Initial Environmental Examination

April 2017

BAN: Third Urban Governance and Infrastructure Improvement (Sector) Project – Additional Financing – Faridpur Water Supply Subproject

Prepared by Local Government Engineering Department – Government of Bangladesh for the Asian Development Bank. This is an initial draft available on http://www.adb.org/projects/39295-038/documents.

CURRENCY EQUIVALENTS

(as of 3 March 2017)

Currency Unit	=	BDT
BDT1.00	=	$0.01260
$1.00	=	BDT79.36

ABBREVIATIONS

ADB	–	Asian Development Bank
AM	–	Accountability Mechanism
AP	–	Affected Person
BBS	–	Bangladesh Bureau of Statistics
BSCIC	–	Bangladesh Small and Cottage Industries Corporation
BDT	–	Bangladesh Taka
BIWTA	–	Bangladesh Inland Water Transport Agency
BMD	–	Bangladesh Meteorological Department
BNBC	–	Bangladesh National Building Code
BOD	–	Biochemical Oxygen Demand
BOD_5	–	5-day Biochemical Oxygen Demand
BWDB	–	Bangladesh Water Development Board
CC	–	cement concrete
CCA	–	climate change adaptation
COD	–	Chemical Oxygen Demand
CRO	–	Complaint Receiving Officer
CRIUP	–	Climate Resilient Integrated Urban Plan Reports
dB	–	Decibel
DFR	–	Draft Final Report
DO	–	Dissolved Oxygen
DoE	–	Department of Environment
DPHE	–	Department of Public Heath Engineering
EA	–	Environmental Assessment
EARF	–	Environmental Assessment and Review Framework
ECA	–	Environmental Conservation Act
ECC	–	Environmental Clearance Certificate
ECR	–	Environment Conservation Rules
EIA	–	Environmental Impact Assessment
EM&MP	–	Environmental Management & Monitoring Plan
EMP	–	Environmental Management Plan
FGD	–	Focus Group Discussion
GHG	–	Green House Gas
GoB	–	Government of Bangladesh
GRC	–	Grievance Redress Committee
GRM	–	Grievance Redress Mechanism
H&S	–	Health and Safety
IEE	–	Initial Environmental Examination
IUCN	–	International Union for Conservation of Nature
LGD	–	Local Government Division
LGED	–	Local Government Engineering Department
MDSC	–	Management Design and Supervision Consultant
MLGRDC	–	Ministry of Local Government, Rural Development, and

		Cooperatives
NEMAP	–	National Environmental Management Action Plan
NGO	–	Non-Government Organization
O&M	–	Operation and Maintenance
OHS	–	Occupational Health and Safety
OHT	–	Over Head Tank
PAP	–	Project Affected Persons
PIU	–	Project Implementation Unit
PM	–	Particulate Matter
PMU	–	Project Management Unit
RAP	–	Resettlement Action Plan
RCC	–	Reinforced Cement Concrete
ROW	–	Right of Way
RUCCA	–	Rapid Urban and Climate Change Assessment reports
SC	–	Supervision Consultants
SPM	–	Suspended Particulate Matter
SPS	–	Safeguard Policy Statement
SWM	–	Solid Waste Management
SWTP	–	Surface Water Treatment Plant
TC	–	Total Coliform
TDS	–	Total Dissolved Solids
TSS	–	Total Suspended Solids
UNESCO	–	United Nations Educational, Scientific and Cultural Organization
USEPA	–	United States Environmental Protection Agency
WHO	–	World Health Organization
WLCC	–	Ward Level Coordination Committee
WTP	–	Water Treatment Plant

GLOSSARY OF TERMS

beel	–	Permanent water body
bosti	–	Slum
charra	–	Natural drainage channel
ghat	–	Boat landing station
khal	–	Drainage ditch/canal
katcha	–	Poor quality, poorly built
lakepar	–	Side of lake
mahalla	–	Community area
mouza	–	Government-recognized land area
parashad	–	Authority (*pourashava*)
pourashava	–	Municipality
pucca	–	Good quality, well built, solid
thana	–	Police station
upazila	–	Sub-district

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
m	–	meter
mm	–	millimeter
km/h	–	kilometer per hour

NOTES

(i) The fiscal year of the Government of Bangladesh and its agencies ends on 30 June. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2011 ends on 30 June 2011.

(ii) In this report, "$" refers to US dollars.

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EXECUTIVE SUMMARY

1. After the successful implementation of the first and second Urban Governance and Infrastructure Improvement (Sector) Project (UGIIP-1 and UGIIP-2)[1] in 78 *pourashavas* (municipalities), Local Government Engineering Department (LGED) with the financial assistance of Asian Development Bank (ADB) have been implementing UGIIP-3 in selected 30 *pourashavas* over a period of six years (2014 to 2020). The on-going UGIIP-3 (current project) supports strengthening of urban governance and improvement of urban infrastructure and service delivery in *pourashavas* by providing investment support to *pourashavas* based on their governance performance.[2] The additional financing will expand the current project and invest in (i) additional priority infrastructure and governance improvement in *pourashavas* under the current project, and (ii) infrastructure and governance improvement in five new *pourashavas*.[3] With additional financing the project implementation period is proposed to be extended for one year to 2021.

2. **Subproject scope.** The Faridpur Water Supply subproject is one of the subprojects proposed under the additional financing UGIIP-3. The subproject includes construction of (i) Surface Water Treatment plant of 540 m^3/h capacity; (ii) installation of Pontoon type intake in the Padma River at CNB ghat and Guccho gram with double suction volute type centrifugal pump of 350m^3/h discharge (25m head with 3 phase 400V, 45 kw) and 1450 RPM electric motor; (iii) construction of OHT of capacity 680 m^3, (iv) re-excavation/ development of Tapakhola lake as impounding reservoir, (v) installation of water transmission and distribution pipe of about 58 km (100mm, 150mm, 200mm and 300mm diameter pipe) (vi) Procurement & Installation of water meters in service connections of 13 mm, 20 mm, 25 mm and 50 mm connection; (vii) Procurement & Installation of Bulk Water Meter of 150 mm dia (viii) Installation of Hand Deep Tube Well (Depth 150 m) for dia 37 inch (ix) Mini Water Testing Laboratory (x) Logistics: Water carrier, Pick-up (Double Cabin), Motor Cycle, Photo copier, Computer and Software with printer and scanner etc.; Generator for Existing System and proposed System, Billing Software (xi) Piloting, demonstration and campaign for Rain Water Harvesting (xii) Training and awareness building for water safety

3. **Screening and Categorization.** An environmental assessment of the subproject is required per ADB's Safeguard Policy Statement (SPS, 2009). An environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for water supply (Appendix 1) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, Faridpur Water Supply subproject is classified as environmental category B as per ADB SPS and an initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

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[1] With limited but effective incentives for *pourashavas* to improve their governance, the first UGIIP introduced a performance-based fund allocation strategy through the urban governance improvement action plan (UGIAP) ensuring governance reforms while creating tangible development impacts in an integrated manner.

[2] Under UGIIP-3 the UGIAP covers the areas (i) citizen awareness and participation, (ii) urban planning, (iii) gender equality and social inclusion, (iv) local resource mobilization, (v) financial management and accountability, (vi) administrative transparency, and (vii) keeping essential *pourashava* services functional.

[3] P*ourashavas* to be included under additional financing are Cox's Bazar, Faridpur, Gopalganj, Kushtia, and Mymensingh.

4. This is the draft Initial Environmental Examination (IEE) based on the feasibility study and preliminary engineering designs prepared during project preparation. This IEE will be finalized during detailed design stage to reflect any changes and latest subproject designs.

5. As per Government of Bangladesh Environment Conservation Act, 1995 (ECA, 1995) and Environment Conservation Rules (ECR, 1997), Faridpur water supply is categorized as "red" and location clearance certificate (LCC) and environmental clearance certificate (ECC) must be obtained from the DoE.

6. **Implementation Arrangements.** LGED and Department of Public Health Engineering (DPHE), both under the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC), are the executing agencies (EA). LGED is responsible for providing support and guidance to *pourashavas* concerning performance criteria and *pourashava* development planning. DPHE will provide support in water supply and sanitation schemes. Implementation activities will be overseen by a project management unit (PMU). Participating *pourashavas* are the implementing agencies (IA), with a project implementation unit (PIU) within the *pourashava* structure. Consultant teams, composed of Management Design and Supervision Consultants, and Governance Improvement and Capacity Development Consultants, are responsible for (i) detailed engineering design, contract documents preparation and safeguards facilitation; (ii) project management and administration support; (iii) assistance in supervising construction; (iii) strengthening of local governance, conducting required studies/surveys and (iv) awareness raising on behavioral change in water, sanitation and solid waste management activities.

7. **Description of the Environment.** Subproject components are located in Faridpur urban area or in its immediate surroundings, which were converted into urban use for many years ago, and presently there is no natural habitat at these sites. The intake of water supply is proposed in Padma River, proposed impounding reservoir, Tapakhola lake and proposed location of treatment plant are located in government-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Faridpur.

8. **Environmental Management.** An environmental management plan (EMP) is included as part of this IEE, which includes (i) mitigation measures for environmental impacts during implementation; (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting; (iii) public consultation and information disclosure; and (iv) a grievance redress mechanism. A number of impacts and their significance have already been reduced by amending the designs. The EMP will be included in civil work bidding and contract documents.

