas have different types of lands, e.g. agricultural dry land, seasonal wetland, homestead land, fallow land, roadside low land, as well as rivers, canals, ditches, which provide moderate environment for terrestrial habitat. Terrestrial wildlife is divided into 4 major group viz. mammal, bird, reptile and amphibia. A total of 62 faunal species has so far been identified in the project areas, and a breakdown of the subspecies is shown in this report. This indicates that the area is rich in faunal species. A complete list of terrestrial faunal species is given Table 30.

Table 30: Identified terrestrial fauna at three major sampling areas of Cumilla Cluster

Class	Family	English Name	Scientific Name
Amphibia	Bufonidae	Common Toad	<i>Bufo melanostictus</i>
	Rhacophoridae	Maculated Tree frog	<i>Polypedates maculatus</i>
	Ranidae	Bull frog	<i>Hoplobatrachus tigerinus</i>
		Cricket frog	<i>Limnonectes limnocharis</i>
		Boulenger's Frog	<i>Rana alticola</i>
Reptilia	Scincidae	Common Skink	<i>Mabuya carinata</i>
	Gekkonidae	Common House Lizard	<i>Hemidactylus flaviviridis</i>
		Common House Lizard	<i>Hemidactylus brooki</i>
	Agamidae	Common Garden Lizard	<i>Calotes versicolor</i>
	Varanidae	Grey Monitor Lizard	<i>Varanus bengalensis</i>
		Yellow Monitor Lizard	<i>Varanus salvator</i>
	Dipsadidae	Common Wolf Snake	<i>Lycodon aulicus</i>
Aves	Colubridae	Rat Snake	<i>Coluber mucosus</i>
	Scolopacidae	Fantail Snipe	<i>Gallinago</i>
	Alcedinidae	Common Kingfisher	<i>Alcedo atthis</i>
		White-throated Kingfisher	<i>Halcyon smyrnensis</i>
	Meropidae	Green Bee Eater	<i>Merops orientalis</i>
	Megalaimidae	Lineated Barbet	<i>Megalaima lineata</i>

Class	Family	English Name	Scientific Name
	Apodidae	Asian Palm Swift	<i>Cypsiurus balasiensis</i>
	Psittacidae	Rose ringed Parakeet	<i>Psittacula krameri</i>
	Jacanidae	Bronze-winged Jacana	<i>Metopidius indicus</i>
	Laniidae	Brown Shrike	<i>Lanius cristatus</i>
	Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i>
	Pycnonotidae	Red-vented Bulbul	<i>Pycnonotus cafer</i>
	Motacillidae	White-browed Wagtail	<i>Motacilla alba</i>
	Ardeidae	Indian Pond heron	<i>Ardeola grayii</i>
		Cattle Egret	<i>Bubulcus ibis</i>
		Little Egret	<i>Egretta garzetta</i>
	Centropodidae	Indian Cuckoo	<i>Cuculus micropterus</i>
	Columbidae	Spotted Dove	<i>Streptopelia chinensis</i>
		Rock Pigeon	<i>Columba livia</i>
	Laridae	Common Tern	<i>Sterna hirunda</i>
	Rostratulidae	Greater Painted-Snipe	<i>Rostratula bengalensis</i>
	Accipitridae	Brahminy Kite	<i>Haliastur Indus</i>
	Passeridae	House Sparrow	<i>Passer domesticus</i>
		Baya Weaver	<i>Ploceus philippinus</i>
		Paddy field Pipit	<i>Anthus rufulus</i>
	Sulviidae	Striated Grassbird	<i>Megaurus palustris</i>
		Common Tailorbird	<i>Orthotomus sutorius</i>
		Common Babbler	<i>Turdoides caudatus</i>
	Nectariniidae	Purple Sunbird	<i>Nectarinia asiatica</i>
	Corvidae	House crow	<i>Corvus splendens</i>
		Rufous Tree Pie	<i>Dendrocitta vagabunda</i>
	Sturnidae	Asian Pied Starling	<i>Sturnus contra</i>
		Common Myna	<i>Acridotheres tristis</i>
	Irenidae	Common Iora	<i>Aegithina tiphia</i>
	Laniidae	Long-tailed Shrike	<i>Lanius schach</i>
	Ploceidae	White throated Munia	<i>Lonchura malabarica</i>
	Oriolidae	Black-headed Oriole	<i>Oriolus xanthornus</i>
	Picidae	Black-rumped Flamback	<i>Dinopium benghalense</i>
	Muscicapidae	Oriental Magpie Robin	<i>Copsychus saularis</i>
		White-throated Fantail	<i>Rhipidura albicollis</i>
Mammalia	Muridae	House Mouse	<i>Mus musculus</i>
		Common House Rat	<i>Rattus</i>
		Bandicoot Rat	<i>Bandicota indica</i>
		Indian Field Mouse	<i>Mus booduga</i>
		Indian mole Rat	<i>Bendicota bengalensis</i>
	Soricidae	Grey Musk Shrew	<i>Suncus murinus</i>
	Felidae	Fishing cat	<i>Prionailurus bengalensis</i>
	Pteropodidae	Flying Fox	<i>Pteropus gigantius</i>
	Herpestidae	Small Indian Mongoose	<i>Hervested auropunctatus</i>
	Vespertilionidae	Indian Pipistrelle	<i>Pipistrellus coromandra</i>

2. Terrestrial Flora

115. The terrestrial plant species make a complex ecosystem in which wildlife has direct relationship through their ecological niche. Commercial fruit garden and vegetable plantation were observed at project areas. Common terrestrial flora is Mango - *Mangifera indica*, Betelnut - *Areca catechu*, Coconut - *Cocos nucifera*, Rain tree - *Samanea saman*, etc. Scattered terrestrial flora was observed beside the highway and few terrestrial flora were also observed at the project areas. Three types of terrestrial plant habits, e.g. trees, shrubs and herbs exist in the project areas.

116. Except herbs and shrubs, few natural trees (naturally originated) exist in the project area. Most of the plants particularly the trees and shrubs are planted and cultivated. 68 floral species have so far been identified in the project areas of which 34 are tree species, 25 are herb species, and the rest are shrubs.

Table 31: Identified terrestrial flora at three major sampling areas for the Project Area

Name			Habit
Scientific	Family	Native	
<i>Zizyphus mauritiana</i>	Rhamnaceae	Boroi, Kul	Tree
<i>Datura metol</i>	Solanaceae	Dhutra	Herb
<i>Azadirachta indica</i>	Meliaceae	Neem	Tree
<i>Clerodendrum viscosum</i>	Verbinaceae	Vat	Herb
<i>Litchi chinensis</i>	Sopindaceae	Lichee	Tree
<i>Spondias dulcis</i>	Anacardiaceae	Golden Apple /Amra	Tree
<i>Calotropis procera</i>	Asclepiadaceae	Seto/Gedla Akonda	Tree
<i>Calotropis gigantean</i>	Asclepiadaceae	Akonda	Tree
<i>Averrhoa carambola</i>	Averrhoaceae	Kamranga	Tree
<i>Basella rubra</i>	Basellaceae	Pui Shak	Shrub
<i>Chrysopogon aciculate</i>	Gramineae	Chore kata	Herb
<i>Acacia auriculiformis</i>	Leguminosae	Akashmoni	Tree
<i>Acacia mangium</i>	Leguminosae	Mangium	Tree
<i>Erythrina variegata</i>	Leguminosae	Mandar	Tree
<i>Tamarindus indica</i>	Leguminosae	Tetul	Tree
<i>Centella asiatica</i>	Hydrocotyleaceae	Thankuni	Herb
<i>Solanum indicum</i>	Solanaceae	Titbegun	Shrub
<i>Ficus glomoretta</i>	Moraceae	Jagadumur	Shrub
<i>Eucalyptus citriodora</i>	Myrtaceae	Eucalyptus	Tree
<i>Albizia procera</i>	Leguminosae	Koroi	Tree
<i>Diospyros embryteris</i>	Ebenaceae	Gab	Tree
<i>Anthocephalus chinensis</i>	Rubiaceae	Kadam	Tree
<i>Dalbergia sissoo</i>	Leguminosae	Sisu	Tree
<i>Musa spp</i>	Musaceae	Kala	Herb
<i>Barringtonia acutangula</i>	Lecythidaceae	Hijal	Tree
<i>Aegle marmelos</i>	Rutaceae	Bel	Tree
<i>Blumea lacera</i>	Compositae	Sheyalmutra	Herb
<i>Areca catechu</i>	Plamae	Supari	Tree
<i>Leonurus sibiricus</i>	Libiatae	Raktadrone	Herb

Name			Habit
Scientific	Family	Native	
<i>Carica papaya</i>	Caricaceae	Pape	Shrub
<i>Bombix cliba</i>	Bombacaceae	Simul	Tree
<i>Cynodon dactylon</i>	Gramineae	Durbaghas	Herb
<i>Solanum nigrum</i>	Solanaceae	Phutibegun	Herb
<i>Acacia nilotica</i>	Leguminosae	Babla	Tree
<i>Mikania cordata</i>	Compositae	Assamlata	Herb
<i>Samanea saman</i>	Leguminosae	Rendi	Tree
<i>Lindernia procumbens</i>	Scrophulariaceae	Bakpuspa	Herb
<i>Bambusa spp</i>	Gramineae	Bansh	Tree
<i>Mangifera indica</i>	Anacardiaceae	Am	Tree
<i>Coccinia indica</i>	Cucurbitaceae	Telakucha	Herb
<i>Ricinus communis</i>	Euphorbiaceae	Reri, venna	Shrub
<i>Polygonum hydropiper</i>	Polygonaceae	Bishkatali	Herb
<i>Ipomoea fistulosa</i>	Convolvulaceae	Dholkalmi	Herb
<i>Alstonia scholaris</i>	Apocynaceae	Chatim	Tree
<i>Delomix regia</i>	Leguminosae	Krishnachura	Tree
<i>Alternanthera sesilis</i>	Amaranthaceae	Haicha	Herb
<i>Clerodendrum velosum</i>	Verbinaceae	Bhant	Herb
<i>Heliotropium indicum</i>	Boraginaceae	Hatisur	Herb
<i>Swietenia mahagoni</i>	Meliaceae	Mehagini	Tree
<i>Ficus benghalensis</i>	Moraceae	Bot	Tree
<i>Clematis gouriana</i>	Ranunculaceae	Chagalbati	Herb
<i>Cocos nucifera</i>	Palmae	Narikel	Tree
<i>Lagerstroemia speciosa</i>	Lythidaceae	Jarul	Tree
<i>Phoenix sylvestris</i>	Palmae	Khejur	Tree
<i>Phyllanthus reticulatus</i>	Euphorbiaceae	Chitki	Shrub
<i>Ficus hispida</i>	Moraceae	Kakdumur	Shrub
<i>Artocarpus heterophyllus</i>	Moraceae	Kathal	Tree
<i>Casuarinas equisetifolia</i>	Casuarinaceae	Jhau	Tree
<i>Borassus flabellifer</i>	Palmae	Tal	Tree
<i>Ocimum sanctum</i>	Labiatae	Tulsi	Herb
<i>Hyptis suaveolens</i>	Labiatae	Tokma	Herb
<i>Centolla asiatica</i>	Hydrocotyleaceae	Than kuni	Herb
<i>Saccharum spontaneum</i>	Graminaceae	Kash	Herb
<i>Ocimum sanctum</i>	Labiatae	Tulsi	Herb
<i>Chrysopogon aciculate</i>	Gramineae	Chore Kanta	Herb
<i>Hyptis suaveolens</i>	Labiatae	Tokma	Herb
<i>Molocanna bambusoides</i>		Muli bansh	Shrub

Name			Habit
Scientific	Family	Native	
<i>Pteris vittata</i>		Dhekishak	Pteridophytes

3. Aquatic Fauna

117. Some species of amphibia, reptile, bird, mammal and freshwater fish are the main components of the aquatic fauna. The reproduction, breeding and multiplication of aquatic fauna is finely tuned and adjusted to the rhythm and amplitude of monsoon flooding. Aquatic wildlife is divided into 4 major groups, viz. mammal, bird, reptile and amphibia. A total of 30 aquatic faunal species has so far been identified, and a breakdown of the subspecies is provided in this report. This indicates that the area is also rich in aquatic fauna. A complete list of aquatic faunal species is given in Table 32.

Table 32: Identified aquatic fauna at three major sampling areas for the Cumilla Cluster

Class	Family	English Name (Status)	Scientific Name
Amphibia	Ranidae	Skipper frog	<i>Euphlyctis cyanophlyctis</i>
Reptilia	Bataguridae	Indian Roofed Turtle	<i>Kachuga tecta</i>
	Natricidae	Checkered Keelback	<i>Xenochrophis piscator</i>
	Homalopsidae	Common Smooth Water Snake	<i>Enhydris</i>
Aves	Anhingidae	Darter	<i>Anhinga melanogaster</i>
	Phalacrocoracidae	Little Cormorant	<i>Phalacrocorax niger</i>
	Dendrocygnidae	Brown Crake	<i>Amaurornis akool</i>
		White-breasted Waterhen	<i>Amaurornis phoenicurus</i>
		River tern	<i>Sterna albifrons</i>
Mammalia	Platanistidae	Ganges River Dolphin	<i>Platanista gangetica</i>
Fresh water Fish/ Osteichthyes	Claridae	Magur	<i>Clarius batrachus</i>
	Gobiidae	Tank Goby	<i>Glossogobius giuris</i>
		Bumblebee Goby	<i>Brachygobius nunas</i>
	Clupeidae	Hilsa	<i>Tenualosa ilisha*</i>
		Indian River Shad	<i>Gudusia chapra</i>
	Nanidae	Mottled Nandus	<i>Nandus</i>
	Polynemidae	Indian Threadfish	<i>Polydactylus indicus</i>
	Belontiidae	Sunset Gourami	<i>Colisa sota</i>
	Heteropneustidae	Stinging Catfish	<i>Heteropneustes fossilis</i>
	Ariidae	Gagora catfish	<i>Arius gagora</i>
		Soldier Catfish	<i>Osteogeneiosus militaris</i>
	Channidae	Asiatic Snakehead	<i>Channa orientalis</i>
		Spotted Snakehead	<i>Channa punctatus</i>
	Pangasidae	Pungus (cultured)	<i>Pangasius</i>
	Cyprinidae	Catla	<i>Catla catla</i>
		Rohu	<i>Labeo rohita</i>
		Mrigal	<i>Cirrhinus mrigala</i>
		Ticto / Firefin Barb	<i>Puntius ticto</i>
		Swamp/ Chola Barb	<i>Puntius chola</i>
	Mastacembelidae	Tire-trak Spinyeel	<i>Mastacembelus armatus</i>
		One-stripe Spinyeel	<i>Macrognathus aculeatus</i>

Class	Family	English Name (Status)	Scientific Name
	Polynemidae	Indian Threadfish	<i>Polydactylus indicus</i>
	Anabantidae	Climbing Perch	<i>Anabas testudineus</i>
	Bagridae	Tengra Mystus	<i>Mystus tengara</i>
		Long-whiskered Catfish	<i>Aorichthys aor</i>
	Chacidae	Indian Chaca	<i>Chaca chaca</i>
	Notopteridae	Grey Featerback	<i>Notopterus notopterus</i>
	Synbranchidae	Gangetic mudeel	<i>Monopterusuchia</i>
	Cyprinidae	Indian carplet	<i>Ambhypharyngodon microlepis</i>

4. Aquatic Flora

118. The project area has low land / seasonal wetland with varieties of aquatic flora. The aquatic flora is divided into three major types, viz. tree, shrub and herb. These floral species grow in ponds, canals, ditches, river, seasonal wetland and low-lying agricultural lands as submerged, free-floating, or rooted floating states. The common aquatic floral species in the project area include Sada Shapla - *Nymphaea* sp, Kachuripana - *Eichhornia crassipes*, Khudipana - *Lemna perpusilla*, Helencha- *Enhydra fluctuans*, Kalmi - *Ipomoea aquatica* etc. A total of 24 aquatic floral species has been identified of which two are trees, 21 are herbs and the rest are shrubs.

Table 33: Identified terrestrial flora at three major sampling areas for the Cumilla Cluster

NAME			HABIT
Scientific	Family	Native	
<i>Nymphaea nouchali</i>	Nymphaeaceae	Sada shapla	Herb
<i>Clynogyne dichotoma</i>	Marantaceae	Sitalpati	Herb
<i>Vallisneria spiralis</i>	Hydrocharitaceae	Patajhanghi	Herb
<i>Utricularia aurea</i>	Utriculariaceae	Jhanghi	Herb
<i>Hygroryza aristata</i>	Gramineae	Phutki janglidhan	Herb
<i>Ipomoea aquatica</i>	Convolvulaceae	Kalmi	Herb
<i>Lemna perpusilla</i>	Limnaceae	Khudipana	Herb
<i>Pistia strateotes</i>	Araceae	Topapana	Herb
<i>Salvinia cuculata</i>	Salviniaceae	Indurkanipana	Herb
<i>Eichhornia crassipes</i>	Pontederiaceae	Kachuripana	Herb
<i>Hydrilla verticillata</i>	Hydrocharitaceae	Janjhi, Kurcli	Herb
<i>Dillenia pentagyna</i>		Hargoza	Shrub
<i>Scirpus articulatus</i>	Cyperaceae	Chechra	Herb
<i>Alternanthera philoxeroides</i>	Amaranthaceae	Helencha	Herb
<i>Ceratophyllum demersum</i>	Ceratophytaceae	Jhanjhi	Herb
<i>Barringtonia acutangula</i>	Lecythidaceae	Hijal	Tree
<i>Crataeva nurvala</i>	Capparidaceae	Barun, banny	Tree
<i>Colocasia esculenta</i>	Araceae	Katchu	Herb
<i>Ipomoea fistulosa</i>	Convolvulaceae	Dholkalmi	Herb
<i>Enhydra fluctuans</i>	Compositae	Helencha	Herb
<i>Aponogeton natans</i>	Aponogetonaceae	Ghenchu	Herb
<i>Calamus sp</i>	Palmae	Bet	Herb
<i>Fagopyrum hydropiper</i>	Polygonaceae	Biskhatali	Herb
<i>Monochoria vaginalis</i>	Pontederiaceae	Sarkachu	Herb

5. Threatened Flora and Fauna

119. Specific scientific criteria are followed to declare a species as threatened (critically endangered, endangered etc.). It is declared by the World Conservation Union (IUCN) for each country. Floral or faunal species that exist in threatened condition are generally known as threatened species. Currently, 147 wildlife and 54 freshwater fish species are threatened in Bangladesh; 40 plant species are also threatened in Bangladesh. No threatened floral species have been identified in the project area. However, some threatened wildlife and fish species have been identified in the project areas which are considered threatened throughout the country as well. A systematic research work in different seasons of the year will provide a complete and more accurate status of the threatened wildlife and fish fauna of the study areas.

Table 34: List of Critically Endangered, Endangered and Vulnerable wildlife and fish fauna in the study area

Biological Class	English name	Scientific name	O	CE	E	V	CT	T	DD
Reptilia	Grey Monitor Lizard	<i>Varanus bengalensis</i>				√			
	Yellow Monitor Lizard	<i>Varanus salvator</i>			√				
	Common Wolf Snake	<i>Lycodon aulicus</i>				√			
Mammalia	Ganges River Dolphin	<i>Platanista gangetica</i>			√				
Osteichthyes	Mottled Nandus	<i>Nandus</i>				√	√		
	Asiatic Snakehead	<i>Channa orientalis</i>				√	√		
	Ticto / Firefin Barb	<i>Puntius ticto</i>				√	√		
	Tire-trak Spinyeel	<i>Mastacembelus armatus</i>			√		√		
	One-stripe Spinyeel	<i>Macrognathus aculeatus</i>				√	√		
	Long-whiskered Catfish	<i>Aorichthys aor</i>				√	√		
	Indian Chaca	<i>Chaca</i>			√				
	Grey Featerback (V)	<i>Notopterus</i>				√	√		
	Gangetic mudeel (V)	<i>Monopterusuchia</i>				√	√		

[Legend: O = Observed, CE = Critically Endangered, E = Endangered, V = Vulnerable, CT = Commercially T = Threatened, DD = Data Deficient].

6. Protected Area

120. The protected areas within and surrounding Cumilla City Corporation, Hajiganj, Chandpur, and Laksam municipalities encompass several Cultural Heritage Sites, Urban Green Spaces, and Ecologically Critical Riverine Zones, though these areas are not considered significant wildlife sanctuary, rather may be considered as significant pockets of biodiversity and some are legally protected historical sites. The Red Line bounded areas in the Location Map of Bangladesh (Figure 15) shows Protected areas – none of them are within subproject influence area.

- (i) Cumilla City Corporation: Cumilla district has several protected areas and archeological landscapes, some of which are located with CuCC.
 - a. **Lalmai Shalbon Bihar:** Located at Lalmai hill range is a prominent archeologically protected area of the Department of Archaeology. It is an ancient 8th-century Buddhist monastery founded by King Bhava Deva, the fourth ruler of the Early-Deva dynasty, during the late 7th to early 8th century. The site is covered with Shal trees and preserving ancient flora and providing a habitat for local bird species and small reptiles that have disappeared from the urban center.
 - b. **Dharmasagar Dighi (vast pond):** Located at the heart of Cumilla city. The size of the water reservoir is around 23 acres. It is widely attributed to Maharaja Dharma Manikya-I of the then Tripura (now Tripura is state of India), who reportedly had it excavated around 1458 AD to provide water to residents during a period of scarcity. It is a significant cultural heritage site and has been used as a recreation place for the city dwellers. This pond attracts migratory birds during the winter months and helps recharging groundwater table of Cumilla city.
 - c. **Cumilla Zoo and Botanical Garden:** Located within the city, this is a formal conservation site that maintains various indigenous and exotic plant species, providing a controlled environment for biodiversity.
- (ii) **Chandpur and Hajiganj: Riverine Conservation** Chandpur and Hajiganj regions are important for riverine aquatic ecosystem, of which some are:
 - a. **Hilsa Sanctuary (Lower Meghna):** The stretch of the Meghna River near Chandpur is one of the important designated Hilsa Fish Sanctuaries in Bangladesh. The government enforces "no-fishing" periods to protect the breeding and juvenile stages (*Jatka*) of hilsha (*Tenualosa ilisha*). This is one of the most economically significant protected aquatic zones in Bangladesh.
 - b. **Ganges River Dolphin Habitat:** The confluence of the Padma and Meghna near Chandpur is a known habitat for the endangered Ganges River Dolphin (*Platanista gangetica*). While not a standalone "sanctuary" with borders, it is a high-priority conservation area where harmful fishing gear (like monofilament nets) is restricted.
 - c. **Dakatia River Banks:** Municipalities of Chandpur and Hajiganj often impose regulations to protect specific segments of the Dakatia riverbank to prevent encroachment and preserve the riparian vegetation that stabilizes the soil of the riverbanks.
- (iii) (c) Laksam Municipality: Local Wetlands. Laksam does not have any nationally significant national park or archaeological site, but it relies on Community-Managed Protected Areas.
 - a. **Village Common Forests (VCF):** People of the outskirts of Laksam Municipality conserve traditional homestead forests which may be considered act as *de facto* protected areas. These patches of dense vegetation are vital for preserving the gene pool of local medicinal plants and timber trees.
 - b. **The Dakatia Riparian Zone:** Efforts by the Water Development Board to re-excavate the Dakatia River often involve designating certain stretches as "protected" from illegal sand mining and waste dumping to maintain the river's ecological health.

Table 35: Summary of Archaeological Sites and Protected Areas

Municipality	Type of Protected Area	Key Agency
Cumilla City	Archeological Landscapes & Urban Tanks	Dept. of Archaeology / City Corporation
Chandpur	Hilsa Fish Sanctuary & Dolphin Habitat	Department of Fisheries
Hajiganj	Riverine Riparian Zones	Hajiganj Municipality / Bangladesh Water Development Board (BWDB)
Laksam	Community Wetlands & Dakatia Basin	Laksam Municipality/ Forest Department

7. National Park (NP)

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

8. Game Reserve (GR)

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

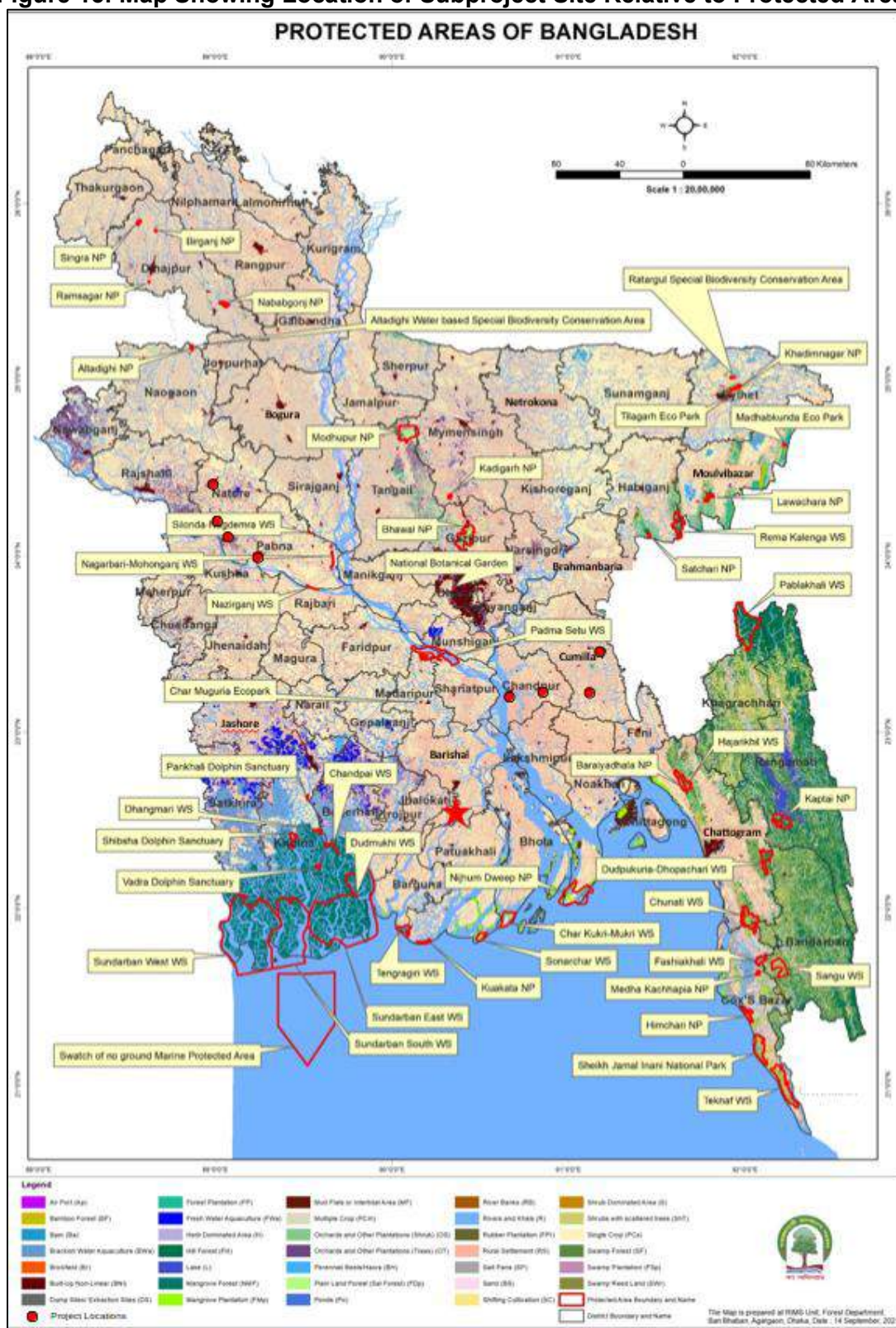
9. Wildlife Sanctuary (WS)

123. A Wildlife Sanctuary (WS) is an area that assures the natural conditions necessary to protect nationally significant species, groups of species, biotic communities, or physical features of the environment where these require specific human manipulation for their perpetuation. No WS exists at or near the proposed project sites.

10. Ecologically Critical Area (ECA)

124. It is an environmental protection zone, defined by the Government of Bangladesh under the Bangladesh Environment Conservation Act, 1995, where ecosystem is considered to be threatened. There is no ECA in the project area.

Figure 15: Map Showing Location of Subproject Site Relative to Protected Areas



11. Critical Habitat

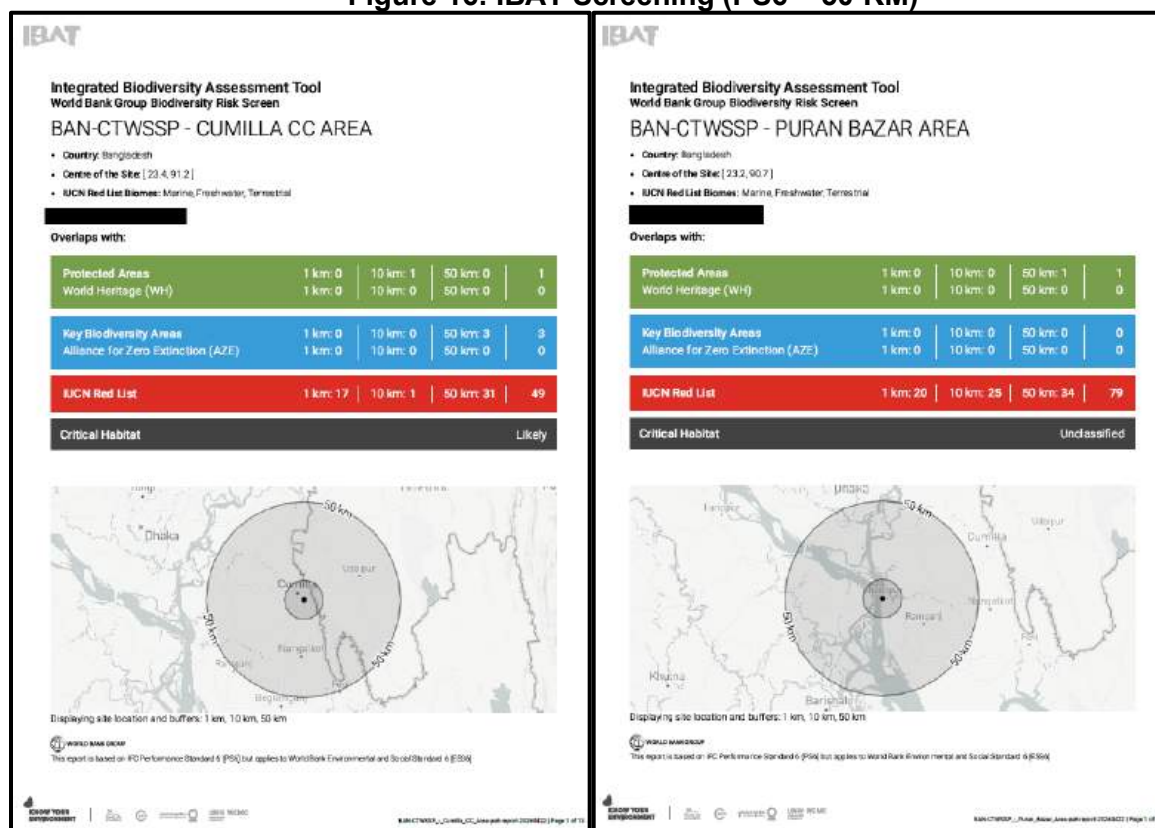
125. Despite being in a built-up and developed urban area, the subproject sites have been assessed in terms of critical habitat status. An initial screening using the Integrated Biodiversity Assessment Tool (IBAT) was undertaken to screen and assess potential risks on sensitive areas or critical habitat that may exist around the subproject sites (default area of analysis of 50 km radius). The IBAT screening for the Cumilla Cluster, covering the Cumilla City Corporation Area and the Puran Bazar Area, Chandpur indicates that the project locations are situated within modified urban and peri-urban landscapes, with no direct overlap with legally protected areas or World Heritage Sites within the immediate 1-km buffer. Several protected or internationally recognized areas occur within wider buffers of the CuCC. Rudrasagar Lake, a designated Ramsar Wetland of International Importance, is located within approximately 10 km, while multiple Key Biodiversity Areas (KBAs), including Rudrasagar Lake, Sepahijala, and Trishna Wildlife Sanctuary, are present within a 50-km radius, however all these sites are located in Tripura, India. In the Puran Bazar Area, one designated wildlife sanctuary (Padma Bridge) occurs within the 50-km buffer, although no KBAs are identified within the same distance.

126. The screening identified a high diversity of species potentially occurring within the broader landscape, including numerous IUCN Red List threatened species (CR and EN) across freshwater, terrestrial, and marine biomes. For both areas, priority species recorded within the 1-km to 50-km buffers include several threatened freshwater turtles, river dolphins, primates, birds of prey, and migratory waterbirds, as well as many threatened chondrichthyan species (sharks and rays) within wider marine and estuarine influence zones. In the Cumilla City Corporation area in particular, the presence of multiple CR and EN species within close proximity (including freshwater and riparian species) indicates the potential for significant biodiversity sensitivities even though the project sites are urban in character.

127. Overall, the IBAT results conclude that while no automatic Critical Habitat determination is made at the screening stage, there are biodiversity features within the wider project influence area that may potentially trigger Critical Habitat considerations under IFC Performance Standard 6, particularly due to the presence of threatened species and nearby KBAs.

128. With this result, further assessment was undertaken through site visits and interviews with the locals, including targeted desktop review, where relevant, to confirm the likelihood of species occurrence. The subproject sites such as roadsides (water supply distribution network alignments) and specific inland sites (PTWs, OHTs and pump houses) are all located in the built up and developed areas. No project component will be constructed or located within or along embankments or riparian sections of water bodies such as rivers where the CR and EN species identified in the IBAT screening are known to thrive. Thus, project activities will have no direct or indirect impact to these species.

Figure 16: IBAT Screening (PS6 – 50-KM)



E. Socioeconomic Environment^{17 18}

1. General Socio-Economic Profiles and Administrative Structures

129. **Cumilla City Corporation.** Cumilla City Corporation is a major urban local government institution in Bangladesh, covering an administrative area of 53.04 square kilometers. The city plays a strategic role in the southeastern region of the country, functioning as an administrative, commercial, and service center. Its urban footprint is compact yet dense, reflecting both its historical importance and its contemporary growth as a regional city.

130. Administratively, the city is divided into 27 wards, which allow decentralized governance and more efficient delivery of municipal services. These wards serve as the basic planning and implementation units for local infrastructure development, community services, and regulatory oversight. Ward-level representation also facilitates citizen participation in local decision-making and service prioritization. With an estimated population of approximately 800,000 residents, the city exhibits significant demographic pressure on urban services and infrastructure. The city corporation manages around 52,600 holding tax units, indicating a relatively large stock of

¹⁷ Secondary information taken from the following websites: (i) <https://cocc.portal.gov.bd/> (for Cumilla City Corporation); (ii) <https://sadar.chandpur.gov.bd/> (for Chandpur Paurashava under Chandpur Sadar); (iii) <https://hajiganj.chandpur.gov.bd/> (for Hajiganj Paurashava under Hajiganj Upazila); and (iv) <https://laksam.comilla.gov.bd/> (for Laksam Paurashava under Laksam Upazila)

¹⁸ Information on demography, and status of water supply systems and sanitation is taken from the Situation Analysis Report for Cumilla Cluster Region. UIIPF Project (DPHE Component). April 2023.

residential, commercial, and institutional properties. This tax base is essential for financing municipal operations, maintenance, and development projects.

131. **Chandpur Paurashava.** Chandpur Paurashava is the sole municipality within Chandpur Sadar Upazila and functions as the primary administrative, commercial, and service center of Chandpur District. The upazila covers an area of approximately 308.78 km², within which the *Paurashava* represents the most urbanized and densely populated settlement. As the district headquarters area, Chandpur Paurashava hosts key government offices, health facilities, educational institutions, financial services, and markets that serve both municipal residents and surrounding rural unions.

132. Administratively, Chandpur Sadar Upazila is divided into 14 union parishads and one municipality, with Chandpur *Paurashava* acting as the focal point for governance, trade, education, and healthcare. The municipality therefore plays a strategic role in regional socio-economic development and service delivery within the lower Meghna basin region.

133. **Hajiganj Paurashava.** Hajiganj Paurashava is the sole municipal authority within Hajiganj Upazila of Chandpur District, operating as the primary urban, commercial, and service center for the surrounding rural unions. The upazila was formally established in 1983, while its administrative and policing functions date back to 1868, underscoring the area's long-standing governance and settlement importance. Hajiganj Paurashava plays a central role in providing urban services, markets, education, and healthcare facilities to both municipal residents and the surrounding rural population.

134. Geographically, Hajiganj is located within the lower Meghna floodplain system. The upazila is bounded by Kachua and Matlab South Upazilas and is characterized by flat low-lying terrain typical of central Bangladesh. This geographic setting strongly influences settlement patterns, livelihoods, transport connectivity, and exposure to seasonal flooding.

135. **Laksam Paurashava.** Laksam Paurashava is the principal urban municipality within Laksam Upazila of Cumilla District, functioning as a key administrative, commercial, and transport hub in the southeastern part of the district. Laksam Upazila covers an area of approximately 141.74 square kilometers and was constituted as an upazila in 1983, following its earlier status as a thana. The Paurashava represents the most urbanized settlement within this administrative unit and serves as the primary service center for surrounding rural areas.

136. A defining feature of Laksam Paurashava is the presence of one of the five major railway junctions in Bangladesh, which significantly elevates the municipality's strategic importance at both regional and national levels. This railway junction underpins Laksam's role in passenger movement, freight transport, commercial activity, and employment generation, shaping the overall socio-economic character of the town.

2. Population

137. **Cumilla City Corporation.** Cumilla City Corporation is the most populous and urbanized area in the Cumilla Cluster, with an estimated population of about 500,000 in 2022 residing across 27 wards within an area of approximately 53 km². It serves as the district's main administrative, commercial, and educational center, attracting steady in-migration from surrounding districts and rural areas. The population is predominantly working age, with a growing number of students and service sector workers, resulting in increasing household numbers and high population densities in central wards. This sustained population growth has significantly intensified demand for urban housing, water supply, sanitation, drainage, and transport infrastructure.

138. **Chandpur Paurashava.** Chandpur Paurashava has a population of around 203,000 in 2022, distributed over 15 wards in an area of about 30 km², making it the largest municipality in the cluster after Cumilla City Corporation. As a historic river port and commercial center located at the confluence of major rivers, Chandpur supports a diverse population engaged in trade, transport, fisheries, and services. Population density is higher in wards adjacent the rivers and commercial wards, while peripheral areas are less dense. Seasonal migration linked to flooding, river erosion, and livelihood patterns influences population dynamics and contributes to steadily rising demand for municipal services.

139. **Hajiganj Paurashava.** Hajiganj Paurashava is a medium-sized urban center with an estimated population of about 101,500 in 2021, living within 12 wards over an area of approximately 21.5 km². The town functions as a local commercial and service hub for surrounding rural areas, and population growth has been moderate but consistent. Settlement patterns are relatively compact in the town core, with lower densities toward the outskirts. The population largely comprises small traders, service workers, and daily laborers, and increasing population pressure is beginning to strain existing urban services and infrastructure.

140. **Laksam Paurashava.** Laksam Paurashava has a population of approximately 102,500 in 2022, spread across 9 wards within an area of about 19.4 km². As an important railway junction and local trading center, Laksam has experienced gradual population growth due to both natural increase and in-migration associated with transport-related and commercial employment. Population density is moderate, with higher concentrations near transport corridors and market areas. The town's semi-urban demographic profile, combined with limited municipal capacity, places increasing pressure on housing, water supply, sanitation, and environmental management systems.

3. Economic Structure

141. **Cumilla City Corporation.** Cumilla City Corporation has developed a strong commercial base supported by eight municipal markets, five shopping complexes, and 984 city-owned shops. These facilities provide organized commercial spaces for retail trade, small businesses, and service providers, contributing to employment generation and local economic vitality. Municipally owned commercial assets also serve as a stable source of revenue for the city corporation. Rental income from shops and market spaces helps fund routine municipal services such as waste management, road maintenance, and public lighting. The distribution of markets across the city supports accessibility for residents and reduces congestion in the central business areas.

142. Licensing functions are a key regulatory responsibility of the city corporation. The issuance of approximately 12,500 trade licenses indicates a relatively high degree of formal economic activity. In addition, around 1,000 rickshaw licenses have been issued, reflecting the importance of informal and local transit services in daily urban mobility and livelihoods for low-income groups.

143. **Chandpur Paurashava.** The economy of Chandpur Paurashava is dominated by trade, services, transport, fisheries marketing, education, healthcare, and small-scale enterprises. The municipality benefits from its strategic position along river transport routes, which facilitates fish trading, agricultural commerce, and inter-district movement of goods and people.

144. Employment within the municipality includes both formal employment in government offices, banks, hospitals, and educational institutions, as well as a large informal workforce engaged in retail trade, transport services, fish handling, and small businesses. This diversified livelihood base enhances economic resilience but also includes income and employment vulnerability for low-income groups.

145. **Hajiganj Paurashava.** The economy of Hajiganj Paurashava is characterized by a mixed structure combining agriculture-based activities, local commerce, small-scale industries, and remittance-supported household incomes. Agriculture remains an important economic base in the surrounding areas, with paddy, jute, and potato identified as the main agricultural resources. Livestock and poultry activities also contribute to local livelihoods, supported by broiler farms, cattle farms, fish seed production farms, and ponds dispersed across the upazila. Agricultural production is complemented by storage and distribution facilities, including food warehouses and access to local and regional markets.

146. At the urban level, Hajiganj Paurashava functions as a local trade and service center, supported by 28 markets, a relatively dense network of banks (22), post offices, transport links, and municipal services. The local economy includes two large industries, a jute mill, and more than 2,300 small cottage industries, which provide employment in manufacturing, processing, repair services, and informal production activities. Business and service sector employment is further supported by educational institutions, healthcare facilities, public administration, and transport-related services. In addition, remittances constitute a notable source of household income, enhancing local purchasing power and supporting small business growth. Overall, the economic structure of Hajiganj Paurashava reflects a semi-urban economy transitioning from agriculture-based livelihoods toward diversified trade, services, and small-scale industrial activities, typical of growing secondary towns in Bangladesh.

147. **Laksam Paurashava.** The socio-economic profile of Laksam Paurashava reflects a diverse livelihood base. Across the upazila, major income sources include agriculture (41.40%), trade (17.77%), employment in services (14.85%), transport and communication (5.11%), and rent and remittances (4.65%). Within the municipality, non-agricultural livelihoods such as trade, transport, services, and small industries are more dominant. A substantial portion of the municipal workforce is engaged in informal employment, including retail trade, transport services, railway-related activities, and small-scale manufacturing, contributing both to economic dynamism and income vulnerability.

4. General Economic Livelihood Condition

148. **Cumilla City Corporation.** Cumilla City Corporation has a diversified urban economy largely driven by commerce, trade, services, and small-scale enterprises, which provide the primary sources of livelihood for the city's residents. The city accommodates 8 public markets, five shopping complexes, and nearly 1,000 municipally owned shops, supporting wholesale and retail trade, food distribution, and daily consumer services. The issuance of more than 12,500 trade licenses indicates the prevalence of micro-, small-, and medium-sized enterprises, including retail shops, repair services, transport-related businesses, food establishments, and informal vendors. A significant proportion of the workforce is engaged in the informal sector, particularly in petty trade, rickshaw pulling, transport services, and casual labor, reflecting typical employment patterns in secondary cities in Bangladesh.

149. In addition to commerce, public services, education, health, and municipal administration contribute substantially to local employment in Cumilla City Corporation. The presence of universities, medical colleges, schools, hospitals, clinics, and government offices creates salaried employment opportunities for professionals, service staff, and support workers. Transport and connectivity infrastructure further enable livelihood activities, with road, rail, and bus services facilitating the movement of goods and labor within the city and with surrounding rural areas. While economic opportunities in city corporation are relatively diverse, livelihoods for low-income households remain vulnerable to market fluctuations, rising living costs, and infrastructure

constraints, underscoring the importance of urban development initiatives aimed at improving service delivery, market access, and employment resilience.

150. **Chandpur Paurashava.** Chandpur Paurashava is a major commercial center, with approximately 26 - 27 markets operating within the upazila, many of which are located within or directly linked to the municipality. The presence of 19 scheduled banks, post offices, and other financial institutions supports commercial activity, savings, remittance handling, and access to credit. These facilities serve not only municipal residents but also traders, farmers, and fisherfolk from surrounding unions, contributing to high daily foot traffic and economic activity within the municipal area.

151. Fisheries constitute a major socio-economic sector closely linked to Chandpur Paurashava. Chandpur Sadar Upazila includes 41 fishing villages, approximately 14,000 fishermen, 39 fishermen's cooperative societies, and multiple fish landing centers, ice mills, and storage facilities. The upazila records annual fish demand of about 6,230 metric tons, with production exceeding demand, resulting in a surplus. Much of the processing, trading, storage, and transport of fish occurs in or through Chandpur Paurashava, reinforcing the municipality's role as a regional fisheries trade hub.

152. While Chandpur Paurashava itself is urban, it is functionally integrated with surrounding agricultural areas. Chandpur Sadar has nearly 12,000 hectares of net cropland, with a high cropping intensity of around 216%, indicating intensive land use and agricultural productivity. Agricultural produce from surrounding unions is marketed and distributed through urban markets within the Paurashava, supporting food security and trade-based livelihoods. The municipality therefore plays a critical intermediary role between rural production and regional consumption systems.

153. **Hajiganj Paurashava.** The general livelihood conditions in Hajiganj Paurashava reflect a semi-urban socio-economic setting, where households rely on a combination of agriculture, small scale business, wage labor, services, and remittance income. While the Paurashava functions as a local urban center, a significant proportion of residents maintain strong economic linkages with surrounding rural areas. Agricultural livelihoods remain important, particularly crop cultivation (paddy, jute, and potatoes), livestock rearing, poultry farming, and fisheries, supported by the presence of ponds, agricultural lands, and related services. These activities provide both direct employment and supplementary income, especially for lower- and middle-income households.

154. Within the urban core, livelihoods are increasingly diversified, with many residents engaged in retail trade, transport services, small and cottage industries, informal labor, and service sector employment. The presence of numerous markets, financial institutions, educational facilities, healthcare services, and small industrial units supports business- and service-oriented employment opportunities. At the same time, remittances from migrant workers play a noticeable role in household income for some families, contributing to improved living standards, housing conditions, and local consumption. Despite this diversification, a segment of the population, particularly daily wage laborers, small traders, and informal workers, which remains economically vulnerable to seasonal fluctuations, price volatility, and limited social protection, which is characteristic of growing *Paurashavas* in Bangladesh.

155. **Laksam Paurashava.** Although Laksam Paurashava is urban, it remains closely connected to surrounding agricultural areas. Major crops within the upazila include rice, potatoes, wheat, mustard, and vegetables, while traditional jute cultivation has become nearly extinct. The municipality functions as a key collection, processing, and marketing point for agricultural produce

from surrounding unions. This rural-urban linkage underscores the role of Laksam Paurashava in local food supply chains and agricultural commercialization.