9. Locations and siting of the proposed infrastructures were considered to further reduce impacts. The concepts considered in design of Faridpur water supply subproject are: (i) demand for new piped water supply through surface water treatment plant; (ii) A pontoon-mounted intake to be installed in the River Padma to readily adjust with seasonal water fluctuation, which may exaggerate due to climate change; (iii) use existing Tapakhola lake as impounding reservoir (primary sedimentary tank) to reduce the treatment load on the treatment plant; (iv) maximum population coverage with pipe layout mostly in residential areas and areas of high growth rate; (v) avoidance of water-use conflicts; (vi) locating pipelines within right of way (ROW) to reduce acquisition of land; (vii) locating pipelines at least 10 meters from latrines, septic tanks and any main drains to avoid contamination; and (viii) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public

consultation and disclosure for site selection. Water pipe laying works should be coordinated with road improvement works to minimize disturbance.

10. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Faridpur water supply subproject, including: (i) structural protection of facilities from future floods; (ii) location of components where there is less risk of flooding or other hazards; (iii) design the components in way so that those can adjust or withstand the flooding and/or other climate change impact and (iv) promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures. As a result, some measures have already been included in the subproject designs. This means that the impacts and their significance have already been reduced.

11. Key construction phase impacts identified and addressed in the IEE include: (i) air, noise, and vibration impacts due to construction vehicles, equipment, and machinery in the vicinity of construction sites and inhabited sections; (ii) management of spoils due to excavation for distribution network and civil works; (iii) adoption of emergency management and handling practice of asbestos cement in case of accidental damage on existing asbestos cement pipe or sudden unearthing of existing asbestos cement pipe during excavation; (iv) safety measures during construction; (v) traffic diversions; (vi) management of sites temporarily used for construction activities, including borrow areas, construction camps, etc., and rehabilitation of the sites after completion of temporary use; and (vii) impacts on community health and safety hazards posed to the public, specifically in inhabited areas.

12. In the operational phase, major impact is identified as handling sludge from the treatment plant. It is proposed to landfill after sludge drying in the proposed sanitary landfill, which is also one of the subproject to be established under this UGIIP-3 Additional financing . In this phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

13. Mitigation will be assured by a program of environmental monitoring to ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

14. **Consultation, Disclosure and Grievance Redress.** The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB and LGED websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

15. **Monitoring and Reporting.** The PMU and Management Design and Supervision Consultants (MDSC) will be responsible for environmental monitoring. MDSC will submit monthly monitoring reports to PMU, and the PMU will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

16. **Conclusions and Recommendations.** The citizens of Faridpur will be the major beneficiaries of this subproject. With the improved water supply system, they will be provided with a constant supply of better quality water piped into their homes and climate-resilient municipal services. Water supply will be from surface water, which is usually considered as green source in terms of water use. While groundwater, which is existing water supply covered only a part of demand, is considered as red source in terms of water use. In addition to improved environmental conditions, the subproject will reduce occurrence of water-related diseases. People would spend less on healthcare and lose fewer working days due to illness, so their economic status and their overall health should improve. Therefore, the proposed subproject is unlikely to cause significant adverse impacts and the net environmental benefits to citizens of Faridpur will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design provided that the EMP is included in the contract and its provisions implemented and monitored to their full extent.

17. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009).

I. INTRODUCTION

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II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. A. ADB Policy

6. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

7. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
(ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

8. **Environmental management plan.** An EMP, which addresses the potential impacts and risks identified by the environmental assessment, shall be prepared. 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.

9. **Public disclosure.** ADB will post the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities:

(i) for environmental category A projects, draft EIA report at least 120 days before Board consideration;

(ii) final or updated EIA and/or IEE upon receipt; and
(iii) environmental monitoring reports submitted by the PMU during project implementation upon receipt.

10. **Pollution Prevention and Control Technologies.** During the design, construction, and operation of the project the PMU and PIUs will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of Bangladesh regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Table 1: Applicable WHO Ambient Air Quality Guidelines

Table 1.1.1: WHO Ambient Air Quality Guidelines[7,8]		
	Averaging Period	Guideline value in µg/m³
Sulfur dioxide (SO_2)	24-hour 10 minute	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
Nitrogen dioxide (NO_2)	1-year 1-hour	40 (guideline) 200 (guideline)
Particulate Matter PM_{10}	1-year 24-hour	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline) 150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter $PM_{2.5}$	1-year 24-hour	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline) 75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Table 2: World Bank Group's Noise Level Guidelines

Table 1.7.1- Noise Level Guidelines[54]		
	One Hour L_{Aeq} (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational[55]	55	45
Industrial; commercial	70	70

B. National Laws

11. Implementation of all subprojects will be governed by the environmental acts, rules, policies, and regulations of the Government of Bangladesh. These regulations impose restrictions on the activities to minimize/mitigate likely impacts on the environment. Many of

these are cross-sectoral and several of them are directly related to environmental issues. The most important of these are the Environment Conservation Act, 1995 (ECA, 1995), and the Environment Conservation Rules (ECR, 1997).

12. Table 3 presents specific requirements for the Faridpur water supply subproject. **Appendix 8** provides the environmental standards for air, surface water, drinking water, emissions, noise and vehicular exhaust.

Table 3: Applicable Government of Bangladesh Environmental Legislations

	Legislation	Requirements for the Project	Relevance
1.	Environmental Conservation Act of 1995 and amendments in 2000, 2002 and 2010[a]	• Restriction on operation and process, which can be continued or cannot be initiated in the ecologically critical areas • Regulation on vehicles emitting smoke harmful to the environment • Remedial measures for injuries to ecosystems • Standards for quality of air, water, noise and soil for different areas for various purposes and limits for discharging and emitting waste • Environmental guidelines	The provisions of the act apply to the entire subproject in the construction and operation and maintenance (O&M) phases.
2.	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	• Environmental clearances • Compliance to environmental quality standards	The subproject is categorized as red and requires locational clearance certificate (LCC) and environmental clearance certificate (ECC). All requisite clearances from DoE shall be obtained prior to commencement of civil works.
3.	Forest Act of 1927 and amendments (2000)	• Clearance for any felling, extraction, and transport of forest produce	Considered in subproject preparation and implementation.
4.	Bangladesh Climate Change Strategy and Action Plan of 2009	• Ensure existing assets is put in place to deal with the likely impacts of climate change. • Enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change	Considered in subproject preparation and implementation.
5.	Bangladesh Labor Law of 2006	• Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement • Prohibition of employment of children and adolescent	Considered in the EMP.

[a] *ECA Amendment 2000* focuses on ascertaining responsibility for compensation in cases of damage to ecosystems, increased provision of punitive measures both for fines and imprisonment and the authority to take cognizance of offences. *ECA Amendment 2002* elaborates restrictions on polluting automobiles; restrictions on the sale, production of environmentally harmful items like polythene bags; assistance from law enforcement agencies for environmental actions; break up of punitive measures; and authority to try environmental cases. In *ECA Amendment 2010,* no individual or institution (government or semi-government/non-government/self-governing can cut any hill or hillock; fill-up or changed any remarked water body however in case of national interest; the mentioned activities can be done after getting clearance from respective the departments.

C. Government of Bangladesh Environmental Assessment Procedures

13. Under ECA, 1995 and ECR, 1997 industrial units and projects are classified into four categories according to "their site and impact on the environment" and investment size, and each category (Green, Orange-A, Orange-B and Red) requires a different level of environmental assessment as a prerequisite for the Department of Environment (DoE) in granting the locational clearance certificate (LCC) and environmental clearance certificate (ECC) that allow the project to proceed.

14. As per Schedule 1 of ECA, 1995 Faridpur water supply subproject is likely to be classified as red category (Table 4). Thus, LCC and ECC are required from the DoE prior to commencement of the subproject.

Table 4: Likely Government of Bangladesh Classification of Faridpur water supply Subproject

	Subproject	Component	Equivalent in Schedule I of ECR 1997	DoE Classification
1.	Water Supply	Intake, over head tank (OHT), pump, pumping stations	Engineering works: capital above 10 (ten) hundred thousand Taka.	Red
		Water transmission line	Water, power and gas distribution line laying/relaying/extension	Red
		Surface Water Treatment Plant	Water treatment plant	Red

15. Rule 7 of the ECR, 1997 indicates that the application for ECC must be made to the relevant DoE Divisional Officer, and the application for red category projects will include the following:

(i) completed application for ECC, and the appropriate fee;
(ii) report on the feasibility of the project;
(iii) report on the IEE for the project, and terms of reference (TOR) for the EIA; or EIA report prepared on the basis of TOR previously approved by DoE;
(iv) report on the environmental management plan (EMP);
(v) no objection certificate from the local authority;
(vi) emergency plan relating to adverse environmental impact and plan for mitigation of the effect of pollution; and
(vii) Outline of the relocation and rehabilitation plan (where applicable).

16. DoE has 60 days to respond to receipt of the ECC application for a red category project.

17. This draft IEE will serve the basis for the ECC application and will be supplemented to fulfill any additional government requirements.

D. Relevant Occupational Health and Safety Laws and Rules

18. The implementation of the subproject shall comply with the relevant occupational health and safety Laws and Rules as shown in Table 5.

Table 5: Relevant Occupational Health and Safety Laws and Rules

Title of Laws and Rules	Descriptions
Social Security under the Act, 1923 and an amendment in 1980	According to the Act social impact assessment includes the processes of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions.
Bangladesh Labor Law of 2006	- Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement - Prohibition of employment of children and adolescent
The Employer's Liability Act, 1938	The Act declares that the doctrine of common employment and of assumed risk shall not be raised as a defense in suits for damages in respect of employment injuries. Under the Maternity Benefit Act, 1939, the Maternity Benefit Act, 1950, the Mines Maternity Benefit Act, 1941, and finally the rules framed thereunder, female employees are entitled to various benefits for maternity, but in practice they enjoy leave of 6 weeks before and 6 weeks after delivery.
Public Health (Emergency Provisions) Ordinance, 1994	The ordinance calls for special provisions with regard to public health. Whereas an emergency has arisen, it is necessary to make special provision for preventing the spread of human disease, safeguarding public health and providing them adequate medical service and other services essential to the health of respective community and workers in particular during the construction related work.
The Employees State Insurance Act, 1948	It has to be noted that health, injury and sickness benefit should be paid to people, particularly respective workers at work place under the Act.
Bangladesh Factory Act, 1979	The Act requires every workplace including small or large scale construction where women are employed to have an arrangement of childcare services. Based on this Act and Labor Laws - medical facilities, first aid and accident and emergency arrangements are to be provided by the authority to the workers at workplaces.
Water Supply and Sewerage Authority Act, 1996	The Act specify WASA's responsibility to develop and manage water supply and sewerage systems for the public health and environmental conservation.

E. Conventions, Treaties and Protocols

19. Bangladesh has consented to be bound by the terms of some 21 of the 44 principal international conventions, treaties and protocols relating to the environment (Islam, 1996). Those with partial and indirect relevance to industrial projects are the Paris convention of 1972 concerning the protection of the World cultural and natural Heritage, Convention concerning safety in the use of chemicals at work, Geneva 1990, Biodiversity convention, Rio-de-Janeiro, 1992, Convention concerning occupational health services, Geneva 1985 etc.

III. DESCRIPTION OF THE PROJECT

A. The Study Area

20. Faridpur is located within the Padma River's floodplain and straddles the Kumar River, one of the branches of the Padma River. The Kumar River is situated on the northern part and crosses the town from north to south almost through the center. The Bhuboneshwar River flows through the eastern edge of the municipality. The *pourashava* covers an area of 17.38 sq.km (BBS, 2011). It consists of nine wards. In 2011 the population of the *pourashava* was 121,632 (BBS, 2014); the population density is 6999 persons per km^2.

21. Faridpur served as a regional growth center, and following a long period of decline, is slowly regaining its historic position. Faridpur is becoming a strong regional trade base for a

large region that encompasses Rajbari, Gopalganj, Madaripur, Sariatpur and Magura districts. In the immediate vicinity of the municipality, there are jute mills, lentil processing factory, a cable factory, brickfields and a plastic factory. The municipality also hosts two medical colleges, an engineering college, a polytechnic institute, a paramedic institute as well as a number of reputable colleges.

B. Existing Situation

22. **Groundwater source.** The present source of water supply for Faridpur *pourashava* is based completely on groundwater. The groundwater is being drawn through 11 nos. of active production wells. The groundwater of Faridpur p*ourashava* contains excessive dissolved iron. There are two iron removal plants having capacity of 200 m^3/day. There are 15 nos. (11 active) production wells. Data on the production wells are shown in Table 6.

Table 6: List of Existing Production Wells of Faridpur

Sl. No.	Location	Year of Installation	Depth (ft)	Production Capacity (m^3/h)	Status
1	Goalchamat, Bishorjon Ghat	1997	355	60	Active
2	Goalchamat, Beside of main gate	1997	345	65	Active
3	Goalchamat, Beside of Selim House	1997	340	55	Active
4	Goalchamat, Beside of Badsha House	2015	345		Inactive
5	Goalchamat, Beside of Old Bus Stand	2015	355	55	Active
6	Goalchamat, Beside of Mohabiddaloy	2015	355		Inactive
7	Jheeltuly,Backside of Sohid's House	1998	340	55	Active
8	Jheeltuly,Backside of Filterbed	2003	345	60	Active
9	Jheeltuly,Backside of W.S House	2003	340	55	Active
10	Jheeltuly,Near of Moshiour House	2015	350	65	Active
11	Jheeltuly,Near of Anich House	2008	345	40	Active
12	Jheeltuly,Near of Hannan House	2008	340		Inactive
13	Jheeltuly,Near of Over Head tank	2008	342	60	Active
14	Jheeltuly,Front Roadside of Pump House	2015	350	60	Active
15	Jheeltuly,Inside of Robi House	1989	355		Inactive

Source: Faridpur *pourashava*.

23. **Daily water production from water treatment plants.** There are two existing groundwater treatment plants (iron removal plant), with a third under construction by the DPHE 37 District Towns Project (Table 7). The daily water treated production of 8,800 m^3/day is not sufficient to meet the present water demand.

Table 7: Water Production from Treatment Plants - Faridpur

Sl No.	Location	Capacity (m^3/h)	Operating Production (h)	Total Production (m^3/d)	Type of treatment plant	Remarks
WTP-1	Jhiltuli(IRP)	200	22	4,400	IRP	
WTP-2	Goal chamot (IRP)	200	22	4,400	IRP	
WTP-3	Near Shisu Park	350			IRP	Under Construction by 37 town water supply project DPHE
Total				8,800		

Source: Faridpur *pourashava*

24. **Daily supply and service connection.** The existing water supply system is capable to supply 8,800 m^3/day for 6,760 residential connections and 308 commercial connections. The domestic connection ranges from 0.5 inch to 3 inch diameter, and the supply is three times daily at the rate of one hour per time.

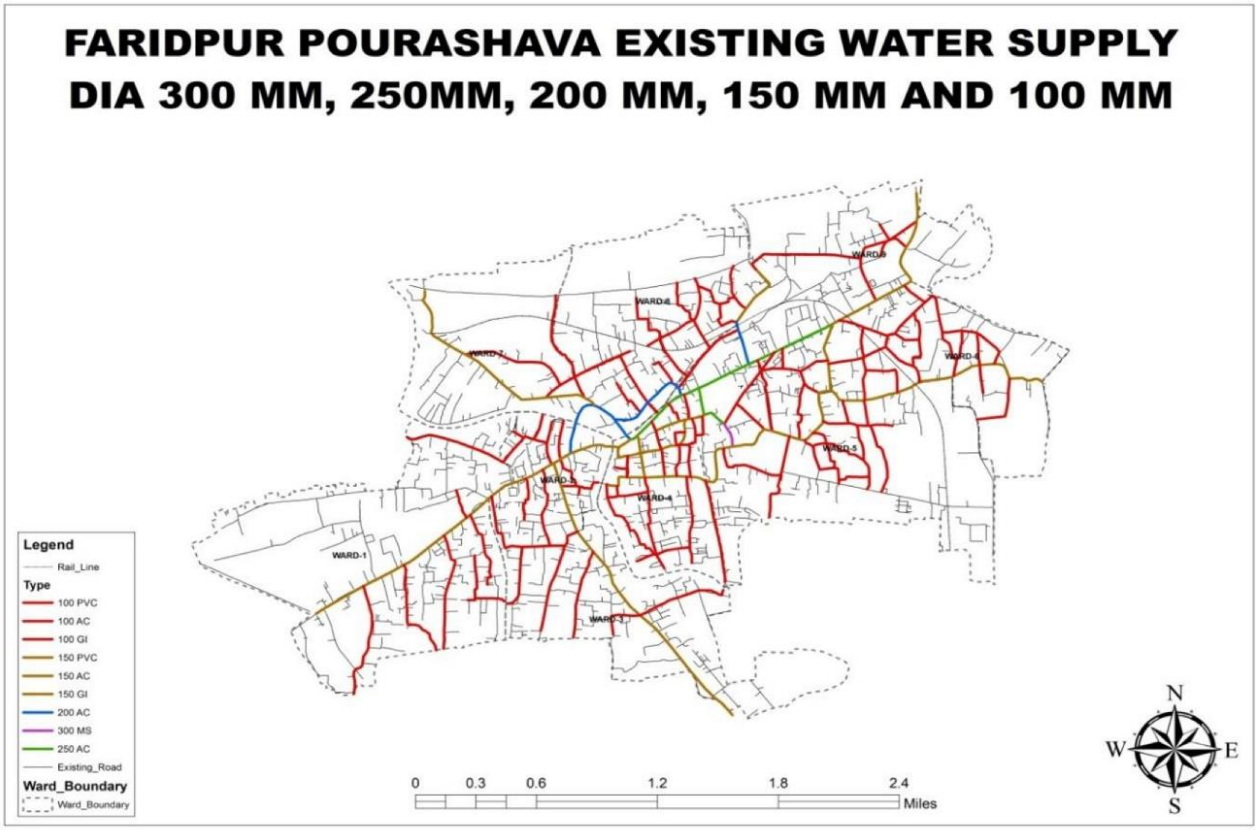
24. Forty percent of the total population is covered by the piped water supply system, and 60% depends on shallow hand tube-wells and other own sources. List of existing pipelines are shown in Table 8. Existing water supply network is shown in Figure 1.

25. **Existing Asbestos cement pipe**. Existing about 23 km pipe line is of asbestos cement pipe are in operation. Though World Health Organization (WHO) have no limit on asbestos cement in drinking water as there is no certain evidence of cancer occurrence through digestion of asbestos cement, however, it is hazardous material and needs to be managed and disposed as per prescribed guidelines. Considering associated health issues with disposal of old asbestos pipes, PMU and PIU may consider abandoning the old pipes underground when the new one's are laid.