156. Fisheries and livestock activities form an important component of the broader upazila economy, with 402 fisheries, 28 poultry farms, 6 hatcheries, and 4 artificial breeding centers recorded. While most production activities occur outside the municipal boundary, fish marketing, input supply, and service support are often concentrated within the Paurashava. These activities contribute to employment, nutrition, and income generation, particularly for low- and middle-income households linked to peri-urban and rural areas.

157. Industrial activity within and around Laksam Paurashava is primarily small- to medium-scale and includes rice mills, oil mills, cigarette factories, and bidi factories. These industries are closely linked to local agricultural production and transport networks and provide employment opportunities for semi-skilled and unskilled labor. Commercial activities are concentrated around markets, transport hubs, and major roads, reinforcing the municipality's role as a regional trading center.

5. Literacy and Educational Infrastructure

158. **Cumilla City Corporation.** Cumilla City Corporation has a strong educational base, hosting a wide range of institutions that serve both the city and surrounding districts. These include one public university, three private universities, one public medical college, and four private medical colleges, establishing the city as a regional education hub. The city also accommodates public and private colleges, cadet college, art college, law college, homoeopathic medical college, polytechnic institutes, and engineering survey institutes. This diversity supports vocational, professional, and academic education pathways.

159. At the primary and secondary levels, the presence of 55 government primary schools, around 150 kindergartens, and numerous government and nongovernment high schools ensures broad access to basic education. Teacher training colleges further support educational quality and workforce development within the city.

160. **Chandpur Paurashava.** Educational attainment within Chandpur Paurashava is relatively higher than in surrounding rural unions. While the overall literacy rate in Chandpur Sadar Upazila is approximately 56-57%, the literacy rate within the municipality is significantly higher at around 68%, reflecting better access to educational facilities and services.

161. The upazila hosts 170 government primary schools, government and private secondary schools, registered private primary schools, kindergartens, madrasas (Ebtedayi, secondary, and higher levels), and colleges. Many of these institutions are concentrated within or adjacent to Chandpur Paurashava, reinforcing its role as an educational hub for the district.

162. **Hajiganj Paurashava.** Education infrastructure in Hajiganj is relatively well developed for a secondary level urban center. The upazila has an overall literacy rate of 60.06%, supported by 157 government primary schools, 33 high schools, and numerous kindergartens. Within and around Hajiganj Paurashava, secondary and tertiary institutions serve both municipal residents and surrounding rural communities.

163. Notable institutions include Hajiganj Degree College, Hajiganj Model University College, Hajiganj Ahmediya Kamil Madrasa, and girls' and co-educational pilot schools. The presence of teacher training institutes, madrasas at Dakhil, Alim, Fazil, and Kamil levels, and a children's

academy contributes to human capital development and workforce readiness within the municipality.

164. **Laksam Paurashava.** Laksam Paurashava exhibits a relatively high literacy rate of approximately 73.30%, with male literacy at 73.72% and female literacy at 72.94%, indicating comparatively balanced educational attainment between genders. This literacy rate is higher than national averages and reflects strong access to educational facilities within the upazila and municipality.

165. Educational infrastructure includes multiple colleges, a technical college, 19 secondary schools, 76 primary schools, and several madrasas offering Dakhil, Alim, Fazil, and Kamil education. Prominent institutions such as Nawab Faizunnesa Government College and Laksam Pilot High School are in or near the Paurashava, reinforcing its role as an education center serving a wider catchment area.

6. Water Supply System

166. **Cumilla City Corporation.** The water supply system in Cumilla City Corporation is predominantly groundwater-based, with no operational surface water source. Public water supply is provided through 18 active deep tubewells, complemented by a groundwater treatment plant (GWTP) constructed in 2021 with a nominal capacity of about 350 m³/hour. The GWTP receives water from two production tubewells and conveys treated water directly into the existing distribution network without intermediate storage. While the city has six overhead tanks, overall service coverage remains very limited, with piped water connections reaching only about 7-8% of taxable households. As a result, most residents depend on privately owned tubewells, resulting in high abstraction pressure on groundwater resources.

167. Operationally, water supply is intermittent, typically limited to several hours per day, with low pressure at consumer ends in many areas. Although groundwater quality tests of raw water generally show acceptable levels for arsenic, iron, and manganese, routine monitoring of treated water quality is not consistently practiced, and disinfection at treatment facilities is limited. The distribution network is aging, with sections showing leakage, corrosion, and hydraulic inefficiencies, contributing to non-revenue water. Overall, the system faces challenges related to low coverage, aging infrastructure, weak water quality surveillance, and the long-term sustainability of groundwater-only supply, particularly considering projected population growth.

168. **Chandpur Paurashava.** Chandpur Paurashava has the most advanced and diversified water supply system within the Cumilla Cluster, operating a hybrid system that combines surface water and groundwater sources. The town is served by four surface water treatment plants (SWTPs) abstracting raw water from the Dakatia River, along with one iron removal plant (IRP) that treats groundwater from selected deep tubewells. Additionally, deep tubewells supply water directly into the network without treatment. The system is supported by three operational overhead tanks, which provide limited pressure stabilization and storage. Piped water supply coverage is relatively higher than in other cluster towns, reaching approximately 46% of households, while about 10% of the population relies on public standposts for water access.

169. Despite having substantial treatment capacity, Chandpur's system exhibits significant operational and distribution challenges. Water quality monitoring indicates that while treated water at plant outlets generally meets standards, fecal coliform contamination occurs at consumer points, highlighting problems with pipe integrity, intermittent supply, and intrusion risks. Hydraulic analysis and pressure testing reveal high head losses, frequent leaks, and structurally weakened pipes, particularly in older sections of the distribution network. As demand increases, the system's

ability to maintain adequate pressure and continuous supply is constrained unless extensive network rehabilitation and leakage control are undertaken. While Chandpur is better positioned than the other towns, system inefficiencies, aging infrastructure, and distribution losses continue to limit service reliability and safety.

170. **Hajiganj Paurashava.** Hajiganj Paurashava operates a combined groundwater and surface water supply system, with notable recent investments in surface water infrastructure. A surface water treatment plant (SWTP) drawing from the Dakatia River became operational in 2021 and supplies treated water for about 12 hours per day. This system operates alongside five active deep tubewells, while several older tubewells have been abandoned due to age or mechanical failure. Both treated surface water and untreated groundwater are mixed within the same distribution network, which does not include any overhead tanks. Piped water connections cover only about 18% of households, and 85 public standposts provide free water access to portions of the population.

171. Although the SWTP itself is relatively new and structurally sound, system management and water quality controls remain weak. Disinfection at the treatment plant is not consistently practiced, and there is no regular program for monitoring raw or treated water quality. The lack of storage facilities results in intermittent, demand-driven supply with limited pressure regulation, increasing the risk of contamination and service inequities. Groundwater continues to play a substantial role in meeting demand, raising concerns about sustainability as service coverage expands. Overall, Hajiganj's water supply system remains inadequate in scale, weak in operational controls, and constrained by the absence of storage and network segmentation, despite recent progress in source diversification.

172. **Laksam Paurashava.** Laksam Paurashava's water supply system is currently almost entirely dependent on groundwater, supplied through six operational deep tubewells, with additional tubewells constructed under recent investment programs. A groundwater treatment plant (GWTP) with a design capacity of about 180 m³/hour was completed in 2021, and the associated treatment units and production wells are physically in place. However, the system remains non-operational because the overhead tank required for distribution and pressure management is still under construction. As a result, untreated groundwater continues to be distributed directly into the network. Piped water supply coverage is very low, estimated at below 10% of households, with heavy reliance on private tubewells and limited public standposts.

173. Water quality testing of production tubewells indicates elevated concentrations of iron, manganese, and barium in several wells, underscoring the urgency of commissioning the treatment plant. Distribution infrastructure is limited to an extent and does not provide adequate redundancy or pressure stability. Operational capacity within the Paurashava is constrained by limited technical oversight and the absence of systematic water quality monitoring for supplied water. Until the overhead tank is completed and the GWTP becomes operational, Laksam's system will remain structurally incomplete and unable to deliver safe, treated water on a reliable basis, posing both public health and sustainability challenges.

7. Drainage System and Water Management

174. **Cumilla City Corporation.** Cumilla City Corporation operates an urban drainage network totaling approximately 200.5 kilometers, designed to manage stormwater runoff and reduce waterlogging. The system includes 95.5 km of pucca drains, which are structurally built and more durable, as well as 105 km of earthen drains, commonly found in peripheral or less developed areas.

175. In addition to drains, the city maintains 24 kilometers of canals, which serve as natural and engineered waterways for stormwater conveyance. These canals play a critical role during the monsoon season by diverting excess water and reducing flood risks in low-lying neighborhoods.

176. Despite the extensive drainage infrastructure, the mix of pucca and earthen systems suggests varying levels of performance and maintenance needs. Sedimentation, encroachment, and solid waste disposal into drains and canals remain ongoing challenges requiring regular cleaning and enforcement by the city authority.

177. **Chandpur Paurashava.** Chandpur Paurashava is in a low-lying riverine environment, influenced primarily by the Meghna and Dakatia Rivers, which significantly shape its surface water drainage characteristics. The municipal area and surrounding upazila contain an extensive natural drainage network comprising rivers, canals, ponds, and low-lying floodplains, which facilitate the conveyance of stormwater during the monsoon season. Within Chandpur Sadar, at least 10 canals with a total area of approximately 195 hectares and more than 9,500 ponds serve as natural storage and drainage features. While these water bodies provide effective outfall pathways during normal rainfall conditions, their capacity can be constrained during peak monsoon periods due to high river water levels, leading to periodic waterlogging in low-elevation residential and commercial areas.

178. Water management in Chandpur Paurashava is closely linked to its hydrological setting and dependence on surface water systems. The proximity of the Meghna River supports fisheries, domestic water uses, and seasonal livelihoods, while ponds and canals play a dual role in stormwater retention and localized water supply, particularly for non-potable uses. However, increasing urbanization, infilling natural drainage channels, and inadequate maintenance of canals may reduce drainage efficiency and exacerbate localized flooding risks. Effective water management in the Paurashava therefore requires regular desilting of canals, protection of existing ponds and lowlands, and integration of drainage planning with river water-level dynamics, particularly under climate-induced variability in rainfall and flood regimes.

179. **Hajiganj Paurashava.** Drinking water supply in Hajiganj Paurashava relies primarily on groundwater extracted through approximately 4,571 tube wells. These wells serve household, institutional, and commercial water needs. In addition, the upazila contains 948 ponds, which are used for domestic purposes, aquaculture, irrigation, and sometimes bathing, particularly in areas with limited piped infrastructure.

180. While groundwater availability is relatively widespread, reliance on shallow tube wells and surface water sources implies potential seasonal variability and water quality concerns. Sanitation infrastructure includes household latrines and public facilities, though waste and wastewater management challenges remain common in dense urban neighborhoods, particularly during monsoon periods.

181. **Laksam Paurashava.** Laksam Paurashava is influenced by several important water bodies within the upazila, including the Dakatia River, Choto Feni River, and the notable Karjan Canal. These water bodies support drainage, fisheries, and livelihood activities, while also interacting closely with urban settlement patterns. The proximity of these rivers and canals to urban areas increases sensitivity to water quality issues, flooding, and drainage congestion. Effective management of these environmental features is essential for maintaining public health and urban resilience.

8. Sanitation

182. **Cumilla City Corporation.** Sanitation services in Cumilla City Corporation are largely limited to on-site household sanitation systems, mainly septic tanks and pit latrines, with no centralized sewerage or wastewater treatment system. Households are responsible for desludging their own containment systems, typically using private vacuum trucks or informal service providers, and there is no city-wide, regulated fecal sludge treatment facility in regular operation. As a result, the management of fecal sludge is fragmented and only partially controlled, with risks of unsafe disposal into open drains, low-lying areas, or nearby water bodies.

183. Municipal involvement in sanitation is mainly confined to street cleaning and solid waste management, with relatively high cleanliness coverage in core urban areas but limited integration with drainage and wastewater management. There are no clearly defined service standards, monitoring mechanisms, or performance benchmarks for sanitation services, and water quality surveillance linked to sanitation impacts is weak. Overall, Cumilla City Corporation faces major challenges in transitioning from on-site sanitation toward a more city-wide FSM framework, alongside improving regulation, environmental safeguards, and institutional capacity.

184. **Chandpur Paurashava.** Chandpur Paurashava also relies predominantly on on-site sanitation systems, with septic tanks and pit latrines serving almost all households. There is no sewer network or wastewater treatment plant, and fecal sludge is managed mainly through manual emptying and limited mechanical desludging, often without proper treatment or controlled disposal. Given Chandpur's proximity to major rivers, this practice creates heightened environmental and public health risks, particularly from potential discharge of untreated sludge into the river system.

185. The Paurashava undertakes street cleaning and limited solid waste services, but these activities are not systematically linked to sanitation or drainage management. Institutional arrangements for sanitation are fragmented, with no dedicated sanitation or FSM unit and inadequate record-keeping on desludging practices. While water supply infrastructure is relatively more developed in Chandpur, sanitation services remain lagging and uneven, and the absence of treatment facilities and formal FSM arrangements represents a critical gap in overall urban environmental management.

186. **Hajiganj Paurashava.** In Hajiganj Paurashava, sanitation conditions are characterized by near total dependence on household level containment systems, primarily pit latrines and septic tanks. There is no sewerage network, wastewater conveyance system, or fecal sludge treatment facility. Desludging is infrequent and mostly carried out through informal or household-arranged services, often without adherence to safe disposal practices. This situation increases the likelihood of soil, surface water, and drainage contamination, especially during the monsoon season.

187. Municipal sanitation activities are limited to basic street cleaning and solid waste handling, with modest coverage relative to the town area. Sanitation planning, monitoring, and regulation remain weak, and there is no defined FSM service chain covering emptying, transport, treatment, and disposal. Given the town's growing population and expanding water supply services, Hajiganj faces increasing risks of sanitation-related environmental degradation unless structured FSM interventions and institutional strengthening are introduced.

188. **Laksam Paurashava.** Sanitation in Laksam Paurashava is similarly dominated by on-site sanitation facilities, with households relying on pit latrines or septic tanks. The Paurashava does not have a sewer system, wastewater treatment facilities, or a designated fecal sludge treatment

site. Emptying services are limited, irregular, and largely informal, and sludge is often disposed of without adequate environmental protection measures. This is of particular concern given the town's reliance on groundwater for water supply.

189. Municipal sanitation services focus primarily on street cleaning, with relatively low overall coverage and minimal linkage to drainage or public health outcomes. There are no formal service benchmarks, sanitation databases, or routine monitoring systems in place. Until comprehensive FSM infrastructure, regulatory mechanisms, and institutional arrangements are established, sanitation in Laksam is expected to remain insufficient to protect public health and environmental quality, especially as urban density increases.

9. Solid Waste Management

190. Solid waste management across Cumilla City Corporation, Chandpur Paurashava, Hajiganj Paurashava, and Laksam Paurashava are generally municipality-led but remains basic, limited, and environmentally inadequate, with notable differences in coverage and operational capacity. Cumilla City Corporation and Chandpur Paurashava have comparatively better systems, characterized by regular street sweeping and more established primary collection in core urban areas, while Hajiganj and Laksam exhibit lower collection coverage and heavier reliance on informal disposal practices. Across all four towns, house-to-house collection is uneven, declining significantly in peripheral and newly developed areas, and waste is predominantly collected manually with minimal logistical or technical support.

191. Disposal practices represent the most significant common challenge, as all four towns rely on open or semi-controlled dumping sites without engineered landfill facilities, leachate management, or environmental safeguards. There is no systematic segregation at source, recycling, composting, or treatment of organic waste, and solid waste systems are weakly integrated with drainage, sanitation, and environmental health management. Institutional capacity constraints limited financial resources, and the absence of clear service benchmarks or long-term SWM planning further undermine system performance. As urban populations and commercial activities continue to grow across the Cumilla Cluster, these limitations pose increasing risks to public health, drainage performance, and environmental quality, reinforcing the need for expanded collection coverage, environmentally sound disposal solutions, and a transition toward more sustainable and integrated solid waste management systems across all four towns.

10. Public Health Services

192. **Cumilla City Corporation.** Public health and sanitation are key service areas for Cumilla City Corporation, particularly given its dense population. The city operates 16 public toilets and facilitates access to improved sanitation through 23,802 sanitary latrines, reflecting significant investment in household and community sanitation coverage.

193. Cumilla City also supports public health services through 10 permanent and 14 temporary Expanded Programme on Immunization centers, ensuring immunization coverage. Healthcare infrastructure includes two hospitals, one tuberculosis clinic, two maternity clinics, one diabetic hospital, and 59 private clinics, providing a mix of public and private healthcare services to residents.

194. **Chandpur Paurashava.** Chandpur Paurashava and its surrounding areas are served by a comparatively well-established healthcare system. Facilities include one government hospital, one Upazila Health Complex, one chest hospital, one charity hospital, and 44 community clinics distributed across the upazila.

195. In addition, there are 14 family welfare centers and specialized maternal health facilities, which provide primary healthcare, maternal and child health services, and disease prevention. The concentration of health institutions within the municipal area improves service accessibility but also contributes to daily population inflows from surrounding unions.

196. **Hajiganj Paurashava.** Healthcare services in Hajiganj Paurashava and its catchment area are centered on a 50-bed Upazila Health Complex, supported by three union health centers, ten union health and family welfare centers, and 15 diagnostic facilities. These public facilities are complemented by private clinics and pharmacies within the municipal area, providing primary and secondary healthcare access to residents.

197. Family planning and maternal health services are supported by two family planning clinics, while emergency and disaster response capacity is enhanced by a fire service station and shelters. Social welfare infrastructure includes seven orphanages, women's organizations, and NGO operations, reflecting the presence of structured community support mechanisms within the upazila.

198. **Laksam Paurashava.** The 50-bed Upazila Health Complex is the main health care facility in Laksam providing affordable, subsidized primary and secondary medical treatments to the people of Paurashava and rural areas. The health care system also supplemented by multiple maternal care centers, private hospitals and diagnostic centers.

11. Road Network and Transportation Infrastructure

199. **Cumilla City Corporation.** Cumilla City Corporation manages an extensive road network totaling 482 kilometers, which forms the backbone of urban mobility and economic connectivity. This network accommodates motorized and non-motorized transport, freight movement, and public transportation services within the city.

200. The road system is composed of multiple surface types, including 197 km of bituminous roads, 60 km of cement concrete roads, and 16 km of reinforced cement concrete roads, which typically support higher traffic volumes. In addition, 55 km of brick flat soling roads and 154 km of earthen roads serve peri-urban and lower traffic areas, highlighting variations in infrastructure quality across the city.

201. Supporting structures such as 279 culverts, six major road intersections, two bridges, and 24 km of footpaths enhance connectivity and pedestrian safety. Together, these assets enable the functioning of commercial activities, access to services, and emergency response, while also posing ongoing maintenance and upgrading challenges for the city authority.

202. **Chandpur Paurashava.** Chandpur Paurashava benefits from strong multimodal connectivity, including road networks linking all unions, river transport along the Meghna system, and proximity to regional transport corridors. The municipality functions as an important node for passenger movement, agricultural marketing, and fisheries logistics.

203. Despite this connectivity, high traffic volumes, informal transport operations, seasonal flooding, and drainage constraints create challenges related to congestion, road condition deterioration, and pedestrian safety within the urban area.

204. **Hajiganj Paurashava.** Hajiganj Paurashava is well connected to the wider district through a multimodal transport network. The area is served by two railway stations, linking it to Chandpur

and regional markets. Inland waterways totaling approximately 20 km also provide seasonal transport and goods movement flexibility.

205. Road infrastructure includes paved and unpaved roads, with approximately 410 bridges and culverts facilitating access across canals and low-lying terrain. This network supports daily commuting, agricultural marketing, and municipal service delivery, although drainage congestion and road condition deterioration are recurring issues during the monsoon season.

206. **Laksam Paurashava.** Transport connectivity is a defining feature of Laksam Paurashava. The upazila contains approximately 685 km of paved roads, 380 km of unpaved roads, and 72 km of railway, with the Laksam Railway Junction serving as a national level transport node. This connectivity supports passenger movement, freight transport, and economic integration with other regions of Bangladesh.

207. The high volume of transport contributes significantly to local economic vitality but also creates challenges related to congestion, safety, noise, and infrastructure maintenance within dense urban areas.

12. Cultural, Religious, and Recreational Facilities

208. **Cumilla City Corporation.** Cumilla City Corporation reflects Bangladesh's cultural and religious diversity through its numerous religious institutions. These include 165 mosques, seven temples, three Eidgah's, two churches, two Buddhist temples, and several graveyards and burning ghats, serving the spiritual needs of different communities.

209. Social welfare facilities such as orphanages also contribute to the city's social support system. These institutions play an important role in caring for vulnerable groups and strengthening community resilience.

210. Recreational facilities within the city include parks, a zoo, a cinema hall, a stadium, an auditorium, and a gymnasium, providing spaces for leisure, sports, and cultural events. These amenities enhance the quality of urban life and contribute to physical and mental well-being.

211. **Chandpur Paurashava.** The municipality hosts numerous religious, social, and community institutions, including mosques, madrasas, temples, NGOs, clubs, and community organizations. These institutions form the backbone of social cohesion, cultural identity, and informal governance within urban neighborhoods. Higher literacy rates and access to institutional services contribute to relatively strong civic engagement within Chandpur Paurashava compared to more rural parts of the upazila.

212. **Hajiganj Paurasahva.** Hajiganj Paurasahva reflects a culturally rich and religiously diverse social environment. The upazila contains 520 mosques, 35 temples, 18 shrines, and other religious institutions that serve as focal points for community interaction and social organization. These facilities play important roles in cultural identity, conflict mediation, and social cohesion.

213. Community recreation is supported by 23 playgrounds, 73 clubs, a cinema hall, and a theater, providing space for sports, cultural events, and youth engagement. Libraries, NGOs, and social organizations further contribute to civic life and community development within the municipality.

214. **Laksam Paurashava.** Laksam Paurashava and its surrounding areas contain a rich array of cultural and historical assets, including 962 mosques, 18 temples, 7 tombs, monasteries, and Buddhist institutions.

13. Cultural Heritage Sites

215. **Cumilla City Corporation.** Cumilla City Corporation benefits from strong transportation and communication connectivity, including two railway stations and six bus stations, which link the city to regional and national transport networks. Communication services are supported by post offices, general post office (GPO), and BTCL facilities.

216. The city is also rich in historical, cultural, and natural heritage. Notable sites include Dharmashagor Dighi, Shalban Bihar, Mainamati Museum, BARD at Kotbari, the Gomati Riverbank, and several heritage structures associated with the Tripura Maharajas and renowned cultural figures. These sites contribute to tourism, education, and cultural identity.

217. **Hajiganj Paurashava.** Hajiganj Upazila hosts numerous culturally and historically significant sites that lie within or near the municipal boundary. These include the Hajiganj Historical Big Mosque, Hazrat Madakhan (R.A.) Mosque, Alipur Shahi Jame Mosque, and the Muktijoddha Smritisoudha, which commemorates the Liberation War. Additional heritage features include ancient bridges, traditional residential structures, and historic dighis (ponds).

218. These heritage assets contribute to local identity and collective memory and represent important considerations for urban development planning and infrastructure projects within Hajiganj *Paurashava*.

219. **Laksam Paurashava.** The municipality is a host to Liberation War memorials and mass graves, commemorating events from 1971. These sites hold significant historical and cultural value and are integral to local identity and collective memory. Notable heritage structures include Qazir Mosque, Nawab Bari Mosque, Arfannesa Mosque, Jagannath Dighi, and historic zamindar residences.

220. **Chandpur Paurashava.** Chandpur is renowned for its vibrant riverine traditions where the majestic river Padma and Meghna meet. A striking sculpture, named as Angikar Liberation War Monument, situated in the heart of the city (near the sadar area), serving as a memorial of the martyrs of 1971 Liberation War of Bangladesh. Shahebganj Neelkuthi exists as a historical remnant of the British colonial era depicting a glimpse of the indigo cultivation history of the region. A Kalibari Mandir which is historic Hindu temple built around 1878 is still standing as a testament to the region's long-standing religious and architectural heritage.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

221. ADB SPS, 2009 requires that all subproject activities need to be carefully assessed and considered to avoid and/or minimize negative social, religious, and cultural, and environmental impacts.

222. The assessment of anticipated impacts has been undertaken using: (i) preliminary engineering information for the Cumilla Cluster subproject; (ii) field observations and stakeholder consultations conducted during IEE preparation; (iii) baseline environmental monitoring results for air, noise, groundwater, and surface water; (iv) secondary data from government and development partner sources relevant to Cumilla, Chandpur, Hajiganj, and Laksam; and (v) good international industry practice, including ADB SPS 2009 and the World Bank Group Environmental, Health, and Safety Guidelines. The Bangladesh Climate and Disaster Risk Atlas identified Bangladesh as a highly climate and disaster exposed deltaic country, with frequent flooding, river erosion, cyclones, drought, salinity intrusion, and earthquake risks relevant to infrastructure planning. These risks are directly relevant to the Cumilla Cluster because Chandpur and Hajiganj are within the lower Meghna-Dakatia riverine setting, while Cumilla and Laksam are exposed to urban flooding, drainage congestion, and groundwater-quality concerns. Therefore, the impact assessment applies a precautionary approach and requires that the final detailed design, EMP, SEMP, and O&M manuals incorporate climate resilience, source protection, water-quality assurance, construction safety, and emergency-response measures.

A. Impacts Rating System

223. The approach for the environmental assessment of this subproject involved the following steps:

- (i) Review of baseline information on the subproject area and site location;
- (ii) Initial environmental screening using ADB's Rapid Environmental Assessment (REA) checklist (Appendix 1);
- (iii) Consultation with the design team on the proposed infrastructure design and plan;
- (iv) Site visits and consultation with project staff; and
- (v) Discussions with DPHE, community people and other stakeholders.

224. Several criteria were used for assessment. These include:

- (i) Type/nature of activities proposed;
- (ii) Subproject footprint/spatial scale of the proposed infrastructure work/magnitude of impact;
- (iii) Likelihood of the impacts from occurrence;
- (iv) Existing baseline conditions at the subproject site and within the subproject zone of influence, which in this case is up to 200 m;
- (v) Duration of the proposed activities and period of impact (short, medium, or long term); and
- (vi) Requirements for compliance with national acts, rules and regulations and compliance with ADB policies.

Table 36: Likelihood of Impacts from Occurrence

Likelihood	Definition
Certain	Occurs under typical operating or construction conditions.
Likely	Occurs under worst case (negative impact) or best case (positive impact) operating conditions.
Occasional	Occurs under abnormal, exceptional or emergency conditions.
Unlikely	Unlikely to occur.

Source: ADB training module on prediction of impacts and development of site specific EMPs. 2018.

Table 37: Parameters for Determining Magnitude

Parameter	Major	Medium/ Moderate	Minor	Negligible
Duration of potential impact	Long term (more than 15 years)	Medium Term Lifespan of the subproject (5 to 15 years)	Limited to construction period	Temporary with no detectable potential impact
Spatial extent of potential impact	Widespread far beyond subproject boundaries	Beyond immediate subproject components, site boundaries or local area	Within subproject boundary	Specific location within subproject component or site boundaries with no detectable potential impact
Reversibility of potential impact	Potential impact is effectively permanent, requiring considerable intervention to return to baseline	Baseline requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal requirements	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential impacts occurring	Certain	Likely	Occasional	Unlikely

Source: ADB training module on prediction of impacts and development of site specific EMPs. 2018.

225. Sensitivity of Receptor. The sensitivity of a receptor has been determined based on review of the population (including proximity/numbers/vulnerability) and presence of features on the site or the surrounding area. Each detailed assessment has defined sensitivity in relation to the topic. Criteria for determining receptor sensitivity of the subproject's potential impacts are outlined in the following table.

Table 38: Parameters for Determining Sensitivity

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

Source: ADB training module on prediction of impacts and development of site specific EMPs. 2018.

226. **Assigning Significance.** Following the determination of impact magnitude and sensitivity of the receiving environment or potential receptors, the significance of each potential impact has been established using the impact significance matrix shown below in the table.

Table 39: Significance of Impact Criteria

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

Source: ADB training module on prediction of impacts and development of site specific EMPs. 2018.

B. Summary of Impacts Rating for the Subproject

227. The subproject's potential impacts on the key environmental parameters have been assessed and their significance determined using the methodology described above. A summary of the potential impacts of the subproject on the key environmental parameters and significance of these impacts is presented in the following table.

228. Residual impact ratings are contingent on full implementation of the EMP, SEMP, sub-plans, monitoring requirements, and corrective action procedures. Where mitigation effectiveness depends on detailed design or contractor performance, the residual rating shall be treated as provisional and shall be reviewed during detailed design, SEMP approval, and semi-annual environmental monitoring. A residual rating of "negligible" shall not be assigned unless the mitigation measure fully removes the pathway of impact and monitoring confirms compliance.

Table 40: Summary of Rating of Potential Impacts

Activity/ Impact	Duration of Impact	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Prior to Mitigation	Significance after Mitigation
Design and Pre-Construction phase								
Impact due to natural hazards and disasters such as earthquakes, including climate change	Long term	Local	Yes	Likely ^a	Medium	Mild	Moderate	Negligible
Impact due to sustainability – raw water availability	Long term	Local	Yes	Likely	Medium	Mild	Moderate	Negligible
Impact due to sustainability – raw water quality	Long term	Local	Yes	Certain	Major	Severe	High	Low ^b
Impact due to competing use of water	Long term	Local	Yes	Likely	Medium	Mild	Moderate	Negligible
Land subsidence	Long term	Local	Yes	Likely	Medium	Mild	Moderate	Negligible
Salinization / Salt water intrusion	Long term	Local	Yes	Likely	Medium	Mild	Moderate	Negligible
Impacts due to disruption of existing utilities and services	Short term	Local	Yes	Likely	Minor	Mild	Moderate	Negligible
Impact due to lack of spoil disposal sites	Short term	Local	Yes	Likely	Minor	Mild	Low	Negligible
Impact due to likely presence of asbestos cement pipes in existing pipelines	Long term	Local	Yes	Likely	Minor	Mild	Moderate	Negligible
Tree Removal	Long term	Local	No	Unlikely	Minor	Mild	Negligible	Negligible
Impact on Physical Cultural Resources (internationally protected and other locally protected cultural heritage sites)	Long term	Universal	No	Unlikely	Minor	Mild	Low	Negligible
Approval of Consents, Permits and Clearances	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Compliance with ADB Loan Agreement and SPS	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impacts due to contractor mobilization	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Impacts due to construction camps or workers' accommodation	Short term	Local	Yes	Likely	Minor	Mild	Low	Negligible
Construction/Post-Construction Phase								
Sources of Materials	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impact to topography and aesthetics	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible

Activity/ Impact	Duration of Impact	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Prior to Mitigation	Significance after Mitigation
Impact to surface water quality and aquatic life	Long term	Local	Yes	Likely	Medium	Moderate	Moderate	Moderate ^c
Impact to groundwater quality	Short term	Local	Yes	Certain	Minor	Mild	Moderate	Low ^d
Impact to ambient air quality	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impact to noise and vibration level	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impact to community health and safety	Short term	Local	Yes	Certain	High	Moderate	High	Moderate ^e
Impact to occupational health and safety	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Impact to physical cultural resources and other cultural heritage structures	Long term	Universal	No	Unlikely	Minor	Mild	Low	Negligible
Impact on local festivals and cultural practices	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Impact on ecologically sensitive areas (critical habitat, wetlands, etc.)	Long term	Local	Yes	Unlikely	Medium	High	Moderate	Low ^f
Impact on endangered species	Long term	Local	Yes	Unlikely	Negligible	Low	Negligible	Negligible
Post-construction Waste Management, Disposal and Site Restoration	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Cumulative construction impacts from 1,080 km network	Short term	Local	Yes	Certain	High	Moderate	High	Moderate ^g
Operation Phase								
Maintenance and operation of the distribution network and sanitation facilities (Public Toilet)	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
SWTP sludge/backwash discharge	Long Term	Local	Yes	Likely	Medium	Mild	Moderate	Low ^h
Sanitation facilities and FSM	Long Term	Local	Yes	Likely	Medium	Mild	Moderate	Low ⁱ
Disaster and natural hazards	Long term	Local	Yes	Likely ^a	Medium	Mild	Moderate	Negligible
Community and occupational health and safety	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Socio-economic status/livelihood	Long term	Local	Yes	Certain	Medium	Mild	Positive	Positive

^a Natural hazards/extreme events are likely to occur, but not predictable as to when these will occur.

^b The rating of "Low" assumes that the approved design ensures compliance of the treated water with the National Drinking Water Quality Standards.

^c Residual risk remains because Dakatia and Meghna-Dakatia systems show high BOD, turbidity, and microbial contamination during dry season.

^d Residual risk remains due to iron, manganese, arsenic, and microbial contamination.

^e Residual risk remains unless stop-work triggers and incident reporting are enforced.

^f Residual depends on avoidance of riverbank works during sensitive periods and no untreated discharge.

^g Residual impacts remain due to traffic, access, dust, noise, and social disruption across multiple workfronts.

^h Residual depends on installation of sludge/backwash management facilities.

ⁱ Residual depends on safe siting, pit design, desludging, and final disposal/treatment arrangements.

C. Environmental Audit of Existing Facilities

229. In compliance with ADB SPS requirement, an environmental audit on the existing facilities relative to the scope of the subproject (Cumilla Cluster) was undertaken. The environmental audit evaluates current system performance, environmental compliance, and operational risks across the existing water supply facilities in Cumilla City Corporation, Chandpur, Hajiganj, and Laksam. The findings show that the systems are largely dependent on groundwater abstraction, with aging infrastructure, intermittent service, and limited treatment practices. These conditions likely contribute to declining aquifer sustainability, water quality concerns (including iron, manganese, and arsenic contamination), and weak environmental safeguards such as lack of source protection and inadequate monitoring.

230. Key environmental performance issues and risks identified include the following:

- (i) Unsustainable groundwater use leading to aquifer depletion, reduced surface water flows, and potential land subsidence;
- (ii) Water quality risks due to contamination and insufficient treatment processes, posing public health concerns;
- (iii) Inefficient infrastructure with high leakage, non-revenue water, and excessive energy consumption;
- (iv) Weak environmental management practices, including poor chemical handling, lack of monitoring, and inadequate wastewater/residual disposal; and
- (v) Institutional capacity gaps affect maintenance, regulatory compliance, and environmental oversight.

231. Overall, the audit concludes that the cumulative environmental impacts of the existing systems are significant and unsustainable in the long term. The current groundwater-based approach demonstrates poor performance in sustainability, efficiency, and resilience compared to a proposed centralized surface water supply system. The findings strongly support transitioning to this new system while ensuring that any retained infrastructure is rehabilitated in line with environmental management and mitigation measures to improve compliance and reduce risks. Should these existing facilities be rehabilitated as part of the overall water supply system, corrective actions or key design measures are included in the recommendations section of this IEE. These recommendations should be considered in conjunction with other more specific environmental safeguard measures in the final detailed design and operations of the future water supply system. The environmental audit report is in Appendix 8.

D. Anticipated Impacts and Mitigation Measures During Design Phase

1. Risk of natural hazards such as earthquakes, landslides, and climate change-induced events such as floods

232. **Impact.** While the subproject area (which is falling within the medium risk seismic zone) only experienced some minor earthquakes in recent years, there is still a likelihood that the site will be impacted by a minor earthquake to its location and undulating terrains. Any earthquake/seismic events or any other extreme events such as unprecedented flooding could potentially disturb the land at the site and cause damage to subproject infrastructures such as the storage reservoirs, pump houses and distribution pipelines.

233. **Mitigation.** Mitigation measures include ensuring subproject components use materials that could withstand potential stress during extreme events, temperatures, pressures, etc. The structural designs of the storage reservoirs and pump houses shall comply with relevant good international practice to ensure the structures can withstand earthquakes and climate-induced events in the future.¹⁹

2. Source Sustainability, and Seasonal Surface Water Availability and Quality.²⁰

234. **Impact Due to Availability – Groundwater.** The continued use of production tube wells as supplementary, peak-demand, and emergency sources may contribute to cumulative groundwater stress if abstraction is not monitored and managed. With the projected population of Cumilla City Corporation, Chandpur, Hajiganj, and Laksam reaching nearly 1.4 million by 2045 and peak water demand estimated at approximately 345 MLD, continued reliance on production tube wells (PTWs) is expected to intensify. In the Cumilla cluster, increasing abstraction of groundwater to meet current and future urban water demand poses a significant sustainability risk. baseline testing indicates exceedances of iron, manganese, arsenic, fecal coliform, and total coliform in several sampled groundwater sources. Secondary literature²¹ for Bangladesh confirms that groundwater is a major drinking-water source and that iron and manganese contamination are widespread, largely geogenic, while arsenic risk remains significant in floodplain and deltaic aquifers. A case study covering Laksam²² and arsenic/salinity-affected areas found shallow tubewells in Laksam to be arsenic-contaminated, while deep and Tara tubewells were generally arsenic-free but often affected by high iron. These findings indicate that groundwater use under the subproject must be treated as a managed and monitored supplementary source rather than an unrestricted long-term primary source.

235. The aggressive use of groundwater can result in progressive lowering of groundwater tables, particularly during the dry season when natural recharge is limited. Declining groundwater levels may reduce the yield of existing wells, necessitate deeper drilling, increase operational costs due to higher energy requirements for pumping, and ultimately compromise the reliability of groundwater as a long-term primary water source.

236. **Impact Due to Availability – Surface Water.** Surface water abstraction from the Meghna-Dhonagoda river system is hydrologically feasible, with studies indicating that dry-season flows are substantially higher than projected abstraction requirements for the Cumilla cluster. However, availability-related impacts arise from river dynamics rather than absolute water quantity. Seasonal variability in water levels, floodplain inundation, and riverbank instability, particularly near Chandpur and downstream reaches, can affect the safety and continuity of intake operations.

237. Climate change introduces additional uncertainty to both groundwater and surface water availability in the Cumilla cluster. The final intake and abstraction design will also consider seasonal low-flow conditions, riverbank instability, sediment transport, navigability, floodwater

¹⁹ Pipe selection considers all the potential climate-induced risks. This is already integrated into the design as discussed in the climate risk assessment for the overall project. Accordingly, all climate-induced hazards and adaptation measures are already integrated into the distribution network design.

²⁰ Analysis of impacts and identification of proposed mitigation measures for this aspect have been based on the data provided in the Feasibility Study Report prepared for Cumilla cluster.

²¹ <https://iwaponline.com/wpt/article/19/3/745/100410/Iron-manganese-and-lead-contamination-in>

²² https://paperity.org/p/260907409/drinking-water-supply-options-in-arsenic-and-salinity-affected-areas-of-bangladesh-a-case?__cf_chl_f_tk=nRDpRL61PMGTvGiFCjxsSJM9xoe6JHv8ZQoeL0M.NNI-1783336847-1.0.1.1-hT28zCH.d.UqCqBPF2pGFkbq.thWc_ss_w28UPAsKCo

levels, river morphology, and climate-change-induced variability. This is particularly important for Chandpur and Hajiganj, where the Dakatia and lower Meghna river systems are hydrologically dynamic and where riverbank erosion and flood risks are relevant. The Bangladesh Climate and Disaster Risk Atlas identifies Bangladesh as a low-lying deltaic country where flood and river erosion are persistent hazards, and the Atlas is intended to support climate- and disaster-resilient planning in the water sector. Changes in rainfall intensity and distribution can affect groundwater recharge rates, exacerbate dry season deficits, and increase reliance on surface water sources. At the same time, higher monsoon flows and more frequent extreme events may increase sediment loads and hydraulic stress on river intakes. While current assessments indicate adequate surface water availability, long-term sustainability requires proactive planning to manage these evolving hydrological conditions.

Table 41: Surface Water Discharge Volume

Location	River	Dependable flow (m ³ /s)		
		90%	80%	50%
Khaguria	Meghna Branch	343	533	854
Satnal	Upper Meghna	2,903	5,293	8,899
Matlab bazar	Dhonagoda	79	130	229
Dashadi	Lower Meghna	3,033	5,844	10,558
Chandpur	Lower Meghna	5,399	10,104	20,368
Haim char	Lower Meghna	5,252	10,166	21,303

Source: Situational Analysis Report for Cumilla Cluster Region. UIIPF Project (DPHE Component). April 2023

238. **Mitigation.** To address sustainability impacts related to water availability in the Cumilla cluster, a conjunctive use strategy is proposed, whereby treated surface water becomes the primary bulk water source while groundwater is reserved for supplementary, peak demand, and emergency supply. Gradual reduction in abstraction from existing production tube wells (PTWs) will help stabilize groundwater levels and reduce long-term aquifer stress. This strategy will be supported by systematic monitoring of groundwater levels and abstraction rates, integration of groundwater considerations into urban water planning, and demand-side management measures such as non-revenue water reduction, metering, and water conservation programs to moderate future demand growth.

239. Availability-related risks associated with surface water abstraction will be mitigated through careful siting, design, and protection of intake structures along the Meghna-Dakatia river system. Intake locations will be selected based on detailed hydro-morphological assessments²³ to avoid zones prone to excessive erosion, sedimentation, or flood vulnerability. Engineering measures such as riverbank protection works, sediment exclusion arrangements, and flood-resilient design elevations will be incorporated to ensure uninterrupted abstraction during extreme events. Climate-resilient design considerations, informed by long-term flow, flood, and sediment

²³ The final design will include: (i) hydromorphological screening of proposed intake and river-adjacent works; (ii) confirmation that abstraction will not interfere with navigation, fisheries, or community uses during low-flow periods; (iii) flood-resilient siting and elevation of intake-related electrical and mechanical equipment; (iv) sediment exclusion or pre-settlement measures suitable for monsoon turbidity; (v) safe access for O&M during floods; and (vi) an emergency supply protocol for raw-water quality shocks, high turbidity, accidental pollution, or intake outage.

modeling, will further enhance the reliability of surface water supply under future climatic variability.

240. The final design for SWTP rehabilitation and any surface-water-based supply will be based on a defined raw-water quality design envelope. At a minimum, the design shall: (i) confirm dry-season and monsoon raw-water quality through additional sampling prior to final design; (ii) provide or rehabilitate coagulation, flocculation, sedimentation/clarification, filtration, and disinfection units suitable for seasonal turbidity, microbial contamination, and organic load; (iii) require jar testing and chemical dose optimization; (iv) install functional chlorine dosing, residual chlorine testing, turbidity monitoring, and operator-controlled process monitoring; (v) define operational response procedures for turbidity spikes, microbial contamination, low DO/high BOD events, accidental pollution, and taste/odor episodes; (vi) prohibit supply of treated water to the distribution system unless turbidity, residual chlorine, and microbiological standards are achieved; and (vii) ensure routine raw, treated, and distribution-point monitoring, including at consumer taps.

241. The final detailed design shall include a groundwater source sustainability and water-quality management plan. At minimum, this plan shall: (i) confirm the number, depth, yield, and design abstraction rate of each existing and proposed PTW; (ii) establish baseline static and dynamic water levels before commissioning; (iii) define seasonal groundwater-level monitoring, at least pre-monsoon and post-monsoon, and monthly abstraction records; (iv) include routine testing for arsenic, iron, manganese, chloride, TDS, electrical conductivity, fecal coliform, total coliform, and any locally relevant contaminants; (v) establish operational triggers for reducing or suspending abstraction where declining water levels, salinity indicators, or contaminant concentrations show deterioration; (vi) prioritize treated surface water and NRW reduction before increasing groundwater abstraction; and (vii) require reporting of groundwater abstraction and quality trends in the SEMR during construction and operation.

242. **Impact Due to Water Quality.** Unsustainable groundwater abstraction in the Cumilla cluster has implications for long-term groundwater quality. Intensive pumping can alter subsurface flow regimes and increase the risk of mobilizing naturally occurring contaminants such as iron and, in deeper formations, salinity. While arsenic contamination has not been identified as a dominant issue across the cluster towns, declining groundwater levels may increase vulnerability to future water quality deterioration. Poor groundwater quality can increase treatment requirements at the source or household level, raise costs for water utilities and consumers, and reduce public confidence in piped water supply systems.

243. Water quality represents the most significant sustainability challenge for surface water use in the Cumilla cluster. Monitoring and modeling indicate that water quality at potential intake locations along the Meghna-Dakatia system frequently falls within poor to very poor categories based on the Water Quality Index. Key contributing factors include upstream municipal wastewater discharges, industrial effluents, agricultural runoff, and high fecal coliform levels. During the dry season, reduced flows concentrate pollutants, while during the monsoon, elevated turbidity and suspended solids increase treatment complexity. If not adequately addressed, these conditions can increase treatment costs, operational risks, and the potential for supply interruptions.

244. **Mitigation** Groundwater quality risks will be mitigated primarily by reducing long-term dependence on groundwater and preventing over-extraction that could mobilize naturally occurring contaminants. Routine groundwater quality monitoring will be undertaken for key parameters such as iron, salinity, and other location-specific indicators, enabling early detection of deterioration. Where groundwater continues to be used, appropriate construction standards,

periodic rehabilitation of PTWs, and localized treatment (if required) will be applied to ensure compliance with the national drinking water quality standards. Institutional strengthening and data-driven management will support informed decision-making on sustainable abstraction limits.

245. Surface water quality impacts will be mitigated through a combination of pollution control, treatment, and watershed management measures. Upstream source protection will be promoted through coordination with relevant agencies to improve municipal wastewater management, enforce industrial effluent discharge standards, and reduce direct discharge of untreated wastes into rivers. At the system level, robust and flexible water treatment processes will be designed to cope with seasonal variations in turbidity, microbial contamination, and organic loads. Continuous raw and treated water quality monitoring, coupled with adaptive treatment operations, will ensure public health protection and long-term sustainability of surface water as the primary drinking water source for the Cumilla cluster.

3. Potential Competing Use of Water Resource

246. **Impact.** The proposed surface water source for the Cumilla cluster is the Meghna-Dakatia river system, which also supports irrigation, fisheries, navigation, local domestic uses, and other community-based water-dependent activities, particularly around the Paurashavas of Chandpur, Hajiganj, and Laksam, and beyond. Based on the subproject context and the source-sustainability, the projected abstraction for the water supply system in Cumilla cluster will be small even during the dry-season; therefore, significant competition for the surface water resource is not anticipated under normal operating conditions. Potential competition may arise only during localized dry-season low-flow periods, if intake points of the Dakatia river are used by the communities or fisheries, or if abstraction structures interfere with navigation, fish movement, or existing riverbank activities.

247. **Mitigation.** DPHE and the consulting firms engaged with detailed engineering design of the water supply system have conducted meetings with the stakeholders and consulted relevant local authorities, other competing users of surface water, such as fisheries representatives, boat operators, and nearby communities to identify existing water uses and avoid conflicts. Since these impacts are expected to be site-specific and manageable through proper siting, intake design, consultation, and operating controls, water abstraction volumes will be monitored, and operating procedures will be adjusted during unusually low-flow periods if required to prevent adverse impacts on other users. Also, grievance redress mechanism will remain available to address complaints related to water-resource competition or intake operation.