Table 8: List of Existing Pipelines of Faridpur

Ward No.	**Diameter of Pipe Line**				
	75mm	**100mm**	**150mm**	**200mm**	**300mm**
1	2 km	13 km	7 km	3 km	
2	1 km	8 km	3 km	2 km	
3	1 km	6 km	5 km	1 km	
4	-	10 km	8 km	5 km	
5	-	9 km	8 km	4 km	1 km
6	1 km	5 km	4 km	1 km	
7	2 km	7 km	4 km	2 km	
8	1 km	5 km	3 km	1 km	
9	2 km	4 km	4 km	2 km	
	10 km	67 km	46 km	21 km	1 km
Total	**144 km**				

Figure 1: Existing Water Supply Network – Faridpur



Source: TA 8913 Report for UGIIP-3 additional financing project preparation

C. Proposed Water Supply Interventions

26. **Future Water Demand – Faridpur**: Based on the population (BBS, 2011) and population growth rate (Table 9), water demand is projected in Table 10 considering climate change impact.

Table 9: Water Demand Projection for Faridpur

Ward No.	Population in 2011	Pop. in 2016	Water Demand in 2016, in liter	Pop. in 2020	Water Demand in 2020, in liter	Pop. in 2030	Water Demand in 2030, in litre	Population in 2040	Water Demand in 2040, in liter
1	15,644	18580	1858000	21,321	2,132,100	30,076	3,007,600	42,425	4,242,500
2	12,715	15102	1510200	17,329	1,732,900	24,445	2,444,500	34,482	3,448,200
3	13,867	16470	1647000	18,899	1,889,900	26,659	2,665,900	37,606	3,760,600
4	16,686	19818	1981800	22,741	2,274,100	32,079	3,207,900	45,250	4,525,000
5	15,401	18292	1829200	20,990	2,099,000	29,608	2,960,800	41,766	4,176,600
6	9,699	11520	1152000	13,219	1,321,900	18,646	1,864,600	26,303	2,630,300
7	11,102	13190	1319000	15,131	1,513,100	21,344	2,134,400	30,107	3,010,700
8	13,919	16531	1653100	18,970	1,897,000	26,759	2,675,900	37,747	3,774,700
9	12,599	14964	1496400	17,171	1,717,100	24,222	2,422,200	34,167	3,416,700
Total	121,632	144,467	14,446,700	165,771	16,577,100	233,838	23,383,800	329,853	32,985,300

Source: BBS 2011 and TA 8913 Report for UGIIP-3 additional financing project preparation

Table 10: Future water demand for Faridpur

Total Demand	Water Demand 2015, m^3	Water Demand 2020, m^3	Water Demand 2025, m^3	Water Demand 2030, m^3	Water Demand 2035, m^3	Water Demand 2040, m^3
Average Daily Demand (ADD)	13,958	16,577	19,688	23,384	27,773	32,986
Increased water demand due to temperature rise 15% of average daily demand	2,094	2,486	2,953	3,508	4,166	4,948
Total Average Daily Demand (ADD)	16,052	19,064	22,642	26,891	31,939	37,934

Source: TA 8913 Report for UGIIP-3 additional financing project preparation

27. **Scope for utilization of surface water:** Groundwater is being used for the supply source for Faridpur p*ourashava* since start of the *pourashava*. As the groundwater quality of the area has deteriorated overtime (high concentration of dissolved iron); beyond the Bangladesh Standard, the *pourashava* needs to explore utilization of surface water sources. Till date there has been no attempt made to explore the possibility of using surface water; water from the Padma River may be a good source of surface water available for Faridpur *pourashava*.

28. **Proposed Water Supply for Faridpur.** Considering Padama as a river source two options are proposed as intake.

29. **Option 1: Intake at Padma River and Tapakhola Lake is proposed to be used as impounding reservoir:** Surface water from the Padma River has to be drawn at the intake point and transmitted to the proposed Tepakhola Lake, which will be used as an impounding reservoir. The water may be carried to the proposed treatment plant from this lake. Water is available in the Padma River during all seasons. But in the dry season the main river stream alignment shifts 5-8 km away but a perianal stream flows by the side of the *pourashava*. However, a complete feasibility study is needed to be conducted. There are some studies conducted by Bangladesh Water Development Board (BWDB), which can be considered. Tepakhola Lake needs to be re- excavated and protected from bathing, laundering, dumping garbage, fish culture and sanitary connections.

30. **Option 2: Intake at Bhubonessar River by making Bhubonessar River as impounding reservoir through re-excavation of the river and introducing water control structure:** Bhubonessar River is a dead river (Photo in Figure 2) connected to the Padma River and in the winter season it is dried up. It is 2 km long and 300 feet (92.5 m) wide and average 12 feet (3.7 m) depth. Surface water from the Padma River has to be drawn at intake point and transmitted to the proposed Bhubonessar river, can be used as impounding to be used as an impounding reservoir. Bhubonessar Lake is to be re-excavated and keep protected from bathing, laundering, dumping garbage, fish culture and sanitary connections. This lake can be developed and used as a water park, tourist spot, boat racing and natural fish culture. However, in both cases it is very necessary to conduct complete feasibility study.

31. Figure 3 shows the existing and proposed water supply at Faridpur and Figure 6 shows the proposed intake/alternative proposed intake, Tapakhola Lake, Bhubonessar River river location in Google Earth.

32. **Intake.** A pontoon-mounted intake (10mX6mX1.5m all marine quality MS sheet) may be installed in the River Padma at the old C&B Ghat at Uttar Tepakhola (Photo in Figure 2) to feed Tapakhola lake for surface water treatment plant at Tapakhola. Alternatively a pontoon-mounted

intake (10mX6mX1.5m all marine quality MS sheet) may be installed in the river at Gachcha gram in Degreechar for Bhuvonessor Lake.

33. **Tapakhola Lake.** An intake in the River Padma at the old C&B Ghat at Uttar Tepakhola to feed Tapakhola Lake Is more feasible. Tapakhola Lake (Photo in Figure 2) can be used as a potential impounding reservoir. Water is to be pumped from Padma River through a pontoon mounted intake to Tapakhola Lake to maintain the water level of the lake every time and water of the lake will be collected to the proposed surface water treatment plant at Tapakhola. Lake storage capacity: 960ft length x 900 ft width x8ft average depth = 6,912,000 33 ft^3 =195,918 m^3. Tepakhola Lake is to be re-excavated and kept protected from bathing, laundering, dumping garbage, fish culture and sanitary connections. Faridpur *pourashava* has consented to use the lake for water treatment.

34. **Surface water treatment plant.** A surface water treatment plant has been proposed at:

(i) Proposed option 1. Tepakhola (near cow market) in Mouza Habili Gopalpur (BS Plot No: 1146) with a land area of 0.65 acre (Photo in Figure 2), which is belong to *Pourashava*. Due to the scarcity and high price of land, a multi storied surface water treatment plant may be constructed.

(ii) Proposed option 2. An alternate site of treatment plant has been selected in the Komlapur area, which is 5 km from Tepakhola lake (J.L No: 116, BS Dag 8062, 8063) with an area of 2 acres. This land is belongs to Faridpur Zela Parisad.

35. For treatment plant proposed option 1, the available land area is insufficient for construction of all basic elements of a surface water treatment plant and it is located inside the town where residential area, school, etc. are close by. Different activities for treatment such as chlorination or other disinfection, operation of motors (sound pollution), etc., may create health hazard for the people living nearby. On the other hand for the option 2, it is reported by *pourashava* that it might not be available as it is also considered as a potential site for recreational area by Zila Parisad.

36. The surface water treatment plant location alternatives will be further explored by the *pouroushava* to ensure that there are no significant environmental impacts due to the chosen location of the treatment plant. A detailed feasibility study will be conducted once a feasible location for construction of treatment plant has been decided.

37. **Distribution zones.** The service area under Faridpur *Pourashava* is to be divided into two service zones as follows:

(i) Service Zone-1: Northern part of Sk Mujib Sarak;

(ii) Service Zone-2: Southern portion of Shekh Mujib Sarak.

38. The main purposes of this zoning are as follows:

(i) To monitor water production, supply and consumption.

(ii) To monitor UFW and NRW (non-revenue water) and minimize system losses.

(iii) To ensure quality, quantity, 24-hours supply with 5 meter pressure.

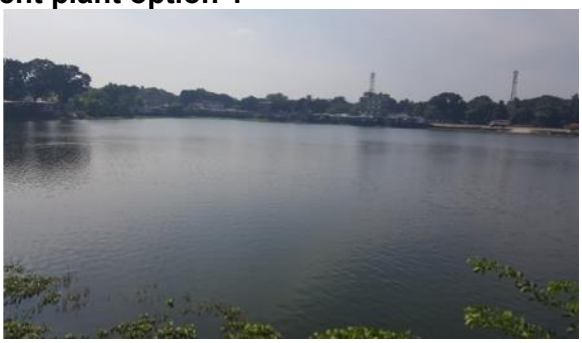
39. **Proposed new pipelines.** Proposed water distribution pipelines amounting about 43 km total length (Figure 4) in different diameters ranging 100-300 mm with uPVC pipes are shown below:

300mm	30km
150mm	5 km
100mm	8km

Total = 43km

Figure 1: Photos of intake at Padma, Takakhola lake, dried up Bhubonessar River near intake point and location of proposed treatment plant option 1