4. Land Subsidence Due to Groundwater Abstraction

248. The subproject involves the rehabilitation of existing Production Tube Wells (PTWs), which serve as supplementary sources of drinking water for the overall water supply system. These PTWs have been in operation for several decades, and no evidence of land subsidence has been observed at any of the existing sites to date. However, the continued long-term abstraction of groundwater may pose a potential risk of land subsidence in the area, particularly if additional PTWs are developed and operated under the subproject as supplementary water sources. To assess and manage this potential impact, a hydrological study supported by groundwater modeling has been conducted for the subproject, providing an evaluation of groundwater availability and abstraction sustainability.

249. The hydrological and source-sustainability assessment for the Cumilla cluster indicates that the long-term water-supply strategy will shift from heavy reliance on groundwater to

conjunctive use, with treated surface water serving as the primary bulk source and existing PTWs retained mainly for supplementary, peak-demand, and emergency use. This approach will reduce the need for additional groundwater abstraction and will help stabilize aquifer stress over time. Existing PTWs have already been operating for several decades in the cluster towns without observed evidence of ground settlement at the well sites or nearby infrastructure. The project does not propose large-scale expansion of groundwater abstraction as the principal source; instead, groundwater use will be progressively managed and monitored through abstraction records, groundwater-level measurements, and routine well-condition assessments. On this basis, and subject to continued monitoring during operation, the likelihood of measurable land subsidence attributable to the subproject will be barely minimum.

250. In view of the above, impact due to land subsidence is considered insignificant. No mitigation measures are required.

5. Salinization Due to Groundwater Abstraction

251. Groundwater salinization may result from both natural and anthropogenic factors. Natural sources include geogenic conditions related to local geology and, where applicable, saltwater intrusion from coastal waters into inland freshwater aquifers. Anthropogenic sources of salinity may arise from irrigation return flows, the use of saline surface water, and other human activities at ground level. Based on environmental baseline investigations conducted for the subproject, groundwater salinity indicators measured in existing deep tube wells in the project area were relatively low, chloride was from 28 mg/l to 212 mg/l and TDS from 68 mg/l to 609 mg/l. Despite several decades of groundwater abstraction from these tube wells, the results suggest that significant groundwater salinization has not occurred in the project area to date. This condition may be attributed to favorable hydrogeological characteristics, including recharge from surrounding water bodies, which provide sufficient replenishment to the groundwater aquifer and help maintain its freshwater quality.

252. The baseline groundwater quality results also support this assessment. Across the sampled locations in Cumilla City Corporation, Laksam, Hajiganj, and Chandpur, chloride concentrations range from 28 mg/l to 212 mg/l, which is below the Bangladesh drinking water standard of 250 mg/l. TDS values range from 68 mg/l to 609 mg/l, also below the drinking water standard of 1,000 mg/l. These results indicate that the sampled groundwater remains fresh to slightly mineralized rather than saline. Although Chandpur is in a lower Meghna riverine setting and may be more sensitive to hydrological changes than the inland towns, the observed chloride and TDS levels do not indicate present saltwater intrusion in the tested production sources. Continued monitoring of chloride, TDS, electrical conductivity, and groundwater levels is recommended, particularly during the dry season and at wells closest to major river channels, to confirm that salinity conditions remain stable as abstraction patterns change under the project.

6. Disruption of existing utilities and services

253. **Impact.** All alignment of subproject packages will pass through roads in the different parts of municipalities and Paurashavas of the Cumilla cluster. There is high likelihood that these will cross, intercept and/or align with existing utilities and services, such as underground and overground cables, electricity posts, etc., already installed in these areas. Any damage to these utilities will disrupt the daily lives of the people affected.

254. **Mitigation.** Including in the design of the alignments the best options that will result in minimum impact on these utilities. Where alignments cannot avoid disrupting the operation of

these utilities, include in the bidding and contract documents the mandatory task for Contractors during pre-construction phase to coordinate with relevant authorities (e.g. Bangladesh Power Development Board) regarding this potential impact. This will ensure that any interruption on utility and service operations is minimized, and that affected households or communities are properly informed in advance.

255. Further, ensure that the bidding and contract documents has the condition that Contractors will need to carry out environment friendly construction works, and the Contractors will be responsible for any damage to utilities or infrastructure such as electricity poles, cable lines, telephone booth, etc. above ground level.

256. Before excavation, HDD, or road cutting, the contractor will prepare a utility identification and protection plan. The plan shall include: (i) review of available utility drawings; (ii) joint site verification with DPHE, CuCC/ Paurashava, electricity, telecommunications, gas, drainage, and road authorities where relevant; (iii) trial pits or non-destructive detection in congested corridors; (iv) marking of utilities on site; (v) permit-to-dig procedures; (vi) emergency contact list; (vii) advance notice to affected households, businesses, schools, hospitals, and religious institutions; and (viii) reinstatement and compensation procedures for contractor-caused damage. No excavation or HDD shall commence in a workfront until utility clearance is documented and approved by the PIU/PMSC.

7. Health Hazard from Asbestos-Containing Materials (ACMs)

257. **Impact.** Available information from DPHE and municipal operators indicates that the existing water distribution network within the Cumilla Cluster is not known to include asbestos cement pipes. Therefore, the known ACM risk is considered low. However, because parts of the network are old, undocumented, and may include legacy materials, a precautionary ACM chance-find procedure is required. This is necessary to protect workers and the public if suspect pipes, insulation, roofing sheets, gaskets, or other ACMs are unexpectedly encountered during excavation, rehabilitation, or demolition.

258. **Mitigation.** If any suspect ACM is encountered, the contractor will immediately stop work in the affected area, isolate and barricade the location, prohibit cutting/breaking/drilling, wet the material only if safe to prevent dust, notify the PIU/PMSC, and arrange inspection by a competent person. Work will resume only after the material is confirmed non-ACM or after an ACM management method statement is approved. Any ACM handling, removal, packaging, transport, and disposal shall follow national requirements and GIIP, including PPE, dust suppression, labeling, covered transport, disposal at an approved site, and documentation.

8. Disposal Sites

259. **Impact.** The subproject is expected to generate significant amounts of spoils during the construction phase. Assuming no other uses for excess spoils, their indiscriminate or unmanaged disposal will negatively impact the environment and may also result to other forms of nuisance to surrounding communities wherever these are disposed.

260. **Mitigation.** Prior to award of contract, DPHE and/or PIU will identify a location for the disposal of excess spoils that will be generated during the construction phase. The disposal location will need to obtain clearance from relevant government agencies having jurisdiction over such location. No award of the contract shall be made until disposal location and relevant clearance are obtained. The contractor will prepare a Spoil and Excavated Material Management Plan before mobilization. The plan will identify expected spoil volumes by package, opportunities

for reuse in trench backfilling and site restoration, temporary stockpile locations, haul routes, final disposal locations, permissions from landowners and relevant authorities, sediment and erosion controls, dust suppression, traffic safety measures, and drainage protection. Spoil will not be placed in wetlands, khals, ponds, drains, riverbanks, road shoulders causing obstruction, agricultural land without consent, or areas prone to erosion or flooding. Stockpiles will be protected by toe bunds, covers, drainage channels, and silt traps where needed. Reuse shall be prioritized where material is suitable and uncontaminated. Contaminated spoil, if encountered, will be segregated and managed under a hazardous/contaminated materials procedure.

9. Physical Cultural Resources

261. **Impact.** Cumilla cluster particularly CuCC encompasses rich PCR (cultural sites, shrines, and old graveyards), including historic Dharmasagar *dighi* (large ponds), Ranir *dighi*, Nanuar *dighi*, and Nawab Bari as heritage building. Mainamoti and Lamai areas are nationally significant archaeological sites located outside the CuCC, it is unlikely that sites will be influenced by the subproject activities. Nawab Faizunnessa Estate (zamindar bari and the museum) is a nationally significant heritage site located within Laksam Paurashava. There is less likelihood that the construction activities for implementation of the new distribution water supply networks may cause risks to historic *dighis*, through surface runoff of construction waste, debris and seepage from drainage system of existing CuCC. Construction of improved toilet and sanitation facilities in Hajiganj Paurashava may induce insignificant public/social nuisance during construction phase, however environmental impacts will be beneficial during operation time as septic waste will be confined within the anaerobic chamber for treatment of sewage. PCR in the four cluster towns will have minimum likelihood of adverse environmental impacts by the new construction of OHTs as sites are secured and mostly protected with existing boundary walls, and apart from the PCR. Rehabilitation of SWTPs in Hajiganj and Chandpur will not hamper environmental degradation of PCR, as all existing infrastructures are already built and confined with their own boundaries.

262. **Mitigation.** The subproject will have to identify known PCRs existing in the cluster towns during preconstruction phase. Among other, significant heritage sites are Dharmasagar *dighi*, Ranir *dighi* and *Nanua* within CuCC are to be considered as 'heritage water bodies' and any excavation or construction related activities nearby the catchment of these PCR will take strong measures to ensure *business as usual* operations of these *dighis*. Nawab Faizunnessa Estate is protected by the National Museum Authority, hence no impacts will likely to be caused by the subproject activities. Specific implementing protocols have to be undertaken to stop work immediately if archaeological artifacts are discovered during excavation or horizontal drilling, and alternative protocols will be considered immediately. Community people and public representatives should be consulted, and local concerned officials from city corporation, *Paurashava* and DPHE should be engaged during construction works nearby the heritage *dighis*, Nawab Bari and other mosque, shrines, graveyards and any other important PCR.

10. Public Toilet Design for Pollution Prevention

263. **Impact.** The subproject will include construction of two public toilet facilities in strategic locations of Hajiganj Paurashava in the subproject area. During the operation phase of the project, these toilet facilities will be a source of potential pollution to water bodies and the immediate environment. During the operation phase, indiscriminate disposal of solid wastes may occur, and this will potentially cause land pollution and degradation of visual aesthetics in the area.

264. **Mitigation.** The design of toilet facilities will follow internationally accepted standards, which include, among others, the following:

- (i) Locate in public or government-owned lands with no or minimal/not significant negative social impacts. The area shall have sufficient space for the infrastructures, including septic tanks/chambers, and other allied components based on the detailed design;
- (ii) Septic tanks shall be designed as per national standards (e.g. two-chambered) and codes to allow for maximum retention of septage and water sealing;
- (iii) Locate where there is no overlap with or does not traverse water supply pipelines or sewer lines;
- (iv) Locate in an area where there is sufficient access to civil works contractors during construction phase, and access to maintenance providers, such as desludging service providers, during operation phase (i.e. the period when the toilets are already in use by the communities);
- (v) As much as possible, locate away from receiving bodies of water. If unavoidable, locate the toilets at least 30 meters from the banks of these water bodies;
- (vi) Sites must be at least 100m from groundwater wells;
- (vii) During construction phase, does not lead to alteration of surface water hydrology of streams/waterways that may result in increased sediment load due to erosion from construction sites;
- (viii) Provides for appropriate protection/mitigation measures to address noise impacts on adjoining communities or establishments; and
- (ix) Ensure requirements for maintenance measures are included in the responsibilities of community-based organizations, and suitable budget to ensure ongoing performance of measures.

11. Consents, Permits and Clearances

265. **Impact.** The subproject is required to comply with relevant environmental laws. Prior to any construction works, EIA will need to be undertaken, and EIA reports prepared and approved by the Department of Environment. Any delay in the preparation and approval of the EIA will potentially delay the execution of the subproject.

266. **Mitigation.** All necessary consents, permits and clearances required from local government bodies shall be obtained prior to the award of contract. Also, draft EIA will be prepared, which will then be submitted to DOE for approval. Subsequently, the ECC will be issued. No award of the contract shall be made for a specific package under the subproject until and unless ECC is obtained.

12. Compliance with ADB Loan Agreement and Safeguard Policy Statement

267. **Impact.** There is a general lack of awareness and familiarity among many Contractors with the requirements of the ADB SPS and the EMP. As a result, EHS, OHS, CHS, and other mitigation measures are often not adequately considered during bid preparation and are therefore not properly costed or incorporated into the contract price. This situation may lead to insufficient

allocation of resources for EMP implementation during construction, increasing the risk of non-compliance with safeguard requirements, delayed corrective actions, and potential adverse EHS impacts during subproject implementation.

268. **Mitigation.** DPHE, through its procurement unit (or equivalent), shall ensure that the mitigation measures required under the EMP are fully integrated into the bidding and contract documents. This shall include (i) clear technical specifications and contract clauses mandating compliance with the EMP, OHS requirements, and all applicable provisions of the ADB SPS as well as relevant government laws and regulations, and (ii) explicit inclusion of the associated costs for EMP and OHS implementation in the Engineer's Estimate and Bills of Quantities, to ensure that such measures are adequately budgeted by bidders.

269. Following contract award, DPHE shall arrange and facilitate awareness and orientation training for the selected Contractor(s) prior to mobilization. The training shall cover, at a minimum, the Contractor's responsibilities for EMP and OHS implementation, applicable ADB and national safeguard requirements, site-specific environmental and safety risks, self-monitoring obligations, documentation and reporting procedures, and corrective action processes. This capacity-building measure aims to enhance Contractor understanding and compliance, ensure effective implementation of safeguard measures during construction, and reduce the risk of non-compliance arising from lack of awareness or inadequate budgeting.

E. Anticipated Impacts and Mitigation Measures During Pre-Construction Phase

1. Contractor Mobilization

270. **Impact.** Contractors' fielding of equipment and manpower to the site will likely impact baseline site conditions and potentially damage private properties and public properties, including heritage assets. Safety of both workers and the community will also be likely affected due to movements of both workers and construction equipment.

271. **Mitigation.** Immediately after award of their respective contracts, the Contractors shall undertake all pre-mobilization works in order to ensure impacts are avoided on natural environment and man-made structures specific to different sections of the subproject alignments, including any disturbance to existing customs, movements and way of life of local people in the different sections of subproject alignments. No mobilization and civil works shall be undertaken unless the following have been complied with by the Contractors:

- (i) **Conduct consultations** with the communities that will be affected by the subproject works prior to any construction activity. This will also be used as avenue to understand the local condition and stakeholders needed in developing the required site-specific EMP (SEMP);
- (ii) **Develop SEMP.** For subproject packages with potential impact to PCRs including internationally protected PCRs, if any; SEMP needs to be approved by PIU based on the EMP of this IEE. Sectioning of the subproject alignments shall be based on common but contiguous environmental features and attributes along said alignments;

- (iii) **Develop a Traffic Management Plan** covering all areas along the subproject alignments, in coordination with local traffic police. Contractors shall have a traffic management plan in place prior to the excavation. As an example, and as suggested during consultations, the plan should include the identification of most efficient alternate routes should there be any road closures to ensure no disruption of traffic flow occurs during the construction period. For all road-based pipe-laying works, the contractor will maintain safe and continuous access to residences, shops, schools, hospitals, mosques, markets, and transport stands. Temporary pedestrian bridges or steel/wooden plates with handrails will be provided across trenches where access is required. Work near schools, hospitals, markets, and religious facilities shall be scheduled in consultation with facility managers and communities. Where temporary business access disruption is unavoidable, the contractor will provide advance notice, minimize the duration of obstruction, maintain signage, and restore access immediately after pipe installation. Construction near markets and transport nodes will be sequenced to avoid peak trading and commuting hours wherever feasible. See Appendix 7 for a common outline of TMP;
- (iv) **Develop a Spoil Management Plan** that will include information on the government-approved disposal site and the route from subproject locations to the said site;
- (v) **Develop a Health and Safety Plan** that will be approved by the PIU. The plan will include specific steps to manage potential spread of emerging infectious diseases; and
- (vi) **Undergo training** conducted by DPHE, supervision consultant, and/or PIU, including training on excavation methods in sensitive areas, if any; and chance finds procedures.

2. Construction Camps or Workers' Accommodation

272. **Impact.** There may be instances under certain subproject packages where workers will be required to reside within or near construction sites for the duration of specific construction activities. In such cases, Contractors typically establish temporary construction camps or worker accommodation facilities. However, the unplanned or poorly managed establishment of these camps; particularly in the absence of adequate basic services such as safe water supply, sanitation, solid waste management, drainage, and proper living conditions; may result in social stress within host communities and contribute to localized environmental degradation. Potential impacts include pressure on local resources and services, generation of unmanaged waste and wastewater, increased health and safety risks, and adverse interactions between workers and surrounding communities.

273. **Mitigation.** The Contractor shall ensure that all construction camps or worker accommodation facilities are properly planned, sited, constructed, and managed, and provided with adequate sanitary and basic living amenities within designated areas. At a minimum, these facilities shall include safe drinking water, adequate sanitation and ablution facilities, proper drainage, solid waste management systems, lighting, ventilation, and cooking and washing areas, as applicable. In the absence of nationally prescribed standards in Bangladesh specifying

minimum requirements such as the number of ablution blocks or sanitation facilities for temporary labor camps, the Contractor may apply its own internal occupational health and safety (OHS) standards for worker camps and accommodation, provided that such standards are consistent with and at least equivalent to international good practice. In particular, the Contractor shall comply with the principles and performance requirements outlined in *“Workers’ Accommodation: Processes and Standards – A Guidance Note by IFC and EBRD (2009)”*,²⁴ as well as relevant provisions of the International Labour Organization (ILO) Workers’ Housing Standards.²⁵

274. Worker camps should be designed and constructed to ensure structural safety and reasonable standards of decency, hygiene, health, and comfort. Construction materials shall be durable and appropriate to local environmental conditions, taking into consideration potential risks such as flooding, waterlogging, cyclones, and landslides. Camps should be regularly maintained and managed to prevent environmental pollution, minimize health and safety risks, and avoid adverse social impacts on surrounding communities. The camp should comply with the following as a minimum standard:

- (i) Camps should be secured/fenced, and guarded;
- (ii) Camps (including kitchen, dining, and toilets) shall avoid using CGI sheet and bamboo frames, and shall be constructed using prefabricated material or colored CGI sheet constructed on iron frame, as approved by the contractors’ health and safety officer (or equivalent);
- (iii) The camp shall have minimum headroom of 203 centimeters, and have impervious and raised floor above flood level or at least 60 centimeters;
- (iv) The camp premises shall be kept clean using concrete blocks or gravel, drainage, and flood light. Also use security camera as required on strategic locations outside the buildings;
- (v) The cabin floor area should not be less than 7.5 m² in rooms accommodating two people; 11.5 m² three persons; or 14.5 m² accommodating four persons. The area of cabin should be at least 3.6 m² per person;
- (vi) A separate bed with proper bedding materials shall be provided for each worker;
- (vii) If a double decker bed is used, the minimum clearance between lower and upper bunk shall be more than 700 centimeters, height of 168 centimeters, and headroom of 203 centimeters;
- (viii) Provide separate accommodation and toilets for male and female workers with adequate privacy;
- (ix) Provide adequate light and ventilation in the camp area and cabins. Provide safe electric plugs to charge mobile or listen to radio. Arrange light and fan;
- (x) Restrict use of heaters for cooking or heating within the cabins;
- (xi) Provide adequate supply of safe and clean water for drinking and washing/bathing;
- (xii) Provide at least one toilet, one washing basin and one shower for every six persons, and separate facility for male and female workers with sufficient privacy;
- (xiii) Provide stormwater and wastewater drainage with sump pits before discharging them in open;

²⁴ https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_workersaccommodation

²⁵ <https://www.ilo.org/publications/workers-housing>

- (xiv) Arrange solid waste collection from camps for safe disposal. Restrict burning of waste;
- (xv) Provide locker for each worker to secure their valuable belongings;
- (xvi) Provide a common kitchen and dining room located away from cabins. Restrict individual cooking and eating meals in the cabins;
- (xvii) The accommodation should be kept free of rats, mice, insects and vermin. In areas where mosquitoes are prevalent, workers should be provided mosquito net;
- (xviii) Provide a separate medical room serviced by a medical worker for regular health checks and general types of treatment and emergency facilities. Also keep first aid boxes at easy access of workers and train a few workers to use first aid;
- (xix) Keep fire alarm system and enough fire extinguishers in the camp. Train few workers to operate fire extinguisher;
- (xx) Keep emergency evacuation details, contact number in case of emergency;
- (xxi) Keep standby vehicle for emergency evacuation or transportation to hospital;
- (xxii) Arrange recreation facilities for the workers. Restrict use of alcohol, gambling, and other unsocial activities within the camp, and any person found guilty shall be dealt with required penalty measures. Restrict workers are going out of camp after 7pm. A workers' Code of Conduct shall be prepared and orientation provided during induction and on regular basis; and
- (xxiii) Restrict use of firewood for cooking and heating.

F. Anticipated Impacts and Mitigation Measures During Construction Phase

275. Potential environmental impacts expected during the construction phase are mostly due to the transport, excavation works, and other standard construction activities in urban development projects and are discussed as follows:

1. Sources of Materials

276. **Impacts.** Extraction of construction materials that will be used for the subproject (cement, sand, aggregates) can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.

277. **Mitigation.** PMU, with support from Supervision Consultant, will guide the subproject Contractor in minimizing the use of non-renewable resources and rock-based materials. The Contractor will be responsible for:

- (i) Sourcing construction materials, including aggregates, etc., from legitimate suppliers authorized by the government; and
- (ii) Maintain a construction material register at the site.

2. Impact on Topography and Aesthetics

278. Excavation, pipelaying and other construction works for the subproject packages will affect the topography and aesthetics at the sites due to accumulation of unmanaged spoils and construction debris.

279. **Mitigation.** The Contractors will need to implement the following:

- (i) Avoid storing spoils at the vicinity of excavation or construction sites for a long period of time. Haul spoils on a regular basis to ensure more efficient handling and management at the disposal sites following the Spoil Management Plan;
- (ii) Dispose only in the designated disposal areas identified under the subproject;
- (iii) To minimize excess spoils for disposal, use some for beneficial purposes such as in any other construction activities, or to raise the level of low-lying areas;
- (iv) Ensure adequate compaction, and drainage system around the disposal areas;
- (v) Ensure disposal areas are utilized up to their capacity limit only and in accordance with the required sloping and leveling/grading specifications approved under the subproject; and
- (vi) If the disposal area reaches the limit, utilize another designated disposal area approved under the subproject.

3. Impact on Surface Water Quality

280. Excavation and construction activities may result in accidental spills of chemicals and siltation that could threaten or further deteriorate the quality of receiving bodies of water nearby the sites.

281. **Mitigation.** Contractors will need to implement the following measures:

- (i) Dispose excess spoils only in the designated disposal areas identified under the subproject;
- (ii) Avoid storing spoils at the vicinity of the site for a long period of time. Haul spoils on a regular basis to ensure more efficient handling and management at the disposal sites. Use temporary storage sites for spoils that will be used for backfilling, but location should be away from sites so as not to create any negative impact on aesthetics in the area;
- (iii) To minimize excess spoils for disposal, use some for beneficial purposes such as in any other construction activities, or to raise the level of low-lying areas;
- (iv) Ensure proper compaction of refilled soil and there shall not be any loose soil particles on the top; the material shall be refilled in layers and compacted properly layer by layer;
- (v) Silt traps to be provided at construction area near receiving bodies of water;
- (vi) No equipment or machinery should be operated outside the work areas;
- (vii) Avoid spillage of fuels, chemicals and lubricants. Fuel and other petroleum products are stored at storage areas away from water drainage and protected by impermeable lining and banded 110% by volume;
- (viii) Ensure that drains are not blocked with excavated soil;
- (ix) Locate stockyards away from canals or receiving bodies of water;
- (x) For effluents from construction camps and Contractors' offices, provide treatment arrangements such as retention ponds and septic tanks which should be incorporated in the facility designs. A sewage management plan must be prepared by the Contractor and agreed with PIU;
- (xi) Clean-up of the area after the completion and prior to the onset of monsoon season; and
- (xii) Avoid scheduling excavation work during the monsoon season. Earthworks should be undertaken during dry season.

4. Impact on Groundwater Quality

282. Subproject packages are scheduled to be implemented from January 2027 – December 2031. With this kind of undertaking, a Contractor normally establishes their site offices, storage sites and workers' camps. Operational activities and use of these facilities during the construction period could potentially contaminate groundwater resources due to seepage of liquid waste and chemicals from the sites.

283. **Mitigation.** In addition to the mitigation measures described to prevent impact to surface waters, Contractors will need to implement the following measures:

- (i) Store fuel, oil and other chemicals in secure, managed areas with lined impervious floors and bunded with 110% by volume;
- (ii) Ensure refueling area has lining to avoid seepage of unavoidable spills during refueling. Ensure clean up spills immediately and all used cleaning materials are disposed properly;
- (iii) Ensure to provide portable toilets in all construction camps to discourage injecting septic waste on land;
- (iv) Avoid cutting down trees or vegetations within and around the construction camps and sites; and
- (v) Conduct ground water quality monitoring, particularly at sites near fuel depot or refueling site and construction camps. Ensure to conduct at least one sampling every six months. The important parameters to test are Oil and Grease, and Fecal Coliform. The results of the first sampling shall be used as reference. Any subsequent sampling bearing results above the reference, the contractor shall investigate the cause and report to PIU. Contractors shall also evaluate the effectivity of the measures being implemented at the site and ensure no seepage occurs from the facilities (fuel depot and construction camps).

5. Impacts from backwash water and sludge/residuals management

284. Rehabilitation and operation of SWTPs in Chandpur and Hajiganj will generate backwash water, settled sludge, and treatment residuals containing suspended solids, organic matter, coagulant residuals, and microbial contamination. If discharged directly to drains, open land, or the Dakatia River without control, these residuals may increase turbidity, sedimentation, organic loading, and localized water-quality degradation. Poor residuals management may also create nuisance, odor, vector breeding, worker exposure, and community complaints. The risk is higher where existing SWTPs lack functioning sludge drying, backwash recovery, or controlled disposal systems.

285. **Mitigation.** The final detailed design shall include a SWTP residuals management plan for each SWTP to be rehabilitated. The plan will: (i) estimate backwash water and sludge generation under normal and high-turbidity conditions; (ii) provide settling, thickening, drying beds, geotextile dewatering, or other technically appropriate residuals management facilities; (iii) prohibit direct discharge of untreated sludge or backwash water to the Dakatia River, drains, ponds, or open land; (iv) define effluent-quality standards and monitoring points for any treated backwash discharge; (v) identify approved disposal or beneficial reuse options for dried sludge, subject to testing and regulatory acceptance; (vi) include worker protection measures for handling

wet sludge and chemicals; (vii) include O&M responsibilities, budget, and recordkeeping; and (viii) report residuals generation and disposal in routine O&M records and SEMRs.

6. Impacts on Aquatic ecology and Fisheries

286. **Impact.** Although no subproject component is proposed within a legally protected area or the Meghna-Padma confluence,²⁶ river-adjacent works, SWTP rehabilitation, intake-related activities, and untreated discharges could affect local aquatic habitats in the Dakatia and lower Meghna river system. Potential impacts include localized turbidity, sedimentation, disturbance to fish habitat, accidental discharge of backwash or chemicals, and temporary disturbance to riparian areas. Chandpur is recognized as part of an important riverine fisheries landscape, including Hilsa migration and Ganges River Dolphin habitat in the broader lower Meghna system.

287. **Mitigation.** The contractor and operator shall: (i) avoid spoil disposal, chemical storage, and equipment washing near rivers, khals, ponds, or drains; (ii) avoid in-river works unless specifically approved; (iii) consult the Department of Fisheries for any works that may affect riverbanks, intakes, or fisheries-sensitive periods; (iv) avoid construction methods that increase turbidity during fish migration/spawning periods where feasible; (v) prohibit discharge of untreated backwash, sludge, concrete wash water, drilling slurry, oil, or chemicals to water bodies; and (vi) include aquatic-habitat incident reporting in the SEMR.

7. Impact on Ambient Air Quality

288. Excavation and construction activities will result in generations of dust that could remain airborne within and around the subproject sites. Operation of heavy construction equipment and vehicles will also result in the release of emissions. Dust and emissions are significant factors that could degrade the ambient air quality in the area, which in turn affects the general well-being of the residents in households or establishments nearby.

289. **Mitigation.** Contractors will need to implement the following measures:

- (i) Conventional dust control measures such as use of water sprays and minimizing hauling and vehicle movements during windy times of the day or night;
- (ii) Proper covering (e.g. tarpaulin) of hauling equipment such as dumps trucks during transport of materials or spoils;
- (iii) Provide temporary barriers or covers around active site excavation areas;
- (iv) Limit vehicles speed at work site enough to not cause vigorous suspension of dust;
- (v) Prohibits idling of heavy equipment or vehicles for a long time;
- (vi) Regular maintenance of heavy equipment and vehicles to ensure compliance with national vehicle emissions standards;
- (vii) Prohibit burning of any liquid or solid waste;
- (viii) Conduct regular visual inspections to identify and address other potential sources of dust emissions; and
- (ix) Conduct ambient air quality monitoring at strategic locations at least once every six months. Ensure that sampling locations are at the nearest establishment (residential,

²⁶ This IEE identifies Hilsa, Ganges River Dolphin, and threatened fish species in the broader riverine environment.

commercial, institutional) based on the wind and dust/smoke dispersion direction at the site.

8. Impact on Noise and Vibration Level

290. Excavation and construction activities will result in generation of noise that could disturb the construction workers, staff, and community people. Use of machinery for excavation and compaction will also result in vibration that could damage sensitive and old structures at the subproject sites.

291. **Mitigation.** Contractors will need to implement the following measures:

- (i) Provide prior information of the scheduled work to nearby residents;
- (ii) Use silencers for all equipment;
- (iii) Avoid delivery of raw construction materials during nighttime;
- (iv) Avoid noise-intensive activities at nighttime;
- (v) Horns should not be used unless it is necessary to warn others or animals of the vehicle's approach and prevent any potential accident;
- (vi) Minimize drop heights during delivery and stacking of raw construction materials;
- (vii) Use sound barriers to lessen the noise from sites;
- (viii) Maintain maximum of noise level of 45 dB(A) at the nearest residence relative to the specific worksites;
- (ix) Conduct noise level monitoring. Ensure to conduct at least one sampling every six months and when construction activities are at peak. Important areas to test are at the nearest establishments (residential, commercial, institutional) and construction camps;
- (x) Use pumping equipment with low level noise generation;
- (xi) If using generators, ensure generators complies with the noise standards; and
- (xii) Ensure generator set has an acoustic enclosure and silencer (if necessary) in the exhaust muffler.
- (xiii) Where baseline noise already exceeds standards, the contractor will ensure that construction activities do not cause avoidable additional exceedances and shall implement feasible controls, including silencers, equipment maintenance, acoustic barriers, scheduling, and restricted working hours.
- (xiv) Noise-intensive will be prohibited at night near residential areas, hospitals, schools, and religious facilities unless specifically approved and disclosed to affected communities.
- (xv) Vibration-generating activities near old structures, PCRs, mosques, schools, hospitals, and fragile buildings will be preceded by condition surveys and use of low-vibration methods. Any complaint of cracking or vibration damage will trigger immediate inspection, work suspension if needed, and corrective action.

9. Impact on Overground Physical Cultural Resources

292. **Impact.** While the protected cultural heritage sites and PCRs are avoided based on mitigation measures considered during the design phase, other locally important PCRs (i.e. those without protection status) are still found in some alignments. These include mosques, temples, etc. Due to the proximity to the alignments, the PCRs may be directly impacted by the pipelaying

works. The foundation of these structures could be damaged due to vibration or collapse of excavated trench.

293. **Mitigation.** Excavation shall be avoided during rainy days and seasons all along the subproject area. For excavation of more than 1m depth or depending on site condition, shoring shall be applied to avoid any sort of collapse and maintain safety of lives and property. Proper barricade and signage boards shall be installed during excavation to avoid unauthorized person entering the construction site. Shoring shall be in place in each excavated trench along the alignment. Excavated materials shall be handled properly; which shall be loaded to dump truck and shall be taken to temporary storage area (spoils to be used for backfilling or reinstatement works) or disposal site (for the excess spoils). The excavated material shall not be stored along the excavated trench.

10. Impact on Underground Physical Cultural Resources

294. **Impacts.** Bangladesh is home to many old and ancient structures and there is a possibility that chance finds such as underground relics or structures considered as physical cultural resource (PCR) will be encountered and impacted during excavation at the subproject sites.

295. **Mitigation.** As a precautionary approach, the Contractors will need to strictly implement the following chance finds protocol:

- (i) Require the Contractors to coordinate immediately with DPHE, PIU and Bangladesh Department of Archaeology for any suspicion of chance finds during excavation works;
- (ii) Stop working immediately to allow further investigation if any finds are suspected; and
- (iii) Request authorized person from the Bangladesh Department of Archaeology to observe when excavation resumes for the identification of the potential chance finds and comply with further instructions.

11. Community Health and Safety

296. **Impacts.** A range of community health and safety risks may arise in the vicinity of subproject sites, including construction areas, material storage camps or yards, and workers' camps. Inadequate site control and unrestricted access may allow pedestrians, children, livestock, and other community members to enter active work areas. Such exposure could subject them to safety hazards associated with construction activities, including moving heavy equipment and vehicles, open excavations, falling materials, and electrical installations, potentially leading to injury or fatal accidents. In addition, unprotected trenches and excavated areas may pose a risk of accidental falls for both community members and animals, particularly during nighttime or poor visibility conditions.

297. There is also a risk of transmission of communicable diseases to communities surrounding the subproject sites due to interactions between Contractors' staff, construction workers, and residents. Outbreaks of infectious diseases may occur if appropriate prevention and control

measures are not implemented. Such transmission could pose serious public health risks, including illness and potential loss of life, especially among vulnerable community groups.

298. **Mitigation.** Contractors will need to implement the following measures:

- (i) Appoint full-time EHS officer per contract requirement;
- (ii) Install warning signs, warning tapes, hard barricades, and notices around the work site perimeter to avoid unauthorized entry. For excavated sections that cannot be isolated or enclosed due to access issues for the community or residents, ensure to cover these with steel planks or durable wood planks during off-work hours. If during work hours that these excavated sections, especially the deep trenches, cannot be covered entirely, provide steel planks or durable wood planks with handrails that can be used by pedestrians;
- (iii) Install sturdy fences around storage camps or yards and workers' camps;
- (iv) Assign guards around the subproject sites, including storage camps or yards and workers' camps, on a 24/7 basis;
- (v) Provide lighting all around the subproject site, including storage camps or yards and workers' camps, to ensure the perimeter is well-lit at nighttime;
- (vi) Follow a code of conduct for workers, which should include restricting workers in designated areas, no open defecation, no littering, no firewood collection, no setting of fire except when needed but in designated places, no trespassing, no unauthorized overstaying at construction sites, and no obligation to undertake potentially dangerous work without the use of proper personal protective equipment, among others;
- (vii) Follow International best practices on community health and safety such as those in Section 4.3 of World Bank Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities;²⁷
- (viii) Follow the established community and occupational health and safety protocol on emerging infectious diseases;
- (ix) Establish and implement a community awareness program so that the community people are apprised of the developments on the construction works on a regular basis;
- (x) Maintain a complaint logbook at the site and act promptly of complaints;
- (xi) Schedule transport and hauling activities by avoiding peak traffic periods;
- (xii) Clean wheels and undercarriage of haul trucks prior to leaving construction sites;
- (xiii) Educate drivers and advise to limit speed between 20-25 km/h while traversing settlement areas and avoid use of horn unless necessary to prevent accidents; and
- (xiv) Earmark parking place for construction equipment and vehicles when idling; no parking shall be allowed on the roads, that may disturb the traffic movement.

12. Occupational Health and Safety

299. **Impacts.** Occupational health and safety (OHS) risks are inherent in construction activities and are of concern for all subproject components. Construction workers may be exposed to health risks and safety hazards arising from the storage, handling, and transportation of hazardous materials, including fuels, chemicals, and construction materials. Workers are also vulnerable to accidents associated with moving vehicles, heavy machinery, lifting operations, excavation works,

²⁷ IFC World Bank Group. 2007. [*Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning*](#).

and other construction-related activities at active worksites. In addition, workers may be exposed to elevated levels of environmental pollution during construction, including dust emissions, exhaust fumes from vehicles and construction equipment, and excessive noise, which may cause respiratory illnesses, hearing impairment, and other adverse health effects if not properly controlled. Extended working hours, inadequate rest periods, and high work intensity may further increase the risk of accidents and injuries due to worker fatigue, reduced alertness, and human error.

300. There is additional occupational health concerns related to communicable and infectious diseases among construction workers. Outbreaks of diseases and other public health threats may pose serious risks to worker health and safety. Clustering, close interaction, and gathering of workers at worksites or during transportation can facilitate disease transmission. The risk may be further elevated within construction camps or worker accommodation facilities due to high occupancy density, shared facilities, and potentially inadequate hygiene and sanitation conditions. If not properly managed, such situations could result in illness outbreaks among workers, work stoppages, and, in severe cases, loss of human life.

301. **Mitigation.** The Contractors will need to implement their respective health and safety protocols approved by PMU. This will contain normal internationally accepted procedures in relation to the risks imposed by the nature of the work to be undertaken, including risks associated with emerging infectious diseases. The Contractors shall ensure all authorized persons present on all sites, be they own staff, representatives of the implementing agency or the construction manager, or other visitors, are aware of any site-specific safety requirements and are supplied with hard hats and other protective clothing appropriate for the work being undertaken, including other precautionary measures against infectious diseases.

302. The Contractors shall implement their respective SEMP in accordance with its internal health and safety protocols, subject to review and approval by PIU prior to commencement of works. The OHS protocols shall incorporate internationally accepted good practice relevant to the nature and scale of construction activities, including measures addressing risks associated with hazardous materials, working at heights, moving vehicles and machinery, confined spaces, and other construction-related hazards. The plan shall also include specific preventive and response measures for emerging and communicable diseases, and similar public health threats.

303. The Contractor shall ensure that all authorized personnel present at construction sites, including its own workforce, subcontractors, representatives of the implementing agency, supervision consultants, and other approved visitors, are fully informed of applicable site-specific safety rules and procedures. All such personnel shall be provided with, and required to use, appropriate personal protective equipment (PPE), including safety helmets, high visibility clothing, safety footwear, and task-specific protective gear, commensurate with the activities being undertaken. In addition, the Contractor shall implement necessary precautionary measures to minimize health risks related to infectious diseases, including worker health screening where applicable, hygiene and sanitation provisions, physical distancing measures as required, and awareness briefings. These measures are intended to protect workers and site visitors, ensure compliance with national regulations and ADB safeguard requirements, and reduce the risk of occupational accidents, injuries, and disease transmission during subproject implementation.

304. In particular, the Contractors shall implement the following mitigation measures:

- (i) appoint full-time EHS officer per contract requirement;
- (ii) All relevant provisions of the Bangladesh Labor Law and relevant WHO guidelines will be adhered to, concerning the provision of adequate measures to avoid contracting and/or spreading diseases during construction phase;
- (iii) Follow international best practices on occupational health and safety such as those in Section 4.2 of World Bank EHS Guidelines on Construction and Decommissioning Activities,²⁸ which include the following elements, whichever are applicable:
 - a. Communication and Training
 - i Training of all workers on occupational health and safety prior to construction works;
 - ii Conduct of daily toolbox talks;
 - iii Conduct of orientation to visitors on health and safety procedures at work site;
 - iv Signages strategically installed to identify all areas at work site, including hazard or danger areas;
 - v Proper labeling of equipment and containers at construction and storage sites; and
 - vi Suitable arrangements to cater for emergencies, including: first aid equipment; personnel trained to administer first aid; communication with, and transport to, the nearest hospital with an accident / emergency department; monitoring equipment; rescue equipment; firefighting equipment; and
 - vii communication with nearest fire brigade station;
 - b. Physical Hazards
 - i. Use of personal protective equipment (PPE) by all workers such as earplugs, safety shoes, hard hats, masks, goggles, etc. as applicable, and ensure these are used properly;
 - ii. Avoidance of slips and falls through good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths, cleaning up excessive waste debris and liquid spills regularly, locating electrical cords and ropes in common areas and marked corridors, and use of slip retardant footwear;
 - iii. Use of bracing or trench shoring on deep excavation works;
 - iv. Adequate lighting in dark working areas and areas with night works;

²⁸ IFC World Bank Group. 2007. [*Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning.*](#)

- v. Rotating and moving equipment inspected and tested prior to use during construction works. These shall be parked at designated areas and operated by qualified and trained operators only;
 - vi. Specific site traffic rules and routes in place and known to all personnel, workers, drivers, and equipment operators; and
 - vii. Use of air pollution source equipment and vehicles that are well maintained and with valid permits;
- c. General Facility Design and Operation
- i. Regular checking of integrity of workplace structures to avoid collapse or failure;
 - ii. Ensuring workplace can withstand severe weather conditions;
 - iii. Enough workspaces available for workers, including exit routes during emergencies;
 - iv. Fire precautions and firefighting equipment installed;
 - v. First aid stations and kits are available. Trained personnel should always be available who can provide first aid measures to victims of accidents;
 - vi. Secured storage areas for chemicals and other hazardous and flammable substances are installed and ensure access is limited to authorized personnel only;
 - vii. Good working environment temperature maintained;
 - viii. Worker camps and work sites provided with housekeeping facilities, such as separate toilets for male and female workers, drinking water supply, wash and bathing water, rest areas, and other lavatory and worker welfare facilities; and
 - ix. Maintain records and make reports concerning health, safety and welfare of persons, and damage to property. Take remedial action to prevent any recurrence of accidents that may occur.
- (iv) Provide regular health check-ups, sanitation and hygiene, health care, and control of diseases for the workforce;
 - (v) Provide at cost all labor and materials and construct/install and maintain site safety, hard barricading, flexible green net, signboards, and lightings throughout the construction site;
 - (vi) Launch awareness programs concerning human trafficking and the possibility of spread of sexually transmitted diseases (STDs) and HIV/AIDS using brochures, posters, and signboards;
 - (vii) Make available ambulance facility at the construction site and camp site, if any;
 - (viii) Compensation for the loss of life (a zero tolerance to loss of life policy should be developed and implemented) or for any type of injuries; and
 - (ix) Provide insurance to the workers. Health and safety training for all site personnel is very important and must be mandatory.

305. The PMSC and PIU can issue immediate stop-work instructions where there is imminent danger to workers or the public. Stop-work triggers include, but not be limited to: unprotected or unbarricaded open trenches; excavation deeper than 1 m without shoring where soil conditions require support; work at height without fall protection; energized electrical hazards; absence of PPE for high-risk activities; unsafe lifting operations; unsafe traffic control; chemical storage without secondary containment; uncontrolled fuel or chemical spills; and work near schools, hospitals, or dense pedestrian areas without approved traffic and access controls. Work will resume only after corrective action is verified.

306. Serious incidents, including fatalities, lost-time injuries, major spills, fires, structural collapse, electric shock, or significant community accidents, will be reported to PMU and ADB within 48 hours. A root-cause analysis and corrective action plan shall be submitted within 7 days.

13. Impact on Local Festivals and Cultural Practices

307. For various times of the year, festivals, rituals, and cultural practices are held within and around the subproject area. Construction activities may disturb the organization of these festivals.

103. **Mitigation.** Contractors follow the festival calendar to avoid impact upon local festivals. Construction works need to be avoided or minimized during the festivals. If excavation works or construction works have been done but remain unrestored approaching a certain festivity, alternative access to temples, shrines, and other important sites must be considered or set up. For resuming construction works after the festivities or festivals, Contractors shall duly inform the affected community people.

14. Cumulative Impacts of 1,080 km Distribution Works

308. **Impact.** The construction of approximately 1,080 km of distribution and secondary mains across four urban local bodies may create cumulative impacts beyond individual workfronts. These include repeated traffic disruption, restricted access to homes and businesses, dust, noise, open trenches, utility disruptions, spoil stockpiling, market disruption, reduced pedestrian safety, and community fatigue. The impact may be particularly significant in dense areas of Cumilla City Corporation and Chandpur, near markets, hospitals, schools, mosques, transport nodes, and narrow urban roads.

309. **Mitigation.** The contractor will prepare a workfront sequencing and impact management plan. The plan will: (i) divide the network works into manageable DMA/ward-based workfronts; (ii) limit the maximum length of open trench at any one time; (iii) require same-day backfilling or temporary safe covering wherever feasible; (iv) prohibit simultaneous closure of parallel access routes; (v) maintain pedestrian and emergency vehicle access at all times; (vi) coordinate with schools, hospitals, markets, transport operators, and religious institutions; (vii) provide at least 48–72 hours' advance public notice before works; (viii) require rapid reinstatement of roads and access points; and (ix) review grievances weekly to identify cumulative hotspots. If complaints or incidents increase in a ward or DMA, the contractor will slow or resequence works and implement corrective measures before opening additional workfronts.

G. Anticipated Impacts and Mitigation Measures During Post-Construction Phase

310. **Impact.** The activities of the subproject will result in sorts of construction and demolition of debris waste after the construction period. These include excess spoils that were generated at the end of the construction period, various scraps from distribution pipelaying, and PTW and storage tank rehabilitation works, debris from demolition of structures in the temporary facilities such as workers and storage camps, etc. Due to the volume and hazardous nature of some of these wastes, indiscriminate disposal or ignoring their proper disposal could be dangerous to the environment and the people in the vicinity of the subproject sites.

311. **Mitigation.** Immediately within one week after construction phase, the Contractor shall collect all the wastes at the different sites and implement the following. Contractor may opt to outsource this to qualified entities in the subproject area, if Contractor's EHS personnel strictly supervise the cradle-to-grave management of all these wastes. All costs related to management of these wastes shall be borne by the Contractor, or as per agreement in the contract documents.

- (i) Segregate or sort all wastes according to nature (recyclable, non-recyclable, hazardous, non-hazardous or any combination);
- (ii) Ensure to handover (or sell as the case may be) recyclable wastes to authorized recycling entities in Bangladesh. Contractor shall coordinate this action with DPHE through the PMU;
- (iii) Ensure to dispose non-recyclable and non-hazardous waste to appropriate disposal sites. These may be collected, transported, and disposed similar to how solid waste in the city is managed. Thus, Contractor shall coordinate with DPHE through the PMU in this regard;
- (iv) Ensure to transport and dispose hazardous wastes using authorized hazardous waste transporters and treaters in Bangladesh. Contractor shall coordinate all actions for these wastes with DPHE through the PMU; and
- (v) Ensure the sites are cleared with all wastes disposed accordingly, and compliance with this measure shall be included as one of the conditions for payment to the Contractor.

H. Anticipated Impacts and Mitigation Measures During Operation Phase

312. Anticipated impacts of subproject during operation and maintenance (O&M) will be related to repair of leaks, pipe bursts, and pipe replacement. These are likely to be not significant, as proper design and selection of good quality pipe material shall mean that leaks are minimal. However, any repair work may still create impacts on both the environment and the people, such as those related to increasing noise levels in repair sites, and risks of accidents to community people and workers during repairs.

313. **Mitigation.** DPHE shall develop an O&M Manual that should be followed by PIUs on managing the water supply and sanitation facilities. Include in the O&M Manual the following measures during maintenance works:

- (i) The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. Recurrence of pipe bursts and leakage problems can be managed by leak detection, rectification, and water

auditing surveys. The operator of the facility will be required to ensure that the leak detection and rectification time is minimized;²⁹ and

- (ii) For any excavation works related to these O&M issues, the methodologies and protocols developed for the construction phase shall be strictly followed;
- (iii) Noise abatement measures developed for the construction phase shall be strictly followed; and
- (iv) All relevant and applicable community and occupational health and safety measures developed for the construction phase shall be strictly followed.

1. Chemical handling and disinfection safety

314. **Impacts.** SWTP rehabilitation and operation will involve storage, handling, dosing, and transport of treatment chemicals such as alum/coagulants and chlorine-based disinfectants. Poor chemical storage, incompatible chemical handling, lack of spill containment, poor ventilation, inadequate PPE, or untrained operators may cause worker exposure, accidental releases, corrosion, unsafe dosing, or interruption of disinfection.

315. **Mitigation.** Each SWTP shall prepare and implement a chemical management and disinfection SOP before commissioning. The SOP will include: (i) inventory and safety data sheets for all chemicals; (ii) bunded, ventilated, labeled, and access-controlled chemical storage areas; (iii) segregation of incompatible chemicals; (iv) PPE requirements; (v) spill kits and emergency showers/eyewash where appropriate; (vi) dosing calibration and recordkeeping; (vii) routine residual chlorine monitoring at plant outlet and distribution points; (viii) emergency response for spills, over-dosing, under-dosing, and accidental exposure; and (ix) operator training and certification records. Liquid hypochlorite systems, where used, shall be protected from heat and sunlight and shall be regularly checked for concentration loss.

2. Sanitation facilities and fecal sludge management

316. **Impacts.** The construction of household twin-pit latrines and public toilets in Hajiganj will improve sanitation access but may create localized environmental and public-health risks if facilities are poorly sited, poorly designed, not flood-resilient, or not linked to safe emptying and final disposal. Potential risks include contamination of shallow groundwater, seepage to nearby drains or ponds, overflow during monsoon flooding or waterlogging, odor, vector breeding, unsafe manual emptying, uncontrolled fecal sludge disposal, and inadequate O&M of public toilets. These risks are significant in Bangladesh secondary towns where fecal sludge management services are often incomplete and where on-site sanitation systems may discharge to drains or open land.

317. **Mitigation.** Before construction, the PIU and contractor shall prepare a sanitation siting and FSM checklist³⁰ for each public toilet and representative household latrine locations. The checklist shall verify: (i) land ownership and no involuntary displacement; (ii) flood and waterlogging risk; (iii) groundwater depth and separation distance; (iv) minimum distance from drinking-water wells, ponds, drains, and watercourses; (v) soil permeability and need for lining; (vi) safe access for desludging equipment; (vii) gender-responsive and disability-inclusive design;

²⁹ DPHE should ensure that this concern is given attention during the detailed design. DPHE should ensure that the Contractors undertake checking and validation of structural integrity of the subproject components, during detailed design stage and prior to construction.

³⁰ <https://documents1.worldbank.org/curated/en/393701536909036591/pdf/Revised-Final-EMF-DPHE-BMWSSP-30-07-18-R.pdf>

(viii) lighting, security, and MHM waste arrangements for public toilets; (ix) handwashing and water supply; (x) drainage and greywater management; and (xi) identification of a lawful fecal sludge collection, transport, treatment, or disposal route. Public toilets shall not be commissioned until an O&M arrangement, cleaning schedule, desludging plan, responsible operator, tariff/fee arrangement, and GRM signage are in place.

318. The residents will be the major beneficiaries of the improved water supply system and sanitation, as they will be provided with a constant supply of better-quality water into their homes at the appropriate pressure, and the provision of sanitation facilities such as public toilets. The subproject will improve the overall health condition of the target areas in the city as water borne diseases will be reduced, so people would spend less on healthcare and lose fewer working days due to illness, thus improving their overall health, economic status, and better quality of life. This will also improve the environment in these areas.

3. Distribution-system water safety and residual chlorine

319. **Impacts.** The main operation-phase environmental and public-health risk is delivery of unsafe water due to treatment failure, inadequate disinfection, intermittent pressure, intrusion through leaking pipes, cross-connections, storage contamination, or weak monitoring. Baseline conditions indicate intermittent supply, aging networks, leakage, and microbial contamination risks. If distribution-system integrity is not maintained, improved treatment at source may not translate into safe water at consumer points.

320. **Mitigation.** DPHE and the utility operators will prepare and implement a water safety and O&M plan before commissioning. The plan shall include: (i) raw-water, treated-water, and consumer-point monitoring; (ii) minimum residual chlorine targets at plant outlet and network extremities; (iii) turbidity and microbiological performance targets; (iv) flushing and disinfection of new pipelines before commissioning; (v) pressure management to reduce intrusion risks; (vi) leak detection and repair time targets; (vii) sanitary inspection of PTWs, OHTs, reservoirs, and public standposts; (viii) emergency response for contamination events; and (ix) public notification protocols for boil-water advisories or supply interruptions.

VI. CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM

A. Consultation and Information Disclosure

321. Meaningful stakeholder consultation and participation are integral parts of the subproject preparation and devising implementation process. Consultation and participation will ensure that information is provided, and feedback is obtained and considered in the implementation of the subproject. Affected persons will be consulted at various stages of subproject preparation to ensure: (i) incorporation of views/concerns of affected persons, particularly the vulnerable, on environmental impacts and mitigation measures; (ii) identification of any help required by affected persons during rehabilitation; and (iii) avoidance of potential conflicts for smooth subproject implementation. ADB SPS requires consultation to begin early, continue during implementation, be free of intimidation, gender-inclusive, and responsive to vulnerable groups.

322. Meaningful consultation will also provide adequate opportunities for participation of all stakeholders and inclusion of the vulnerable in subproject process. This is also the avenue where relevant information on any major changes to the subproject will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders.

1. Objective and Purpose

323. The objectives of the consultations are to inform the project-affected people about the subproject, the present status of environmental, social and ecological condition in the area, potential impacts of the proposed subproject, suggested measures to mitigate these impacts, and at the same time to seek other possible solutions to these impacts from them. The consultations are also an avenue to reduce conflict through the early identification of controversial issues about the subproject and work with the stakeholders to find acceptable solutions; increase public confidence about the proponent, reviewers and decision makers, and develop a proposal which is truly sustainable which will be integrated into the subproject design.

2. Identification of Stakeholder

324. Stakeholders' identification is critical exercise to mapping who has a vested interest in, or will be impacted by, the CTWSSP. Identifying these individuals or groups early allows project managers to secure crucial buy-in, anticipate risks, avoid costly delays, and tailor communication to ensure long-term, sustainable success. The stakeholder identification process also helps devise participation and engagement of the players with the subproject at various phases of project life. Main stakeholders of the CTWSSP, particularly for Cumilla cluster, are the CuCC, and the Paurashavas of Laksam, Hajiganj and Chandpur, DPHE offices at the district and upazila level, and consumers and beneficiaries of the project. Stakeholders also may include various offices like local leaders, schools, hospitals, community leaders and residents who help plan to regulate and deliver services.

325. The main stakeholders who have a lot of influence and interest in the CTWSSP with respect to environmental and social impact identification and mitigation measures are:

- (i) Government institutions like the CuCC and the Paurashavas of Chandpur, Hajiganj and Laksam; and the DPHE offices in Cumilla, Laksam, Hajiganj and Chandpur.

- (ii) Regulatory bodies like the Department of Environment (DOE).
- (iii) Development partners and donors like the Asian Development Bank (ADB).
- (iv) The people who are directly affected by the proposed project, like local consumers, like households of the cluster towns.
- (v) The commercial entities (markets, shops, etc.), service sectors (hotel, restaurants, transport hubs, etc.) and community institutions (hospital, schools, mosque, madrasa, shrines, *mandir*, temple, etc.).
- (vi) NGOs involved with water supply and sanitation, and hygiene related community awareness activities.

3. Summary of Consultations Conducted

326. Four stakeholder meetings with the officials and staff of four cluster towns composed of Cumilla City Corporation and Laksam, Hajiganj and Chandpur Paurashava – to collect feedback on existing water supply and sanitation services, as well as to identify potential environmental and social impacts associated with the proposed subproject. The people of the four clusters towns were engaged in the project through organizing 25 consultation meetings which were conducted by the environmental and social safeguards team. The stakeholder meetings were organized with proper notices at the city corporation and Paurashava offices, while the public consultation meetings were arranged at short notice at various water supply infrastructure operating sites of each cluster town and involved local people. However, a formal environmental public consultation meeting was also organized with participation of Paurashava staff, DPHE and residents from various wards of Hajiganj Paurashava on 3 June 2026 at Hajiganj Paurashava to identify potential environmental impacts and discussing appropriate mitigation measures. During the meeting, participants were informed about the proposed subproject activities and the likely inconveniences, disturbances, and temporary hardships that nearby communities might experience during the construction phase. Findings from both stakeholder and public consultations highlighted several common concerns, issues, and expectations as stated below.

- (i) Inadequate and Unreliable Water Supply. Community members consistently reported that the existing water supply system is insufficient to meet daily household demand. Many areas do not receive continuous water supply, and several households remain outside the existing service coverage despite applying for new connections. Seasonal shortages further worsen the situation, particularly during dry periods.
- (ii) Low Water Pressure and Uneven Distribution. Low water pressure was identified as a major concern in most consultation areas, especially households located at the tail-end of the distribution network. The weak flow limits access to sufficient water and affects regular household activities.
- (iii) Poor Water Quality and Health Concerns. Participants repeatedly expressed concern regarding poor water quality, commonly due to excessive concentration of iron in supplied water, which was explained as dirty, turbid, and discolored. Communities also feared contamination of arsenic and other pollutants, creating significant public health concerns.
- (iv) Old and Damaged Distribution Network and Poor Functioning Infrastructures. The existing pipeline network was widely described as old, weak, fragile, and poorly maintained. Frequent leakages were reported, which not only reduces supply efficiency but also allows external contamination to enter the system. Delayed repair and poor maintenance practices were also highlighted.

- (v) **Excessive Indirect Costs.** Supplying poor quality water, particularly high concentration of iron in the supplied water frequently chokes water pipelines and causing maintenance 3-4 times of the year. This may incur an additional 2000-4000 Tk annually for households. Also, poor quality water increases skin problems and other waterborne diseases that lead to additional healthcare costs of the people. Many participants mentioned that despite insufficient or even 'no supply', authorities are charging as per their billing policy. Consequently, water users are paying for services that are either inadequate or unavailable.
- (vi) **Disproportionate Pressure of Female Family Members.** In areas without household water connections, women spend considerable time fetching water from neighboring sources or public hydrants. Waterborne diseases on any family member resulting from unsafe water increase women's caregiving responsibilities and stress. While construction-related environmental impacts will affect all community members equally, temporary disruptions such as excavated roads may create greater mobility challenges for women. The subproject may create limited employment opportunities for women in workers' camps, although participation in core construction activities is unlikely.
- (vii) **Need for Improved Sanitation Awareness.** Many community members demonstrated limited knowledge regarding improved sanitation systems, sewerage management, and waste management practices. Participants emphasized the need for community awareness and hygiene promotion programs alongside infrastructure development.
- (viii) **Positive Community Support for the Project.** Despite existing hardships and anticipated temporary inconvenience during construction, the majority of participants expressed strong support for the proposed subproject. Communities acknowledged the long-term benefits of improved water supply and sanitation services and showed willingness to cooperate during implementation.

327. Overall, the consultation meetings reflected strong public demand for improved, reliable, and safe water supply services. Communities demonstrated positive attitudes toward the proposed project and expressed readiness to tolerate temporary construction-related disturbances in anticipation of long-term benefits. At the same time, stakeholders emphasized the importance of ensuring proper mitigation of environmental and social impacts, timely implementation, fair compensation, improved maintenance systems, and inclusive community engagement throughout project execution.

4. Follow up Consultations³¹

328. The social safeguards team conducted 18 public consultation meetings across the Cumilla cluster towns. The consultations revealed findings similar to those of the environmental team regarding water supply and sanitation conditions, water quality, service coverage, improvement potential, and community perceptions of development-related inconveniences. Key social impact observations included:

- (i) **Temporary livelihood and access disruptions.** Construction activities may temporarily affect squatters, small vendors, CNG drivers, and roadside businesses due to restricted access, traffic congestion, and reduced customer flow.

³¹ Consultations conducted with support from the social safeguards team of the subproject.

- Participants stressed the need for appropriate mitigation and support measures for faster completion of construction activities.
- (ii) Demand for local employment. Community members expressed strong interest in project-related jobs and requested priority employment opportunities for local skilled and unskilled workers.
 - (iii) Land acquisition and compensation. Affected landowners generally supported the project and were willing to cooperate with land acquisition for public benefit, provided that fair compensation and adequate assistance are ensured in line with government regulations and resettlement policies.

5. Information Disclosure

329. Subproject information was disclosed through the different consultations organized by the DPHE, city corporation, and the involved *Paurashavas*. The ADB and the DPHE, as an executing agency, will disclose the IEE report more formally by making written documents and other materials in suitable form and at locations which can be easily accessed by the stakeholders. This also includes drafting summary reports in the local language and posted at public locations in municipality/ *Paurashava* wards and important public areas of cluster towns. The aim is to provide wider reach and means for the receipt of comments from the public. All documents will be disclosed on ADB and DPHE websites.

330. This draft IEE and EMP will be disclosed for stakeholder review during project preparation. The final ADB-cleared IEE and EMP, and any updated IEE or revised EMP prepared due to material³² design changes, scope changes, additional sites, or new impacts, will be disclosed on the ADB and DPHE websites before the start of related civil works. Concurrence from the ADB will be secured before any update in the IEE is undertaken. Copies shall also be made available at the PMU and PIU offices, Cumilla City Corporation, Laksam, Hajiganj, and Chandpur Paurashava offices, and relevant ward offices. Summary information in Bangla shall be prepared and displayed at public locations in the project towns, including municipal and ward offices, public notice boards, contractor site offices, market/community locations, and active worksite boards.

331. The Bangla summary will include, at a minimum, the subproject scope, key anticipated construction impacts, EMP mitigation measures, public safety requirements, construction schedule, affected road or ward sections, traffic diversion and pedestrian access arrangements, utility-interruption notices where relevant, GRM contact persons and complaint channels, and emergency contact details. Construction schedules, road-section work plans, traffic/access arrangements, and any expected utility interruptions will be disclosed locally at least 7 days before works commence in a ward, road section, market area, or sensitive receptor location, with a reminder notice at least 48 hours before excavation, traffic diversion, access restriction, or service interruption.

332. During implementation, semi-annual environmental monitoring reports, corrective action updates, and non-confidential summaries of grievance trends and resolution status shall be disclosed through the ADB and DPHE websites and, where relevant, through local offices and

³² An IEE will be updated whenever the approved or detailed design, site conditions, construction methodology, implementation arrangements, associated facilities, baseline conditions, or environmental risk profile differs materially from what was assessed in the original IEE. **An update is required where such changes may introduce new impacts, increase the significance of previously assessed impacts, affect the adequacy of the EMP, require additional consultation or disclosure, or trigger additional requirements from ADB or regulatory authorities.** The updated IEE and EMP will be reviewed, cleared, and disclosed before commencement of the related works or activities.

public notice boards. Corrective action updates shall be disclosed promptly were non-compliance, incidents, unresolved grievances, or changes in construction methods or schedules may affect communities. Public disclosure of grievances and corrective actions shall protect complainant confidentiality and shall not disclose personal identities or sensitive information.

B. Future Consultations and Communication Plan

333. Meaningful consultations with stakeholders will continue throughout subproject implementation as necessary to address issues related to environmental assessment. The consultation process will continue and expand during the subproject implementation to ensure stakeholders participate fully in subproject execution, as well as to implement a comprehensive information, education, and communication plan.

334. For the benefit of the community, the IEE report will be made available at (i) offices of executing and implementing agencies, (ii) municipality and ward offices; and (iii) Contractors' offices at their respective subproject sites. It will be ensured that the hard copies of the IEE report are kept at places which are conveniently accessible to people, to disclose the document and at the same time creating wider public awareness. An electronic version of the IEE report will be placed on the official website of DPHE and the ADB website after clearance of the IEE by ADB. Moreover, all semi-annual environmental monitoring reports during subproject implementation will be available at both DPHE and ADB websites.

335. Future consultation and disclosure activities shall include the following:

(i) Consultations During Construction Phase

- a. Public meetings with affected communities to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and
- b. Small group meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and to provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation.

(ii) Information Disclosure

- a. Public information campaigns (via newspaper, flyers, and media) to explain the subproject to the wider population of the subproject area and prepare them for disruptions they may experience once construction activities are underway;
- b. Public disclosure meetings at key project stages to inform the public of progress and plans , and to provide copies of summary documents in local language;
- c. Formal disclosure of completed subproject reports by making copies available at convenient locations in the subproject area, and informing the public of their availability; and
- d. Providing a mechanism through which comments can be made.

C. Grievance Redress Mechanism

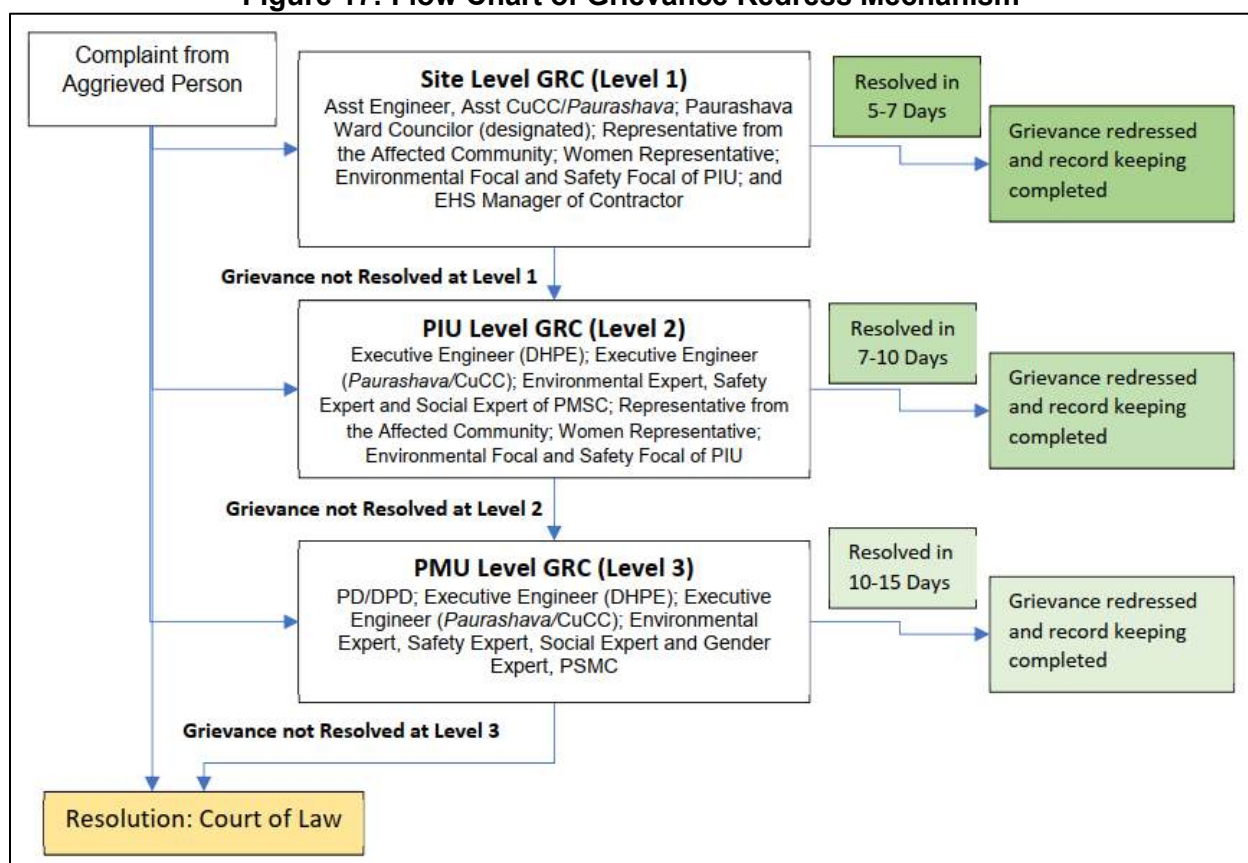
336. A common GRM will be in place to redress social, environmental or any other project related grievances. The GRM has been developed in consultation with the stakeholders. As per

this, affected persons will have the flexibility of conveying grievances/suggestions at various levels depending on the nature of the grievance. The GRM shall provide for a time-bound and transparent mechanism to redress them. The aim of GRM is to provide an accessible, inclusive, gender-sensitive and culturally appropriate platform for receiving and facilitating resolution of affected persons' grievances related to the project. A three-tier GRM is proposed: one, at the field/site level, second at the PIU Level and the third at the PMU Level.

- (i) **Site Level GRM (Level 1):** In case of grievances that are immediate and urgent in the perception of the complaint, concerned officer of PIU will direct the contractor³³ to resolve the complaint and ensure that it is resolved. The contractor in discussion with the Assistant Engineer, DPHE, representative from Paurashava/City Corporation as nominated, will make efforts to resolve the complaint at the site level. Efforts will be made to resolve all grievance within 5-7 days from the date of receipt of a complaint/grievance. If the grievance is not at the field/site level, then it will be escalated to second level.
- (ii) **PIU Level GRM (Level 2):** Grievances that can't be redressed at first level within 5-7 days will be brought to the notice of PIU. The head of the respective PIU will try to resolve the grievance/complaint within a timeframe of 7-10 days of receiving the complaint from the first level with the support of Social/Environmental Safeguard Officers, PIU, Paurashava/City Corporation Ward Councilor where the project will be implemented can be consulted as and when required. Any unresolved complaint at the second level will be taken up to the third level.
- (iii) **PMU Level GRM (Level 3):** All grievances that can't be redressed within 10-15 days at PIU level will be brought up to the PMU level. The PMU safeguards team will refer any unresolved/ major issues to the PMU level grievance redress team, that headed by the Project Director/ Deputy Project Director of PMU will resolve the complaints/grievance within 15 days.

³³ Contractors are the frontline for construction impacts and complaints. Contractors will serve as community liaison focal point to provide site boards, work schedule disclosure, complaint log, daily communication with affected shops/households, and reporting to PIU/PMSC.

Figure 17: Flow Chart of Grievance Redress Mechanism



337. Documentation shall be an important part of the GRM. Under this, the name of the complainant, date of receipt of the complaint, address/contact details of the person, nature of grievance, and location of problem area, and later details of resolution of grievance shall be recorded. Depending on the complexity of the grievance, the PIU/PMU with support from the PMSC Consultants will be required to undertake follow-up activities and periodic information dissemination to complainants on the status of their grievance and recording their feedback (satisfaction/dissatisfaction and suggestions).

338. A public awareness campaign will be conducted to ensure that awareness on the project, GR Mechanism and grievance redress procedures is created. The campaign will specifically ensure that the poor, vulnerable and others are made aware of grievance redress procedures. The contractor supports GRM implementation and may assign staff internally, but the overall responsibility for staffing and oversight of the GRM system rests with the PMU/DPHE.

339. **ADB Accountability Mechanism.** If the established GRM cannot resolve a grievance, the affected person can also use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer at ADB headquarters or the ADB Bangladesh Resident Mission (BRM). Before submitting a complaint to the Accountability Mechanism, affected/aggrieved person/s should make a good faith effort to solve the problem by working with the concerned ADB operations department and/or BRM. Only after doing that, and if they are still dissatisfied, will the Accountability Mechanism consider the complaint eligible for review.³⁴ The

³⁴ Accountability Mechanism. <http://www.adb.org/Accountability-Mechanism/default.asp>.

complaint can be submitted in any of the official languages of ADB's developing member countries. The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

340. **Consultation arrangements and information dissemination.** Proposed GRM will adopt a consultative and participatory approach to grievance resolution which in cases may require one-to-one consultation with individual complainant or the aggrieved community. Further, project implementation agencies and the PIU/DPHE and supervision consultants will be responsible for dissemination to affected persons on grievance redressal procedure and ensuring that host community are assisted to understand the grievance redress process as well as for encouraging them to register complaints. Adequate consultations/ meetings/public awareness campaign will be conducted to achieve this objective. Information on grievances received, and responses provided will be documented and reported back to the affected people. The number of grievances recorded, resolved and the outcomes will be displayed/disclosed on notice boards at PIU/DPHE offices, concerned *Paurashava* office notice boards and on the web. All grievances will be treated with utmost confidentiality and identity of complainant will not be disclosed. A Sample Grievance Registration Form is provided in Appendix 5.

341. **Record Keeping.** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were taken, and outcome will be maintained by the PIU (with the support of PIU/DPHE and supervision consultant) and submitted to DPHE. As part of record keeping and reporting practice, information will also be maintained on grievance tracking. Grievance reporting by PIUs at their respective levels will provide information both for the reporting period and a cumulative grievance redress tracking data (on select parameters such as total grievances received, redressed, pending etc. i.e., cumulative information on these parameters from project start). Summarized information will be included as part of periodic reporting by PIUs (with support from consultants) to ADB. The grievance monitoring indicator will include number received, acknowledged, resolved, pending, overdue, average closure time, repeat complaints, SEAH complaints handled confidentially, and corrective actions closed.

342. **Periodic review and documentation of lessons learned.** DPHE will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the DPHE's ability to prevent and address grievances.

343. **Costs.** Contractors are required to allocate budget for pamphlets and billboards as part of the EMP. All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the DPHE and/or PIUs.

344. **Sexual Exploitation, Abuse and Harassment (SEAH).** The project will adopt the SEAH Good Practice Note (GPN) to address risks of SEAH in ADB-financed operations with a specific focus on sovereign projects with civil works.³⁵ The reporting requirements and grievance redressal mechanism of the government (for SEAH) will be fully adhered by DPHE, the project consultants and works contractors, in line with the national legislation framework of the Government of Bangladesh.

345. In case a SEAH in workplace related complaint is received, the following process will be followed: (i) each PIU will nominate a senior staff as SEAH Manager (Focal Person); (ii) all project entities (PIU staff, consultants, contractors) can access the GRM for SEAH in workplace

³⁵ ADB. 2023. [The Good Practice Note on Addressing Sexual Exploitation, Abuse, and Harassment in ADB-Financed Projects with Civil Works](#). Manila.

complaints; (iii) the project GRC members will be trained to handle SEAH in workplace complaints and on the requirements and processes as per GoB law. The first level and project GRC will include at least one female member each; (iv) the SEAH Manager will explain to the complainant the provisions of the law and the actions taken / proposed to be taken by the GRC; and (v) the complainant is free to approach the national legal system, in line with national law.

346. Anonymous and Confidential Complaints. The grievance redress mechanism will accept complaints submitted with or without the complainant's name and contact details. The grievance form allows complainants to provide their name, address, telephone number, and other contact information, but submission of these details is not mandatory. Anonymous complaints will be accepted, recorded in the grievance register, screened, investigated, and acted upon to the extent possible. The absence of a complainant's identity or contact information will not be used as a reason to refuse registration or assessment of a complaint.

347. Where a complaint is submitted anonymously, the contractor, PIU, PMU, and relevant grievance redress body will still assess the nature, location, urgency, and potential risk associated with the complaint. If the complaint relates to an active construction site, unsafe excavation, blocked access, traffic hazard, dust, noise, utility disruption, water-quality concern, sanitation facility issue, worker behavior, or other project-related impact, the responsible party will verify the issue through site inspection, consultation with affected persons where appropriate, review of site records, and coordination with the contractor and relevant local authority. Corrective actions will be recorded and reported in the grievance register and semi-annual environmental monitoring reports, even where the complainant cannot be directly informed of the outcome.

348. All complainant information will be treated as confidential. The identity, contact details, address, occupation, household information, or other identifying details of a complainant shall not be disclosed to contractors, community members, local authorities, project staff, or any third party except where: (i) the complainant provides informed consent; (ii) disclosure is required by law; or (iii) disclosure is strictly necessary to resolve the complaint and has been agreed with the complainant. Public reporting of grievances will use aggregated and anonymized information only and will not disclose personal identities or information that could reasonably identify a complainant.

349. Confidential handling is particularly important for sensitive complaints, including complaints related to sexual exploitation, abuse and harassment, worker misconduct, labor issues, intimidation, retaliation, discrimination, access restrictions affecting vulnerable persons, sanitation-related privacy concerns, or complaints involving fear of reprisal. Such complaints will be handled through restricted-access procedures by designated and trained focal persons. Records of sensitive complaints shall be stored securely, access shall be limited to authorized personnel only, and any reporting to the PMU, ADB, or other parties shall use anonymized information unless the complainant has consented to disclosure.

350. The project will prohibit retaliation against any person who submits a complaint, assists another person to submit a complaint, participates in grievance investigation, or raises concerns about project-related impacts. Contractors, PIUs, PMU, and grievance redress committee members shall ensure that complainants are not subject to intimidation, harassment, discrimination, loss of access, denial of service, or adverse treatment because of using the GRM. Any allegation of retaliation will be treated as a serious complaint and escalated promptly to the PIU and PMU for investigation and corrective action.

351. For non-anonymous complaints, acknowledgment, updates, resolution proposals, and closure confirmation will be communicated directly to the complainant using the preferred contact

method indicated in the grievance form. For anonymous complaints, closure will be documented through the grievance register, site inspection records, corrective action reports, worksite notices where appropriate, and reporting in SEMRs. Where an anonymous complaint raises a community-wide issue, the resolution may also be communicated through public notice boards, ward-level updates, contractor site boards, or community meetings without disclosing any personal information.

352. The grievance register will include fields to indicate whether a complaint is anonymous, confidential, sensitive, or subject to restricted access. The register will record the date received, location, issue category, urgency, responsible party, action taken, date of resolution, and closure status. Personal identifying information, where provided, will be kept separately or protected from general disclosure. The PMU and PIUs will monitor the number and type of anonymous and confidential complaints as part of GRM performance monitoring and will report only anonymized and aggregated grievance information in SEMRs.

VII. ENVIRONMENTAL MANAGEMENT PLAN

A. Purpose

353. The purpose of this EMP is to provide a framework that outlines how DPHE, other implementing units, and any Contractor appointed will manage and where practicable, minimize negative environmental effects during the design, construction and operation of the proposed subproject. Construction is considered to include all site preparation, enabling works, demolition, materials delivery, materials and waste removal, construction activities and associated engineering works.

354. This EMP identifies the minimum requirements about the appropriate mitigation, monitoring, inspection and reporting mechanisms that need to be implemented throughout design, construction and operation periods of the project. Compliance with this EMP does not absolve the contractors or their subcontractors (during construction phase) from compliance with all laws, rules and regulations applicable during construction phase and operation phase activities.

B. Approach

355. This EMP provides a framework to:

- (i) Describe the subproject for environmental management during design, construction and operation phases;
- (ii) Implement those monitoring and mitigation measures identified in this IEE;
- (iii) Outline the principles and minimum standards required of the contractors during the development of their respective site-specific EMPs (SEMPs);
- (iv) Identify the relevant roles and responsibilities for developing, implementing, maintaining and monitoring environmental management; and
- (v) Outline the procedures for communicating and reporting on environmental aspects of the proposed subproject throughout all phases of subproject implementation.

C. Institutional Arrangement

1. Overall Project Implementation Arrangement

356. The Department of Public Health Engineering (DPHE) on behalf of the Government of Bangladesh, will be the Borrower for the project. DPHE will be the executing agency (EA) of the project which will also act as the implementing agency responsible for designs, procurement, and contract management. A project steering committee will be established at the Local Government Division, which will serve as the oversight body of the project. A project management unit (PMU) will be established in DPHE to perform the project management function for the proposed project and provide support to all implementing agencies. Project implementation units (PIUs) will be established at each selected city corporation and Paurashavas. The overall implementation arrangement of the project is summarized in the following table.

Table 42: Overall Implementation Arrangements

Aspects	Arrangements
Implementation period	January 2027–December 2031
Estimated completion date	31 December 2031
Estimated loan closing date	30 June 2032
Management	
(i) Oversight body	Project steering committee at LGD, MLGRDC Chair: Senior secretary/secretary, LGD, MLGRDC Members: (i) Director general, LGD (ii) Additional secretary (water supply), LGD (iii) Chief engineer, DPHE (iv) Representative of Finance Division (v) Representative of Economic Relations Division (vi) Joint chief, Physical Infrastructure Division, Planning Commission (vii) Joint secretary (planning), LGD (viii) Joint secretary (water supply), LGD (ix) Representative of Executive Committee of the National Economic Council and Coordination Wing of the Planning Division (x) Representative of General Economic Division, Planning Commission (xi) Representative of Implementation Monitoring and Evaluation Division, Planning Commission (xii) Representative of the Programming Division, Planning Commission (xiii) Project director, Cluster Towns Water Supply and Sanitation Project, DPHE (xiv) Senior assistant secretary/deputy secretary (Planning Section-2), LGD (member-secretary)
(ii) Executing agency	DPHE
(iii) Key implementing agency	Cumilla city corporation and the Paurashavas of Haziganj, Chandpur, Laksam, Ishwardi, Pabna, Natore, and Gopalpur. <u>DPHE will implement consulting services, goods, and works packages under Paurashavas in coordination with above IAs.</u>
(iv) Implementation unit	Project management unit (DPHE, Dhaka); project implementation units: Cumilla city corporation and the Paurashavas of Haziganj, Chandpur, Laksam, Ishwardi, Pabna, Natore, and Gopalpur

ADB = Asian Development Bank; DPHE = Department of Public Health Engineering; LGD = Local Government Division; MLGRDC = Ministry of Local Government, Rural Development, and Cooperatives.

2. Environmental Safeguards

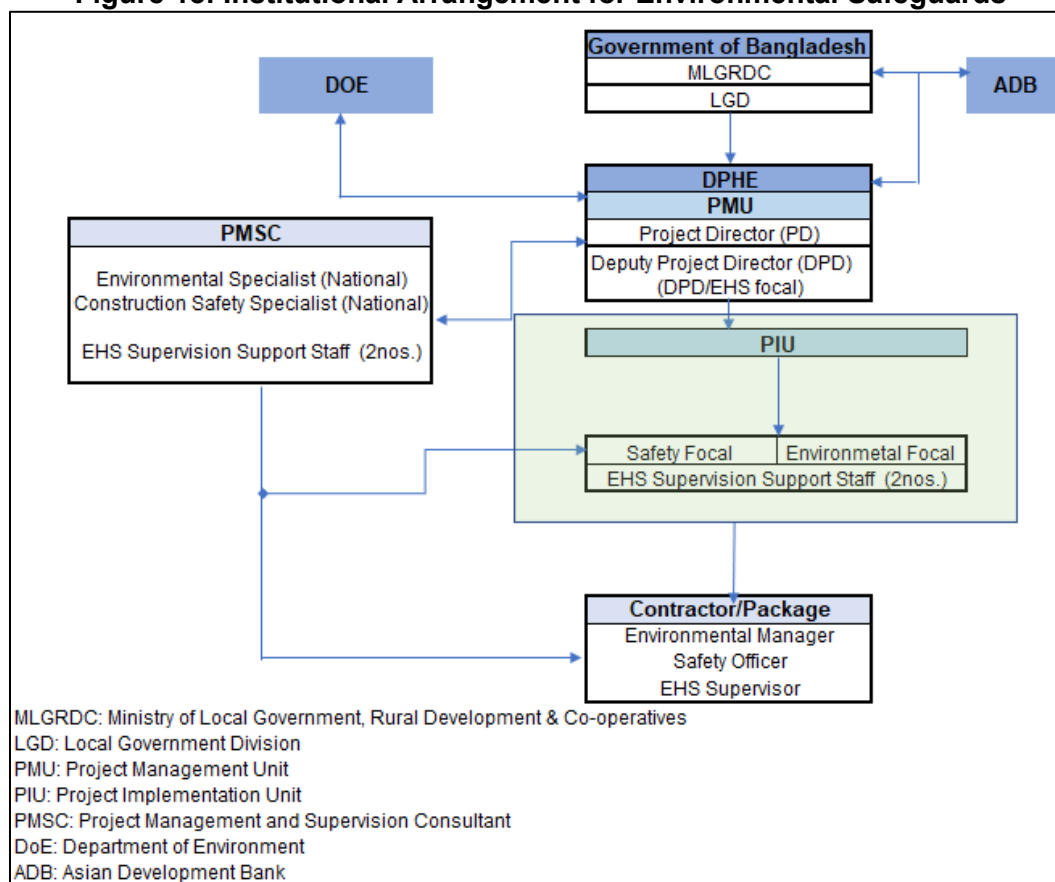
357. DPHE agreed to assign adequate staff and consultants to oversee the project performance, environmental and social safeguards, and financial management compliance. The PMU will have staff such as project director, environment specialist, health and safety specialist, social specialist, procurement specialist, and financial specialist. Consultants may also be recruited by DPHE to support PMU functions.

358. For the subproject covered by this IEE, Cumilla City Corporation (or Cumilla WASA, if applicable) and at the Paurashavas of Laksam, Hajiganj and Chandpur will be the PIUs. PIU staff members will include 1-environmental safeguards focal, 1-safety focal, and 2-EHS supervision support staff.

359. Project management and supervision consultant (PMSC) (firm) will support the PMU and PIUs in implementing the project.

360. For the implementation of environmental safeguards, concerned staff from PMU and PIUs will work together with support from PMSC. The roles and responsibilities of these key players are defined below. An overall diagram showing the implementation arrangement for environmental safeguards under the project is depicted in the following figure.

Figure 18: Institutional Arrangement for Environmental Safeguards



361. **Project Management Unit (PMU).** The PMU, established within the DPHE and led by a Project Director, will be responsible for the overall planning, management, coordination, supervision, and progress monitoring of the project. The PMU will be supported by a Deputy Project Director, who will serve as the EHS focal point and lead the implementation of environmental safeguards. With the support of the Project Management and Supervision Consultant, the PMU will be responsible for the following environmental safeguard functions:

- (i) ensure project compliance with government requirements and ADB SPS;
- (ii) establish a system to ensure environmental safeguards compliance with the project, including monitoring and reporting formats used by project implementation unit (PIU), consultants, and contractors;
- (iii) ensure that the draft IEE reports are included in the bidding and contract documents;
- (iv) ensure bidding and contract documents include specific provisions requiring contractors to comply with (i) all applicable labor laws and core labor standards on

- (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the subproject site;
- (v) review and confirm draft IEE reports are finalized by the PMSC based on final detailed designs;
- (vi) ensure that no civil work commences until the corresponding final IEE report is cleared by ADB;
- (vii) review and provide recommendations on the approval of SEMP of the contractors;
- (viii) provide oversight on environmental management aspects of the projects, and ensure the SEMP and EMPs are implemented by the contractors;
- (ix) establish a system to monitor environmental safeguards of the subprojects including monitoring the indicators set out in the monitoring plans of the EMPs;
- (x) facilitate and confirm overall compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements as relevant;
- (xi) review, monitor and evaluate effectiveness with which the SEMP and EMPs are implemented, and recommend necessary corrective actions to be taken;
- (xii) with support from design and supervision consultants, consolidate monthly environmental monitoring reports from the contractors and submit semi-annual environmental monitoring reports to ADB;
- (xiii) ensure timely disclosure of documents (IEE report and monitoring reports) in project website and in a form understandable and accessible to the public;
- (xiv) address any grievances brought about through the GRM in a timely manner;
- (xv) undertake regular review of safeguards-related loan covenants, and the compliance during program implementation; and
- (xvi) with support from PMSC, organize periodic capacity building and training programs on safeguards for DPHE, PIU, supervising engineers, and contractors.

362. **Project Implementation Unit (PIU).** A PIU will be established at each City Corporation and Paurashava under the guidance of the PMU, jointly constituted by DPHE and the City Corporation/Paurashava. The PIU will serve as the field-level entity responsible for implementing the EMP and occupational health and safety (OHS) measures, under the supervision of the DPD/EHS focal of PMU, and with support from PMSC specialists. Each PIU will designate environmental and safety focal points from the City Corporation/Paurashava and DPHE, respectively, and engage EHS support staff for field implementation and supervision. In addition to overseeing subproject execution, the PIU will ensure compliance with environmental and social safeguards, and manage stakeholder engagement and grievance redress.

363. **Roles and responsibilities of PIU Safety Focal:**

- (i) with the support of PMSC, establish and maintain overall project's health and safety systems, promote safe work culture, establish industry specific health and safety performance indicators, and assist safety committee in performance reviews, and follow up actions;
- (ii) ensure the subprojects comply with all relevant national laws, rules, and regulations on health and safety;

- (iii) ensure the bidding and contract documents require contractors to develop or prepare appropriate health and safety management plan following internationally best practices and/or safety standards in water supply infrastructure projects, including the mandatory requirement to employ qualified and experienced health and safety officers; and
- (iv) with support from the PMSC health and safety experts, lead the following:
 - a. review of health and safety management plans prepared by contractors;
 - b. supervise and monitor the health and safety management plan implementation in subprojects;
 - c. provide training to relevant staff, contractors, and workers on health and safety at the workplace, including emergency preparedness;
 - d. ensure that contractors have their corresponding health and safety management plans approved by PMU and in place prior to commencement of works; and
 - e. any other tasks may be necessary to ensure all community and occupational health, and safety measures are always implemented in the project.

364. Roles and responsibilities of PIU Environmental Focal:

- (i) overseeing environmental management aspects of the project and ensuring effective implementation of the EMP by contractors;
- (ii) establishing and maintaining a system to monitor environmental safeguards, including indicators specified in the EMP monitoring plan;
- (iii) facilitating and ensuring compliance with all applicable government rules and regulations related to environmental clearances and site approvals;
- (iv) reviewing, monitoring, and evaluating the effectiveness of EMP implementation, and recommending corrective actions to the PMSC, as necessary;
- (v) consolidating monthly environmental monitoring reports from the contractors and submitting them to PMSC;
- (vi) maintaining proper documentation and records of environmental safeguards compliance; and
- (vii) addressing grievances received through the Grievance Redress Mechanism (GRM) in a timely manner.

365. **Project Management and Supervision Consultant (PMSC).** The PMSC will support the PMU in project implementation, including review and approval of contractor submissions, construction programs, and work methods; supervision of works; quality assurance; and day-to-day contract management. The PMSC will also oversee the implementation of the EMP and ensure compliance with ADB and government environmental safeguard requirements through document preparation and review, site monitoring, corrective actions, reporting, capacity building, training, consultation, and disclosure. The team will include a National Environmental Specialist, a Construction Safety Specialist, and EHS supervision support staff. Key environmental safeguard responsibilities of the PMSC include, but are not limited to, the following:

- (i) assist PMU and PIU in all environmental safeguard's tasks related to the project to ensure project compliance with ADB SPS and government rules and regulations;
- (ii) assist in developing and adapting standard reporting formats, checklist at levels – contractor, PMSC, PMU, and PIU levels;

- (iii) work closely with PMU and PIU, PMSC and contractor technical teams to ensure that environmental considerations as per EMP are duly considered in the final designs and implementation;
- (iv) identify statutory clearances / permissions / approvals required for the project and assist the PMU and PIU in obtaining the same;
- (v) update the draft IEE and EMP based on the final detailed design;
- (vi) assist in including standards/conditions of regulatory clearances and consents, if any, in the project design, construction and operation;
- (vii) approve environmental monitoring locations (air, noise, etc.,) of the contractor; ensure conduct of baseline and periodic environmental monitoring as per environmental monitoring plan;
- (viii) assist PMU and PIU in reviewing and approving contractor SEMP, health and safety plans, traffic management plans and any other associated plans as required;
- (ix) carry out site verification and monitoring of EMP/SEMP implementation on a regular basis, monitor the implementation of EMPs/SEMPs and ensure compliance;
- (x) provide guidance on resolving issues, if any arise, pertaining to effective and efficient implementation of proposed environmental mitigation measures per EMPs/SEMPs during construction phase. Identify, non-compliance or unanticipated impacts, if any, and initiate corrective actions in consultation with PMU and PIU;
- (xi) assist in public consultations, documentation and include inputs from the public consultation in the project design and EMP, and implementation;
- (xii) assist in disclosing relevant information on safeguards to affected people and relevant stakeholders;
- (xiii) assist the PMU and PIU in the review and approval of monthly monitoring reports submitted by contractor;
- (xiv) assist PMU and PIU in preparing semi-annual environmental monitoring reports (SEMR) for submission to ADB;
- (xv) identify training needs and implement capacity development activities on environmental safeguards for the PMU and PIU, contractors, and other stakeholders.
- (xvi) assist PMU and PIU in establishing GRM for the project;
- (xvii) assist PMU and PIU in grievance redress, advise the contractor on appropriate actions on grievances, ensure timely resolution and proper documentation; and
- (xviii) support all other environmental safeguards-related activities and tasks of the PMU and PIU as may be needed.

366. PMSC's roles and responsibilities in health and safety management:

- (i) establish and maintain overall project's health and safety systems, protocols; project performance through industry specific health and safety indicators; work permit methods and communication structures; expert will be responsible for ensuring safety culture at project sites;
- (ii) ensure work site safety is one key responsibility of PMSC in design, implementation, commissioning, and operation of the project;
- (iii) ensure that the designs assess risks to worker and public safety and specifications are included in the bid documents to mitigate any potential impacts, which should be adequately costed in the bills of quantities. Sufficient competent staff input and qualifications must be included in the bid documents;

- (iv) establish occupational and community health and safety requirements for contractors following provisions of the respective contracts, legal provisions, and project requirements;
- (v) ensure competent staff are appointed by contractors for health and safety tasks. Review and consent to appointment of health and safety related experts/staff proposed to be provided by the contractors as per provision of the contracts;
- (vi) ensure that site-specific health and safety plan is developed and implemented by all contractors in accordance with legal and contractual requirements which must include method statements. Such plan shall be prepared by contractors and be reviewed and approved by PMSC prior to commencement of works;
- (vii) develop and implement a health and safety training program. This should include health and safety orientation for the contractor personnel, and any health and safety designated focal point must be confirmed to have taken the orientation prior to starting their work. The training curriculum should include regular sessions on practical topics over the life of the construction contracts;
- (viii) during the construction, supervise contractors' performance of the works on a day-to-day basis, particularly regarding execution of work as per approved construction methodology ensuring work site safety, safe removal and/or relocation of utilities and compliance with health and safety plan;
- (ix) ensure work site safety, safety of workers, staff and other personnel, road users and communities living around. If PMSC determines that there is a risk and no adequate arrangements for ensuring safety are made or that any work is being carried out in a manner that threatens the safety and/or hampers the progress of the work, PMSC shall notify the contractor concerned on suspension of whole or part of the works for ensuring safety. PMSC shall promptly communicate such notices to the PIU and PMU. The suspension shall be lifted by the PMSC, only upon its determination that the conditions which caused the suspension to have been removed or remedy sufficiently, in the PMSC's professional judgment and following its subsequent inspection of the works;
- (x) plan and ensuring that contractors carry out drills and exercises on managing emergency situations;
- (xi) conduct investigations on accidents and incidents and prepare reports on findings;
- (xii) submit a monthly progress report that includes a section on review of all health and safety aspects during the month including reports on all accidents and actions proposed to prevent further occurrence;
- (xiii) promptly report on any such event which has affected or is likely to affect the work site safety; and
- (xiv) engage with local communities to raise awareness about the project's health and safety impacts. Address community concerns related to project activities.