Proposed intake point at Padma River

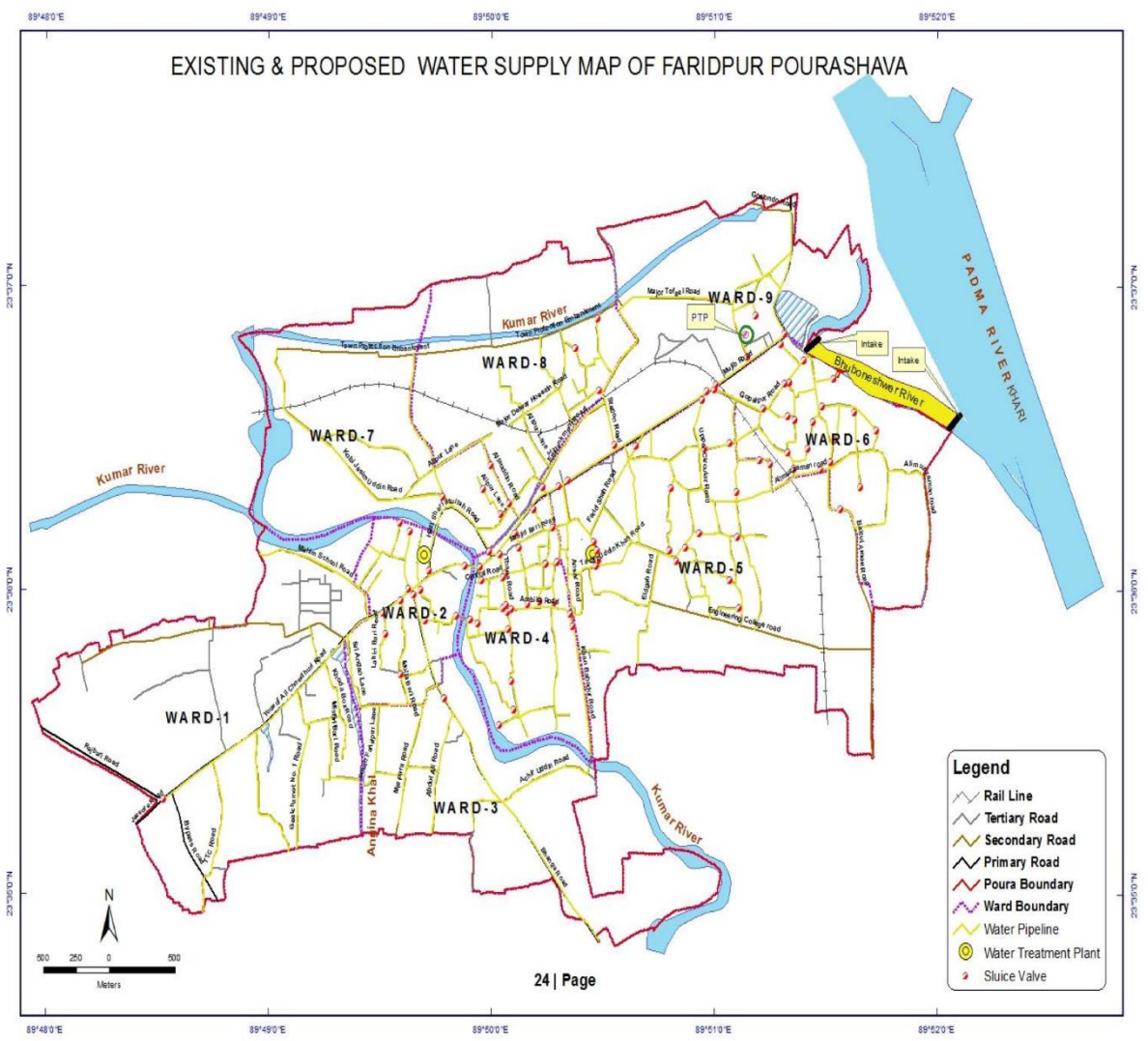


Tapakhola Lake proposed as impounding reservoir

Dried up Bhubonessar River near intake point at Padma River

Proposed tretment plant site option 1 near Tapakhola

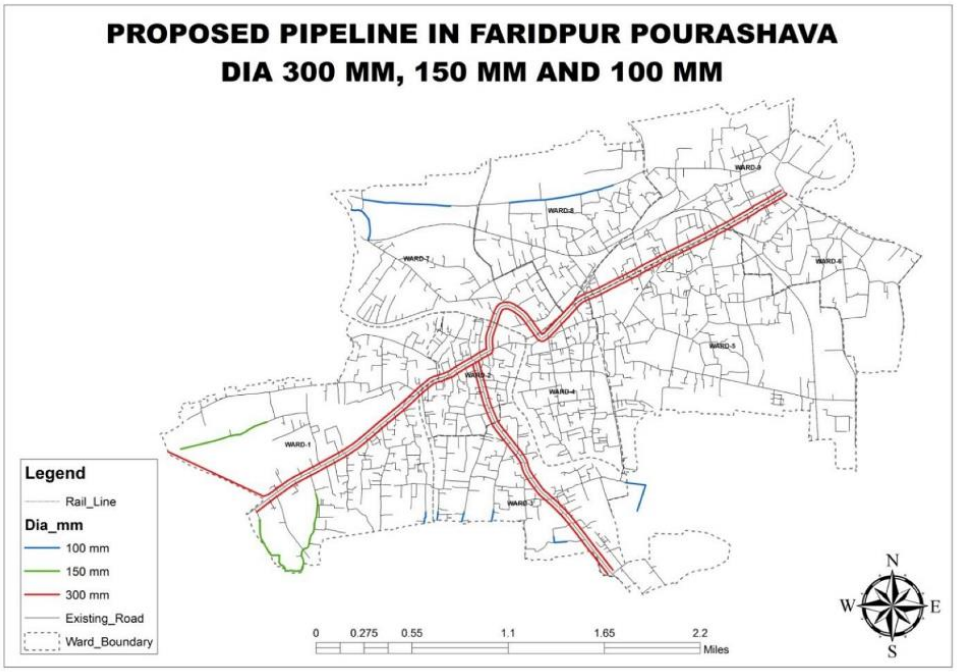
Figure 2: Existing and proposed Water Supply for Faridpur



Source: TA 8913 Report for UGIIP-3 additional financing project preparation

40. **District metering area (DMA).** Service zone-1 (Northern portion of the Skeik Mujib Road) are to be separated from Service Zone -2 (southern portion of the Sheik Mujib road) by establishing DMA. The bulk water meter will be installed at each of the DMA junctions to monitor the total volume of water supplied in the demarcated service zones. This system will help to ensure supply for 24 hours with minimum residual pressure of 5m in the system. A bulk meter (horizontal helix Woltmann type bulk water meter of metrological Class B as per ISO 4064 is recommended) is to be identified during detailed design.

Figure 3: Proposed pipeline for Faridpur



Source: TA 8913 Report for UGIIP-3 additional financing project preparation

41. **Overhead tank (OHT).** An OHT has been proposed at Tepakhola Cow Market on the p*ourashava* own land closer to the proposed treatment plant. The proposed capacity of the OHT is 680m^3. Strong wind during cyclone is being considers in detail design of the structure to make it strong enough to withstand the cyclone and climate resilient.

41. **Groundwater exploration in and around Faridpur:** There is high iron and arsenic concentration in the groundwater of Faridpur.

(i) 7,200 m^3 groundwater has been treated by IRP every day.

(ii) A groundwater treatment plant with a capacity of 350 m3 is under construction by DPHE.

(iii) It is observed that there are some sweet water pockets at 1) Tapakhola, 2) Jhiltuly near Dr Noni Gopal Sarkar, 3) Goalchamat, Raguchandanpur near Mahabyddalay, and 4) Near RAB camp. More exploratory boring may be conducted in that area to ascertain the extent of possibilities for sweet water reserve. Location of Groundwater Potental Area in Upazila Faridpur Sadar is shown in Figure 5.

(iv) It is reported that water at deep aquifer of Aliabad, Gerda and Krisnanagar Union of Faridpur Sadar Upazila are within acceptable limits (irrespective of iron and chloride).

(v) 12 exploratory borings may be conducted up to 300 m (test tubewell) to tap the possibility of potable groundwater for Faridpur Pourashava (Table 11).

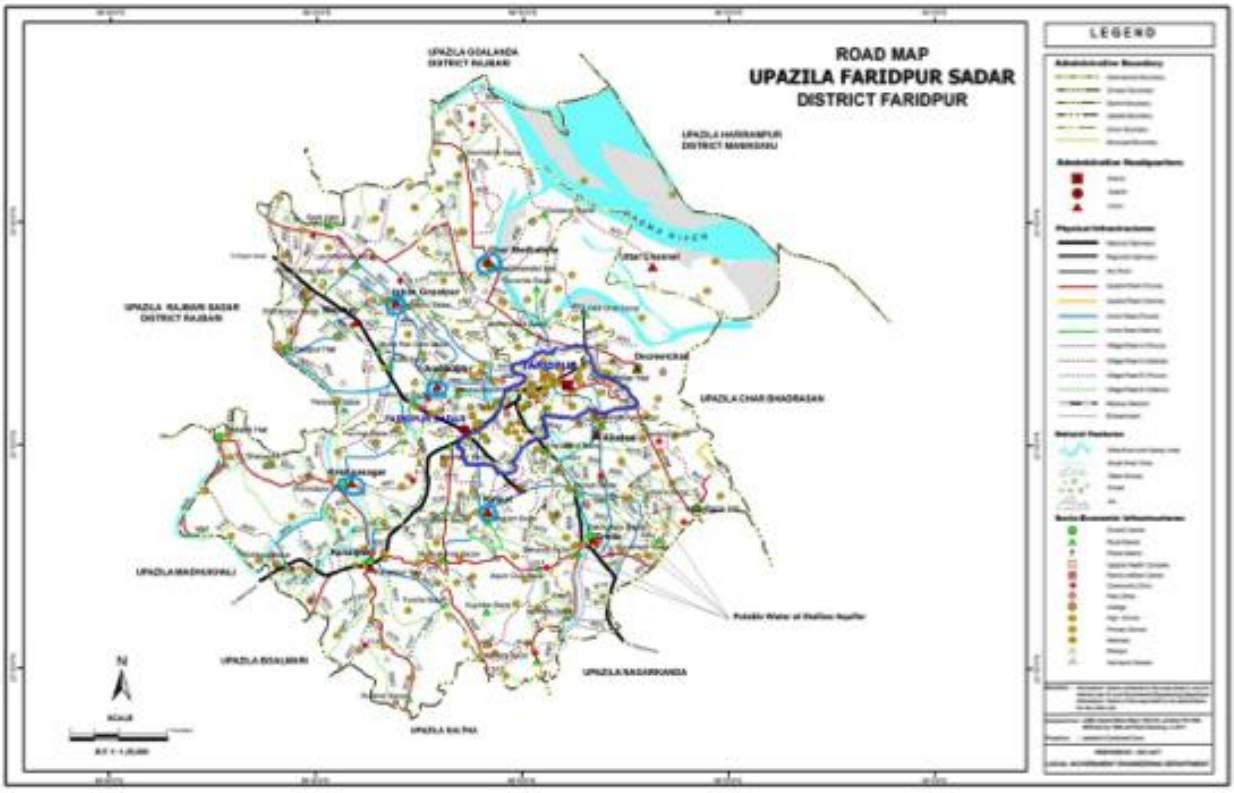
Table 11: Proposed Test Wells - Faridpur