367. Roles and Responsibilities of Contractors. Contractors shall be responsible for implementing all environmental mitigation and monitoring measures stipulated in the contract and shall undergo safeguards orientation during the pre-construction phase. Each contractor shall appoint a full-time Environmental Manager, Safety Officer, and EHS Supervisor to ensure effective EMP implementation during civil work. Prior to commencement of works, contractors shall prepare and submit a site-specific Environmental Management Plan (SEMP) for PIU and PMU approval, including site layouts, mitigation measures aligned with the approved IEE/EMP, monitoring program, and implementation budget; no works shall commence until approval is obtained. Contractors shall conduct routine monitoring of SEMP implementation, submit monthly reports to the PIU, and always maintain approved EMP/SEMP documents on-site. Any non-compliance or deviation shall trigger corrective actions. The IEE and EMP will form part of the

contract, and contractors shall ensure full compliance, including worker orientation on environmental awareness prior to site deployment. Key responsibilities of contractors' EHS personnel include, but are not limited to, the following:

- (i) prepare SEMP including site-specific occupational health and safety plan and submit to PIU and PMU for approval prior to start of construction;
- (ii) ensure implementation of SEMP and report to PIU and PMU, and/or PMSC on any new or unanticipated impacts;
- (iii) ensure that necessary pre-construction and construction permits are obtained timely;
- (iv) supervise work site safety, and provision and use of personnel protection equipment, among others;
- (v) carry out site inspections on a regular basis and prepare site-inspection checklists and/or reports;
- (vi) record EHS incidents and undertake remedial actions;
- (vii) conduct environmental monitoring (air, noise, among others) as per the monitoring plan;
- (viii) ensure that appropriate worker facilities are provided at the workplace and labor camps as per the contractual provisions;
- (ix) ensure compliance with all applicable laws and regulations relating to EHS;
- (x) ensure compliance with all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; (c) no discrimination in respect of employment and occupation; (d) allow freedom of association and effectively recognize the right to collective bargaining; and (e) elimination of forced labor; and with (f) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites;
- (xi) reinstate pathways, and other local infrastructure etc. to at least their pre-project condition upon the completion of construction;
- (xii) conduct trainings, orientation, and daily briefing sessions to workers on EHS;
- (xiii) prepare monthly EMP monitoring reports and submit to PIU and PMU, and/or PMSC;
- (xiv) provide proper information to communities and ensure communities are aware of project-related impacts, mitigation measures, and GRM;
- (xv) ensure that any complaints and grievances brought about by community and affected persons are received and recorded properly; and
- (xvi) coordinate with the PIU, PMU, and PMSC on any grievances received and ensure that these are addressed in an effective and timely manner.

368. A copy of the EMP/approved SEMP will be always kept on-site during the construction period. Non-compliance with, or any deviation from, the conditions set out in the EMP/SEMP constitutes a failure in compliance and will require corrective actions.

Table 43: The Activities and Responsible agency

Activities	Responsible Agency / Unit
Disclosure of proposed project and anticipated social and environmental impacts on the ADB website	ADB & DPHE
Disclosure of proposed project, social/environmental impacts, and proposed mitigation measures in local languages	DPHE
Disclosure of grievance redress mechanism/process	DPHE, PMU, PIU
Updating of safeguard documents based on detailed design	PMU
Review of updated IEE/EIA and send to ADB for approval before contract award	DPHE PMU
Clearance and disclosure of updated safeguard documents	DPHE, ADB
Acquire required permits, NOC, and clearances	DPHE, PMU, PMSC
Conducting meetings at the community/household level with affected persons (APs)	PMSC, PIU and Contractor
Implementation of mitigation and rehabilitation measures	DPHE, PMU, PMSC, PIU and Contractor
Consultations with APs during rehabilitation activities	PMU, PMSC, PIU Contractor and INGO
Grievance Redressal	GRC, DPHE, PMU, PIU, and Contractor
Internal monitoring	PMU, PIU and PMSC

Table 44: Summary Environmental Impacts and Mitigation Measures

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
DESIGN AND PRE-CONSTRUCTION PHASE					
1	Design consideration of likelihood of natural disasters on the subproject	Impact due to natural hazards and disasters such as earthquakes, including climate change may cause damage of the subproject	- Materials and equipment and machineries to be used should withstand potential stresses during extreme events, temperatures, pressures, etc. - Structural designs of OHT and PTW should comply with relevant good international practice to ensure the structures can withstand earthquakes and future climate-induced events.	DPHE	DPHE
2	Groundwater (GW) abstraction	- Abstraction of GW to meet current and future urban water demand poses a significant sustainability risk - Climate change may impose additional uncertainty to groundwater availability - changes in rainfall intensity and distribution can affect groundwater recharge rates, exacerbate dry season deficits.	- Subproject will adopt a conjunctive use approach to supply both treated surface water as the primary bulk water source, while GW is reserved for supplementary, peak demand, and emergency supply. - Gradual reduction in abstraction of GW will help stabilize groundwater levels and reduce long-term aquifer stress. - Conduct systematic monitoring of groundwater levels and abstraction rates. - Conduct demand-side management measures such as non-revenue water reduction, metering, and water conservation programs. - Adequate study on groundwater abstraction and depletion must be completed prior to	DPHE	DPHE
3	Surface water availability	Climate change may introduce additional uncertainty to surface water availability - higher monsoon flows and frequent extreme events may increase sediment loads and hydraulic stresses on river intakes.	- Careful design, and protection of intake structures along the Meghna-Dakatia river system. - Intake locations will be selected based on detailed hydromorphological assessments to avoid zones prone to excessive erosion, sedimentation, or flood vulnerability. - Engineering measures such as riverbank protection works, sediment exclusion arrangements, and flood-resilient design	DPHE	DPHE

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
			elevations will be incorporated to ensure uninterrupted abstraction during extreme events.		
4	Water quality of groundwater	• Unsustainable groundwater abstraction may impose risk of risk of mobilizing naturally occurring contaminants such as iron, As and, in deeper formations, salinity. • Poor groundwater quality may increase cost of treatment and raise costs for water utilities and consumers, and reduce public confidence in piped water supply systems.	• Plan to use groundwater for short-term only, and preventing over-extraction reduce chance of mobility of Fe, As and other contaminants. • Conduct routine monitoring of groundwater quality to determine concentration of iron, salinity, and other location-specific indicators. • Conduct periodic rehabilitation of PTWs, and, if require, localized treatment to ensure compliance with the national drinking water quality standards. • Ensure data-driven management to support informed decision-making on sustainable abstraction limits.	DPHE	DPHE
5	Water quality of surface water	• Surface water quality at the Meghna-Dakatia system falls within poor to very poor categories based on the Water Quality Index. • Poor quality surface water increases treatment costs, operational risks, and the potential for supply interruptions.	• Impose pollution control, treatment, and watershed management measures for ensure good quality water intake points. • Control pollution control measure for upstream source protection engaging relevant agencies to improve municipal wastewater management, enforce industrial effluent discharge standards, and reduce direct discharge of untreated wastes into rivers. • Adopt robust and flexible surface water treatment processes to cope with seasonal variations in turbidity, microbial contamination, and organic loads.	DPHE	DPHE
6	Impact due to competing use of water	• Although the Meghna-Dakatia river system also supports irrigation, fisheries, navigation, and local domestic uses, the projected abstraction for	• Design team will consider proper siting, intake design, consultation, and operating controls, water abstraction volumes to avoid competing use of water especially during unusually low-flow periods	DPHE	DPHE

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
		Cumilla cluster is unlikely to be impacted even during the dry-season. Potential competition may arise only during localized dry-season low-flow periods, if intake point of the Dakatia river at Hajiganj point is used by the communities or fisheries, or if abstraction structures interfere with navigation, fish movement, or existing riverbank activities.	Ensure grievance redress mechanism functional to address complaints related to water-resource competition or intake operation.		
7	Land subsidence	Long-term continued abstraction of groundwater may pose a potential risk of land subsidence, particularly if additional PTWs are operated as supplementary water sources.	- Conduct hydrological study supported by groundwater modeling to assess and manage this potential impact, providing an evaluation of groundwater availability and abstraction sustainability. - As the subproject is designed, water-supply will shift from heavy reliance on groundwater to conjunctive use, with treated surface water to reduce the risk of land subsidence. - In view of the above, impact due to land subsidence is considered insignificant. No mitigation measure is required.	DPHE	DPHE
8	Salinization / Salt water intrusion	There exists no evidence of salinity in groundwater, despite several decades of groundwater abstraction.	- Ensure continued monitoring of chloride, TDS, and electrical conductivity, particularly during the dry season at wells closest to major river channels to confirm that salinity conditions remain stable as abstraction patterns change under the project. - As the subproject is designed, water-supply will shift from heavy reliance on groundwater to conjunctive use, with treated surface water to	DPHE	DPHE

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
			reduce the risk of saline contamination of the aquifers. No mitigation measure is required.		
9	Disruption of existing utilities and services	Water pipeline network that will pass through roads of the city corporation and <i>Paurashavas</i> cross, intercept and/or align with existing utilities and services. Any damage to these utilities will disrupt the daily lives of the people affected.	- Adopt best options that will result minimum impact to the existing e utilities. - Ensure immediate corrective measures where alignments cannot avoid disrupting the operation of the existing utilities, and this responsibility has to be included in the bidding and contract documents as the mandatory task for Contractors during pre-construction phase to coordinate with relevant authorities. - Ensure minimum interruption on utility and service operation that affected households. - Inform affected communities in advance about possible shutdown of utility service.	DPHE	DPHE
10	Lack of spoil disposal sites	Negative environmental impacts may be caused due to generation significant amounts of spoils during construction phase. Assuming no other uses for excess spoils, their indiscriminate or unmanaged disposal will negatively impact the environment and may also result to other forms of nuisance to surrounding communities wherever these are disposed.	- Ensure dedicated location for disposal of excess spoils that will be generated during the construction phase. - Confirm that the disposal location obtains clearance from relevant government agencies having jurisdiction over such location. - No award of the contract shall be made until disposal location and relevant clearance are obtained.	DPHE	DPHE
11	Tree Removal	There will be no tree removal during Phase-I of the subproject.	No mitigation measures are required	DPHE	DPHE

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
12	Physical Cultural Resources (PCR) (internationally protected and other locally protected cultural heritage sites)	- There is minimum likelihood that existing PCR in the cluster towns will be impacted by the subproject as sites are secured and mostly protected with existing boundary walls, and also apart from the PCR. - Rehabilitation of SWTPs in Hajiganj and Chandpur will not hamper environmental degradation of PCR, as all existing infrastructures are already built and confined with own boundaries.	- Identify all PCRs existing in the cluster towns during preconstruction phase, and any excavation or construction related activities nearby the catchment of these PCR will allow the <i>business-as-usual</i> operations of all PCR. - Adopt specific implementing protocols to stop work immediately if archaeological artifacts are discovered during excavation or horizontal drilling, and alternative protocols will be considered immediately. - Consult, and if necessary, engage local concerned officials from city corporation, <i>Paurashava</i> and DPHE during construction works nearby the PCR.	DPHE	DPHE
13	Approval of Consents, Permits and Clearances	Any delay in the preparation and approval of the IEE/EIA will potentially delay the execution of the subproject.	- Obtain all necessary consents, permits and clearances required from local government bodies prior to the award of contract. - No award of the contract shall be made for a specific package under the subproject until and unless ECC is obtained.	DPHE	DPHE
14	Compliance with ADB Loan Agreement and SPS	EHS, OHS, CHS, and other mitigation measures are often not adequately considered during bid preparation and are therefore not properly costed or incorporated into the contract price leading to insufficient allocation of resources for EMP implementation during construction, increasing the risk of non-compliance with	- EA must ensure that mitigation measures required under the EMP are fully integrated into the bidding and contract documents. - Include (i) clear technical specifications and contract clauses mandating compliance with the EMP, OHS requirements, and all applicable provisions of the ADB SPS as well as relevant government laws and regulations, and (ii) explicit inclusion of the associated costs for EMP and OHS implementation in the Engineer's Estimate and Bills of Quantities, to ensure that such measures are adequately budgeted by bidders.	DPHE	DPHE

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
		safeguard requirements, delayed corrective actions, and potential adverse EHS impacts on local environment.			
15	Contractor mobilization	• Mobilization of contractors' equipment and manpower to the site likely impact baseline site conditions and damage private and public properties, including heritage assets. • Safety of workers and community are likely to be affected due to movements of both workers and construction equipment.	• Upon awarding contract, contractor must undertake all pre-mobilization works to avoid impacts on natural environment and man-made structures. • Ensure no mobilization and civil works unless following items have been complied with: - Conduct consultation with communities - Develop SEMP and get approved by PMU - Develop a Traffic Management Plan and get approved - Develop a Spoil Management Plan and get approved by the PMU - Develop a Health and Safety Plan and get approved by the PMU - Conduct training on excavation method sensitive areas.	DPHE	DPHE
16	Construction camps or workers' accommodation	• Unplanned or poorly managed construction camps may cause environmental degradation and social stress on the host communities. • Potential impacts including pressure on local resources and services could be generated. • Pollution due to unmanaged waste and wastewater leading to increased health and safety risks.	• Make sure construction camps are properly planned, sited, constructed, and managed, and are provided with adequate sanitary and basic living amenities within designated areas. • Provide adequate safe drinking water, sanitation and ablution facilities, proper drainage, solid waste management systems, lighting, ventilation, and cooking and washing areas, as applicable. • Comply with the National Labor Act 2006 and National Labor Rules 2015 as well as relevant provisions of the International Labour Organization (ILO) Workers' Housing Standards. • Worker camps shall be designed and constructed to ensure structural safety and reasonable standards of decency, hygiene, health, and comfort, and construction materials shall be	Contractor	DPHE

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
		Emergence of adverse interactions between workers and surrounding communities.	durable and appropriate to local environmental conditions, taking into consideration potential risks such as flooding, waterlogging, cyclones, and landslides.		
CONSTRUCTION AND POST-CONSTRUCTION PHASE					
1	Sourcing of construction materials	Extraction of construction materials (cement, sand, aggregates) can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	- Minimize use of non-renewable resources and rock-based materials in construction activities. - Purchase/source construction materials, including aggregates, etc., from legitimate suppliers authorized by the government - Maintain a construction material register at the site.	Contractor	PMU with support from PMSC
2	Topography and Aesthetics	Subproject activities, such as excavation, pipelaying and other construction works will affect the topography and aesthetics at the sites due to accumulation of unmanaged spoils and construction debris.	- Avoid storing spoils at the vicinity of excavation or construction sites for a long period of time. - Dispose only in the designated disposal areas identified under the subproject. - Use spoils for beneficial purposes, such as reuse in other construction activities, or to raise the level of low-lying areas. - Ensure disposal areas are utilized up to their capacity limit only, and if necessary, utilize another designated disposal area approved under the subproject.	Contractor	PMU with support from PMSC
3	Surface Water Quality	Excavation and construction activities may result to accidental spills of chemicals and siltation that could threaten or further deteriorate the quality of receiving bodies of water nearby the sites.	- Dispose excess spoils only in the designated disposal areas identified under the subproject; - Avoid storing spoils at the vicinity of site for a long period of time. - Use spoils for beneficial purposes, such as reuse in other construction activities, or to raise the level of low-lying areas. - Ensure proper compaction of refilled soil and ensure no loose soil particles on the top	Contractor	PMU with support from PMSC

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
			• Silt traps to be provided at construction area near receiving bodies of water. • No equipment or machinery shall be operated outside the work areas. • Avoid spillage of fuels, chemicals and lubricants. • Ensure that drains are not blocked with excavated soil. • Locate stockyards away from canals or receiving bodies of water. • Provide treatment arrangements such as retention ponds and septic tanks for workers camps. • Prepare and get approval of a sewage management plan by the PMU. • Clean up of the area after the completion and prior to the onset of monsoon season. • Undertake earthworks during dry season, avoid monsoon as much as possible.		
4	Groundwater quality	• Groundwater resource can be contaminated due to seepage of liquid wastes and chemicals from the workers 'camps.	• In addition to the mitigation measures described to prevent impact to surface waters, Contractors will need to implement the following measures: • Store fuel, oil and other chemicals in secure, managed areas with lined impervious floors and bunded with 110% by volume; • Ensure refueling area has lining to avoid seepage of unavoidable spills during refueling. Ensure to clean up spills immediately and all used cleaning materials are disposed properly; • Ensure to provide portable toilets in all construction camps to discourage injecting septic wastes on land; • Conduct ground water quality monitoring, particularly at sites near fuel depot or refueling site and construction camps.	Contractor	PMU with support from PMSC

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
5	Ambient Air Quality	- Excavation and construction activities will result to generation of dust that could remain airborne within and around the subproject sites. - Increase of vehicular emission during operation of construction heavy equipment and vehicles. - The dust and emissions are significant factors that could degrade the ambient air quality in the area, which in turn affect the general well-being of the residents.	- Use water sprays and minimize hauling and vehicle movements during windy times of the day or night; - Cover hauling equipment such as dump trucks during transport of materials or spoils; - Provide temporary barriers or covers around active site excavation areas; - Limit vehicles speed at work site enough to not cause vigorous suspension of dust; - Prohibit idling of heavy equipment or vehicles for a long time; - Regular maintenance of heavy equipment and vehicles to ensure compliance with national vehicle emissions standards; - Prohibit burning of any liquid or solid wastes; - Conduct regular visual inspections to identify and address other potential sources of dust emissions; and - Conduct ambient air quality monitoring at selected locations at least quarterly.	Contractor	PMU with support from PMSC
6	Noise and Vibration	- Excavation and construction activities will result to generation of noise that could disturb the construction workers, staff, and community people. - Use of machinery for excavation and compaction will result to vibration that may damage sensitive and old structures at the subproject sites.	- Provide prior information of the scheduled works to nearby residents; - Use silencers for all equipment; - Where possible, avoid delivery of raw construction materials during night time; - Avoid noise-intensive activities at night time; - Avoid horns near sensitive receptors; - Minimize drop heights during delivery and stacking of raw construction materials; - Use sound barriers to lessen the noise from sites; - Maintain maximum of noise level of 45 dB(A) at the nearest residence relative to the specific worksites; - Conduct noise level monitoring at least quarterly;	Contractor	PMU with support from PMSC

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
			• Use generator set complies with the noise standards; and • Ensure generator set has acoustic enclosure and silencer (if necessary) in the exhaust muffler.		
7	Overground Physical Cultural Resources	• Avoid protected cultural heritage sites and PCRs during the design phase. • Locally important PCRs, including mosques, temples, etc. are still found in some alignments. • The foundation of PCR located close proximity to the alignments may be directly impacted due to vibration, or collapse of excavated trench.	• Excavation shall be avoided during rainy days along the subproject area. • Apply shoring for excavation of more than 1m depth or depending on site condition to avoid any sort of collapse and maintaining safety of lives and property. • Install proper barricade and signage boards during excavation to avoid access of unauthorized person into the construction site. • Place shoring in each excavated trench along the alignment. • Avoid storing excavated material along the excavated trench.	Contractor	PMU with support from PMSC
8	Underground Physical Cultural Resources	• Bangladesh is home to many old and ancient structures and there is a possibility that chance finds such as underground relics or structures considered as physical cultural resource (PCR) will be encountered and impacted during excavation at the subproject sites.	As a precautionary approach, the subproject will need to strictly implement the following chance finds protocol: • require to coordinate immediately with DPHE, PIU and Bangladesh Department of Archaeology for any suspicion of chance finds during excavation works; • Stop work immediately to allow further investigation if any finds are suspected; and • Request authorized person from the Bangladesh Department of Archaeology to observe when excavation resumes for the identification of the potential chance finds, and comply with further instructions.	Contractor	PMU with support from PMSC
9	Community Health and Safety	• Inadequate site control and unrestricted access may allow pedestrians, children, livestock, and other community members	• Appoint full-time EHS officer to monitor health-safety issues; • Install warning signs, warning tapes, hard barricades, and notices around the work site perimeter to avoid unauthorized entry.	Contractor	PMU with support from PMSC

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
		to enter active work areas leading to accident. - In addition, unprotected trenches and excavated areas may pose a risk of accidental falls for both community members and animals, particularly during nighttime or poor visibility conditions. - There is also a risk of transmission of communicable diseases to communities due to interactions between Contractors' staff, construction workers, and local residents.	- For excavated sections that cannot be isolated or enclosed due to access issues for the community or residents, ensure to cover these with steel planks or durable wood planks during off-work hours. - If during work hours that these excavated sections, especially the deep trenches, cannot be covered entirely, provide steel planks or durable wood planks with handrails that can be used by pedestrians; - Install sturdy fence around storage camps or yards and workers' camps; - Assign fulltime (24x7) guards around the subproject sites; - Illuminate all subproject site, including storage camps or yards and workers' camps; - Follow International best practices on community health and safety such as those in Section 4.3 of World Bank Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities; - Follow the established community and occupational health and safety protocol on emerging infectious diseases; - Schedule transport and hauling activities by avoiding peak traffic periods; - Clean wheels and undercarriage of haul trucks prior to leaving construction sites; - Educate drivers and advice to limit speed between 20-25 km/h while traversing settlement areas and avoid use of horn unless necessary to prevent accidents; and - Earmark parking place for construction equipment and vehicles when idling; no parking shall be allowed on the roads.		
10	Occupational Health and Safety	Construction workers may be exposed to health risks and safety hazards	Implement health and safety protocols approved by PMU.	Contractor	PMU with support from PMSC

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
		arising from the storage, handling, and transportation of hazardous materials, including fuels, chemicals, and construction materials. - Workers are also vulnerable to accidents associated with moving vehicles, heavy machinery, lifting operations, excavation works, and other construction-related activities at active worksites. - Workers may be exposed to excessive level of environmental pollution during construction, including dust emissions, exhaust fumes from vehicles and construction equipment, and excessive noise, which may cause respiratory illnesses, hearing impairment, and other adverse health effects if not properly controlled. - Extended working hours, inadequate rest periods, and high work intensity may further increase the risk of accidents and injuries due to worker fatigue, reduced alertness, and human error.	- Ensure implementation of approved SEMP in accordance with its internal health and safety protocols. - Adopt internally acceptable OHS plan including specific preventive and response measures for emerging and communicable diseases, and similar public health threats. - Allow only authorized personnel present at construction sites and they must be fully informed of applicable site-specific safety rules and procedures. - Provide with, and required to use, appropriate personal protective equipment (PPE) that commensurate with the activities being undertaken. - Ensure implementation of necessary precautionary measures to minimize health risks related to infectious diseases, including worker health screening where applicable, hygiene and sanitation provisions, physical distancing measures as required, and awareness briefings. - Comply with all relevant provisions of the Bangladesh Labor Law and relevant WHO guidelines concerning the provision of adequate measures to avoid contracting and/or spreading diseases during construction phase. - Follow international best practices on occupational health and safety such as those in Section 4.2 of World Bank EHS Guidelines on Construction and Decommissioning Activities,		

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
		- Outbreaks of diseases and other public health threats, may pose serious risks to worker health and safety. - High occupancy density, shared facilities, and potentially inadequate hygiene and sanitation conditions may elevate risk of disease transmission.			
11	Local Festivals and Cultural Practices	Construction activities may disturb festivals, rituals and cultural practices that are held within and around the subproject area various of the year.	- Follow festival calendar, if possible, to avoid or minimize construction works during the festivals. - Set up an alternative access to mosque, temples, shrines, or any other important sites, if there exists any unrestored construction site but approaching a festivity. - Contractors shall duly inform the affected community people for resumption of construction works after the festivities or festival.	Contractor	PMU with support from PMSC
12	Clearing Construction Sites	The subproject will result to sorts of construction and demolition debris including excess spoils, various scraps from distribution pipelaying, and PTW and storage tank rehabilitation works, debris from demolition of temporary structures (e.g. workers and storage camps, etc.) may impose risk to environment and the people in the vicinity of the subproject sites through indiscriminate disposal or ignoring their proper disposal.	- Ensure removal of all wastes at the different sites within one week after construction works are completed. - Segregate or sort all wastes according to nature (recyclable, non-recyclable, hazardous, non-hazardous or any combination). - Ensure to handover (or sell as the case may be) recyclable wastes to authorized recycling entities in Bangladesh in consultation with the PMU. - Ensure to dispose non-recyclable and non-hazardous wastes to appropriate disposal sites. - Ensure to transport and dispose hazardous wastes using authorized hazardous waste transporters and treaters in Bangladesh. - Ensure the sites are cleared with all wastes disposed accordingly, and compliance with this	Contractor	PMU with support from PMSC

No.	Activities/Risks	Potential Environmental Impacts	Measures to Mitigate Impacts	Implementing Responsibility	Supervision Responsibility
			measure shall be included as one of the conditions for payment to the Contractor.		
OPERATION PHASE					
1	Operation and Maintenance	- There will be insignificant risks anticipated during operation and maintenance (O&M), including repair of leaks, pipe bursts, and pipe replacement, as the subproject will deploy proper design and selection of good quality pipe material having strong resistance against leaks. - There would be necessity of repair works that may create impacts to both environment and the people, such as those related to increase of noise level in repair sites, and risks of accidents to community people and workers during repairs.	- Develop an O&M Manual that should be followed by PIUs on managing the water supply and sanitation facilities, including following measures during maintenance works: - The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. The operator of the facility will be required to ensure that the leak detection and rectification time is minimized; - For any excavation works related to these O&M issues, the methodologies and protocols developed for the construction phase shall be strictly followed; - Noise abatement measures developed for the construction phase shall be strictly followed; - All relevant and applicable community and occupational health and safety measures developed for the construction phase shall be strictly followed.	Utility Operator (CuCC, and Paurashavas)	DPHE /PMU/City Corporation/ Paurashava
2	SWTP sludge/backwash management	Untreated backwash/sludge discharge, water pollution, odor, worker exposure.	Residuals management facilities, no untreated discharge, sludge drying/disposal plan, effluent monitoring	Contractor during rehabilitation; utility operator during O&M.	

D. Capacity Building

369. To ensure effective implementation, supervision, and monitoring of the EMP, it is essential that all key implementation stakeholders possess adequate institutional capacity, technical knowledge, and awareness of the requirements of the ADB SPS and applicable national environmental laws, rules, and regulations of the Government of Bangladesh. The Environmental Specialist of the Supervision Consultant will take the lead role in strengthening the capacity of key stakeholders, particularly the PMU in the DPHE and PIUs in participating municipalities or *Paurashavas*, through targeted training, on-the-job guidance, and technical assistance throughout subproject implementation.

370. The proposed capacity-building program will focus on strengthening awareness, skills, and institutional arrangements for environmental management and compliance. The program will include, but not be limited to, the following key components:

- (i) Sensitization and awareness raising of PMU staff and other relevant stakeholders on environmental management principles, including the requirements of ADB SPS and applicable national environmental legislation, rules, and standards;
- (ii) Capacity development interventions to enhance the capability of environmental personnel at all levels to effectively implement, supervise, and monitor EMP mitigation measures and environmental performance of contractors; and
- (iii) Specialized training programs on key environmental issues relevant to the subproject, including asbestos management, PCR management, environmental monitoring, reporting, compliance verification, and quality monitoring.

371. The Supervision Consultant's Environmental Specialist will provide both basic and specialized training tailored to the nature of the subproject and the roles and responsibilities of participating institutions. Initial training will focus on general environmental awareness and safeguard requirements, followed by technical modules related specifically to infrastructure improvement works and their environmental implications. Training modules will be customized based on an assessment of the existing skill levels of participants and the specific requirements of the subproject. Overall, the training program will cover the fundamental principles of environmental assessment and management, EMP and mitigation planning, implementation techniques, environmental monitoring methods, reporting requirements, and use of relevant tools and checklists. An indicative capacity-building and training program, including proposed frequency of sessions, is presented in the table below.

Table 45: Training Modules for Environmental Management

Program	Description	Participants	Form of Training	Duration	Trainer /Agency
Introduction and sensitization to environment issues	Sensitization on Environmental concerns Environmental impacts of water supply projects Environmental regulations of the Government	PMU and PIU engineers / management team, officials responsible for implementing the subproject, and other DPHE Officials and	Workshop	One-day workshop during construction	Supervision Consultant Environmental Specialist

Program	Description	Participants	Form of Training	Duration	Trainer /Agency
	and ADB environmental regulations Coordination between departments for implementation of environmental issues.	PMU Environmental Safeguards Officer Contractors			
Subproject training on hazards, health, safety and environmental issues pertaining to the subproject	Sensitization and training for engineering and management professionals, to be involved in on-site execution and operation of the proposed distribution network and sanitation facility. Special training on handling and disposal of asbestos-containing materials such as asbestos cement pipes.	PMU and PIU engineers/ Management Team, PMU Environmental Safeguards Officer Contractors	Workshops , site visits	Two days before and during construction	Supervision Consultant Environment Specialist and Health and Safety Specialist Asbestos Expert (may be hired by the Supervision Consultant as resource person during the preparation of ACM Management Plan and training)
EMP implementation	Implementation of EMP Identification of environment impacts Monitoring and reporting for EMP Public interactions and consultations Coordination for consents with various departments	PMU and PIU engineers, officials responsible for implementing the subproject, and other DPHE and PIU Staff Contractors	Lectures and field visit	Two-day session at construction stage	Supervision Consultant Environment Specialist

Program	Description	Participants	Form of Training	Duration	Trainer /Agency
	Monitoring formats, filling and review of impacts				

VIII. MONITORING AND REPORTING

372. PMU will monitor the progress of EMP implementation. The PMU and PIUs, with support from Supervision Consultant, will undertake site inspections and document review to verify compliance with the EMP and progress toward the outcome. The Contractor will conduct day-to-day implementation of the SEMP.

373. The Contractors will submit their respective monthly reports to the PIU. The monthly reports will include a compilation of copies of monitoring sheets accomplished and duly signed by the Contractors' EHS officers (or equivalent) daily. A sample daily monitoring sheet which can be used by the Contractors is in Appendix 2. This monitoring sheet is indicative, which can be further enhanced depending on the actual situations at construction sites.

374. PMU, with support from Supervision Consultant, shall also conduct its own monitoring activities consistent with the indicators in the EMP to confirm that all environmental safeguard measures are properly implemented at the subproject sites. A sample monitoring sheet which can be used by PMU and Supervision Consultant is in Appendix 3. Similarly, this monitoring sheet is indicative which can be further enhanced depending on the actual situations and other needs of information during the implementation phase.

375. PMU, with support from Supervision Consultant, shall consolidate its own findings with the reports from the Contractors. Based on consolidated information, PMU shall accomplish semi-annual environmental monitoring reports (SEMRs), which shall be submitted to ADB for review and disclosure on ADB website. Submission of SEMR will continue until ADB issues a Project Completion Report. The template for the SEMR is attached as Appendix 4.

376. ADB will carry out the following monitoring actions to supervise the subproject:

- (i) On a need basis, conduct visits when potential adverse environmental or social impact exists;
- (ii) Conduct supervision missions with detailed review by ADB's environment/social safeguard specialists and/or officers and/or consultants for components with adverse environmental and social impacts;
- (iii) Review the SEMRs submitted by PMU to ensure that adverse impacts and risks are mitigated as planned in the EMP;
- (iv) Work with PMU to rectify to the extent possible any failures to comply with its environmental safeguard commitments, as covenanted in the loan agreement and elaborated in all environmental safeguard documents; and formulate and implement a corrective action plan to re-establish compliance as appropriate; and

- (v) Prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.

377. ADB's monitoring and supervision activities are carried out on an on-going basis until a project completion report is issued. ADB issues completion report within 1-2 years after the project is physically completed and in operation.

Table 46: Environmental Quality Monitoring Plan^a

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards	Responsibility	
						Implementation	Monitoring
1. Design / Pre-Construction Phases							
1.1	Air Quality Sampling	PM2.5, PM10, SOx, NOx, CO	Subproject sites (PTWs, OHTs, distribution network alignments)	At least once for each site	National Ambient Air Quality Standards	Contractor or through a nationally recognized laboratory sourced by Contractor	PMU, PIU, Supervision Consultant
1.2	Noise Level Measurement	Sensitive receptors and workfront baseline mapping	Schools, hospitals, mosques, markets, transport nodes, PCRs, drains, water bodies, road crossings, railway crossings, utility crossings, and high pedestrian-use areas	Once before SEMP approval and updated before each active workfront	Approved IEE, EMP, SEMP,	Contractor or through a nationally recognized laboratory sourced by Contractor	PMU, PIU, Supervision Consultant
		Noise levels at daytime and night time in dBA	Subproject sites (PTWs, OHTs, distribution network alignments)	At least once for each site	National Noise Level Standards		
1.3	Surface Water Quality (Dakatia river used as raw water source for the water supply)	BOD, TSS, oil and grease, fecal coliform	Upstream and downstream of river relative to the locations of the subproject sites	At least once	National Standard for Inland Surface water	Contractor or through a nationally recognized laboratory sourced by Contractor	PMU, PIU, Supervision Consultant
1.4	Groundwater quality (for construction and drinking purposes)	Groundwater level, All drinking water quality standards	Subproject sites (PTWs, OHTs, near sites used for fuel depot, construction camps, and all sites utilizing groundwater)	At least once for each site	National Drinking Water Quality Standard	Contractor or through a nationally recognized laboratory sourced by Contractor	PMU, PIU, Supervision Consultant
2. Construction Phase							
2.4	Air Quality Sampling	PM2.5, PM10, SOx, NOx, CO	Subproject sites (active construction areas)	At least once every six months throughout the construction period.	National Ambient Air Quality Standards	Contractor or through a nationally recognized	PMU, PIU, Supervision Consultant

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards	Responsibility	
						Implementation	Monitoring
						laboratory sourced by Contractor	
2.5	Noise Level Measurement	Daytime and nighttime LAeq dBA vibration observations /complaints; condition survey records near fragile structures/PCRs	Subproject sites and vicinities (relative to active construction areas) Active construction workfronts, nearest houses, schools, hospitals, mosques, markets, PCRs, OHT construction sites, HDD/open-cut locations, and camps	At least once every six months with daytime and night time readings, throughout the construction period additional monitoring during peak noisy works, night works, works near sensitive receptors, or after complaints.	National Noise Level Standards; WHO/WBG EHS Guidelines where relevant; approved SEMP	Contractor or through a nationally recognized laboratory sourced by Contractor	PMU, PIU, Supervision Consultant
2.6	Groundwater quality near construction risk areas	pH, EC, TDS, chloride, arsenic, iron, manganese, fecal coliform, total coliform, oil and grease, and groundwater level where relevant, Groundwater level,	PTW sites, fuel/chemical storage areas, refueling points, construction camps, sanitation works, and any construction water supply wells	At least once every six months throughout the construction period immediately after major spill, suspected contamination, or complaint	Bangladesh National Drinking Water Quality Standards; baseline values; spill response plan	Contractor or through a nationally recognized laboratory sourced by Contractor	PMU, PIU, Supervision Consultant
2.7	Surface water and drainage quality during construction	pH, DO, BOD, COD, turbidity, TSS, oil and grease, fecal coliform, total coliform; visual siltation, drainage blockage, and spill observations	Upstream and downstream of river/drain/khal crossings, SWTP sites, Dakatia River near Chandpur and Hajiganj works, and drainage channels near active workfronts	At least once in six months At least once every six months; before and after high-risk river/drain crossing works; after spills, visible pollution, or complaints	Bangladesh Inland Surface Water Standards; ECR 2023; approved SEMP/spill response plan	Contractor or through a nationally recognized laboratory sourced by Contractor	PMU, PIU, Supervision Consultant
2.8	Spoil, waste, and drainage	Spoil volume, reuse/disposal records, approved disposal site use, stockpile protection, drain blockage, sediment	Active workfronts, spoil stockpiles, disposal sites, camps, SWTP/PTW/OHT sites, public toilet	Weekly site inspection by Contractor; monthly verification by PMSC; after heavy rainfall	Approved Spoil Management Plan, Waste Management Plan, SEMP, ECR 2023, Solid Waste	Contractor	PMU, PIU, PMSC

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards	Responsibility	
						Implementation	Monitoring
		control, hazardous waste segregation, waste transfer notes	sites, and drainage channels		Management Rules 2021		
2.9	Chemical, fuel, and hazardous materials	Inventory, SDS availability, labeling, secondary containment, spill kits, training records, spill incidents, disposal records	Fuel depots, chemical storage areas, SWTP rehabilitation sites, refueling points, camps, and maintenance areas	Weekly inspection; immediate reporting after spill or incident	Approved Spill Prevention and Response Plan, SEMP, national requirements, GIIP	Contractor	PMU, PIU, PMSC
3.0	Community health and safety at active workfronts	Barricading, signage, night lighting, trench covers/bridges, pedestrian access, emergency access, traffic controls, speed limits, complaint records, incidents and near misses	Active pipeline workfronts, markets, schools, hospitals, mosques, transport nodes, narrow roads, OHT sites, PTW sites, SWTP sites	Daily by Contractor; weekly by PIU/PMSC; immediately after incident or complaint	Approved CHS Plan, Traffic Management Plan, SEMP, WBG EHS Guidelines	Contractor	PMU, PIU, PMSC
3.1	Aquatic ecology and fisheries protection	Evidence of in-river works, spoil/chemical discharge, turbidity plume, fish mortality, dolphin/fisheries incident reports, consultation with Department of Fisheries where relevant	Dakatia River, Meghna-Dakatia influenced areas, SWTP sites, river/drain crossings, intake-adjacent works	Before and during river-adjacent works; after any incident/complaint; at least semi-annually	Approved EMP/SEMP; Department of Fisheries requirements where applicable; no untreated discharge requirement	Contractor	PMU, PIU, PMSC
3.2	Cumulative construction impact monitoring	Number and length of open workfronts, simultaneous road closures, access restrictions, unresolved grievances, traffic delays, repeated complaints, reinstatement delays	DMA/ward-based workfronts across Cumilla, Laksam, Hajiganj, and Chandpur	Weekly during pipeline construction; monthly review of cumulative hotspots	Approved workfront sequencing plan, traffic management plan, stakeholder communication plan, GRM records	Contractor	PMU, PIU, PMSC
3. Operation Phase							
3.1	Air Quality Sampling	PM2.5, PM10, SOx, NOx, CO	Subproject sites and vicinity where O&M is being undertaken	As needed	National Ambient Air Quality Standards	DPHE/PMU/PIU or through a nationally	DPHE, PIU, Supervision

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards	Responsibility	
						Implementation	Monitoring
						recognized laboratory sourced by operator	Consultant (if still onboard)
3.2	Noise Level Measurement	Noise levels at daytime and night time in dBA	Subproject sites and vicinity where O&M is being undertaken	As needed	National Noise Level Standards	DPHE/PMU/PIU or through a nationally recognized laboratory sourced by operator	DPHE, PIU, Supervision Consultant (if still onboard)
3.3	Groundwater source sustainability and quality monitoring	Static/dynamic water level, abstraction volume, pump operating hours, pH, EC, TDS, chloride, arsenic, iron, manganese, fluoride, fecal coliform, total coliform	All operational PTWs; representative monitoring wells or nearby community wells where relevant	Water level and abstraction: monthly; chemical parameters: quarterly; microbiological parameters: monthly or at minimum quarterly; additional testing after complaints or contamination events	Bangladesh National Drinking Water Quality Standards; approved groundwater source sustainability plan	DPHE/PMU/PIU or through a nationally recognized laboratory sourced by operator	DPHE, PIU, Supervision Consultant (if still onboard)
3.4	Raw Surface Water Monitoring	Flow, DO, BOD, COD, Turbidity, TSS, Phosphate, Nitrate, Fecal Coliform, Total Coliform, Oil and Grease	Hajiganj intake, Chandpur intake, upstream control point, downstream control point	Monthly	Bangladesh Inland Surface Water Standards; treatment design envelope; approved Water Safety/O&M Plan	Utility operator/DPHE/PIU or nationally recognized laboratory	DPHE, PIU, Supervision Consultant (if still onboard)
	Drinking Water Quality	pH, Turbidity, Residual chlorine, Iron, Manganese, Arsenic, Fecal coliform, Total coliform	SWTP outlet, OHT outlet, PTW outlet after treatment, network extremities, household/consumer sampling points, public standposts where applicable	Monthly	Residual chlorine and turbidity: daily at plant/OHT and routine network checks; microbiological quality: monthly; full chemical profile: quarterly or as required by national standards; additional testing after pipe bursts, low pressure	Utility operator/DPHE/PIU or nationally recognized laboratory	DPHE, PIU, Supervision Consultant (if still onboard)

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards	Responsibility	
						Implementation	Monitoring
					events, contamination complaints, or treatment failure		
	STP Sludge and Backwash	sludge volume generated, sludge disposal destination, moisture content, disposal records	SWTP: Coagulation (alum or other coagulants), Flocculation, Sedimentation/ clarification Backwash: rapid sand filters, pressure filters, multimedia filters, iron/manganese removal filters (if installed)	Monthly	National Standard for Inland Surface water	DPHE/PMU/ PIU or through a nationally recognized laboratory sourced by operator	DPHE, PIU, Supervision Consultant (if still onboard)
	Sanitation and FSM	Desludging records Overflow incidents Complaints Disposal locations	Latrines and public toilets included in project.	Annual	Institutional and Regulatory Framework for Faecal Sludge Management (IRF-FSM) (2017) for City Corporations, Paurashavas, Rural Areas and Dhaka; National Action Plan for Implementation of the IRF-FSM (2021); Bangladesh Environmental Conservation Rules (ECR) 2023; DoE Bangladesh Standards and Guidelines for Sludge Management.		

^a All environmental quality sampling should follow methodologies and sampling periods per relevant rules and/or guidelines (ambient air quality, noise level, and water quality)

Table 47: EMP Implementation Monitoring Plan

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards or Methods	Responsibility	
						Implementation	Monitoring
1. Design / Pre-Construction Phases							
1.1	Design measures addressing risks of climate change	Design elements included to ensure infrastructure can withstand seismic events, flooding, landslides, etc. On PTWs, siting and depths considered climate change.	PMU / PIU / Supervision Consultant Office	Once after final detailed design is completed	Bangladesh National Building Code	DPHE Design Engineers / Supervision Consultant /	PMU / PIU
1.2	Raw Water Source Quality Sustainability	All required raw water quality parameters per national regulations	PMU / PIU / Supervision Consultant Office	Once after final detailed design is completed	Final detailed design	DPHE Design Engineers / Supervision Consultant /	PMU / PIU
1.3	Design phase consideration for an environmentally effective and efficient operation	O&M Manual preparation is initiated and/or prepared	PMU / PIU / Supervision Consultant Office	Ongoing basis during detailed design phase	O&M Manual draft	DPHE Design Engineers / Supervision Consultant /	PMU / PIU
1.4	Disruption of Public Utilities/services	Ensure that the respective authority of utility service providers and consumers are informed in time; and Inspect that utilities are being relocated at the designated site maintaining proper safety measures	Subproject sites	Monthly – prior to start of construction	Utility relocation plan	Contractor (together with relevant utility authority)	PMU, PIU, Supervision Consultant
1.5	Spoil disposal site identification	Spoil disposal site identified and corresponding clearance (or equivalent) is obtained.	PIU Office	On ongoing basis prior to contract award	Written confirmation of disposal site location. Clearance (or equivalent) issued.	PIU	PMU, Supervision Consultant

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards or Methods	Responsibility	
						Implementation	Monitoring
1.6	Physical cultural resources	Condition for Contractor to follow the chance finds protocol as discussed in the EMP/IEE are included in the bidding and contract documents.	PMU Office,	On ongoing basis prior to floating of bidding documents On ongoing basis prior to contract award	Bidding Documents Contract Documents	PMU, Supervision Consultant	PMU
1.7	Tree Removal	Check whether trees were preserved at the sites	For all the subproject areas	On an ongoing basis from start of mobilization to construction phase.	IEE requirement (avoidance of cutting of trees)	Contractor	PMU, PIU, Supervision Consultant
1.8	Consents, Permits, NOCs, Clearances, etc.	All valid permits, clearances and NOCs, are in place during the detailed design or pre-construction phase at the latest.	PMU / PIU Offices, Contractor office or site office	Ongoing basis; prior to start of construction	Copies of permits, clearances and NOCs.	PIU, Contractor	PMU, Supervision Consultant
1.9	Updating of IEE and Preparation of SEMP and all pre-construction sub-plans	Updated IEE based on final detailed design has been done. SEMP and all sub-plans per EMP/IEE requirements have been prepared by Contractor and approved by PMU/ PIU/ Supervision Consultant	PMU Office / Contractor Office	On ongoing basis during detailed design phase	Updated IEE report Approved SEMP Approved sub-plans	PMU, Supervision Consultant Contractor	PMU/ Supervision Consultant
1.10	Construction camps or workers' accommodation	Construction camps are established or built following standard requirements and recommendations in the EMP/IEE.	Construction camp sites	At least weekly or may be needed	EMP (including standards per IFC, ILO, and EBRD)	Contractor	PMU, PIU, Supervision Consultant
1.11	Community awareness	Continuing consultations done per EMP requirements	Contractor Office	On ongoing basis during detailed design phase	Reports of consultations done	Contractor	PMU, PIU, Supervision Consultant
1.12	EMP Implementation Training	EMP implementation training to Contractors, workers and DPHE and PIU personnel has	Supervision Consultant Office	On ongoing basis during detailed design phase/pre-construction phase	Reports of training done	Supervision Consultant	PMU

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards or Methods	Responsibility	
						Implementation	Monitoring
		been conducted prior to construction works.					
2. Construction Phase							
2.1	Construction camps or workers' accommodation	Construction camps are maintained based on the EMP/IEE requirements.	Construction camp sites	At least weekly or may be needed	EMP (including standards per IFC and EBRD; and Sewage Facility Design)	Contractor	PMU, PIU, Supervision Consultant
2.2	Sources of Materials	Materials are sourced per EMP requirements	Storage areas at the different subproject sites	At least once every 6 months for Supervision Consultant throughout the construction period.	Materials register or record of purchase by Contractor	Contractor	PMU, PIU, Supervision Consultant
2.3	Excavation and other construction activities	All mitigation measures for potential impacts arising from excavation and other construction activities as defined in the EMP are implemented effectively and efficiently (see EMP: - Land topography and aesthetics - Terrestrial flora and fauna resources - Surface water quality - Groundwater quality - Ambient air quality - Noise level at site and vicinity - Chance finds - Community and occupation health and safety - Local festivals and cultural practices - Grievances/ complaints	Construction camps, work sites (active construction areas)	Daily by Contractor throughout the construction period. At least once every 6 months for Supervision Consultant throughout the construction period.	SEMP and other sub-plans, EMP; Complaints register Contractor monthly monitoring reports	Contractor	PMU, PIU, Supervision Consultant

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards or Methods	Responsibility	
						Implementation	Monitoring
2.4	Socioeconomic benefit	Local labor employment, income level status	Subproject sites	At least once in six months during the construction period.	Primary survey and consultations	Supervision Consultant (to be led by the Social Safeguard Officer)	PMU, PIU, Supervision Consultant
2.5	Community awareness and consultation	Progress of continuing community awareness and consultation	At the community areas and/or subproject sites (active construction areas)	At least once every six months	Minutes of meetings Record of attendees list Photolog	Contractor, Supervision Consultant	PMU, PIU, Supervision Consultant
3. Post-Construction Phase							
3.1	Post-construction site clean up	All post-construction site cleanup activities per EMP requirements have been done effectively	All subproject sites	At least once after construction phase but prior to final payment related to construction activities completed.	Contractor monthly reports Related Contractor activity reports	Contractor	PMU, PIU, Supervision Consultant
4. Operation Phase							
4.1	Surface water quality	All mitigation measures related to protection of surface water body, per O&M Manual (and EMP) are implemented effectively and efficiently	All active O&M sites	As needed	O&M Manual; EMP; Complaints register	DPHE/ PIU (after turnover of facilities to Municipality or <i>Paurashava</i>)	DPHE, PIU, Supervision Consultant (if still onboard)
4.2	Groundwater quality	All mitigation measures related to protection of groundwater per O&M Manual (and EMP) are implemented effectively and efficiently	All active O&M sites	As needed	O&M Manual; EMP; Complaints register	DPHE/ PIU (after turnover of facilities to Municipality or <i>Paurashava</i>)	DPHE, PIU, Supervision Consultant (if still onboard)
4.3	Ambient air quality	All mitigation measures related to avoidance or minimization of air pollution per O&M Manual (and EMP) are implemented effectively and efficiently	All active O&M sites	As needed	O&M Manual; EMP; Complaints register	DPHE/ PIU (after turnover of facilities to Municipality or <i>Paurashava</i>)	DPHE, PIU, Supervision Consultant (if still onboard)

Sl. No.	Monitoring Attributes	Parameters to be Monitored	Location	Frequency	Standards or Methods	Responsibility	
						Implementation	Monitoring
4.4	Noise level	All mitigation measures related to avoidance or minimization of noise pollution per O&M Manual (and EMP) are implemented effectively and efficiently	All active O&M sites	As needed	O&M Manual; EMP; Complaints register	DPHE/ PIU (after turnover of facilities to Municipality or <i>Paurashava</i>)	DPHE, PIU, Supervision Consultant (if still onboard)
4.5	Waste Management	Check storage, transportation, disposal, handling of all types of wastes (e.g., packaging materials, engine filters, other garbage, etc.) at the worksites.	All active O&M sites	As needed	O&M Manual; EMP; Complaints register	DPHE/ PIU (after turnover of facilities to Municipality or <i>Paurashava</i>)	DPHE, PIU, Supervision Consultant (if still onboard)
4.6	Community and Occupational Health and Safety	Complaints, Accident/Incident Records	All active O&M sites	As needed	O&M Manual; EMP; Complaints register	DPHE/ PIU (after turnover of facilities to Municipality or <i>Paurashava</i>)	DPHE, PIU, Supervision Consultant (if still onboard)

A. Environmental Budget

378. Costs for implementing the EMP in this IEE report include monitoring costs during construction and capacity building costs on environmental management, which are absorbed into the Contractor's work contract. The costs for training proposed include the costs incurred toward site visits, travel to the training program by participants, printing of training materials, and other logistic arrangements. The costs involved towards preparation of training material and training are covered in the consultancy budget for the Supervision Consultant. These costs are presented in table below.