SL	Name of Union	Depth in Feet	% of Success
1	Gerda	350-600	75
2	Aliabad	350-600	80
3	Krisnanagar	500-600	65

SL	Name of Union	Depth in Feet	% of Success
4	Kaijuri	350-600	65
5	Kanaipur	350-600	70

Source: DPHE.

Figure 4: Location of Groundwater Potential Area in Upazila Faridpur Sadar



Source: TA 8913 Report for UGIIP-3 additional financing project preparation

41. **Service connections with water meter.** All domestic connections are to be provided with meters by phase to minimize NRW (non-revenue water). Multijet water meters of metrological Class B as per ISO 4064 recommended. There is a need for 6,437 domestic connections of different diameters:

(i) 1st phase – 3,000 Nos.
(ii) 2nd phase – 2,200 Nos.
(iii) 3rd phase – 1,237 Nos.

42. **Power backup.** A water supply system is a KPI (key point installation) and an essential installation. Water supply systems are interrupted by frequent power failures, especially during cyclones. So, generators for power backup are recommended to continue water supply during climatic disasters, for climatic resilience.

43. **Hand deep/shallow tubewells.** In some areas within the *pourashava* which are not within the piped water supply system network, such as slum areas where most of the poor people live and who are not in a position to pay for supplied water, 100 nos. of hand tubewells (38 mm) are recommended.

43. **Water testing laboratory.** Surface water is the most potential source for Faridpur. The water of the River Padma has a seasonal change of quality. So, frequent river water quality surveillance and maintaining a water safety plan are essential. For this, a water testing laboratory is recommended. Instruments for water testing laboratory is shown in Table 12.

Table 12: Instruments for Water Testing Laboratory

Sl. No.	Instruments	Probable Cost in Lac Taka
1	UV Visible Spectro-Photometer (DR 2400)	5.00
2	Multimeter (Conductivity, salinity, TDS meter)	1.50
3	Arsenator	2.50
4	pH Meter (Bench top)	2.00
5	Bacteriological Portable Kit	5.00
6	Turbidity Meter	2.00
7	Water Purification Unit	10.00
8	Glass Wares	1.00
9	Other Accessories	2.50
10	Furniture etc.	8.50
Total		40.00

Source: *Pourashava* and TA 8913 Report for UGIIP-3 additional financing project preparation

44. Logistics:

Table 13: Logistics Equipment for Faridpur

SL	Logistics	Purposes
1	Water carrier(truck)- 2	To carry water to the crisis area
2	Pickup Double Cab -1	To carry materials and equipment
3	Motor cycles-4	For supervision
4	Computer & Software training -4	Billing, Data base, Programming etc.
5	Generator for existing and proposed system -2	Back up during load shedding

Source: *Pourashava* and TA 8913 Report for UGIIP-3 additional financing project preparation

45. **Rain water harvesting:** The annual average rainfall of Faridpur is about 1,583 mm. The amount of rainfall in the *pourashava* can meet the demand of two months. So, rainwater collection may be a potential source of water for domestic use. Some considerations:

(i) during the approval of new building plans in the *pourashava* area, a provision for rain water harvesting on the roof top and an underground tank should to be made mandatory for the collection rain water.
(ii) *Pourashava* buildings can be a pioneer to piloting and public demonstration for rainwater harvesting system on the roof.
(iii) Some other buildings (6 no.) may be selected for the piloting of rainwater harvesting for popularization.

46. **Challenges in 2020 to operate, maintain and manage water supply system:**

(i) 2 existing groundwater treatment plants (200m^3 capacity).
(ii) 1 (one) groundwater treatment plant under construction in 37 town water supply projects by DPHE (350m^3/h capacity).
(iii) 1 (one) proposed surface water treatment plant (540m^3/h capacity)
(iv) 1 (one) another proposed surface water treatment plant in 2021 at Kamalapur (540m^3/h capacity).

47. The above 5 no. treatment plants would be in operation by 2021 along with all other development works. This will be great management challenge for Faridpur (proposed city corporation in the near future). An initiative should be taken for restructuring the organogram for better management.

48. After proper metering of the house connections and maximize the collection, the *pourashava* would be capable to meet all the establishment cost and water sector would be a potential income source.

49. **Proposed Manpower:**

(i) Executive Engineer : 2;
(ii) Assistant Engineer : 4;
(iii) Sub Assistant Engineer : 6;
(iv) Water Works Supper : 2; and
(v) proportionate other supportive staff.

50. **Capacity Building:**

(i) For the operation and maintenance of a new water supply system training is essential to develop skilled manpower to run the system.
(ii) Training, workshops and demonstrations for newly installed water supply systems are to be arranged for relevant *pourashava* engineering staff.
(iii) Training of a chemist for water surveillance and water safety plan. d) Training of the bill programmer.
(iv) Training for meter readers, revenue inspector, pump operators, etc.

51. **Water production and demand analysis:**

52. Total production: Existing 2 groundwater Treatment Plants: 8,800 m3/day

(i) Groundwater treatment plant proposed by DPHE (under construction by 37 Towns DPHE) =350 m^3/h x 22(hours) =7,700 m3/day
(ii) Direct supply by 4 production wells =4 x 70 m^3/h x 22 hours operation = 6,160m^3/d
(iii) Proposed surface water treatment plant at Tapakhola =540 m^3/h x 22 (hours) = 11,880 m^3/day

Total supply =34,540 m3/day

52. The water demand in 2040 is 37,934 m^3/day, and the total calculated production of water of 34,540 m^3/day would be able to meet 90% of this demand.

53. A review assessment should be be done after 2020 to address the demand of the extended area.

54. **Estimated cost for proposed interventions for water supply at Faridpur**. The interventions to improve the water supply system and increased coverage was proposed based on the results of field investigations, analysis and review of the current water supply system, the water demand projection for the year 2040, and climate change impacts for the year 2050. The proposed water supply interventions for Faridpur with climate change adaptation cost are presented in Table 14.

Table 14: Cost Estimate for Proposed Water Supply for Faridpur

No.	Items	Unit	Rate (Lac BDT)	Qty	Amount (Lac BDT) (With 15% increase for Climate Change Adaptation	Remarks
1.0	Construction of Overhead Tanks (OHTs): Capacity = 680 m^3	No.	270.00	1	302.4	15% (assumed) of total cost will be increased as the cyclonic strong wind is taken into account for designing the structure.
2.0	Surface Water Treatment Plant: 540 m^3/hour	No.	1500.00	1	1,725.00	15% (assumed) of total cost will be increased if the height of the plant is raised for designing the structure.
3.0	Development of Tepakhola Lake	No.	50.00	1	58.00	15% (assumed) of total cost will be increased to raise the bank of the lake.
4.0	Development and Excavation of Bhubonessor Lake with a protection Dam	No.				After feasibility study
5.1	Pontoon: 6mm MS steel 1. CNB ghat 2. Guccho Gram	No.	60.00	LS	60.00	
5.2	Pump: Double suction volute type centrifugal with 350m^3/h discharge, 25m head with 3 phase 400V , 45kw(60 HP), 1450 RPM electric motor with BUET test	No.	7.50	4	30.00	
5.3	Electrical, Mechanical components with 2 pump house	No.	30.00	2	60.00	
6.0	Installation of Water Transmission and Distribution Pipelines	km	13.0	8	104.00	
6.1	100 mm	km	16.00	5	80.00	
6.2	150 mm dia.	km	25.00	15	375.00	
6.3	200 mm dia.	km	30.00	30	900.00	
	300 mm dia. (only laying in the withdrawn channel)					
8.0	Procurement & Installation of					
8.1	water Meters in Service Connections 13 mm connection 1st Phase – 2,700 nos 2nd	Nos.	0.045	6,437	321.85	
8.2	Phase – 2,500 nos 3rd Phase –	Nos.	0.05	200	11.00	
8.3	1,237 nos 20 mm connection	Nos.	0.055	100	6.00	
8.4	25 mm connection 50 mm connection	Nos.	0.07	50	4.00	
9.0	Procurement & Installation of Bulk Water Meter	Nos.				
9.1	150 mm dia.		0.55	10	5.50	
10.0	Installation of Hand Deep Tube Well (Depth 150 m) for dia 37 inch	Nos.	0.50	100	50.00	

No.	Items	Unit	Rate (Lac BDT)	Qty	Amount (Lac BDT) (With 15% increase for Climate Change Adaptation	Remarks
11.0	Mini Water Testing Laboratory[7]	LS	40.00	1	40.00	-
12.0	Logistics					
12.1	Water carrier	No.	50.00	2	100.00	-
12.2	Pick-up (Double Cabin)	No.	40.00	1	40.00	-
12.3	Motor Cycle	Nos.	2.00	5	10.00	-
12.4	Photo copier	Nos.	2.00	1	2.00	
12.5	Computer & Software with printer and scanner etc.	LS.	2.00	3	6.00	As a KPI Power backup for water supply is
12.6	Generator for Existing System Branded	No.	40.00	2	80.00	urgently needed if the normal power supply is
12.7	Generator for proposed System Branded	No.	40.00	2	80.00	interrupted.
12.8	Billing Software	LS	20.00	LS	20.00	
13.0	Piloting, demonstration and campaign for Rain Water Harvesting	LS	20.00	LS	20.00	
14.0	Training and awareness building for water safety	LS	30.00	LS	30.00	
	Total (BDT)				4303.25 lac	
	Total (USD)				5.49 million USD	Conversion Rate: 1 USD @ 78.4 BDT

D. Project Activities and Schedule

54. Implementation of UGIIP-3 is in three phases based on achievement of governance criteria of the *pourashavas*. The additional financing will provide support for the project's (i) second phase = 24 months of that 18 months is assumed for construction, and (ii) third phase of UGIIP-3 = 26 months.

[7] Laboratory development and management protocol including staffing requirements to be prepared during detailed design.

Figure 5: Proposed Intake, alternative intake, impounding reservior for Faridpur

55. Proposed water supply will be implemented both in second phase of UGIIP-3. Preliminary site selection and concept design of water supply proposed intervention are done by the TA 8913 consultant team and will be finalized during implementation.

56. The final detailed implementation schedule will be provided in the updated IEE If required.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Landforms, Geology and Soils

57. The Bengal basin contains 15 km thick sequence of Cretaceous to Resent sediments and occupies 100,000 km^2 low land flood plain and delta. The combined deltas of Ganges, Brahamaputra and Meghna (GBM) river system lie within Bangladesh. The geological succession of Bangladesh shows that the sub-surface stratigraphy includes: (i) the Precambrian, (ii) the Permain Gondwana sediments, (iii) the upper Jurassic Volcanic rocks, and (iv) a thin mantle of Cretaceous sedimentary rocks originating mainly from deposition of the denuded volcanics. Overlaying these deposits are the tertiary lime stones, sandstones, and shales. The surface geology of the country consists of holocene deposits (80%), tertiary sedimentary rocks (12%), and uplifted Pleistone clay residual (8%). The holocene deposits, consisting of unconsolidated sand, silt and clay of varying amounts, are the products of piedmont alluvial, fluvial, deltaic, or coastal activities.

58. The Bengal Foredeep is one of the world's largest exogeosynclines. It runs parallel to the hinge zone of the Sub-Himalayan Foredeep. It is about 450 kilometers wide in southern Bangladesh, narrowing towards the northeast. Folded belts of the Burmese Alpine mobile belt mark its eastern boundary. It can be divided into further sub-zones: (1) the Faridpur Trough, (2) the Barisal High; (3) the Hatiya Trough; (4) the Sylhet Trough; and (5) the Madhupur High

59. The Ganges—Brahmaputra Delta occupies most of the Bengal Basin and is slowly subsiding as a result of isostatic adjustment of the crust due to rise of the Himalayas and dewatering of the Proto-Bengal Fan sediments which is now buried under thick Mio-Pliocene-Pleistocene deltaic sediments. Well-log data from northwest of Dhaka indicates that at least a part of the basin is subsiding at a rate of 2.2 cm/year. Three areas of the basin — the Hatiya Trough, Faridpur Trough and Sylhet Trough — may be subsiding at similar or higher rates. Engineering projects that do not consider the subsidence component in planning and designing may produce results detrimental to the environment.

60. The subsidence and the relative sea-level rise could cause serious drainage and sedimentation problems in the Ganges-Brahmaputra-Meghna Delta. With higher sea level, more areas will be affected by cyclonic surge; inland fresh water lakes, ponds and aquifers are likely to be affected by saline and brackish water intrusion. The present limit of tidal influence is expected to extend further north. Expected sea-level rise will cause soil salinity, as well as surface water and ground water salinity for a large part of the coastal area. The above

conditions, together with lack of dry-season stream flow, may cause serious ecological and economic problems for the country.[8]

2. Soil

61. During the lowest stand of sea level the Pleistocene sediments were exposed, weathered and was eroded and incised by rivers. The basal sand and gravel bed found at different places of the Bengal Basin was deposited during this time in the incised channels of the proto Ganges-Brahmaputra rivers and flood plains. The sea level continued to rise resulting in transgression and onlapping of sedimentation and filling up of the entranced valleys by fluvial and or fluvio-deltaic sand with scattered gravel. At some time there was a regression (sea level fall) and as a result the upper surface of these sediments were exposed to aerial oxidation in different parts of the country. BGS-DPHE (2001) mentions oxidized sediments from 45-70 meters depth in Faridpur and GBM indicates similar oxidized sediments from a number of drill holes at 45-50 meters in Bhola District.

62. The Faridpur district depends upon it for the annual deposit of silt. Soils differ from other inland soils as they are subjected to the effects of salinity and waterlogging, which naturally affect the vegetation. In places soils are semi-solid and poorly consolidated. The pH ranges widely from 5.3 to 8.0. Although the soil is in general medium textured, sandy loam, silt loam or clay loam, the grain size distribution is highly variable. Silt loam is dominant textural class.

3. Earthquake

63. Faridpur is located in a seismic zone III, referred to as the low risk zone for earthquake in the country. Seismic events in Bangladesh are relatively infrequent, but historically, have been severe, such as the earthquakes of 1930, 1950 and 2004. To address any potential impacts due to seismic activities, provisions of the Bangladesh National Building Code (BNBC) 1993 and 2006 shall be strictly followed in the detailed designs of project components, apart from consideration of seismic vulnerability in the specifications for the design and construction of the works, including the choice of materials and methods for construction work.

4. Ambient Air Temperature, Humidity and Rainfall

64. The temperature of the country has the relationship with the period of rainfall. In general, cool seasons coincide with the period of lowest rainfall. Table 15 show the monthly average temperature along with average monthly humidity of the project area. Maximum mean temperature of 29.13°C was observed in August and minimum average temperature was 17.81°C in January.

Table 15: Temperature and humidity for project area, 1975-2015

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Mean Temp (°C)	17.81	21.16	25.96	28.57	28.82	29.02	28.87	29.13	28.85	27.47	23.78	19.35	25.73
Average Humidity (%)	75.93	70.49	65.5	71.41	78.6	84.9	86.31	84.9	84.6	80.9	77.1	77.51	77.61

Source: Bangladesh Meteorological Department.

[8] Mahmood Alam, Sea-Level Rise and Coastal Subsidence, Volume 2 of the series Coastal Systems and Continental Margins Subsidence of the Ganges—Brahmaputra Delta of Bangladesh and Associated Drainage, Sedimentation and Salinity Problems) pp 169-192.

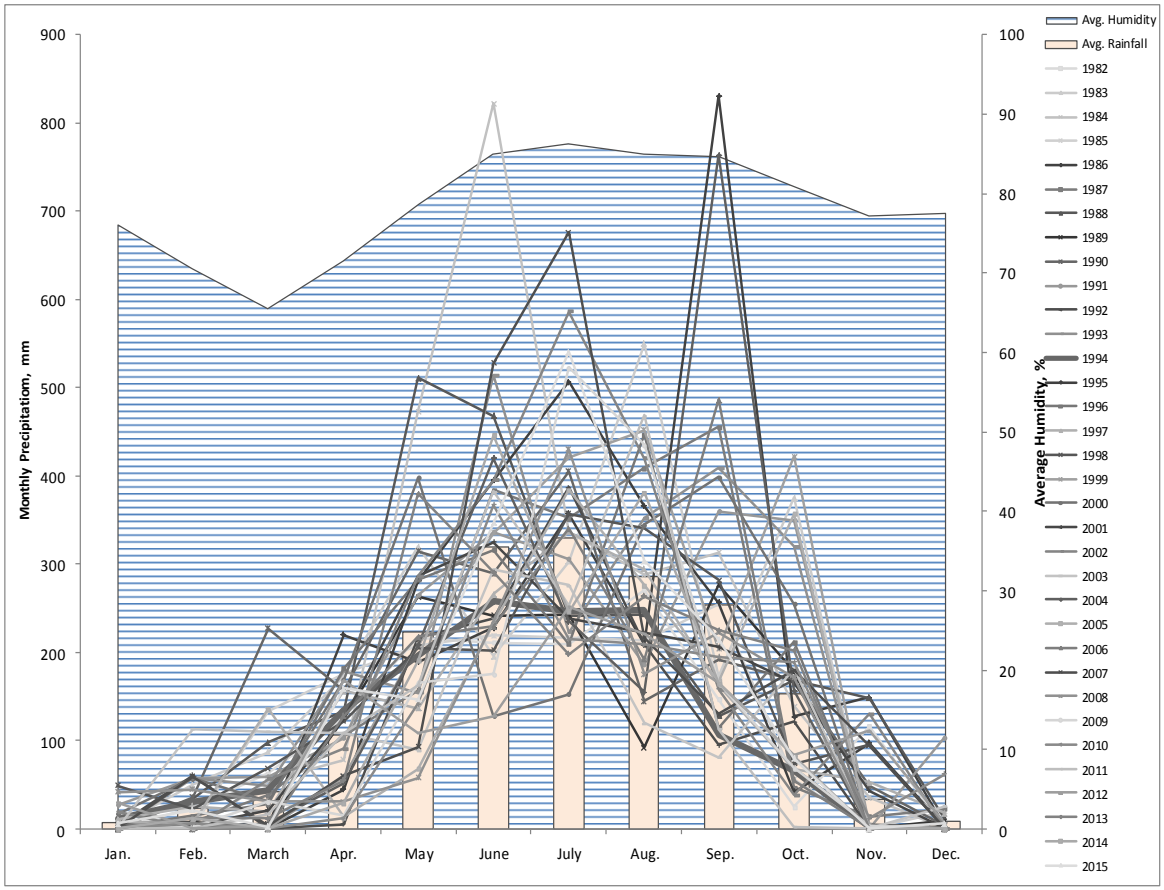
65. According to the data collected from Bangladesh Meteorological Department (BMD), April to September appears to be the hottest period of the year while November to February is the coolest. Average annual rainfall in Faridpur is 1557.21 mm, with maximum in July = 329.56 mm. During heavy rainfall, water logging causes 20-25 cm inundation, which lasts for 4-8 hours.