379. The cost estimates mentioned in table below are indicative amounts. These shall be reviewed by the Contractor, and assessed if enough for implementing the EMP. Any budget shortfall, including other necessary measures identified during the implementation phase, shall be supplemented from the provisional sum of the Contractor's contract.

380. As such, these costs must be included in the Contract documents along with a copy of IEE. The EMP implementation shall be integrated into the Project Administration Manual (PAM).

Table 48: Indicative Cost Estimates to Implement the EMP

(This set of indicative cost estimates is intended for each package under the subproject)

Particulars	Stage	Unit	Total number	Rate	Cost	Costs covered by
				(BDT)	(BDT)	
Mitigation Measures						
Environmental mitigation / enhancement measures integrated into the designs and costs included as part of civil works, including procurement of PPE and OHS measures	Pre-construction / Construction	Number/ Package	LS	1,500,000	1,500,000	Contractor
Barricading sites for public safety, Implementing traffic management plans, Emergency preparedness and contingency Worker health and safety Community disruptions, Support Fiber-Reinforced Plastic (FRP) Mobile Toilet, Provision of alternative access routes and safety measures. Restoration of construction sites	Pre-construction/ Construction	Per Package	LS	1,000,000	1,000,000	Contractor
Sub-Total (A)					2,500,000	
Monitoring Measures						
Air Quality monitoring	Pre-Construction: Once	Per Package	5	25,000	125,000	Contractor
Air Quality monitoring	Construction: Twice/Year for 4 years	Per Package	23	25,000	575,000	Contractor
Noise level	Pre-Construction: Once for day time and night time	Once Per Package	55	2,000	110,000	Contractor
Noise level	Construction: Twice/Year for 4 years for day time and night time	Once Per Package	248	2,000	496,000	Contractor

Particulars	Stage	Unit	Total number	Rate	Cost	Costs covered by
				(BDT)	(BDT)	
Water quality (Pre-Construction)	Pre-Construction: Once	Per Package	5	12,000	60,000	Contractor
Water quality (Construction)	Construction: Twice/Year for 4 years	Per Package	30	12,000	360,000	Contractor
Various Monitoring (Adequacy of solid waste management system, chemical waste disposal, implementation of community and occupational health and safety measures) ^d	Construction, Post construction and operation	Per visit	8	50,000	400,000	PMU, Supervision Consultant
Socioeconomic monitoring	Construction, Post construction and operation	Per visit	8	50,000	400,000	PMU, Supervision Consultant
Sub-Total (B)					2,526,000	
Health Safety and Medical Facilities, including Medical Equipment, Industrial First Aid Box, Foldable Emergency Stretcher, Spine Board (Backboard Stretcher), Digital BP Monitor & Thermometer, Oxygen Cylinder (Portable - 2L), Consumables & Refills, PPE for First Aiders (Gloves, Masks, Aprons), Personnel & Logistics, Medicines, Medical consumables (Bandages, Gauze, Savlon, ORS, Cotton), Ambulance rental	Pre-construction / Construction	Monthly/Packag e	54	35,000	1,890,000.00	Contractor
Sub-Total (C)					1,890,000.00	
Public Consultation and Information Disclosure						
Information disclosure and consultations including a public awareness campaign, rally, special day celebration, media coverage, etc	Pre-construction / Construction	Nos/Packag e	18	5,000	90,000	Contractor
Sub-Total (D)					90,000	
Capacity Building						
Introduction and sensitization to environmental issue	Preconstruction	LS	1	40,000	40,000	Supervision Consultant
Subproject training on hazards, health, safety, and environmental issues	Preconstruction	LS	1	40,000	40,000	Supervision Consultant

Particulars	Stage	Unit	Total number	Rate	Cost	Costs covered by
				(BDT)	(BDT)	
EMP implementation	Construction	LS	16	10,000	160,000	Contractor
Sub-Total (E)					240,000	
Total (A+B+C+D+E)					7,246,000	
Any unanticipated impact due to project implementation (F)					200,000	Contractor
Total Budget for EMP implementation Per Package					7,446,000	
Total (in USD) @ BDT 123 per USD					60,537	

IX. CONCLUSIONS AND RECOMMENDATIONS

381. This IEE has been prepared based on review of the environmental condition of the subproject area where the subproject sites are located, the immediate surrounding communities, possible biodiversity areas near the sites, preliminary technical information on the proposed distribution network and sanitation packages, consultation with the stakeholders, and other primary and secondary information of the site and its surroundings. The overall findings of this IEE are:

- (i) The subproject will be a beneficial undertaking because it will improve the quality of life of the people of Cumilla Corporation and the *Paurashavas* Laksam, Hajiganj and Chandpur through provision of 24/7 drinking water source;
- (ii) The IEE identifies substantial risks relating to: raw water quality; groundwater sustainability; non-revenue water; rehabilitation of aging infrastructure; institutional O&M capacity; and treatment plant performance. Achievement of continuous ("24/7") supply will depend on final design adequacy, sustainable source management, treatment performance, operational efficiency, and long-term asset management.
- (iii) The environmental assessment indicates that no significant irreversible or unprecedented impacts are anticipated. However, moderate environmental risks remain associated with raw-water quality, construction activities, management of treatment residuals, community health and safety, and long-term source sustainability. These impacts are expected to be reduced to acceptable levels through implementation of the EMP, monitoring program, and adaptive management measures.
- (iv) Although project facilities are located primarily within existing urbanized areas and outside legally protected areas and designated critical habitats, environmentally sensitive receptors remain present, including rivers, drainage channels, aquatic ecosystems, and community water resources. Appropriate mitigation measures have therefore been incorporated into the EMP to avoid or minimize indirect impacts on these receptors.
- (v) No significant permanent social impacts relating to land acquisition, physical displacement, loss of productive land, or long-term loss of livelihood are anticipated. However, temporary disruptions to access, mobility, and commercial activities may occur during construction and shall be managed through traffic management, stakeholder engagement, and grievance redress measures.
- (vi) During construction and operations, the subproject will not have significant adverse environmental impacts and potential adverse impacts are manageable through the effective implementation of the EMP;
- (vii) The subproject sites are in the built-up and developed urban area of Bangladesh. These are far from any environmentally sensitive areas, and potential impacts to these sensitive areas are not expected; and
- (viii) The IEE also confirmed that there are no significant social impacts pertaining to land loss, physical displacement, loss of income, and loss of productive land as a result of implementing the subproject.

382. While individual construction impacts are generally localized and temporary, cumulative impacts arising from simultaneous construction activities, traffic disruption, access restrictions, and community disturbance across multiple work fronts require careful management through

construction sequencing and strict implementation of the EMP. It is therefore recommended that the subproject be supported, subject to the implementation of the commitments contained in the EMP and allocation of appropriate technical, financial and human resources by the implementing agency DPHE.

383. Recommendations. During the finalization of the design, the DPHE technical design team shall ensure sustainability of the subproject in terms of the supply and quality of raw water, including the quality of treated water which should comply with the Bangladesh National Drinking Water Quality Standards. In view of the environmental audit conducted on the existing facilities, the following corrective actions are recommended for consideration in conjunction with other environmental safeguard measures in the final detailed design and operations of the future water supply system.

**Table 49: Suggested Corrective Actions for Environmental Issues in Existing Facilities
(For Consideration in the Final Detailed Design)**

Issue	Mitigation Measure	Responsible Agency
Unsustainable groundwater abstraction	• Introduce metering, tariffs, leakage reduction. • Establish recharge monitoring via observation wells. • Gradually transition to surface water sources.	City Corporation and Paurashavas, supported by DPHE
Non-compliance with national drinking water quality standards	• Upgrade treatment plants to meet Bangladesh National Drinking Water Quality Standards. • Introduce standard operating procedures for chemical dosing, monitoring, and emergency handling. • Implement wellhead protection zones to prevent contamination.	DPHE
Sludge and backwash mismanagement	• Design sludge drying beds or lined lagoons for safe disposal. • Reuse treated sludge in non-agricultural applications where safe. • Install controlled backwash discharge systems connected to drains with sediment traps. • Ensure compliance with effluent standards.	DPHE
Distribution network leakage and non-revenue water	• Replace aging PVC pipelines with HDPE/ductile iron. • Implement DMAs. • Prioritize repair of high-leakage zones.	DPHE
Energy inefficiency in pumping systems	• Retrofit pumps with variable frequency drives (VFDs). • Replace diesel backup with solar-assisted/hybrid systems.	DPHE

Chemical handling and occupational risks	• Establish standard operating procedures for chemical storage/dosing. • Train operators on good international practices in water supply operations, including emergency preparedness.	City Corporation and Paurashava, DPHE
Inadequate manpower and institutional capacity	• Provide consultant support in the interim. • Build staff capacity for monitoring, preventive maintenance, record-keeping. • Training on safeguards and occupational safety.	City Corporation and Paurashavas, supported by DPHE/ADB

384. During pre-construction phase, the contractor/s shall prepare the following required work plans and submit to PIU, through the PMU or PMSC, for approval. No work shall commence until any relevant or required work plan is approved, which includes, among others, the following:

- (i) Site-Specific Environmental Management Plan (SEMP);
- (ii) Emergency Preparedness and Response Plan;
- (iii) Utility Protection and Relocation Plan;
- (iv) Spill Prevention and Response Plan;
- (v) Camp Management Plan (if camps used);
- (vi) Traffic Management Plan;
- (vii) Spoil Management Plan;
- (viii) Waste Management Plan; and
- (ix) Health and Safety Management Plan (Community and Occupational).

385. This IEE needs to be updated during the detailed design phase to reflect the final design ensuring compliance with the design measures suggested in this document, including measures to ensure sustainability of the drinking water supply system. The updated IEE shall be submitted to ADB for review, clearance and disclosure during detailed design phase but prior to start of construction. The cleared updated IEE shall be treated as the final IEE. No work can commence until (i) the final IEE cleared by ADB is provided to the contractor/s, and (ii) the SEMP, including other work plans, prepared by the contractor, is approved by PMU. If circumstances are required, the IEE will be further updated for ADB's review during the implementation period. In the event of unanticipated impact and/or any design change and/or non-compliance during subproject implementation period, the IEE shall be updated to include (i) assessment of the unanticipated impact and corresponding mitigation measures; and/or (ii) information on the design change and assessment of associated environmental impacts, if any; and/or (iii) corrective actions, associated cost and schedule; respectively. Further, the PMU shall:

- (i) Include this IEE in the bidding and contract documents;
- (ii) Obtain all statutory clearances and ensure relevant conditions or requirements are incorporated in the detailed design;
- (iii) Update/revise this IEE based on final detailed design that ensures sustainability and/or if there are unanticipated impacts or significant change in scope in any component of the subproject;
- (iv) Conduct safeguards induction to the contractor/s after award of contract;

- (v) Ensure contractor/s appoint/s qualified environment, health and safety (EHS) officer prior to start of works;
- (vi) Disclose information and establishment of GRM in a timely manner;
- (vii) Strictly supervise EMP implementation;
- (viii) Continue consultations with stakeholders; and
- (ix) Monitor and report status of implementation of the EMP on a regular basis as indicated in the IEE.

386. This IEE report has been prepared in accordance with ADB SPS requirements for projects classified as Category B for environment. With the above premises considered, the classification of Category B for environment is confirmed. Separately, per ECA, 1995 and ECR, 2023 of Bangladesh, the overall project is classified under “Orange” category. Hence, preparation of an IEE is required. Upon approval of the submitted IEE, ECC must be obtained from the DOE prior to award of contracts.

Appendix 1: Rapid Environmental Assessment Checklist of the Subproject.

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Policy and Technical Services (OSPT) team of the Office of Safeguards.
- (ii) This checklist focuses on environmental issues and concerns and includes an asbestos screening tool. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and indigenous peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.
- (iv) If multiple checklists are submitted, do not fill out duplicated sections, such as project siting and the asbestos screening tool.

Country/Project Title:

BAN: Cluster Towns Water Supply and Sanitation Project

Sector Division:

SD2-WUD

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area:			
■ Densely populated?	X		Cumilla City Corporation and Chandpur Paurashava (Municipality) are more densely compared to Laksam and Hajiganj Paurashava
■ Heavy with development activities?	X		CuCC is busy with urban development activities (mostly building construction) and industrial as well, while Paurashavas of Chandpur, Laksam and Hajiganj are facing less development activities.
■ Adjacent to or within any of the following environmentally sensitive areas?			
● Cultural heritage site	X		There are several large historic ponds in CuCC, Nawab Bari in CuCC and Laksam Paurashava.

Screening Questions	Yes	No	Remarks
Legally protected area (core zone or buffer zone)		X	There is no legally protected area within core or buffer zone, however Mainamoti Shalbon Bihar is located beyond the subproject area of CuCC.
Wetland	X	X	The Meghna River and the confluence of the Padma and Meghna are important riverine wetland potential for fisheries (especially <i>Hilsa</i>, <i>Tenialosa ilisha</i>) habitat. However, these areas will not be affected by the CTWSSP, Phase 1, as there will not be water intake from the Meghna River. The Dakatia river which is the major surface water supplying riverine wetland flowing within the core influence areas of Chandpur and Hajiganj Paurashava. Water intake may affect navigability and biological potential of the river, unless proper mitigation measures are taken.
Mangrove		X	No mangrove exists in these subproject areas.
Estuarine		X	Chandpur as a location is famous due to existence of the direct confluence and estuary of three major rivers: the Meghna, Dakatia and Padma. However, these areas will not be affected by the CTWSSP, Phase 1, as there will not be any subproject activities in the estuary.

Screening Questions	Yes	No	Remarks
Special area for protecting biodiversity		X	The Meghna River and the confluence of the Padma and Meghna are important riverine wetland potential for fisheries (especially <i>Hilsa</i> , <i>Tenialosa ilisha</i>) habitat. Government of Bangladesh declares the riverine area as seasonal sanctuary for Hilsa and other fisheries biodiversity conservation. Also, the confluence potential Habitat for Gangetic Dolphin. However, these areas will not be affected by the CTWSSP, Phase 1, as there will not be any subproject activities in this area.
Bay		X	Not exist
B. Potential Environmental Impacts Will the project cause:			
pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?	X		The subproject activities may affect the existing raw water supply due to accidental damage during laying new pipe lines. The CTWSSP implementing agency (DPHE) is managing the existing water supply, so if any contamination happens there will be immediate action to address the issue.
impairment of historical/cultural monuments/areas and/or loss/damage to these sites?		X	The subproject locations are within the already built environment.
land subsidence caused by excessive ground water pumping?		X	The subproject will not cause land subsidence, as groundwater abstraction affects minimum depletion (domestic supply withdraws 3%) as compared to irrigation (90%) and Industrial uptake (7%) in Bangladesh. Also, the CTWSSP Phase-I will be used as transition for using surface from the Phase-II which is planned after 2032.
social conflicts arising from displacement of communities?		X	There will not be any social displacement.

Screening Questions	Yes	No	Remarks
conflicts over water supply with other beneficial water uses due to abstraction of raw water?		X	No conflict expected, as there is no such competition. Also, proposed subproject will improve water supply quantity and quality for all users.
unsatisfactory raw water supply (e.g., excessive pathogens or mineral constituents)?		X	The proposed CTWSSP is to ensure improved water supply system, compared to existing water supply system. For construction period, the implementing agency will be involved to continue existing water supply system functional satisfactorily.
delivery of unsafe water to distribution system?		X	During construction period, the implementing agency will be involved to provide delivery of safe water to water supply system.
inadequate protection of intake works or wells, leading to pollution of water supply?		X	The surface water intake points in the Dakatia river will be rehabilitated to ensure better quality water supply to Chandpur and Hajiganj Paurashava. Similarly, the production tube wells supplying poor quality water to CuCC and Laksam and Hajiganj Paurashava will be rehabilitated to ensure improved water supply. Necessary actions will be ensured by the implementing agency to pollution control during construction period.
over pumping of ground water, leading to salinization and ground subsidence?		X	The subproject will not cause over pumpim that may lead to salinization and land subsidence. Chandpur Paurashava, is one of the coastal districts of Bangadesh, has been using surface water more than hundred years. There is no chance of groundwater salinization. Other Paurashava and CuCC will not use excessive water, as the subproject will install water meter to optimize water loss and domestic use. Also, the CTWSSP Phase-I will be a transition for using surface from the Phase-II which is planned after 2032.

Screening Questions	Yes	No	Remarks
■ excessive algal growth in storage reservoir?		X	Regular maintenance of OHT and Grountwater tanks during project construction will control excessive algal growth in the storage reservoir.
■ increase in production of sewage beyond capabilities of community facilities?		X	There be no influx of workers or project employees at any specific area that may lead to increase in production of sewage. Also, separate septic latrines will be used for workers' sheds which are sparsely distributed across city corporation and three <i>Paurashavas</i> .
■ inadequate disposal of sludge from water treatment plants?		X	The CTWSSP will ensure regular backwash and proper disposal of sludge to protect environment of receipient waterbodies.
■ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect these facilities?	X		Most of the pumping, treatment plants and storage tanks are already existed. Only 12 new production tube wells (PTW) and 6 OHT will be constructed that may generate elevated noise and dust. The sites will be protected for access control. Working time will be chosen based on public opinions. Silent zone and time will be taken into utmost consideration during construction period, so that noise and other nuisance can be controlled.
■ impairments associated with transmission lines and access roads?	X		More than 1000 km long distribution lines will be constructed across the subproject area. More than 60% pipe laying will follow horizonatal directional drilling (HDD) and remaining will be using open-cut method. Open-cut in narrow roads will cause traffic management problem and access problem for the people of the city and <i>Paurashavas</i> . Short-term and reversible impairments and sufferings will be anticipated. However, alternative roads will be used in many cases to avoid sufferings.

Screening Questions	Yes	No	Remarks
■ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		X	The proposed subproject will rehabilitate all SWTPs that have potential to receive, store and use chlorine, also provide technical guidelines and SOP for safe management.
■ health and safety hazards to workers from handling and managing chlorine, contaminants, and/or biological and physical hazards during project construction and operation?		X	The proposed subproject will organize trainings for the SWTP operators on proper chemical management during construction and operation. Auto dosing will be provided introduced reduce exposure to chlorine hazards. SOP will be provided for proper functioning's of SWTP, while maintaining health and safety of workers.
■ dislocation or involuntary resettlement of people?		X	The CTWSSP Phase 1 will not cause any dislocation or involuntary resettlement of people.
■ disproportionate impacts on the poor, women and children, indigenous peoples, or other vulnerable groups?		X	There will be no disproportionate impacts due to this project, rather improved water supply and sanitation will provide increased services to marginal people.
■ noise and dust from construction activities?	X		There will be noise and dust generation during construction period using horizontal drilling equipment, power generator, and construction machineries. In unavoidable cases, operators and persons to be exposed will be provided with ear plugs and, also work time will be managed in consultation with local people.
■ increased road traffic due to interference of construction activities?	X		Narrow roads that are unfeasible for HDD and to be open-cut for pipe laying will cause traffic congestion or would be inaccessible for local vehicle, rickshaws, vans etc. Short-term suffering will be anticipated in CuCC and Chandpur pourashva, particularly.
■ soil erosion/silt runoff from construction?		X	No soil erosion and silt runoff are expected due to this subproject. Construction activities, OHT and water supply pipe laying will be confined to protect soil runoff.

Screening Questions	Yes	No	Remarks
delivery of unsafe water due to poor O&M treatment processes (especially mud accumulation in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	X		Delivery of unsafe water is prevailing at present in Chandpur and Hajiganj Paurashavas that use mostly SWTP supplied water. The subproject upon completion will provide strong focus to ensure proper O&M treatment processes, and proper backwash to remove mud accumulation in filters, and ensure adequate chlorination through auto dosing mechanism.
delivery of water to distribution system that is corrosive due to inadequate attention to feeding of corrective chemicals?	X		The subproject upon completion will provide strong focus to monitor water quality so that proper chemical presence is maintained in the distribution networks. In addition, the subproject will use HDPE pipes for secondary and distributoin water supply networks that will be less corrosion prone.
accidental leakage of chlorine gas?		X	Liquid chlorine will be used in water treatment process to avoid risk of accidental leakage. Additionally, training will be provided to plant operators for preventing accidental issues.
excessive abstraction of water affecting downstream water users?		X	The surface waters to be abstracted will not cause any effect to down stream users, as the Dakatia river in meets with the Megna River, a largest river of the country, in few a kilometer down stream.
increased sewage flow due to increased water supply?		X	The water supply will be optimised through implementation of the proposed subproject.
increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant?		X	Implementation of metered water supply through the subproject will reduce excessive use of water at domestic level, hence volume of sullage and sludge from the treatment plants will expected to be reduced.

Screening Questions	Yes	No	Remarks
large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	The construction works will spread over large area and there will not be any large population influx of population at any given area due to this subproject.
social conflicts if workers from other regions or countries are hired?		X	Local workers will be deployed for subproject activities for non-technical works; however, a handful of people with specific technical know-how may be hired from other regions or countries. No conflict is expected.
risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	X		There will be necessity for transportation, storage and use of chemical (chlorine) for operation of SWTPs in Chandpur and Hajiganj Paurashava. Paurashavas should adopt proper health-safety protocol to transport, store and handling of chemicals.
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation, and decommissioning?	X		The subproject structural works, particularly construction of overhead tank will involve work-at-height using scaffolding materials. To ensure occupational health and safety, technical people capable of doing this type of work are to be deployed and also these sites should be protected with required access control measures.

ASBESTOS SCREENING TOOL

Screening Questions	Yes*	Maybe*	No	Remarks *For those with answers of YES and MAYBE , document the potential likelihood of asbestos being encountered.
Does the proposed project involve, or potentially involve, any of the following activities that are commonly associated with asbestos use:				The subproject activities in Cumilla Cluster will not encounter any infrastructure that are to be constructed or demolished having asbestos containing materials.
• Construction/commissioning of a new asset?			X	
• Refurbishment/demolition of an existing asset?			X	
• Post-disaster response, involving reconstruction, repair, or removal of damaged assets?			X	
• Maritime activities?			X	
• Water supply, sanitation, wastewater, sewerage, or water hygiene initiatives?			X	
• Earthworks, remedial activities, or solid waste management?			X	
• Power, telecommunications, or energy supply infrastructure?			X	
• Maintenance, demolition, transportation, or disposal of waste associated with the above activities?			X	

Note: If you answered YES or MAYBE to the above questions, assume that the project is likely to encounter asbestos as a direct or indirect result of project-related activities and proceed to the toolkit for screening asbestos risks in new ADB-supported projects Part B – Screening Tools and Checklists

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: BAN: Cluster Towns Water Supply and Sanitation Project

Sector: SD-2 - WUD

Subsector: XXXXXX

Division/Department: XXXXXXXX

Screening Questions		Score	Remarks ³⁶
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	1	
	Would the project design (e.g., the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed, etc.)?	2	Flows of the Dakatia river may be impacted due to the prolonged drought period.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	2	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	2	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g., annual power production) of project output(s) (e.g., hydro-power generation facilities) throughout their design lifetime?	2	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

Result of Initial Screening (Low, Medium, High): 9

³⁶ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Other

Comments: _____

Prepared by: _____

Appendix 2: Sample Daily Environmental and Health-Safety Monitoring Form Contractors

Name: Cluster Town Water Supply and Sanitation Project

WP:

Name of EMO:, Mobile #

Date of Visit: Time: Location #

1. Please check the construction items you visited:

☐ Site clearing/grabbing activity ☐ Earth works and compaction ☐ Piling works ☐ Distribution Network ☐ OHT Construction site ☐ PTW rehabilitation work ☐ Surface Water Plant work	☐ Concrete batching plant ☐ Crushing plant ☐ Brick crushing plant ☐ Oil dispensing system ☐ Lubricants/chemical materials storage ☐ Please mention any other.....
--	--

2. Please tick the status of environmental and health safety level you observed during your visit:

	Worst	←————→		Best
Environmental issues				
☐ Dust / Air pollution	☐ High	☐ Medium	☐ Low	☐ Zero
☐ Noise/Sound	☐ High	☐ Medium	☐ Low	☐ Zero
☐ Water pollution	☐ High	☐ Medium	☐ Low	☐ Zero
☐ Solid waste/construction debris	☐ High	☐ Medium	☐ Low	☐ Zero
☐ Hazardous Waste	☐ High	☐ Medium	☐ Low	☐ Zero
☐ Sewage leakage	☐ High	☐ Medium	☐ Low	☐ Zero
☐ Spills / Site contamination	☐ High	☐ Medium	☐ Low	☐ Zero
Health & Safety Issues				
☐ PPE use	☐ Poor	☐ Moderate		☐ Good
☐ Fence/barricade/Safety Signage	☐ Poor	☐ Moderate		☐ Good
☐ Housekeeping/Tidiness	☐ Poor	☐ Moderate		☐ Good
☐ First aid and medical support	☐ Poor	☐ Moderate		☐ Good

Note: Please provide detail information for the environmental issues marked 'High' and 'Medium', and Health-Safety Issues with 'Moderate' and 'Poor' in relevant sections as follows.

3. Air Emission

- a. Please mention which location is observed with air emission/dust pollution.
- b. Are there any sensitive receptors exposed to air pollution? If so, please give detail. (Distance from the source of pollution, type of receptor, number of exposed persons, etc.).
- c. What measures are taken at site to control air quality? Please discuss with evidence, i.e., data, pictures, etc.
- d. Specify what mitigation measures need to be implemented further to control air quality level within the DOE standards. Who is responsible?

4. Noise/Sound Pollution

- a. What are the sources of noise/sound?
 1. ☐ Generator, ☐ Metal Cutting Machine, ☐ Grinding machine, ☐ Vibrator,
 2. ☐ Crushing Machine, ☐ Hauling trucks, ☐ Existing Highway Traffic, ☐ HDD Equipment
 3. ☐ Others, please mention _____
- b. Are there any sensitive receptors exposed to noise? If yes, please give detail. (Distance from the source of noise, type of receptor, number of exposed person, etc.)
- c. What measures are taken at site to control noise? Please discuss with evidence i.e., data, pictures etc.
- d. Specify, what mitigation measures need to be implemented further to control noise level within the DOE standards. Who is responsible?

5. Waste Management

What kinds of waste did you observe during site visit?

☐ Spoil, ☐ Construction debris, ☐ Mud, ☐ Any other, please mention _____

Volume of wastes (M³): _____ approx.

Location: _____, Number of days dumped here: _____ day

Please mention by when waste will be disposed of properly:

- a. Are there any wastes creating unhygienic and filthy environment at the camp site?
 4. ☐ Yes ☐ No
If so, please explain _____
 - b. Are solid/hazardous wastes stored for reuse, recycle or disposal labeled properly for identification?
 - ☐ Yes ☐ No, Please mention in detail _____
-
- c. Is there any drainage congestion due to waste/sediment disposal to drains or in runoff channel that cause localized inundation or stagnation?
 5. ☐ Yes ☐ No
If yes, location and problem caused in detail: _____

6. Storage of Chemicals/Oil/Hazardous Materials

Check the types of chemicals/ hazardous materials stored with approx quantity.

- ☐ ChlorineKg
- ☐ PaintsLtrs
- ☐ Potash Alum Kg
- ☐ Others, please mentioned Ltrs
- ☐ Chemical admixture Ltrs
- ☐ Oil Ltrs
- ☐ Lubricants Ltrs

a. Check whether all primary containers are enclosed in secondary containments to prevent release of the chemicals/hazardous materials to environment?

☐ Yes ☐ No

If no, please mention in detail _____

b. Is there contamination of soil/water due to leakage/spillage of oil, bitumen and other chemicals?

☐ Yes ☐ No

If yes, please mention _____

c. Please mark whether chemical & hazardous materials are

- **Labeled properly in Bangla for identification.** ☐ Yes ☐ No
- **Stored with safety instructions properly on the storage container for handling.** ☐ Yes ☐ No
- **Managed by trained staff.** ☐ Yes ☐ No

If no, please mention _____

d. Are emergency response procedures (fire extinguishers, PPE, solvents, etc.) in place to address any accidents? ☐ Yes ☐ No

If no, please mention by when to be addressed

7. Spills / Site Contamination

a. What materials did spill out or be released?

6. ☐ Oil, ☐ Chemicals, ☐ Lubricants, ☐ Hazardous materials, ☐ Sewage sludge

Location: _____ When did spill? _____

b. What environmental media was contaminated by the spill or release of chemical or hazardous materials?

☐ Soil, ☐ Surface water, ☐ Ground water, ☐ Air, ☐ Other _____

Location incident happened: _____

c. What measures did the contractor take to clean-up or remediate the site?

7. Please

mention: _____

If no, please get the plan of site remediation. _____

8. Occupational Health and Safety

- a. **Is there health risk due to unsafe working conditions (e.g. improper PPEs, unprotected construction site, dust pollution, high noise, etc.)?**

☐ Yes ☐ No

If so, what poses health risk:

Location:

By when to be addressed:

- b. **Is there proper safety barrier to control trespassing and traffic management at construction site?**

☐ Yes ☐ No

If no, please mention location:

By when safety barrier will be erected:

- c. **Are the instructions given in the Traffic Management Plan followed for proper traffic flow?** ☐ Yes ☐ No

If no, please mention which location

What specific traffic management problem was observed:

What and by when measures will be taken

- d. **Are there adequate safety signs and symbols to be aware and educate pedestrians and existing traffic about construction activities and their safety precautions?**

☐ Yes ☐ No

If no, by when necessary, safety signboards and signage will be placed:

- e. **Are construction sites provided with first aid and medical support services?**

☐ Yes ☐ No

If yes, please specify to what level:

If no, please mention by when first aid and emergency medical support service will be developed:

- f. **Please provide a number of incidents/accidents that took medical support or first aid with necessary evidence. Please mention briefly about the incidents**

9. Personal Protective Equipment

- a. **Do contractors provide adequate PPEs of proper quality?**

☐ Yes ☐ No

8. **If no, mention reason:**

- b. **Do you maintain a PPE register:**

☐ Yes ☐ No

If yes, please mention present stocktaking, last issue date, change request, etc.

c. **Do workers and employees use PPE properly?**

☐ Yes ☐ No

If no, write workers' names and designation not using PPEs.

d. **Corrective Action. Take specific date by when proper PPE will be used properly.**

10. General Housekeeping

a. **Check whether construction materials (stones, bricks, bitumen, rods, etc) are stocked/piled in the designated area with proper labeling?**

☐ Yes ☐ No

If no, please mention by when housekeeping will be improved:

b. **Are base camp and workers' shed premises clean?**

☐ Yes ☐ No

Is there a dedicated person to cleaning premises?

How frequently cleaned:

c. **Are there separate waste collection bins for disposal of different types of waste (kitchen, paper, plastic waste, construction debris, etc.)?**

☐ Yes ☐ No

If no, please mention by when bins will be placed:

Note: To substantiate your observations, relevant pictures and documents are to be attached as evidence.

Signature of the EMO

Date

Appendix 3: A Sample Environmental Monitoring Form

(To be used by PMU and Supervision Consultant)

Project Name: Cluster Town Water Supply and Sanitation Project (CTWSSP)

WP:

Name: _____ Date: _____

Title: _____

Location: _____

Site Visit/Inspection

Emissions	
Air Quality, Dust condition	
Noise pollution	
Hazardous Substances	
Waste Minimization initiatives	
Reuse and Recycling initiatives	
Condition of trees and Vegetation at around the site	
Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s	
Identify muddy water was escaping site boundaries, or muddy tracks were seen on adjacent roads.	
Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures.	
Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Use photographs of each area.	
Confirm spill kits on site and site procedure for handling emergencies.	
Identify any chemical stored on site and provide information on storage conditions. Use photographs for evidence.	
Describe management of stockpiles (construction of materials, excavated soils, spoils, etc.). Use photographs.	
Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Use photographs.	
Provide information on barricades, signages, and on-site boards. Use photographs.	

○ Describe conditions of hauling vehicles/cranes/equipment operating.	
○ Describe performance of batching plants, crushing plants/concrete mixer machine.	

INCIDENT:

Nature of incident: _____

Intervention Steps: _____

Incident Issues

Resolution

Project Stage	Design	
	Pre-construction	
	Construction	
	Operation	
	Guarantee Period	

Site Restored to Original Condition

Yes

☐

No

☐

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory _____ Incident _____ Resolved _____ Unresolved _____

Signature

Appendix 4: Template for the Semi-Annual Monitoring Report (SEMR)

Preamble: The Environmental Monitoring Report template is recommended based on common practice of environmental monitoring and reporting of urban infrastructure development projects. The practitioners of this template will use their own judgment to customize their monitoring report considering the nature of the project and its environmental issues and impacts. Moreover, the environmental impact significance of any project/sub-project activity varies with environmental settings of that site/area. Site specific consideration is very important during EMR reporting.

Executive summary

INTRODUCTION

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009, Environmental category of each subproject as per national laws and regulations
- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components / List of Works	Status of Implementation (Pre-construction/ Construction/ Operation)	Status of Environmental Approval*	SEMP prepared and Approved by PMU (Y/N)	If On-going Construction ³⁷	
					% Physical Progress	Expected Completion Date

*Provide specific response from list below:

- Not yet due (detailed design not yet completed)
- IEE/EIA report prepared and shared with ADB for comments
- IEE submitted to DOE for clearance
- Environmental clearance obtained (provide date) and Valid
- Submitted to ADB (Provide Date of Submission)

- Identify the role/s of the Safeguards Team including schedule of on-site verification of reports submitted by consultants and contractors.
- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.

³⁷ If on-going construction, include %physical progress and expected date of completion

- Include as appendix all supporting documents including signed monthly environmental site inspection reports prepared by consultants and/or contractors.
- Substantiate compliance and non-compliance statements with relevant photographs.
- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below

List of works completed during reporting period

Scope of the EMR

- Scope of monitoring report in the reporting period
- Emphasize on the works that have been implemented during the reporting period and having high potentiality of environmental impacts
- Monitoring requirements including frequency of submission as agreed upon in EMP.

Changes in project scope (if any) and adjusted environmental safeguard measures, if applicable.

Project Safeguard Steam

Name	Designation/Office	Email Address	Contact Number
(i) PMU			
PIUs			
Contractor			

Compliance status with National/ statutory environmental requirements³⁸

Package No.	Subproject Name	Statutory Environmental Requirements ³⁹	Status of Compliance ⁴⁰	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish ⁴¹

³⁸ All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.

³⁹ Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

⁴⁰ Specify if obtained, submitted and awaiting approval, application not yet submitted

⁴¹ Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

Compliance status with environmental loan covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

Approach and methodology for environmental monitoring of the project

- **Brief description on the approach and methodology used for environmental monitoring of each sub-project**
 - **Monitoring environmental components (soil, air, water, etc.) with parameters**
 - **Frequency of Monitoring**
 - **Location of monitoring**

Compliance status with the environmental management plan (refer to EMP TaBLES in APPROVED IEE/s)

- **Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.**

Project activity conducted during reporting period	Potential Impacts	Proposed mitigation measures as per EMP	Actual Implementation	Recommendations	Compliance status

Non-compliance issues identified during the reporting period have been presented below with implementation timeline:

Description of non-compliance	Corrective Actions recommended	Responsible Person	Timeline for Action

Grievance Redress Mechanism (complaints Received during the Reporting Period.)

Provide information on the number, nature, and resolution of complaints received during the reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

Complaints log

Log Ref	Complainant/ Date of Contact	Location	Details of Complaint	Investigation/ Mitigation Action	Resolution Status

Environmental Monitoring Activities

Summary of Environmental Monitoring Activities (for the Reporting Period)⁴²

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Monitoring reports should be attached with the EMR. If test reports are too many, then sample reports may be attached from each category (water, soil, air, noise etc.)

⁴² Attach Laboratory Results and Sampling Map/Locations

Monitoring of environmental IMPACTS on PROJECT SURROUNDINGS (ambient air, water quality and noise levels)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum, the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (µg/m ³)					
			SPM	PM _{2.5}	PM ₁₀	SO ₂	NO ₂	CO
Government Standards			-	65	150	80	80	5

Groundwater Quality Results

Site No.	Date of Sampling	Site Location	Parameters							
			pH	EC	TDS	Chloride	Fluoride	Hardness	Arsenic	Iron
Government Standards			6.5 – 8.5	(µS/cm)	1000 mg/Lt	250mg/Lt	1.0mg/Lt	500mg/Lt	0.05mg/Lt	0.3-1.0mg/Lt

Surface Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters									
			pH	DO	BOD	TDS	Turbidity	Salinity	Nitrate	Phosphate	FC	TC
Government Standards			6.5 – 8.5	>6 mg/Lt	<2mg/Lt	10mg/Lt	NTU	mg/Lt	7mg/Lt	mg/Lt	cfu/100ml	>100cfu/100ml

Noise Quality Results

Site No.	Date of Testing	Site Location	LA _{eq} (dBA) (Monitoring Results)			
			Commercial Day Time	Commercial Night Time	Mixed Day Time	mixed Night Time
Government Standard			70dBa	60dBa	60dBa	50dBa

Describe/explain if there is any non-compliance or higher test results observed for the parameters.

SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

- **Summary of follow up time-bound actions to be taken within a set timeframe.**

APPENDIXES

- **Photos**
- **Summary of consultations**
- **Copies of environmental clearances and permits**
- **Sample of environmental site inspection report**
- **BOQ**
- **Other**

Appendix 5: Grievance Registration Form

Aggrieved party details		
Name (optional)		
Company/Entity (optional)		
Contact details (optional; if no details are provided, it will not be possible to provide acknowledgment or details of the resolution)		
Anonymity (If applicable, state whether your identity can be disclosed).	• Yes	• No
Date of submission		
Grievance details		
Description of grievance (describe exactly who, what, where, when, how the event occurred?)		
If applicable, date and/or duration of the incident that led to the complaint.		
Has this grievance been raised previously?	• Yes	• No
	Date:	Place:
List any attached documents, witness names, emails, photos, or physical evidence that support your complaint.		
Suggestions for how the grievance could be resolved?		

Appendix 6: Photos and Some Attendance Sheets of the Stakeholder and Public Consultation Meetings



Photo 1: Public Consultation meeting at Hajiganj Paurashava.



Photo 2: Public Consultation meeting at Hajiganj Paurashava.



Photo 3: Visiting PTW site at Hajiiganj Paurashava.



Photo 4: Stakeholder Meeting at Hajiganj Paurashava



Photo 5: Visited GWTP site and discussed with the operator at Laksam Paurashava.



Photo 6: Stakeholder Meeting at Laksam Paurashava.



Photo 5: Visited PTW site at Govt Women Collge at CuCC.



Photo 6: Community women fatching water from street hydrant at at CuCC.



Photo 7: Stakeholder discussion at Chandpur Paurashava.



Photo 8: Visiting Public toilet at Hajiganj Paurashava



Photo 9: Public consultation meeting at Baponibag, Chandpur.



Photo 10: Public consultation meeting at Sujanagor, CuCC.



Photo 11: Public consultation meeting at Infront of Cuilla Central Eidgah field, CuCC.



Photo 12: Public consultation meeting at Poschimgao, Collegepara, Laksam.



Photo 13: State of a GWTP at Khesari Potti, Chawkbazar, CuCC.



Photo 14: Chlotine dosing tank at SWTP Puranbazar, Chandpur

Attendance sheets of Some of the Public Consultation Meetings held in Cumilla Cluster

Department of Public Health Engineering
Cluster Towns Water Supply and Sanitation Project (CTWSSP) Phase I
Exchange of views with locals on environmental issues and other issues
(পরিবেশগত বিষয়াদি সহ অন্যান্য বিষয়ে স্থানীয়দের সাথে
মতবিনিময়)

Name of Paurashava: Hajiganj

Date: June 03, 2026

Attendance Sheet

SL. No.	Name of Participants	Designation	Mobile Number	Signature
01.				
02.	Md. Mahbub Afzar			
03.	Md. Shafiqur Rahman			
04.	Md. Nur-A Alam			
05.	ABDUL MANNAF TALUKDER			
06.	Mahza Safiul Baran			
07.	MD. MOSHARAF			
08.	Shaeibul Islam			
09.	MD. MOSHARAF HOSSAIN			
10.	MD. GEMANA			

11 MD. MAHBUBUR RAHMAN

SL. No.	Name of Participants	Designation	Mobile Number	Signature
	শ্রী: অনন্ত কুমার			
	সাহিত্য সমাজ			
	মামুনুর রহিম			
	আবু হান্নান -			
	ডোঃ বিক্রম			
	ডোঃ আব্দুল নজির			
	ডোঃ মাহবুব হোসেন			
	কুতুব			
	আব্দুল			
	আমিন			
	ডোঃ মোঃ ম			
	মাহবুব			
	At-Amin			

SL. No.	Name of Participants	Designation	Mobile Number	Signature
	Mr. Abdul Kader			
	Mr. Abdul Kader			
	Mr. Abdul Kader			
	Mr. Abdul Kader			
	Mr. Abdul Kader			
	Mr. Abdul Kader			
	Sannat Kashi			
	Faizul Ahsan Reza			
	Fahad Md. Fikrullah			
	Mr. Nohidul Islam			
	Mr. Tofaeel Ahmed Shahr			
	Abu Sayed			
	Mr. Abdul Kader			
	Mr. Abdul Kader			
	Mr. Abdul Kader			

Cluster Towns Water Supply and Sanitation Project

Focus Group Discussion/Consultation Meeting

Name of the Municipality: छात्रपुर नगरपालिका
 Name of the Scheme/Package: OHT/PTW/Reservoir/Pipe Distribution network
 Location: बिक्रमी बाग, चारपा, छात्रपुर
 Venue: बिक्रमी बाग बसपार्क, छात्रपुर Date: 22.08.2020

List of the Participants

Sl. No.	Name	Sex	Designation/ Occupation	Contact Number	Signature
०१	श्री. अनिरुद्ध शर्मा	m			
०२	श्री. विष्णु मिश्र	m			
०३	श्री. रमेश शर्मा	m			
०४	श्री. रविन्द्र	m			
०५	श्री. रामेश्वर	m			
०६	श्री. रामेश्वर	m			
०७	श्री. रमेश शर्मा	m			
०८	श्री. रमेश शर्मा	m			
०९	श्री. रमेश शर्मा	m			
१०	श्री. रमेश शर्मा	m			
११	श्री. रमेश शर्मा	m			
१२	श्री. रमेश शर्मा	m			
१३	श्री. रमेश शर्मा	m			
१४	श्री. रमेश शर्मा	m			
१५	श्री. रमेश शर्मा	m			
१६	श्री. रमेश शर्मा	m			
१७	श्री. रमेश शर्मा	m			
१८	श्री. रमेश शर्मा	m			
१९	श्री. रमेश शर्मा	m			
२०	श्री. रमेश शर्मा	m			

Name of the Municipality: হাজীগঞ্জ পৌরসভা, চাঁদপুর

Name of the Scheme/Package: OHT/PTW/Reservoir/pipeline distribution network/BS

Location: ମଝି ହାବିଆବାଦ, ଓଡ଼ିଶା-୭୬

Venue: স্বাধীনতা ক্রমোত্তর রোড টাউ

Date: 22.08.2021

[illegible]

Cluster Towns Water Supply and Sanitation Project

Focus Group Discussion/Consultation Meeting

Name of the Municipality: बुद्धिमान गाँविका कर्मालय

Name of the Scheme/Package: DHT/PTW/Reservoir/Pipe distribution network/BS

Location: कलकत्ता

Venue: ବ୍ରହ୍ମଚରୀ ମାନ୍ଦିର, କଟକ

Date: 26.08.2024

List of the Participants

[illegible]

Cluster Towns Water Supply and Sanitation Project

Focus Group Discussion/Consultation Meeting

Name of the Municipality: कुमिल्ला सिटी कार्पोरेशन,
 Name of the Scheme/Package: OHT/PTW/Reservoir/Pipe Distribution network/BS
 Location: उनेसुवा बाकेलान (अर्द्धशतक कम्पाउन्ड, कुमिल्ला,
 Venue: कुमिल्ला क्षेत्रीय रेसर्भर हाउस आवासीय Date: 22.08.2024

List of the Participants

Sl. No.	Name	Sex	Designation/ Occupation	Contact Number	Signature
१	मो: पारिकर शोभासेन	पुं			
२	आरुख	पुं			
३	मो: आन	पुं			
४	मो: अमिर	पुं			
५	आरुख रेग्माल	पुं			
६	विजान शोभासेन	पुं			
७	मो: अरुण मिश्रा	पुं			
८	रुनमान	पुं			
९	मो: अरुण	पुं			
१०	मो: रामि	पुं			
११	मो: नारि	पुं			
१२	मो: अमिर शोभासेन	पुं			
१३	मो: नारुन मिश्रा	पुं			
१४	मो: नारुन मिश्रा	पुं			
१५	मो: अरुण	पुं			
१६	मो: अरुण	पुं			
१७	मो: अरुण	पुं			
१८	मो: अरुण	पुं			
१९	मो: अरुण	पुं			
२०	मो: अरुण	पुं			
२१	मो: अरुण	पुं			
२२	मो: अरुण	पुं			
२३	मो: अरुण	पुं			
२४	मो: अरुण	पुं			
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२८	मो: अरुण	पुं			
२९	मो: अरुण	पुं			
३०	मो: अरुण	पुं			
३१	मो: अरुण	पुं			
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६४	मो: अरुण	पुं			
६५	मो: अरुण	पुं			
६६	मो: अरुण	पुं			
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७०	मो: अरुण	पुं			
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८९	मो: अरुण	पुं			
९०	मो: अरुण	पुं			
९१	मो: अरुण	पुं			
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९४	मो: अरुण	पुं			
९५	मो: अरुण	पुं			
९६	मो: अरुण	पुं			
९७	मो: अरुण	पुं			
९८	मो: अरुण	पुं			
९९	मो: अरुण	पुं			
१००	मो: अरुण	पुं			

Cluster Towns Water Supply and Sanitation Project

Focus Group Discussion/Consultation Meeting

Name of the Municipality: লাকসাম পৌরসভা

Name of the Scheme/Package: OHT/PTW/Reservoir/Pipe Distribution Network/BS

Location: পশ্চিমগাঁও, লাকসাম

Venue: পশ্চিমগাঁও কলেজগাও

Date: ২২.০৪.২০২৫

List of the Participants

Sl. No.	Name	Sex	Designation/ Occupation	Contact Number	Signature
	মহসিন আলী	পু:			
	আবু হামিদ	পু:			
	জাহিদ মিয়া	পু:			
	মো: সুজন হোসেন	পু:			
	মো: জাহিদ	পু:			
	মো: মরহুম	পু:			
	মো: মুনতাসিমিয়া	পু:			
	মো: জাহান মিয়া	পু:			
	বিজয় হোসেন	পু:			
	জাহিদ মিয়া	পু:			
	মুন্সিংগ কাহিম	পু:			
	সোলায়ম কবিরিয়া	পু:			
	আবু হামিদ	পু:			
	আব্দুল হাকিম	পু:			
	ইমদ	পু:			
	কামাল	পু:			
	আব্দুল	পু:			
	মাহিদ	পু:			
	জাহান মিয়া	পু:			

Appendix 7: A Common Traffic Management Plan

1.0 TRAFFIC MANAGEMENT PLAN

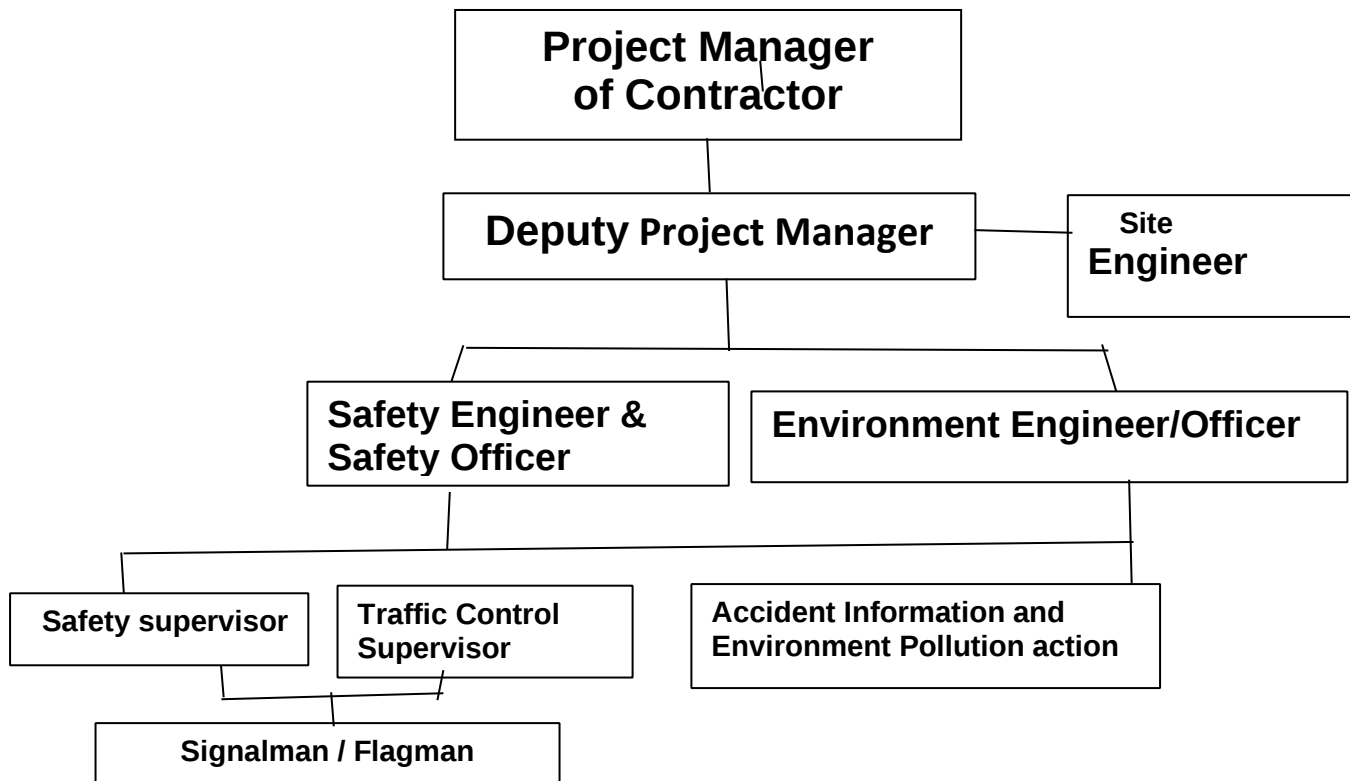
1.1 Introduction

The Management is committed to review all of the subproject's relevant plans. Traffic Management Plan (TMP) part of a comprehensive suite of environmental controls within the Site-Specific Environmental Management Plan (SEMP) for the construction phase of the CTWSSP. The TMP addresses the potential construction traffic effects associated with the construction of the subproject

1.2 Purpose

The purpose of this Traffic Management Plant (TMP) to Perform the requirements and concerns of about the road safety of vehicular traffic, pedestrians and workers in the General and Particular Conditions of each work under the Contract. It shall comply the procedures, requirements and standards necessary for managing the traffic effects during construction works of the subproject so that safe, adequate and convenient facilities for local movements by all transport modes are maintained throughout the construction period". The site-specific traffic management plan is designed to protect the workers and the local community and also the environment of the area. The traffic will move for loading /unloading and hauling in different locations at site using the local and national highway road where the areas are predominantly residential areas. To take due care to the local residents and the Safety Policy is to state clearly the objectives of the subproject in relation to Environment, Health and Safety, Quality and Security and also in compliance to requirements stipulated in the contract documents and legislation and regulations of the Government of the People's Republic of Bangladesh.

1.3 Traffic Control Organization Chart



1.4 Responsibility / Authority

Contractor's Responsibility (as per BRTA Sign Manual)

- Contractor shall be responsible for providing signing in accordance with the BRTA Code of Practice.

The Contractor shall take necessary measures for the safety of traffic, pedestrians and workmen during the road works. The contractor shall provide, erect, operate and maintain signs, markings, lights, barricades and traffic control equipment in accordance with the Bangladesh Road and Transport Authority's Code of Practice for Signing at Roadworks, as modified by the Consultant or the Client's Representative.

The contractor shall maintain an acceptable standard of signing and shall provide adequate signing, if it is detailed in the list of works to be done. This way the contractor will get the paid for each sign supplied and placed correctly.

1.4.1 Project Manager of Contractor

The Project Manager is responsible for the establishment to the Temporary Traffic Management Plan programmed. This programmed shall be according to policies with the recommendations and assistance of the Deputy Project Manager, Site Engineer and the Safety Officer. Accident prevention procedures will be included in all activities by the application of good safety planning. Specifically, the Project Manager shall provide advice to his management staff for administration, implementation and monitoring of the Site Temporary Traffic Management Plan programmed with safety advice from the Safety Manager that include the following:

- Direct the activities of the Safety and traffic control Team as the Project Manager;
- Promote full support of the health Safety & Traffic Planning programmed;
- Delegate responsibilities for the various safety functions and authorities with the traffic control promoted at all of the Project;
- Ensure prompt investigation action on any accident investigations with proper reports completed and follow-up action

1.4.2 Deputy Project Manager

The Deputy Project Manager will be in charge of the activities with Quality Health Safety and Traffic aspects after implementation of the site EHST system in the Project. He will oversee the activities concerning these aspects by reviewing/discussing with the Safety Officer or even together with the Project Manager to ensure compliance with the laws and regulations. The specific health and safety Traffic control plan responsibilities of the Deputy Project Manager:

- Ensure compliance to the Traffic Management safety programmed by all departments in the Project;
- Responsible for all safety activities on the Project and maintain liaison with the Construction Engineer / Safety Officer/Traffic engineer.
- Establish and direct the site health, safety Traffic control plan programmed, and the rehabilitation plan whenever requires;
- Ensure the Safety Team is formed and actively involved in the health safety Traffic and environment matters in the Project;
- Ensure information and follow-up action of HSE & Traffic control team after discussion with Project Manager.

1.4.3 Safety Officer/Traffic Engineer:

Safety Officer will be responsible for the administration of the Health, Safety & Traffic management system, the site security plans and must have a thorough knowledge of the safety. These responsibilities include:

- Overall in-charge of all traffic control operations
- Develop and establish Traffic Control Plans
- Prepares and conducts training for all traffic crew on traffic management plans
- Provision of resources (materials, signage, traffic cones, barricades, lighting, relevant PPE etc.) and maintain inventory
- Maintenance of all traffic control related materials equipment periodically and replenishment of these as needed.
- Regular inspection/audit on implementation of the traffic control plans
- Liaise with Consultant, Authorities and Safety Officer on traffic related matters.
- Monitors road closures to maintain traffic control and ensures compliance with applicable regulations.
- Regular updates and reports to the Contractors' management regarding traffic control plan implementation.
- Identify potential safety/health hazards & risks and significant environmental aspects & impacts and implement the controls.
- Authorized to stop or divert traffic with the consent of consultant and authorities.

1.4.4 Traffic Control Supervisor:

- Be aware of the local regulations and changes on traffic control management based on codes and standards
- Implement all established traffic control plans
- Ensure compliance with regulatory requirements,
- Regulate traffic during peak hours and non-peak hours as per plans, with support from traffic.
- Conduct daily toolbox meeting to brief the crew before starting their work
- Ensure and enforce compliance with PPE requirements for traffic control
- Provide feedback to supervisors on any concerns & suggestions for improvement
- Inform the coordinator upon noticing any abnormal or dangerous signs and symptoms related to traffic management.
- Participate and involve in consultation activities to provide constructive suggestions and implementation measures.
- Implement the control measures effectively for identified hazards related to traffic.
- Directing the movement of traffic through or around the work site location.

1.4.5 Signal Men I Watch men

Trained guider/signal men shall be employed to guide the traffic and the pedestrian. Guiders/Signal men shall have an additional precautionary measure to prevent any accident. There should be at least two Guiders/Signal men in each set having two different coloured flags (green & red) at both ends of diversion road. Signal men I guiders shall work for round the clock in number of sets (as per labour law). Special attention shall be made during nighttime.

Watch men are mandatory to be employed at structure site, bituminous work site, construction equipment movement locations and welding operations areas.

Guider/Signal man shall be trained properly (may be from traffic police) before sent to work. A few examples are given regarding the Traffic Police directing manually the traffic on the road.



Traffic Police Directing the Traffic

A traffic control person may also be known as a flag person (flag woman/flag man) or Signaler. The main role is to:

- Stop, slow, and safely direct traffic through work or construction sites.
- Protect workers in the construction zone by regulating traffic flow.
- Give traffic control directions and signals clearly and precisely so that motorists understand their meaning.
- Keep the flow of traffic moving with as few delays as possible.

Only use traffic control persons when other methods of traffic control are not adequate. Always use barriers, barricades, lane control devices, traffic signal lights, sign trucks, and other methods as appropriate instead of, and/or in addition to, traffic control persons to ensure the safety of all workers and protected against any risk to general public traffic using the road.

1.5 Training Plans

The Traffic Control engineer, with support from the Traffic Control supervisor, shall develop a training plan for the workforce associated with traffic management and implement the trainings effectively for all project sites.

The Traffic Control engineer shall provide regular and appropriate training to all personnel in the operation of Traffic Control Plan (including subcontractors and their workforce) as necessary to ensure their competency to do their work and maintain records of all such trainings.

Additional training will be provided when there is a change in the plan or requirements. The Traffic Control engineer, together with the Project Manager and other subproject team members, shall develop and maintain training.

1.6 Meetings and Instructions

The Project Manager/Safety Officer/Traffic Control Supervisor shall organize regular monthly meetings with relevant stakeholders on the status of traffic control implementation measures.

The team will identify shortcomings if any and improvement opportunities and implement the corrective measures in a timely manner. Meetings of Minutes or Reports shall be maintained. Any special instructions arising from these meeting discussions shall be communicated to the relevant traffic control team for implementation at site level.

1.7 Working Hours

Working hours for the project shall be followed as stipulated by the regulation of Bangladesh (8am to 5pm). Nighttime will be from 5pm to 8am.

1.8 Labour Laws

Contractors will follow all relevant labour laws applicable to the contractor's personnel, including laws relating to their employment, health, safety, welfare, immigration and emigration, and will allow them all their legal rights.

1.9 Forced Labour

Contractors will not employ forced labour, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.

1.10 Child Labour

The Contractor will not employ children in a manner that is economically exploitative, or is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development. Where the relevant labour laws of Bangladesh have provisions for employment of minors the Contractor will follow those laws applicable to the Contractor. Children below the age of 18 years will not be employed in dangerous work.

1.11 Communications and Publicity

Necessary communication modes and channels shall be established for internal and external communications, which include the general public and authorities, relating to traffic control measures and plans.

The following measures shall be implemented for communications

- Internal Communications => Meetings, E-mails, Display Posters and Signage's
- External Communication => Through Media, Publicity materials, Banners and bulletins, Hoardings, Signage's, E-mails

Communication campaigns and programs shall be initiated by the Traffic Coordinator and team. These measures include issuing flyers, handouts, radio & walkie-talkie etc. as deemed necessary prior to commencement of temporary or permanent work.

2.0 TRAFFIC CONTROL DEVICES AND FACILITIES

Materials for traffic control devices shall meet the requirements below:

i. Water Filled Barriers

Water filled barriers are modular water filled plastic container of various sizes and shapes. Hollow polyethylene barriers in trapezoidal shape of about 80cm – 10cm length have been developed for a short-term application where portability is important.

ii. Cones

Cones shall be a minimum of 75 cm in height with a broadened base and shall be capable of withstanding impact without damage to the cones or vehicles. All cones shall be orange/white colored and highly visible both in daylight and darkness. Cones shall be capable of remaining bright and in position during normal traffic flow and wind conditions in the area where they are used. Lamps for cones shall be suitable for purpose.

iii. Warning Lights (flashing or steady)

Warning lights shall be Type A (low intensity flashing), Type B (high intensity flashing), or Type C (steady burn) as deemed appropriate, and as approved by the Consultant.

iv. Stop and Go boards

Where there is a lot of traffic or the work site is very long, traffic will be controlled manually using these Stop and Go boards. If obstruction is less than 30 meters long and is on straight section road you will only need a single board operating at one end or in the middle. Boards will be operated by a competent person.

v. Traffic Flags

The traffic flag is a red square cloth measuring at least 300mm x 300mm. It is fastened to a staff about 600mm. The flag does not contain any message so to give motorist the correct message, the flagger must hold the flag properly and use the correct hand signals.

vi. Wand Flashing Batons

During nighttime work flashing batons are used to supplement the stop and go paddle. The flagger shall hold the flashlight in the left hand, shall hold the paddle or flag in the right hand and shall use the flashlight in the following manner to control approaching road users:

- To inform road users to stop, the flagger shall hold the flashing baton with the left arm extended and pointed down toward the ground and then shall slowly wave the flashlight in front of the body in a slow arc from left to right such that the arc reaches no farther than 45 degrees from vertical.
- To inform road users to proceed, the flagger shall point the flashlight at the vehicle's bumper, slowly aim the flashlight toward the open lane, then hold the flashlight in that position. The flagger shall not wave the flashlight.
- To alert or slow traffic, the flagger shall point the flashlight toward oncoming traffic and quickly wave the flashlight in a figure eight motion.
- Extra reserve batteries should be available to continue usage.

vii. Flashing Lights

Flashing lights are often used to supplement a traffic control device. Flashing lights shall be flashing yellow light with a minimum nominal diameter of 200mm with rotating amber lights equipped to be operated over the entire 24hr duration.

Construction Requirements

Traffic control devices and services shall be provided and maintained both inside and outside the project limits as needed to facilitate traffic guidance should this be necessary.

The provision of traffic control devices and services shall comply with the Bangladesh Road Transport Authority (Road Signal Regulations).

Prior to the start of construction operations, the project site team shall erect such signs, barricades, and other traffic control devices as may be required by the plans and directed by the Consultant.

Traffic control devices shall be operated only when they are needed, and only those devices that apply to conditions actually in existence shall be operable.

Temporary fences shall be placed to provide a visual barrier between the work area and adjacent traffic or buildings and at locations directed by the Consultant. All traffic control devices and materials shall be maintained in good condition at all times.

Three types of Signs to be used at Road Works

TYPE	WHAT THIS TYPE DOES	EXAMPLES
Regulatory Sign	These signs regulate drivers / motorists. It must be obeyed; the police enforce these signs	Speed Restriction No Overtaking No Turns Stop Give Way Keep/Move Left/Right
Warning Signs	These signs provide warning to drivers / motorists about possible hazards ahead.	Road Works Ahead Lane Drop Ahead Diversion Ahead
Guide Signs	These signs provide information and guidance to drivers / motorist to reduce their chance of getting lost or taking the wrong path	Delineators Traffic Cones Chevron Alignment Markers

Plant and Equipment

All vehicles used in traffic control operations shall be equipped with the appropriate vehicle mounted warning devices in accordance with BRTA / RHD / Other Approved Traffic Control at Work-Sites Manuals.

During the daytime, plant and equipment working in a position adjacent to traffic should have a projection beyond the normal width of the item.

During poor light conditions or at night, an additional traffic controller with an illuminated red wand shall direct traffic around such plants and equipment.

During nighttime, where traffic is permitted to use the whole or portion of the existing road, all plant items and similar obstructions shall be removed from the normal path of vehicles, to provide a lateral clearance of at least 6m where practicable, with a minimum clearance of 1.2m.

Plant and equipment, within 6m of the normal path of vehicles, shall be lit by not less than two yellow steady lamps suspended vertically from the point of the obstruction nearest to a traffic lane, and one yellow steady lamp at each end of the obstruction on the side furthest away from the traffic lane.

Basic Signs at Road Works and Installation Procedure

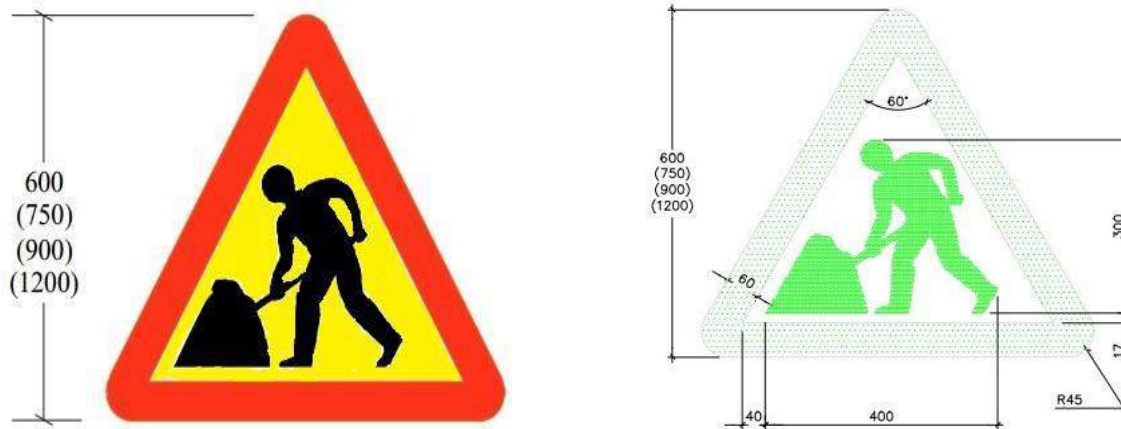
Basic Traffic Signs

The basic traffic signs shall have YELLOW Background, with definition Plate written in both English and Bengali languages

Road Works Ahead (BRTA B38)

Description: Triangular Sign with a symbol of a workman

Application: The sign warns drivers of a temporary obstruction caused by men working in the road ahead. In practice this sign is used for all roadwork's regardless of whether the work is being carried out by manual labor. The sign will normally be positioned on the left-hand side of the road in advance of the hazard. On dual carriageways, a second sign will be placed on the median. The size of the sign and distance from the hazard will be as detailed below. Where there is a series of warning signs, such as at major roadwork's, the sign position may need to be altered in order to keep at least 50 meters between signs. It will always be the first sign that drivers see when approaching roadwork.



Actual Men at Work signage used at worksite

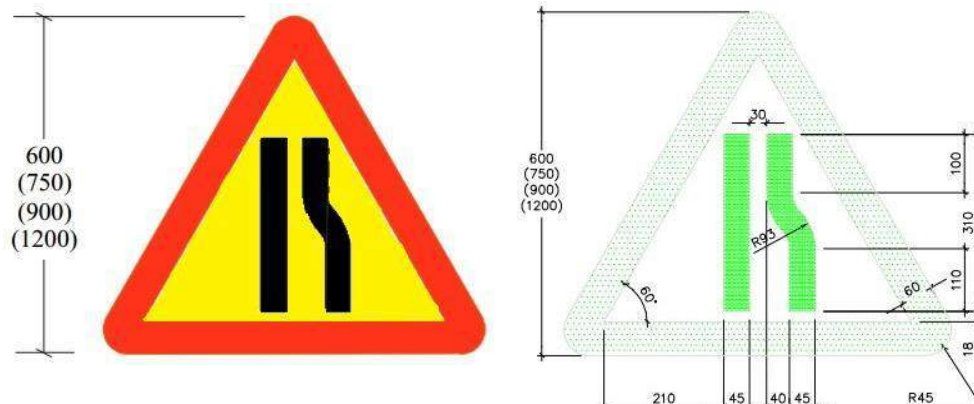


Road Narrow Ahead (BRTA B15)

Description: Triangular Sign with symbol indicating the width of the road ahead narrowing from right or left.

Application: This sign warns that the width of the road ahead will suddenly become narrower from the right (left). The sign is often used at roadworks. The sign should not be used where the reduction in width is gradual. The sign will be positioned on the left hand side of the road in

advance of the hazard. The symbol can be reversed to indicate that the road ahead narrows from the left.



Speed Limit (BRTA A26)

DESCRIPTION: VARIATION: Circular sign with numbers indicating the speed limit.

APPLICATION: The sign shows the maximum permitted speed in kilometer per hour for the section of road ahead. Do not impose a speed limit unless it is essential for road safety. Unrealistically low speed restrictions will be ignored, which will make the signing look silly. Only use limits of 25, 40, 50, and 60 -see Section E2.3. Always ensure that the end of the speed restricted section is marked, either with the A27 sign or with another A26 sign indicating a different speed limit. Where the special speed limit is to apply only to a particular type of vehicle, this should be indicated on a supplementary plate - such as D20 or D21. A supplementary plate explaining in Bangla the meaning of the sign must be added until the new signs have been in use for five years.

LOCATION: The sign should be positioned on both sides of the road, for maximum impact. The sign should be repeated after every major junction and about every 400meter between junctions. The 40 km/h signs are not usually repeated in towns.

COLOURS:	
Background	WHITE
Border	RED
Number	BLACK



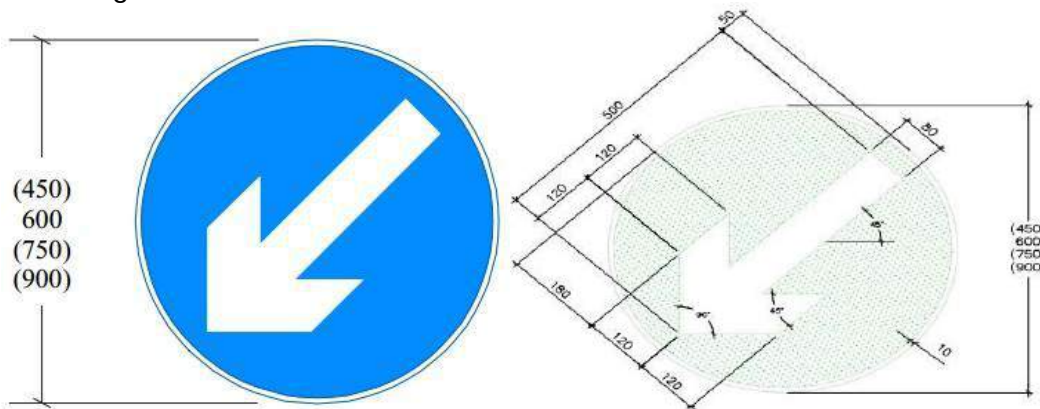
Keep Left / Keep Right (BRTA A33)

Description: Circular Sign with single arrow to indicate Keep Left or Keep Right where the arrow is pointing.

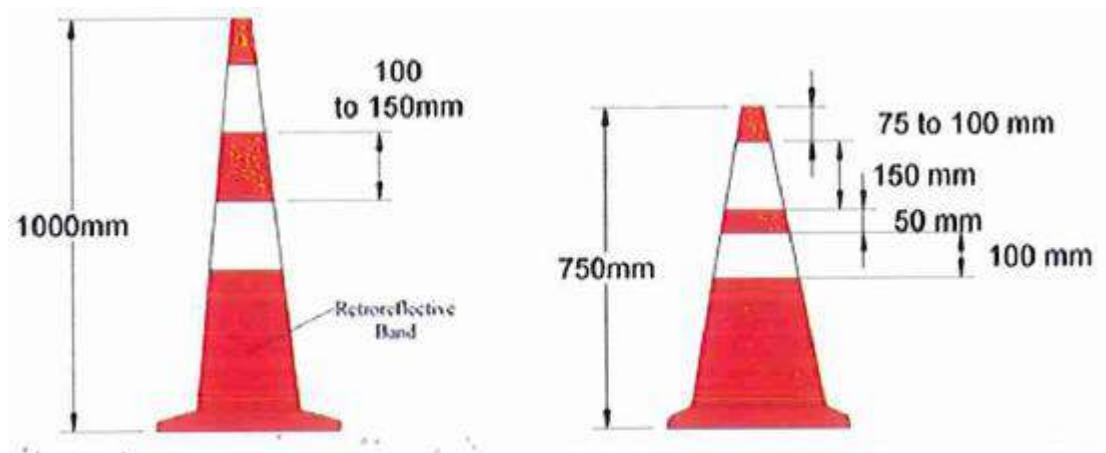
Application: Vehicular traffic may only proceed by keeping to the side indicated by the arrow. The sign is used to mark obstructions, such as traffic islands, medians on dual carriageways, and work

areas at roadworks. The Keep Right sign is only used on temporary roadworks. Vehicular traffic may only proceed by keeping to the side indicated by the arrow. The sign is used to mark obstructions, such as traffic islands, medians on dual carriage ways and work areas on roads. The keep right sign is only used at temporary road works.

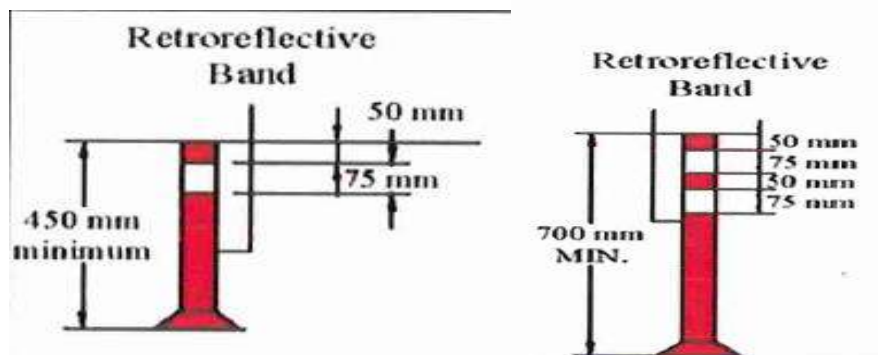
Location: The sign must be placed on or close to the beginning of the obstruction with adequate clearance between the sign and the edge of the carriageway. When used on traffic islands, it may be mounted with the lower edge 1 meter above the carriageway so that it is directly in the beam of vehicle headlight.



Traffic Cones - Place a line of traffic cones to guide pedestrian and vehicle traffic past the works. Leave some working space between the lines and cones and the actual works area. Traffic cones should be red and if used at night, should preferably have white reflective sleeves.



Tubular Markers



Stop and Go – Where there is a lot of traffic or the work site is very long, traffic will be controlled manually using these Stop and Go boards. If obstruction is less than 30 meters long and is on straight section road you will only need a single board operating at one end or in the middle. Boards will be operated by a competent person.

Portable Stop & Go Boards

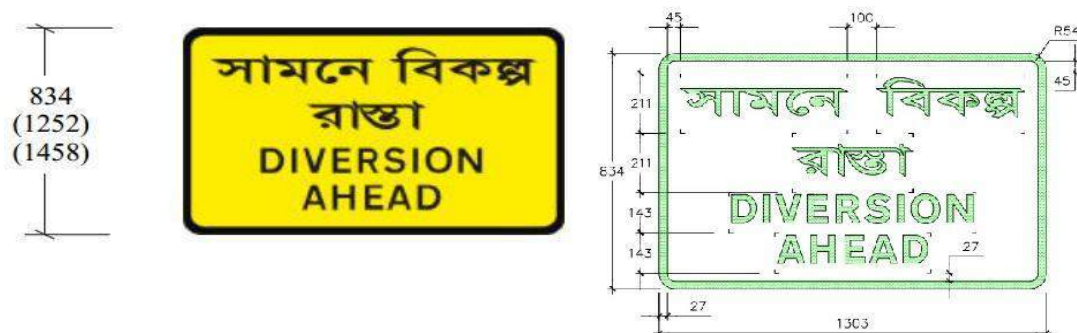


Diversion Ahead (BRTA B51)

Description: Rectangular sign with text stating diversion ahead in both English and Bengali.

Application: This sign warns that due to roadworks or temporary obstruction of carriageway there is a diversion in operation ahead.

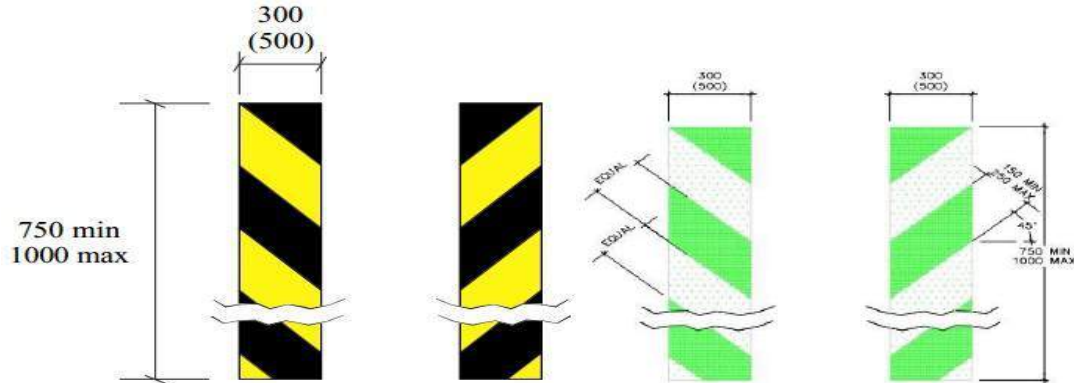
Location: The sign will be positioned on the left-hand side of the road in advance of the hazard.



Dangerous Obstruction – One Way (B49 BRTA)

Description – Rectangular sign with diagonal stripes from top left to bottom right for left side obstruction; from right to bottom left for right side obstruction.

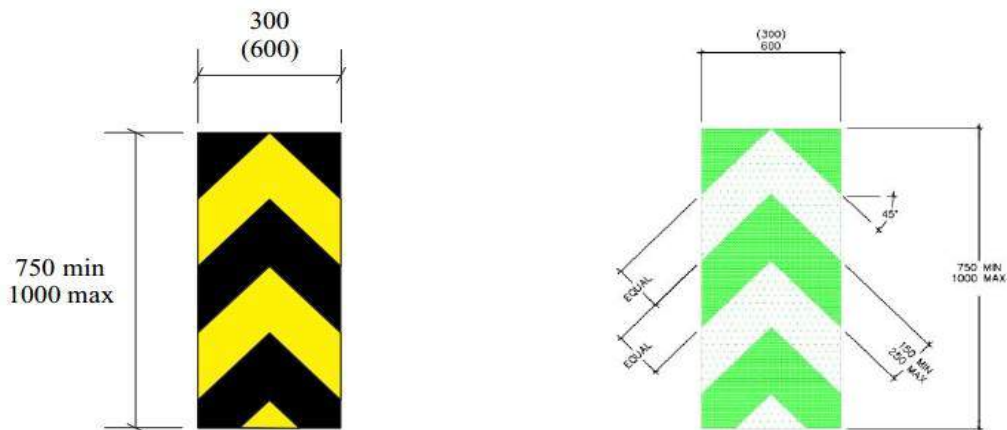
Application – This is used to highlight an obstruction which is close to the edge of the carriage way – such as bridge parapet or bridge pier. The yellow stripes point downwards to the side where the traffic shall pass. The sign plate may be fixed to the end of the obstruction.



Dangerous Obstruction – Two way (B50 BRTA)

Description – Rectangular sign with arrow shades stripes facing upwards.

Application – The sign is used to highlight an obstruction which is close to the edge of the carriageway and where traffic can pass on either side. It can also be used to draw attention to a channelizing island where traffic streams are divided. The sign is sited either on an obstruction or on the nose of the channelizing island where traffic divides.



Other road signs to be used if required follows:

Note: Road signs that have Red, White, Black color shall be Red, YELLOW Background and Black color with definition Plate written in both English and Bengali languages. Yellow replacing White. Other road signs will be the same color.

WARNING SIGN

সতর্কতামূলক সাইনসমূহ

 (CROSS ROAD-MINOR ROAD AHEAD) সামনে আড়াআড়ি ছোট সড়ক আছে	 (CROSS ROAD-MAJOR ROAD AHEAD) সামনে আড়াআড়ি প্রধান সড়ক আছে	 (SIDE ROAD RIGHT) সামনে ডানদিকে পার্শ্ব রাস্তা আছে	 (STAGGERED JUNCTION) সামনে বামে-ডানে একধিক সংযোগ সড়ক আছে
 (T JUNCTION) সামনে টি-জংশন আছে	 (Y JUNCTION) সামনে ওয়াই-জংশন আছে	 (TRAFFIC MERGES FROM LEFT) সামনে বামদিক থেকে গাড়ি এসে মিশতে পারে	 (JUNCTION WITH TRAFFIC FROM RIGHT) সামনে ডানদিকের গাড়ির সাথে মিশতে হবে
 (ROUND ABOUT) সামনে গোলাচক্কর	 (SHARP BEND TO THE RIGHT) সামনে ডানদিকে আচমকা মোড় আছে	 (SHARP TURN BEND TO RIGHT) সামনে ডানদিকে খাঁড়া বাক আছে	 (DOUBLE BEND FIRST LEFT) সামনে দুটি বাক আছে, প্রথমটি বামে
 (ROAD NARROWS ON BOTH SIDES) সামনে উভয়পাশ হতে রাস্তা সর হতেছে	 (ROAD NARROWS ON THE RIGHT) সামনে ডানদিক হতে রাস্তা সর হতেছে	 (DUAL CARRIAGEWAY ROAD) দুটি পৃথক সড়ক সামনে মিলিত হবে দু-পেদের একটি সড়কে পরিণত হয়েছে	 (TRAFFIC SIGNALS) সামনে ট্রাফিক সিগন্যাল আছে
 (STEEP HILL DOWNWARD) সামনে ঢালু পাহাড় আছে	 (STEEP HILL UPWARD) সামনে খাঁড়া পাহাড় আছে	 (HEIGHT LIMIT AHEAD) প্রতিবন্ধকতা কারণে সামনে সীমিত উচ্চতা আছে (এই বোর্ডে ৪.৪ মিটার)	 (TWO WAY TRAFFIC STRAIGHT AHEAD) সামনে উভয়দিকে সোজাসুজি চলাচল

INFORMATIVE SIGNS

 (TWO-WAY TRAFFIC CROSSES ONE-WAY ROAD) একদুই রাস্তা সামনে (বৈ-রাস্তার মিলিত হলে সে-রাস্তার উজ্জ্বলিত গাড়ি/যানচালাই চলবে করে	 (PEDESTRIAN CROSSING) সামনে পথচারী পারাপার	 (PEDESTRIANS IN ROAD AHEAD) হুটপাত না থাকায় সামনে সড়কে পথচারী চলচল করে	 (CHILDREN) সামনে স্কুল থাকায় রাস্তায় শিশু-কিশোরী চলচল করে
 (CATTLE) সামনে গরুগোশুর রাস্তায় চলচল করতে পারে	 (WILD ANIMALS) সামনে বন্যপ্রাণী রাস্তায় চলচল করতে পারে	 (RIVER BANK) সামনে নদী/পাড়ার খালের কিনারা আছে	 (UNEVEN ROAD) সামনে অসমতল/জোঁড়িপূর্ণ সড়ক
 (SLIPPERY ROAD) সামনে সিমিল সড়ক	 (ROAD HUMP) সামনে গতিরোধক	 (LOW FLYING AIRCRAFT) সামনে বিমানবন্দর। নিম্ন/উচ্চতর উড়ন্ত বিমানের উল্লেখ করা হতে পারে	 (FALLING ROCKS) সামনে পাহাড়ের পাশ্ব হতে রাস্তায় শিলা/দেয়রাখণ্ড পড়তে পারে
 (DANGEROUS DIP) সামনে বিপজ্জনক খাদ/পাত আছে	 (NARROW BRIDGE) সামনে সরু/সঙ্কীর্ণ সেতু আছে	 (OTHER DANGER) সামনে বিভিন্ন রকম বিপদাশঙ্কা আছে	 (CHECKPOINT) সামনে চেকপয়েন্ট আছে
 (ROAD WORKS) সামনে সড়ক মেরামতের কাজ চলছে	 (LOOSE CHIPPINGS) সামনে রাস্তার ওপর চিলা/ আলুনা মুড়ি-পাথর আছে	 (CYCLES AND RICKSHAWS) সামনে রাস্তায় সাইকেল/রিকশা চলচল করে	 (DANGEROUS SHOULDER) সামনে রাস্তার শোভার বিপজ্জনক
 (FERRY) সামনে ফেরিঘাট আছে	 (BLIND PERSONS) সামনে রাস্তায় অন্ধমানুষ চলচল করতে পারে	 (RAILWAY LEVEL CROSSING WITHOUT GATE OR BARRIER) ওপেক্ষিত (গেট/পাহারাদার/বাইন) রেলসি	 (RAILWAY LEVEL CROSSING WITH GATE OR BARRIER) রক্ষিত (গেট/পাহারাদার আছে) রেলসি

বিশেষ সতর্কতামূলক সাইনসমূহ

(SHARP CHANGE OF DIRECTION TO THE LEFT) আচমকা বামে মোড়  এই ধরনের সাইন বিপজ্জনক বাঁক, বিশেষ করে যে-সব বাঁক সম্পর্কে পূর্বে হুঁতে ধারণা করা যায় না সে-সব বাঁকে ব্যবহৃত হয়।	(SHARP CHANGE OF DIRECTION TO THE RIGHT) আচমকা বামে মোড়  গাময়িক বিকল্প সড়কের ক্ষেত্রে ব্যবহৃত আচমকা বামে মোড় সাইন।	(T JUNCTION CHEVRON) সামনে টি-জংশন  এই ধরনের সাইন টি-জংশনের প্রবেশ মুখে ছোট রাস্তার বিপরীতে প্রদর্শন করা হয়, যাতে চালক ছোট রাস্তা দিয়ে অগ্রসর হওয়ার সময় জংশন গনাক্ত করতে পারে এবং প্রয়োজন অনুযায়ী গুরুত্বপূর্ণ বা বাঁক দিকে যেতে পারে।
(TEMPORARY DIVERSION AHEAD) সামনে সাময়িক বিকল্প সড়ক  মেয়ামত বা অন্য কোনো কারণে মূল রাস্তা বন্ধ থাকলে, বিকল্প রাস্তা ব্যবহারের বিষয়ে সতর্ক করতে এই সাইন ব্যবহৃত হয়।	(DIRECTION OF TEMPORARY DIVERSION AHEAD) সামনে সাময়িক বিকল্প সড়কের নকশা  এই সাইনটি বিকল্প রাস্তার নকশা বা বিন্যাস বুঝতে ব্যবহৃত হয়। এই নির্দিষ্ট নকশাটি দেখাচ্ছে যে, দু-দশন বিশিষ্ট একটি বিকল্প রাস্তা, যা বিপরীত দিকে দৌঁতে রাস্তা পড়েছে।	(DIRECTION OF TEMPORARY DIVERSION) সাময়িক বিকল্প সড়কের নির্দেশনা  এই সাইনটি শহরের মধ্য দিয়ে প্রবাহিত বিকল্প রাস্তা চিহ্নিত করতে ব্যবহৃত হয়। এটি বিকল্প রাস্তার শুরুতে এবং বিকল্প রাস্তা বরাবর জংশনে ব্যবহৃত হয়।
(LANE CLOSED TO TRAFFIC AHEAD) সামনে সাময়িকভাবে গেন বন্ধ  সামনে এক বা একাধিক লেন সাময়িকভাবে বন্ধ করতে এই ধরনের সাইন ব্যবহার করা হয়। এই নির্দিষ্ট সাইনে লেখা আছে যে, 'হিস লেন' বা 'রাইস লেন' চালানোর লেনটি বন্ধ রয়েছে।	(COUNT-DOWN MARKERS) নিম্নমুখী গণনা সাইন  গেজটসিংলের দূরত্ব বুঝতে এই সাইন ব্যবহৃত হয়। তিনবারের সাইন দিয়ে মোট দূরত্ব, দু-বারের সাইন দিয়ে দু-তৃতীয়াংশ এবং একবারের সাইন দিয়ে এক-তৃতীয়াংশ দূরত্ব বুঝায়।	(LOCATION OF RAILWAY CROSSING) রেলক্রসিংয়ের অবস্থান  এই সাইনটি রেলক্রসিংয়ের অবস্থান বুঝতে রেলিং পয়েন্টের নিকটে প্রদর্শন করা হয়। এদের অধিক রেল-ট্রাক থাকলে সেখানে অতিরিক্ত 'অর্ধেক ক্রস' সাইনটি ব্যবহৃত হয়।
(SINGLE SIDED DANGEROUS OBSTRUCTION) একপাশে বিপজ্জনক প্রতিরোধক  সেতু/ব্রিজ, কাগজাট ইত্যাদি বিপজ্জনক প্রতিরোধকের প্রাচীর/পিছারে এই ধরনের সাইন ব্যবহার করে আলোর প্রতিফলনের মাধ্যমে বিপজ্জনক প্রতিরোধক সম্পর্কে চালকের দৃষ্টি আকর্ষণ করা হয়। হৃদয় ভোরাকাটা দাগসমূহ যে-পাশেরদিকে (বরাবর) নিম্নমুখী হয়, সে-পাশ দিয়ে যানবাহন অতিক্রম করবে।	(DOUBLE SIDED DANGEROUS OBSTRUCTION) উভয়পাশে বিপজ্জনক প্রতিরোধক  এই ক্ষেত্রে গাড়ি যে-কোনো পাশ দিয়ে যেতে পারে। চালকের সড়কদ্বীপ, যেখানে জটিল প্রবাহ বিভক্ত হয় সেখানে চালকের মনোযোগ আকর্ষণ করতে এই ধরনের সাইন ব্যবহৃত হয়।	

High visibility clothing shall be provided for all safety and traffic crew such as Reflective personal vests / clothing for better visibility.

Traffic control Supervisors / Coordinators shall ensure traffic related equipment and protective clothing are available at the site at all times and implement measures for effective enforcement of proper usage and necessary replacement / replenishment of such equipment and clothing. Personal protective equipment shall include as minimum (but not limited to):

- Protective Headgear (hard hat or similar)
- Reflective Jacket
- High Visibility Vest
- Safety Boot with steel toe caps and steel sole plate
- Other items such as Safety Glasses, Gloves and Rubber boot etc.

PLANNING AND IMPLEMENTATION OF TRAFFIC MANAGERMENTS

Delineation of Work Site

Construction site shall be delineated, in absence of boundary walls, by fences. The jobsite should be adequately marked to warn the public of construction activities. Warning signs can be used to restrict public access.

Special attention shall be made for excavation, piling, and pre-stressing. Excavation, piling and pre-stressing sites shall be fenced all around. No trespassing shall be allowed. Sufficient number of notice boards, danger signs, flashing lights etc shall be provided in the area.

.Jobsite marked with

.Jobsite delineated



Jobsite cleaning

The work area should be kept clean in order to minimize hazards to workers. During the erection of tall structures, the nylon net shall be put around the structure periphery 3 to 4 meters below the working level. No scaffolding, ladder, working platform, gangway, runway, etc. shall be placed within 3 meters of an un-insulated electric wire.

- All signs and delineator shall be maintained in good clean conditions.
- The worksite shall be clearly delineated with reflective devices including soft plastic bollards, guideposts, hazard markers, and other approved devices. Dangerous items such as concrete blocks, tree branches, and individual concrete barricades shall not be used for delineation or traffic control at the work site.
- Use fluorescent traffic cones at least 750mm high to delineate the traffic path into, through and out of the work site. Always place the cones in smooth lines so they look like the edge of traffic path. Always replace any cones that are knock out of line.
- Use long tapers. Remember that drivers / motorist need longer tapers than you think
- No alternative paths for road users shall be allowed. Any other possible optional route is to be closed off with strong delineation.
- Vertical Clearance
- In general, any temporary work placed over roads or diversions used by public traffic should maintain a vertical clearance of at least 4.5 meters.
- Where required by the Consultant, the respective site team shall erect and maintain suitable approved check gates, fitted with warning signs indicating the vertical clearance.
- All Temporary Road works and associated materials used for temporary purposes shall be constructed, including temporary traffic fences, road works, temporary traffic ramps, Traffic Control for Public Roads etc.
- The respective site project's team shall erect and maintain at prescribed points on the work and at the approaches to the work, traffic aids, markings, signs, lights, flares, barricades, rubber cones with traffic lamps and other facilities as indicated in the Drawings or required by the Consultant for the direction and control of traffic.

Traffic Safety and Control

The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic approaching or passing through the section of the highway under improvement. The barricades erected on either side of the carriageway / portion of the carriageway closed to traffic, shall be of strong design to resist violation, and painted with alternate black and white stripes. Red lanterns of warning lights

of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise. At the points where traffic is to deviate from its normal path (whether on temporary diversion or part width of the carriageway) the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums or similar devices as per the directions of the Engineer. At night, the passage shall be delineated with lanterns or other suitable light sources.

Safety in Road Construction Zones

The construction zone creates an environment where the road user is faced with a series of unusual hazards in the form of unfamiliar routes, substandard horizontal and vertical alignment, adverse cambers, construction equipment etc. The road user also has to watch for traffic control devices apart from performing normal driving functions of vehicle control and responding to other traffic and hazards. These factors increase the strain on driver performance and lead to accidents. The safety practices in construction zones should, therefore, be orientated towards reducing conditions which lead to such hazards and consequent stress, whereby risk of accidents is increased. The guiding principles for safety in road construction zones are: i) Warn the road user clearly and sufficiently in advance; ii) Provide safe and clearly marked lanes for guiding road users; iii) Provide safe and clearly marked buffer and work zones; iv) Provide adequate measures that control driver behavior through construction zones.

Construction zone

Highest regard is to be given to traffic safety as well as to provide a safe working environment to the workmen. Before starting the construction work, which will influence traffic, the contractor has to get the legal permission of the road traffic authority and local police about the means and extent of securing the construction zone. The traffic management strategies to be used at construction zones should ensure that traffic safety is an integral and high-priority element of the project. This can be ensured by avoiding inconvenience to traffic as far as possible and by guiding the drivers in a clear and positive way. Routine inspections of traffic control elements and traffic operations must be carried out so that care and attention to roadside safety is never slack during the progress of the project.

Traffic Control Means During Non-Working Time

The Safety Officer ensure that during non-working hours and following completion of a particular construction operation, all warning signs, except those necessary for the safety of the public are removed or entirely covered with either metal or plywood sheeting so that the sign panel will not be visible.

Retro-reflective sheeting on signs, barricades, and other devices shall be kept clean. Stretches, rips, and tears in the sheeting shall be promptly corrected by the responsible site personnel as and when necessary. The Traffic Control Coordinator together with the Safety Officer shall ensure Retro-reflective sheeting are maintained to have retro-reflection at all times.

Traffic Control Means During Night Time

In many situations night construction may be preferred as the volume of traffic is generally lower, and conflicts are minimized. Consideration must be given to the effect of night operations on the surrounding environment as well as the workers. Further, even if the work occurs at night, a lane or lanes may need to remain closed during higher traffic times.

Lighting Devices--Lighting devices should be provided in work zones based on engineering judgement. When used to supplement channelization, the maximum spacing for warning lights should be identical to the channelizing device spacing requirements.

Four types of lighting devices are commonly used in work zones. They are floodlights, flashing warning beacons, warning lights, and flashing batons.

Floodlights--Utility maintenance or construction activities on highways are frequently conducted during nighttime periods when vehicular traffic volumes are lower. Large construction projects are sometimes operated on a double shift basis requiring night work. When nighttime works is being performed, floodlights should be used to illuminate the work area, equipment crossings, and other areas. The adequacy of floodlight placement and elimination of potential glare should be determined by driving through and observing the floodlighted area from each direction on all approaching roadways after the initial floodlight setup, at night, and periodically.

Flashing Warning Beacons – Flashing warning beacons are often used to supplement a traffic control device. Flashing warning beacon shall be a flashing yellow light with a minimum nominal diameter of ss200mm with the rotating amber lights equipped to be operated over the entire 24hrs duration. The temporary terminus of an expressways is an example of a location where flashing warning beacons alert the drivers to change roadway conditions and the need to reduce speed in transitioning from expressway to another roadway type.

Warning Lights - Type A, Type B, Type C, and Type D 360° warning lights are portable, powered, yellow lens-directed and enclosed lights. When warning lights are used they shall be mounted on signs or channelizing devices in a manner that, if hit by an errant vehicle, they will not penetrate through the windshield. The maximum spacing for warning lights should be identical to the channelizing device spacing requirements. Flashing lights should not be used as delineation, as a series of flashers fails to identify the desired vehicle path.

- Type A – A low-intensity flashing warning lights are used to warn road users during night time that they are approaching or proceeding in a potentially hazard area. Type A warning light maybe mounted on channelizing device.
- Type B – High intensity flashing warning lights are used to warn road users during both daylight and nighttime hours that they are approaching a potential hazard area.
- Type C -- Steady-burn warning lights and Type D 360° steady-burn warning lights may be used during night time to delineate the edge of the traveled way and channelize traffic.

Flashing Baton - During the night time works, or in other conditions of poor visibility, each traffic control person must be provided with and must use in addition to the personal protective equipment, a flashing baton/wand. The traffic controller must have immediate access to spare batteries for the flashing baton/wand.

Maintenance of Diversions and Traffic Control Devices

Signs, lights, barriers and other traffic control devices, as well as the riding surface of diversions shall be maintained in a satisfactory condition till such time they are required as directed by the Engineer. The temporary diversion road shall be kept free of dust by frequent applications of water, if necessary

SAFETY INDUCTION AND TRAINING PROGRAM

Contractors will take all reasonable steps including training and drills to ensure the safety of all person on the Site, and shall at all times promote the merits of safety awareness.

Awareness program shall be ensured for Contractors staff and workers and new employees regarding safety practices while at work before being allowed to work at project sites. Such items will include “fundamental Safety Rules applicable to each employee”.

No worker shall be allowed to access the Site unless they have undergone an induction course prepared by the Contractor - Participants who successfully complete such a course shall be presented with a laminated card and lanyard, indicating their authority to enter the site, such card being prominently displayed for the period that the holder is on site.

Training is one of the most important ways to ensure that the workers are capable and effective in maintaining a safe and healthy work environment. All workers (including casual, hired and trained workers), supervisors, engineers, sub-contractors, visitor will be inducted in this training.

Training and Record Keeping

Contractor will provide Induction Training for all new employees. Workers shall be trained so that they can apply systems of work and work practices that are safe and without risk to health.

Contractor will make sure that all employees have been adequately trained and instructed to perform their work safely before allowing them to commence construction work.

Contractor will conduct training on monthly/quarterly basis to make aware of any dangers involved with their work and safety precautions that need to be taken to avoid accident or injury.

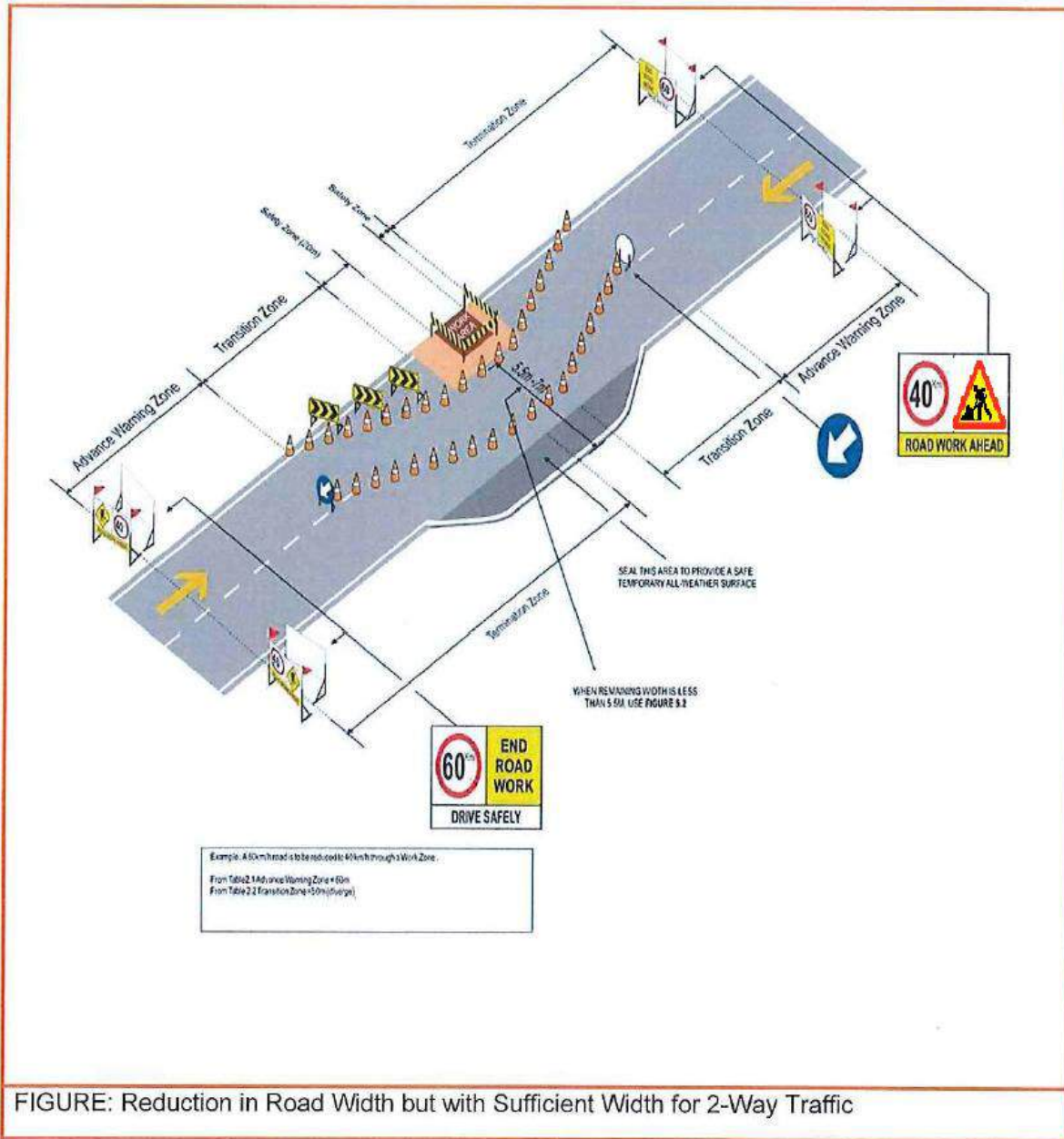
Work Activity and Traffic Induction Training

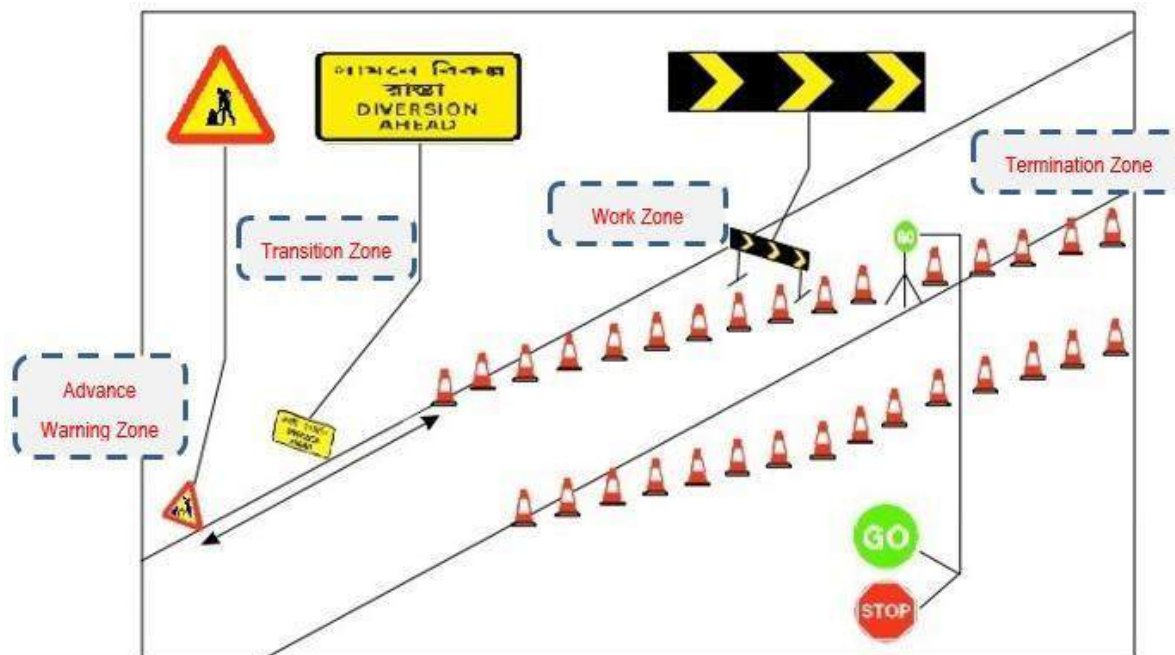
The objective of Work Activity-based health and safety traffic induction in the Road of highway sector is to give workers knowledge of the OHS issues relevant to road construction and maintenance, if this training is Conducted as a training course, where the employer has 10 or more employees it shall be developed by a person who holds a 'Certificate of HIV in Workplace Assessment and Training' and be run by a person who has Statement of Attainment in 'Train Small Groups'.

Emergency Response Training

Regular training in the form of drills and exercises will be conducted by the Emergency teams will be conducted at regular intervals. These drills will be designed to test the knowledge and understanding of the training undertaken and its application to the varying environments within the site.

The drills will cover the training elements j,e, Fire Rescue, Collapse of lifting appliances and transport equipment, Collapse of building, sheds or structure etc. Gas leakage or spillage of dangerous goods or chemicals, criminal or terrorist attack, Landslides getting workers buried floods, Earthquake, storms and other natural calamities, Rescue from Height& Medical Emergency etc. relevant to the extent of their initial training and the risks identified within the location. For each drill a scenario will be developed that clearly identifies the drills objective,





Temporary Traffic Control Zone Components

The Temporary Traffic Control Zone Component is a method of separate breaking zones according to the purpose of each. It follows the path of the road users as they approach, pass through and depart from the work site. The four components that constitute a temporary traffic control zone are describe in the order that drivers encounter them includes the following.

- Advance warning zone is to alert drivers / motorist of road works ahead and to instruct them how to safely proceed. On freeways and expressways, where the driving speed is generally 45mph or more, signs may be placed from 500ft to ½ mile or more before the temporary traffic control zone.
- Transition Zone is used where there is a need to direct traffic into another lane. To guide drivers /motorist into correct alignment in which they should remain in order to pass safely through the work zone.
- Work Zone is the length of the work area. To control drivers /motorist through the area where the work is taking place at a speed and is a lane that is safe for them and which is also safe for the road workers.
- Termination Zone is to inform drivers /motorist that they are now past the work zone, to inform them of a new speed limit that applies on the road ahead, to thank them for driving carefully through the work and remind them to always drive safely.

8.0 CONCLUSION

The contractor will put into practice a list disturbance policy and will implement the specific traffic managements identified in this document. Contractor will ensure that the site rules as set out in this document are complied with by all who work at the subproject. It's important to note that this Plan will be under constant review and will be revised as required to take into account any improvements or modifications which will improve the safety aspects of the route.

Appendix 8: Environmental Audit of Existing Facilities

Draft Environmental Audit of Existing Facility (Cumilla Cluster Water Supply System)

[This draft environmental audit is based on the feasibility study shared and the sample site visits during the IEE study. ADB technical team to confirm that the findings are valid and used as basis for the final detailed designs.]

I. PURPOSE AND SCOPE OF THE ENVIRONMENTAL AUDIT

An environmental audit of the existing water supply systems in the Cumilla Cluster was undertaken to critically examine the environmental performance, compliance status, operational practices, and risk profile of current facilities prior to the implementation of the proposed cluster surface water supply system. The audit covers groundwater abstraction infrastructure, water treatment and storage facilities, distribution networks, and associated operational practices in Cumilla City Corporation, Chandpur, Hajiganj, and Laksam, using feasibility study findings as the primary evidence base. ADB consultants visited and validated status and performance of the water supply infrastructure components through direct witnessing and conducting stakeholder meetings with the people involved with water supply systems across the four cluster towns.

II. OVERVIEW OF EXISTING WATER SUPPLY ARRANGEMENTS⁴³

The audit confirms that existing water supply systems in CuCC and Laksam Paurashava are fully groundwater-based, while Hajiganj Paurashava has a combined groundwater and surface water-based supply system. Chandpur Paurashava solely relies on surface water of the Dakatia river for domestic water source. There are production tubewells (PTWs) for abstraction of groundwater, which are installed in various areas, which include functional ones in CuCC (32 nos.), and Paurashavas of Laksam (9 nos.), and Hajiganj (11 nos.). For surface water treatment plants (SWTPs), there are five operational SWTPs covered by the scope of the project, of which four are in Chandpur Paurashava and one in Hajiganj Paurashava. All surface water intake points are located within the Dakatia river. In addition, nine overhead tanks (OHTs) are functional (6 in CuCC, 1 in Laksam Paurashava and 2 in Chandpur Paurashava) in the water supply systems of four cluster towns.

Water quality in the project towns generally fails to meet government standards and overall piped service coverage remains low reaching only 15-20% of the total population across the four cluster towns. Supply is characterized by intermittent service delivery (2–16 hours per day), limited network coverage, aging infrastructure, and poor treatment performance resulting in both environmental and public health concerns. Many PTWs (18 numbers), all SWTP (5 numbers) and OHTs (3 numbers) need rehabilitation and major refurbishment or repair to continue these water supply systems. Public toilets are limited and poorly maintained, while fecal sludge and solid waste services remain underdeveloped. In addition, the urban local bodies of the project towns lack sufficient technical and financial capacity to operate, maintain, and sustainably expand water supply and sanitation systems. Due to shortage of water supply across all the four cluster towns, people beyond coverage of water supply use their private own deep and shallow tube wells.

⁴³ Partly based on Feasibility Study conducted under the Urban Infrastructure Improvement Preparatory Facility Project (UIIPFP)

Environmental performance of groundwater abstraction.

From an environmental sustainability perspective, uncontrolled and cumulative groundwater abstraction represents a key adverse impact of the existing systems. The feasibility study documents the following:

- (i) Declining groundwater reliability and widespread dependence on aquifers that are already under stress.
- (ii) Continued abstraction without effective demand management or recharge assessment poses risks of aquifer depletion.
- (iii) Potential land subsidence.
- (iv) Reduced base flows to connected surface water systems, indicating poor long-term environmental performance.

Groundwater quality constraints and contamination risks.

Feasibility and baseline studies conducted under the CTWSSP show that groundwater quality is a critical environmental and health constraint. Elevated concentrations of iron, manganese, and in some cases arsenic exceeding Bangladesh drinking water standards have been observed in several operational wells, particularly in Cumilla, Laksam and Chandpur municipalities. The continued use of contaminated groundwater indicates ineffective environmental risk control, exposing users to chronic health hazards and increasing reliance on household-level treatment or alternative unsafe sources.

Water treatment and source protection practices.

Among the five SWTP, one has employed robust water treatment processes with pre-sedimentation ponds and a tertiary treatment with chlorination, while all four SWTP use only basic potash alum and sand filtration for water treatment process. No standard operating procedure (SOP) is found available to maintain a proper surface water treatment process, monitoring quality of inlet and outlet water, and handling, storage and dosing protocol. In no cases, formal protection measures are implemented around wellheads. The absence of delineated protection zones, combined with proximity to drains, sanitation facilities, and solid waste disposal areas, increases the risk of microbial and chemical contamination, reflecting weak environmental safeguards in system operation.

Distribution network leakage and non-revenue water.

The audit identifies poor physical condition of distribution networks as a significant environmental performance issue. Existing pipelines (largely PVC or small-diameter pipes) are aged, frequently leaking, and poorly maintained. High levels of leakage contribute to non-revenue water, increased abstraction volumes, localized waterlogging, increase risk of contamination, and unnecessary stress on groundwater resources, further undermining environmental efficiency.

Energy efficiency and emissions considerations.

Existing pumping systems typically operate with low hydraulic efficiency and limited energy optimization, including the absence of variable-frequency drives and modern control systems. From an environmental audit perspective, this results in excessive electricity consumption per unit of water supplied, indirectly increasing greenhouse gas emissions associated with power generation, particularly where diesel generators are used during power outages.

Chemical handling and storage risks.

SWTP at Puran Bazar under Chandpur *Paurashava*, is observed operating chlorination treatment without any proper dosing process. The audit notes potential risks of chemical spills, improper storage, and occupational exposure, as well as inadequate emergency preparedness, indicating partial non-alignment with good practice environmental health and safety standards.

Wastewater and residuals management.

Existing groundwater-based water supply systems generate limited treatment residuals; however, spent backwash water and sludge, where treatment units exist, are discharged without adequate control, sometimes into nearby drains or open land. While volumes are small relative to a centralized surface water plant, the lack of controlled disposal points represents an environmental compliance gap.

Institutional and operational capacity constraints

The environmental audit highlights institutional weaknesses affecting environmental performance. Local government institutions (city corporation and *Paurashava*) face constraints related to inadequate staff, technical staffing, routine monitoring, record-keeping, and preventive maintenance. Environmental monitoring of abstraction rates, analyzing the data from the observation tube wells to know groundwater levels, and water quality are limited, reducing the ability to identify cumulative impacts or implement corrective actions.

III. SUMMARY OF MUNICIPALITY-SPECIFIC FINDINGS

Cumilla City Corporation.

In Cumilla City Corporation, the largest demand center, the existing system exhibits very low service coverage (approximately 7%), forcing extensive reliance on private tube wells. This fragmented abstraction pattern creates diffuse environmental impacts, complicates regulation, and makes source protection impractical, representing a high-risk environmental performance profile under current arrangements.

Chandpur Paurashava

Chandpur shows relatively higher water supply coverage compared to other towns due to historic dependency on surface water for town water supply. Although, 80-90% water supply system is based on surface water system, there are still a little groundwater-dependency that are vulnerable to iron contamination and saline influence in certain zones. Operating surface water treatment system, environmental audit findings indicate moderate performance, and there is potential scope to develop for sustainable expansion under existing abstraction-based systems.

Hajiganj Paurashava

In Hajiganj, low water supply coverage and reliance jointly on surface and groundwater sources cause moderate environmental risks, particularly during dry seasons when surface water is poor and aquifer recharge is limited. Quality of surface water source (intake point at the Dakatia river) suffers with minimum water flow, excessive turbidity due to absence of environmental management around the wellhead causing supply of poor-quality water that lead to public health risk. The audit notes that continued operation of the existing systems would likely aggravate local environmental stress and fails to meet acceptable sustainability thresholds.

Laksam Paurashava

Laksam's water supply is potentially dependent on PTWs extracting groundwater and a groundwater treatment plant constrained with aging pipes, and limited treatment, excessive

contents of iron, manganese and sometime arsenic. Environmental audit observations indicate that absence of proper groundwater treatment process, backwash and sludge disposal, inadequate distribution networks, leakage losses and operational inefficiencies significantly reduce system performance, contributing to unnecessary abstraction and local environmental degradation.

IV. COMPLIANCE WITH NATIONAL ENVIRONMENTAL REQUIREMENTS

Compliance with scale groundwater abstraction typically falls outside major permitting thresholds in national environmental requirements

From a regulatory standpoint, existing systems in Cumilla cluster operate with minimal formal environmental permitting or monitoring, reflecting legacy conditions rather than current best practice. While the *Paurashavas* of Laksam, Hajiganj and Chandpur do not impose any no requirement of obtaining a permission prior to installation of a private tube well, there is requirement of obtaining a No Objection Certificate (NOC) from the CuCC paying a nominal annual fee. Despite the fact that the groundwater withdrawals (8-12%) for domestic and drinking water supply purposes (2-3%) cause a minimal loss for groundwater depletion as compared to the agriculture (roughly 90%) and industrial sectors (7-8%),⁴⁴ the cumulative environmental impact observed across the cluster raises concerns regarding alignment with the intent of the country's Environmental Conservation Act 1995 and Rules 2023, particularly with respect to groundwater protection, and other environmental consequences as a result of over abstraction of groundwater.

Although slow, Bangladesh is in transition to shift from the heavy reliance on groundwater to surface water use through robust treatment to combat severe aquifer depletion and river pollution. The proposed CTWSSP has been designed to utilize surface water from the Meghna river in the second phase involving large-scale treatment plants utilizing sedimentation, sand filtration, and chlorination.

V. FINDINGS AND CONCLUSION

Long-term cumulative environmental risk

Existing groundwater-based systems offer limited resilience to climate variability, particularly prolonged dry periods. Dependence on declining aquifers reduces adaptive capacity, while the absence of integrated water resource planning limits the system's ability to respond to future climatic stressors, including drought and increased urban demand.

The environmental audit concludes that, while individual components of the existing systems generate relatively localized impacts, their cumulative effect across the four municipalities is significant, resulting in unsustainable groundwater use, inefficient energy consumption, and persistent water quality risks. These cumulative impacts are assessed as environmentally unacceptable in the long term.

Audit conclusion and implications for project design

When benchmarked against the proposed regional surface water supply system, the existing water supply arrangements exhibit inferior environmental performance across key indicators, including resource sustainability, water quality assurance, energy efficiency, and institutional

⁴⁴ Bangladesh: Groundwater Country Profile. <https://un-igrac.org/data/country-profiles/bangladesh/>

environmental control. The audit thus provides a strong environmental justification for system replacement rather than incremental rehabilitation.

In conclusion, the environmental audit of existing water supply systems in the Cumilla Cluster identifies systemic deficiencies that compromise environmental sustainability, public health protection, and climate resilience. The findings support the strategic shift toward a centralized surface water supply system, which, if properly implemented and managed, offers substantially improved environmental performance, stronger regulatory compliance, and long-term sustainability compared to the legacy groundwater-dependent systems.

However, where specific elements of the existing water supply system are retained for continued use, it is essential that their rehabilitation and upgrading strictly adhere to the mitigation measures outlined in the IEE and EMP of the subproject. This approach will ensure that potential environmental and public health risks are minimized while maintaining compliance with applicable standards and improving overall system performance. In addition, and in view of the results of this environmental audit on the existing facilities that may be rehabilitated, the following corrective actions are recommended for consideration in conjunction with other more specific environmental measures in the final detailed design and operations of the future water supply system.

Issue	Mitigation Measure	Responsible Agency
Unsustainable groundwater abstraction	• Introduce metering, tariffs, leakage reduction. • Establish recharge monitoring via observation wells. • Gradually transition to surface water sources.	City Corporation and Paurashavas, supported by DPHE
Non-compliance with national drinking water quality standards	• Upgrade treatment plants to meet Bangladesh National Drinking Water Quality Standards. • Introduce standard operating procedures for chemical dosing, monitoring, and emergency handling. • Implement wellhead protection zones to prevent contamination.	DPHE
Sludge and backwash mismanagement	• Design sludge drying beds or lined lagoons for safe disposal. • Reuse treated sludge in non-agricultural applications where safe. • Install controlled backwash discharge systems connected to drains with sediment traps. • Ensure compliance with effluent standards.	DPHE
Distribution network leakage and non-revenue water	• Replace aging PVC pipelines with HDPE/ductile iron.	DPHE

	• Implement DMAs. • Prioritize repair of high-leakage zones.	
Energy inefficiency in pumping systems	• Retrofit pumps with variable frequency drives (VFDs). • Replace diesel backup with solar-assisted/hybrid systems.	DPHE
Chemical handling and occupational risks	• Establish standard operating procedures for chemical storage/dosing. • Train operators on good international practices in water supply operations, including emergency preparedness.	City Corporation and Paurashavas, DPHE
Inadequate manpower and institutional capacity	• Provide consultant support in the interim. • Build staff capacity for monitoring, preventive maintenance, record-keeping. • Training on safeguards and occupational safety.	City Corporation and Paurashavas, supported by DPHE/ADB

Photos captured during field visit in May 2026



Photo 1: Repairing pipe leakage in Chandpur Paurashava.



Photo 2: Street hydrant at CuCC.



Photo 3: GWTP at CuCC



Photo 3: Inlet of GWTP at CuCC



Photo 5: Production tubewell at Laksam



Photo 6: PTW repairing works at Hajiganj.



Photo 7: Groundwater treatment plant in Laksam Paurashava.



Photo 8: Chlorine dosing tank at Chandpur Paurashava.

Appendix 9: Site Specific Environmental Monitoring Checklist

Site Visit Monitoring Sheet (for non-linear or site-specific infrastructure)

(Note: This sheet should be accomplished based on actual visits undertaken by the Environment Specialist. Once completed, this monitoring sheet will form part of the IEE report as appendix, in addition to the accomplished REA Checklist)

Date of Site Visit: 26.04.2026
 Site Visit Team Members: Md Rakibul Haque, Environment Safeguards Consultant
 Fahim Istiaque, ADB
 Md. Yusuf, Asst Engineer (Water), Cumilla City Corporation

Site Visit Findings

	Findings	Other Remarks
1. Package Name	Rehabilitation of Production Tubewell, Cluster Town Water Supply and Sanitation Project (CTWSSP)	
2. Type of Infrastructure (e.g. Public Toilets, Wastewater Treatment Plant, FSTPs, Transfer Stations, Water Treatment Plants, OHTs, etc.)	Production Tubewell, near Cumilla Govt Woen's College	
3. Footprint, m²	1000m ²	
4. Are there existing infrastructures for demolition? If yes, specify. Support with photos in tabulation below.	At present there is a existing PTW, which will be rehabilitated. At best new boring will be needed for improved production. No structural demolition is likely.	
5. Land use of the site and immediate vicinities	The location of PTW is within Cumilla City Corporation. Mostly urban built environment. Predominantly surrounded by residential houses.	
Nature of adjacent lands or properties		
a) North Side Boundary (or Northeast/Northwest)	Residential houses, both buildings and tin shed houses.	
b) East Side Boundary (or Northeast/Southeast)	Residential tin shed houses.	
c) South Side Boundary (or Southeast/Southwest)	2 lanes local town road	
d) West Side Boundary (or Northwest/Southwest)	Residential houses, both buildings and tin shed houses.	
6. Are there existing man-made or natural drainages within or around the site?	There is a concrete city corporation constructed drain along the south side of the PTW. Drain is functional.	

	Findings	Other Remarks
7. Are there any trees within the site. 8. (If yes, how many? Approx. girth sizes? Will any of the trees be cut/felled?)	There are two trees in the existing premise of the PTW, but those will not be impacted by rehabilitation of the PTW.	
9. Topography of the site and immediate vicinities	Flat topography	
10. Is there a flood or water logging risk?	No water logging risk, since the site is well connected with the city corporation surface drain.	
11. Is there a landslide risk?	As land is flat, no land slide risk.	
12. Any river or khal within 100m from the site? (If yes, what is the name of the water body and approx. distance to the site?)	No	
13. Any Protected Areas (PAs) or environmentally sensitive areas within 1km? If yes, what is/are the name/s?	No	
14. Any Healthcare Facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	There are two private hospital facilities nearby, named as Cumilla Green Life Hospital and the A One Hospital. Cumilla Sadar Hospital is also located a few more than 100m apart.	
15. Any schools or educational facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	Yes. There is a Government Women College approximately 50m from the site, situated other side of the road at the south direction from the PTW.	
16. Any Physical Cultural Resources (PCR) within 100m from the site?		
a. Historical Monuments (Nationally or Internationally Declared)	No	
b. Local Cultural/Historical Monuments	No	
c. Mosques	A mosque is located within 100m in west direction from the site.	
d. Prayers Areas or Eidgahs	No	
e. Other Religious Temples or Structures	No	
f. Graveyard	No	

Photos Taken During Site Visits



Inside the PTW premise with the Machine operator



South side road of the PTW near Cumilla Govt College (right side building)



Photo of Site (Southward View)



Road side shops in front of the PTW



Cumilla Women's College from the road in front of the PTW



Green Life Hospital near the PTW

Site Visit Monitoring Sheet (for non-linear or site-specific infrastructure)

(Note: This sheet should be accomplished based on actual visits undertaken by the Environment Specialist. Once completed, this monitoring sheet will form part of the IEE report as appendix, in addition to the accomplished REA Checklist)

Date of Site Visit: 27.06.2026
 Site Visit Team Members: Md. Rakibul Haque
 Fahim Istiaque, CTWSSP Coordinator, ADB
 Mr. Mohammed Ibrahim

Site Visit Findings

	Findings	Other Remarks
1. Package Name	Construction of Overhead Tank	
2. Type of Infrastructure (e.g. Public Toilets, Wastewater Treatment Plant, FSTPs, Transfer Stations, Water Treatment Plants, OHTs, etc.)	Overhead Tank	
3. Footprint, m²	2500m ²	
4. Are there existing infrastructures for demolition? If yes, specify. Support with photos in tabulation below.	More than 50% of of the proposed land is vacant land, remaining lands are occupied with tinshed structures along the roadside to be demolished.	
5. Land use of the site and immediate vicinities	Land use of the proposed site is temporary bus garage, commercial operation and grass land.	
6. Nature of adjacent lands or properties		
a) North Side Boundary (or Northeast/Northwest)	High rise residential apartment building	
b) East Side Boundary (or Northeast/Southeast)	East side is vacant land, grass land	
c) South Side Boundary (or Southeast/Southwest)	South side is bounded by tinshed commercial structures	
d) West Side Boundary (or Northwest/Southwest)	Access road to Cumilla Town from the Dhaka-Chittagong Highway.	
7. Are there existing man-made or natural drainages within or around the site?	Man-made drain is there maintained by the CuCC.	
8. Are there any trees within the site.	No trees are there.	

	Findings	Other Remarks
9. (If yes, how many? Approx. girth sizes? Will any of the trees be cut/felled?)		
10. Topography of the site and immediate vicinities	Flat topography	
11. Is there a flood or water logging risk?	No water logging risk.	
12. Is there a landslide risk?	No landslide	
13. Any river or khal within 100m from the site? 9. (If yes, what is the name of the water body and approx. distance to the site?)	No river or khal within 100m.	<i>Note: All these should be shown on photos and the google earth maps in the IEE report.</i>
14. Any Protected Areas (PAs) or environmentally sensitive areas within 1km? If yes, what is/are the name/s?	No PA	
15. Any Healthcare Facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	A private healthcare center names as Model Hospital and Trauma Center Cumilla is located within 100m of the proposed subproject location.	
16. Any schools or educational facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	No	
17. Any Physical Cultural Resources (PCR) within 100m from the site?		
a. Historical Monuments (Nationally or Internationally Declared)	No	
b. Local Cultural/Historical Monuments	No	
c. Mosques	No	
d. Prayers Areas or Eidgahs	No	

	Findings	Other Remarks
e. Other Religious Temples or Structures	No	
f. Graveyard	No	

Photos Taken During Site Visits



Proposed site for new OHT near Jangalia Bus Stand in Cumilla City Corporation



East side of the proposed OHT side is main access road to Cumilla town from the Dhaka-Chittagong Highway



North side of the propsoed OHT site is highrise residential apartment building



Google Earth view of proposed new OHT construction site at Jangalia CuCC

Site Visit Monitoring Sheet (for non-linear or site-specific infrastructure)

(Note: This sheet should be accomplished based on actual visits undertaken by the Environment Specialist. Once completed, this monitoring sheet will form part of the IEE report as appendix, in addition to the accomplished REA Checklist)

Date of Site Visit: 27.04.2026
 Site Visit Team Members: Md Rakibul Haque, Environmental Consultant, ADB
 Fahim Istiaque, CTWSSP Coordinator, ADB
 Dharmayoti Chakma, Sub Asst Engineer (Water), Laksam

Paurashava

Site Visit Findings

	Findings	Other Remarks
1. Package Name	Construction of New Overhead Tank	
2. Type of Infrastructure (e.g. Public Toilets, Wastewater Treatment Plant, FSTPs, Transfer Stations, Water Treatment Plants, OHTs, etc.)	Overhead Tank	
3. Footprint, m ²	2500m ²	
4. Are there existing infrastructures for demolition? If yes, specify. Support with photos in tabulation below.	No existing structure for demolition. Site is located within the landfill facility of Laksam Paurashava.	
5. Land use of the site and immediate vicinities	Sorrounding landuses are landfill, crop field, semi urban settlement	
6. Nature of adjacent lands or properties		
a) North Side Boundary (or Northeast/Northwest)	Landfill site and residential building of	
b) East Side Boundary (or Northeast/Southeast)	Solid waste and kitchen waste processing plant of the landfill	
c) South Side Boundary (or Southeast/Southwest)	Bounded on the south side with upazila local road.	
d) West Side Boundary (or Northwest/Southwest)	West side boundary wall of the landfill site. Crop field after boundary wall	
7. Are there existing man-made or natural drainages within or around the site?	Other than landfill drainage system, there is no man-made drain.	
8. Are there any trees within the site.	No trees within the site.	

	Findings	Other Remarks
9. (If yes, how many? Approx. girth sizes? Will any of the trees be cut/felled?)		
10. Topography of the site and immediate vicinities	Flat topogrpahy	
11. Is there a flood or water logging risk?	As the proposed OHT construction site is within the premise of the etended landfill site, flooding risk is minimal as the landfill site maintain water drainage system for the landfill.	
12. Is there a landslide risk?	No land slide risk.	
13. Any river or khal within 100m from the site? 10. (If yes, what is the name of the water body and approx. distance to the site?)	No khal, <i>beel</i> or any other wetland within 100m from the proposed site.	<i>Note: All these should be shown on photos and the google earth maps in the IEE report.</i>
14. Any Protected Areas (PAs) or environmentally sensitive areas within 1km? If yes, what is/are the name/s?	No PA	
15. Any Healthcare Facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	No healthcare facility within 100m	
16. Any schools or educational facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	(e.g. "Yes. There is a madrasa approximately 50m from the site in the direction of the main road to the eastern side.")	
17. Any Physical Cultural Resources (PCR) within 100m from the site?		
a. Historical Monuments (Nationally or Internationally Declared)	No	
b. Local Cultural/Historical Monuments	No	
c. Mosques	No	

	Findings	Other Remarks
d. Prayers Areas or Eidgahs	No	
e. Other Religious Temples or Structures	No	
f. Graveyard	No	

Photos Taken During Site Visits



Location of Proposed OHT site within the premise of Laksam Landfill site



Photo of Southward View of proposed OHT site. Beyond boundary wall is the local Paurashava road connected with town.



Sewage treatment plant at the North side of the proposed OHT plant



Left side of the Photo shows Westward view of proposed OHT site.

Site Visit Monitoring Sheet (for non-linear or site-specific infrastructure)

(Note: This sheet should be accomplished based on actual visits undertaken by the Environment Specialist. Once completed, this monitoring sheet will form part of the IEE report as appendix, in addition to the accomplished REA Checklist)

Date of Site Visit: 29.04.2026
 Site Visit Team Members: Md Rakibul Haque, Environmental Safeguards Consultant, ADB
 Fahim Istiaque, CTWSSP Coordinator, ADB
 Abdul Batern Miaji, Supervisor, Chandpur Paurashava

Site Visit Findings

	Findings	Other Remarks
1. Package Name	Rehabilitation of Surface Water Treatment Plant, Puranbazar, Chandpur	
2. Type of Infrastructure (e.g. Public Toilets, Wastewater Treatment Plant, FSTPs, Transfer Stations, Water Treatment Plants, OHTs, etc.)	Surface Water Treatment Plant with 350m ³ per Hour	
3. Footprint, m ²	10000m ²	
4. Are there existing infrastructures for demolition? If yes, specify. Support with photos in tabulation below.	No	
5. Land use of the site and immediate vicinities	Mixed type of landuse, including greeneries, residential buildings, flowing river, and road	
6. Nature of adjacent lands or properties		
a) North Side Boundary (or Northeast/Northwest)	Dakatia river and domestic greeneries, residential buildings	
b) East Side Boundary (or Northeast/Southeast)	Pre-sedimentation ponds, and semi urban environments with residential buildings and tin shed houses.	
c) South Side Boundary (or Southeast/Southwest)	Connecting Paurashava road and semi urban residential environment with greenery.	
d) West Side Boundary (or Northwest/Southwest)	Crop fields and greeneries	
7. Are there existing man-made or natural drainages within or around the site?	Yes, there is man-made drainage for the plant to discharge backwash water. Other than, the backwash, no local Paurashava drainage in this area.	
8. Are there any trees within the site. 9. (If yes, how many? Approx. girth sizes? Will any of the trees be cut/felled?)	There are several trees within the plant site. These will not be cut due rehabilitation of the subproject.	

	Findings	Other Remarks
10. Topography of the site and immediate vicinities	Flat topography. Residential blocks are 1-2 meter higher than the crop fields.	
11. Is there a flood or water logging risk?	Since the Dakatia River is just beside the plant, the locality has well drainage advantage.	
12. Is there a landslide risk?	No land slide risk.	
13. Any river or khal within 100m from the site? 11. (If yes, what is the name of the water body and approx. distance to the site?)	The Dakatia river within 100 m at the North direction.	<i>Note: All these should be shown on photos and the google earth maps in the IEE report.</i>
14. Any Protected Areas (PAs) or environmentally sensitive areas within 1km? If yes, what is/are the name/s?	No PA.	
15. Any Healthcare Facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	No health care facility nearby.	
16. Any schools or educational facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	No educational facilities within 100 m	
17. Any Physical Cultural Resources (PCR) within 100m from the site?		
a. Historical Monuments (Nationally or Internationally Declared)		
b. Local Cultural/Historical Monuments		
c. Mosques	Yes, there two msoques nearby at the South side	
d. Prayers Areas or Eidgahs	No	
e. Other Religious Temples or Structures	No	
f. Graveyard	No	

Photos Taken During Site Visits



Northeast side bounded by sedimentation pond and residential buildings



North side of the SWTP Puranbazar bounded by the Dakatia river



South side of the plant is bounded by the road and semi-urban environment, mostly tin shed and buildings



Clarifier tanks of SWTP



East side is bounded by the presedimentation ponds.



West side is bounded by crop fields and greeneries



Googleeearth view of SWTP Puranbazar Chandpur

Site Visit Monitoring Sheet (for non-linear or site-specific infrastructure)

(Note: This sheet should be accomplished based on actual visits undertaken by the Environment Specialist. Once completed, this monitoring sheet will form part of the IEE report as appendix, in addition to the accomplished REA Checklist)

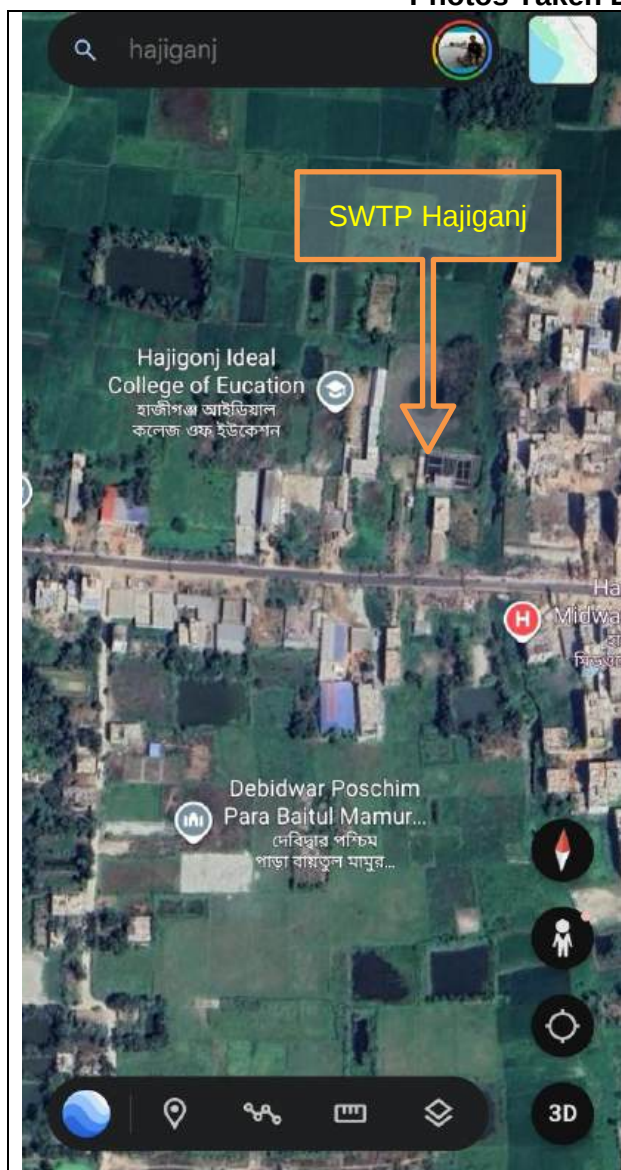
Date of Site Visit: 28. 04.2026
 Site Visit Team Members: Md Rakibul Haque, Environmental Safeguards Consultant, ADB
 Fahim Istiaque, CTWSSP Coordinator, ADB
 Mohammad Ibrahim, DPHE, Hajiganj

Site Visit Findings

	Findings	Other Remarks
1. Package Name	Rehabilitation of Surface water Treatment Plant (SWTP)	
2. Type of Infrastructure (e.g. Public Toilets, Wastewater Treatment Plant, FSTPs, Transfer Stations, Water Treatment Plants, OHTs, etc.)	SWTP of 180m ³ per Hour	
3. Footprint, m²	2500m ²	
4. Are there existing infrastructures for demolition? If yes, specify. Support with photos in tabulation below.	SWTP will rehabilitated without any demolition works. The scope of works may include replacement of pumps, clarifying compartments, sand filters, backwash system and installation of chlorination based tertiary treatment.	
5. Land use of the site and immediate vicinities	Landuse semi urban, greenary, waste dumping and busy inter-district road.	
6. Nature of adjacent lands or properties		
a) North Side Boundary (or Northeast/Northwest)	North side of the SWTP is greenery and crop fields.	
b) East Side Boundary (or Northeast/Southeast)	East side is bonded 9 storied building	
c) South Side Boundary (or Southeast/Southwest)	The SWTP is bounded on the southward direction by under construction building and the Hajiganj - Chandpur Highway.	
d) West Side Boundary (or Northwest/Southwest)	West side is low/ borrow pits, vehicle reparining work and a private school	
7. Are there existing man-made or natural drainages within or around the site?	No existing drainage system around the plant, there is drainage for discharging backwash water of the SWTP.	
8. Are there any trees within the site.	(e.g. "None. The vegetation found at the site are mostly shrubs and other grasses.")	
9. (If yes, how many? Approx. girth sizes? Will any of the trees be cut/felled?)		

	Findings	Other Remarks
10. Topography of the site and immediate vicinities	(e.g. "Mostly flat.")	
11. Is there a flood or water logging risk?	(e.g. "Yes. The site is at lower elevation by approx. 0.5m compared with the main road and other adjacent properties.")	
12. Is there a landslide risk?	(e.g. "No. The topography is mostly flat.")	
13. Any river or khal within 100m from the site? (If yes, what is the name of the water body and approx. distance to the site?)	No river or khal within 100 m	<i>Note: All these should be shown on photos and the google earth maps in the IEE report.</i>
14. Any Protected Areas (PAs) or environmentally sensitive areas within 1km? If yes, what is/are the name/s?	No PA	
15. Any Healthcare Facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	There is healthcare facility named as Hajiganj Midway Hospital	
16. Any schools or educational facilities within 100m from the site? If yes, what is the name of the facility and approx. distance to the site?	There is one school on the west direction and one madrashah (religious school) within on the South direction of the SWTP	
17. Any Physical Cultural Resources (PCR) within 100m from the site?	No PCR	
a. Historical Monuments (Nationally or Internationally Declared)	No	
b. Local Cultural/Historical Monuments	No	
c. Mosques	No	
d. Prayers Areas or Eidgahs	No	
e. Other Religious Temples or Structures	No	
f. Graveyard	No	

Photos Taken During Site Visits



Google earth view of SWTP Hajiganj



View of the SWTP Hajiganj from the Chandpur Hajiganj Highway which bounds the SWTP by the South side