66. May-October is observed to be the most humid period of the year which matches the rainfall pattern of this region as more than 70% of the yearly precipitation is encountered during this four months (Figure 7).

5. Water Quality

67. **Surface Water:** Main Rivers in the district are padma, Kumar, Old Kumar, Bhubaneshwar. Chapa Beel, Hari Beel, Shakuner Beel, Dhol Samudra, Kole (a strip of shallow water) of Beel Mamunpur and Tepa Kholar Lake (excavated) are notable water bodies. Kumar River bisects Faridpur town. All the rivers are tidal. The river water is saline with high sediment load and high turbidity. Faridpur consists of many ponds that were once used for drinking water.

Figure 6: Precipitation in Faridpur



68. As the water from the Padma river will be taken as source, the water quality of river should be recorded for the base line. Water of the Padma River at the intake point (at village: Guchhagram, Union: Decreerchar) was tested on 28-03-2016 at zonal laboratory of Khulna

DPHE and result is shown in Table 16. Result shows all the values are within the limit of Bangladesh Inland Surface Water Quality Standard for Recreation Purpose (ECR, 1997). So the baseline values of the parameters don't create any negative impact on the surrounding environment and the water can be taken as source of water treatment. River water quality can be monitored during construction and operation period.

Table 16: Water Quality Analyses – Padma River

SL No	Water quality parameters	Unit	Bangladesh Inland Surface Water Quality Standard for Recreation Purpose (ECR, 1997)	Bangladesh Drinking Water Quality Standard	Concentration present
1	Chloride	mg/l	-	150-600	17
2	Hardness	mg/l	-	200-500	185
3	Iron (Fe)	mg/l	-	0.3-1	0.43
4	Manganese (Mn)	mg/l	-	0.1	<LOQ (LOQ=0.03)
5	Odor	mg/l	-	Odorless	0
6	pH		6.5-8.5	6.5-8.5	8.4
7	Total Dissolved Solid(TDS)	mg/L	-	1000	115
8	Total Suspended Solid(TSS)	mg/L	-	10	4
9	Turbidity	NTU	-	10	4
10	Dissolved Oxygen	mg/l	5 and above	6	6.05

Source: DPHE zonal laboratory, Khulna

69. **Groundwater:** Water aquifers are present beneath the vast majority of Bangladesh, which are being recharged by the major river systems and by infiltration of rainwater. Most ground water is available within 5 m of the surface. This level fluctuates seasonally, approaching the ground surface over most of the country during the months July to September.

70. The present source of water supply for Faridpur is based completely on groundwater. The groundwater is being drawn through 11 nos. of active production wells. The groundwater of Faridpur contains excessive dissolved iron. There are two iron removal plants having capacity of 200m^3/day. There are 15 nos. (11 active) production wells located at different places in the *pourashava* area with 144.0 km of pipelines of diameters between 75 mm to 300 mm. Local ground water represents a stable source of water for various activities including irrigation (both shallow and deep tube wells), domestic purposes (hand pumps) and industrial applications (deep tube wells).

71. The local groundwater level is lowered to approximately 6 m below ground level during the dry seasons, with levels returning to their normal position before the end of the monsoon reported by Department of Public Health (DPHE). This fall in groundwater levels is an entirely natural process that arises because of the hydrological link with the river.

6. Air Quality

72. Faridpur is a sub-urban area of Bangladesh. In the sub-urban areas ambient air quality is dependent on many factors like air movement, traffic volume, congestion, emissions from motor vehicles, and suspended dust particles. The proposed sites are visually not found as polluted, therefore, no primary data was collected. However, a continuous monitoring scheme is essential to evaluate air quality and for the development of any plan for mitigation of health risks caused by polluted air. The six "criteria pollutants", particulate matter (PM_{10}, $PM_{2.5}$), CO, SO_x

and NO_x have to be monitored more or less. Hence, to establish the baseline air quality, a primary analysis of air quality is proposed before start of construction. Table 17 shows the Bangladesh National Ambient Air Quality Standard comparing the WHO Guideline and US EPA Standard.

Table 17: Bangladesh National Ambient Air Quality Standard comparing the WHO Guideline and US EPA (Source: Country Synthesis Report on Urban Air Quality Management on Bangladesh, ADB 2006)

Pollutant	Averaging Period	Bangladesh Standards[a]	WHO[b] Guideline Values (µg/m³)	US EPA Standards (µg/m³)[d]
CO	8-hour	10,000 µg/m³ (9 ppm)	10,000 [c]	10,000
	1-hour	40,000 µg/m³ (35 ppm)	30,000 [c]	40,000
Pb	Annual	0.5 µg/m³	0.5	–
NO_x	Annual	100 µg/m³ (0.053 ppm)	–	–
TSP	8-hour	200 µg/m³	–	–
PM_{10}	Annual	50 µg/m³	20	revoked
	24-hour	150 µg/m³	50	150
$PM_{2.5}$	Annual	15 µg/m³	10	15
	24-hour	65 µg/m³	25	35
O_3	1-hour	235 µg/m³ (0.12 ppm)	–	235
	8-hour	157 µg/m³ (0.08 ppm)	100	157
SO_2	Annual	80 µg/m³ (0.03 ppm)	–	78
	24-hour	365 µg/m³ (0.14 ppm)	20	365

CO = Carbon monoxide; NO_x = Nitrogen oxide; O_3 = ozone; Pb = lead; PM_{10} = particulate matter with a diameter of not more than 10 microns; $PM_{2.5}$ = particulate matter with a diameter of not more than 2.5 microns; SO_2 = Sulfur dioxide; S.R.O. = US EPA = United States Environmental Protection Agency; TSP = total suspended particulates; WHO = World Health Organization; µg/m³ = micrograms per cubic meter; ppm = parts per million; – = no value
Source: [a]S.R.O. No: 220-Law, 2005; [b]WHO, 2005; [c]WHO, 2000; and [d]US EPA, 2006.

7. Acoustic Environment

73. Sound is transmitted through air when an object moves, like water flowing over rocks, or air passing through vocal cords. This movement causes air waves, similar to ripples in water. When these waves reach human ears, they are transformed into sound. Sound is usually measured in decibels (dB). A decibel is a relative measure that is accompanied by a reference scale. Technically, sound pressure is 20 times the logarithm (base 10) of the ratio of the pressure level of any sound to the reference sound pressure in decibels. Sound (noise) levels can be measured and quantified in several ways. All of them use the logarithmic decibel (dB) scale. The dB scale is logarithmic to accommodate the wide range of sound intensities found in the environment. Table 18 shows typical sound levels generated by common indoor and outdoor activities, along with its effect on human.

Table 18: Sound levels and human response

Common Sounds	Noise Level (dB)	Effect
Carrier deck jet operation; Air raid siren	140	Painfully loud
Thunderclap	130	Painfully loud
Jet takeoff (200 feet); Auto horn (3 feet)	120	Maximum vocal effort
Pile driver; Rock concert	110	Extremely loud
Garbage truck; Firecrackers	100	Very loud
Heavy truck (50 feet); City traffic	90	Very annoying Hearing damage (8 hours)
Noisy restaurant; Freeway traffic; Business office	70	Telephone use difficult
Air conditioning unit; Conversational speech	60	Intrusive
Light auto traffic (100 feet)	50	Quiet

Source: Davis and Cornwell (1998)

74. Existing ambient noise levels can serve as a baseline from which to measure potential disturbance caused by project activities. Hence, to establish the baseline noise quality, a primary analysis of noise quality is proposed before start of construction at the proposed site of the subproject. The standard for noise is shown in Table 19.

Table 19: Noise Quality Standards, by Zone and Time of Day

Zone Class	Limits in dB(A)	
	Daytime (6 am – 9 pm)	Nighttime (9 pm – 6 am)
Silent zone	45	35
Residential zone	50	40
Mixed (residential/commercial/industrial) zone	60	50
Commercial zone	70	60
Industrial zone	75	70
Source: Department of Environment (DoE), Bangladesh		

B. Biological Environment

75. There are no endangered species or critical habitats in the project areas. The ecological environment is characterized by a human managed sub-urban landscape. In the study area, terrestrial floras are present mainly in the homestead regions, roadsides, village groves, tourists spots, and upland/high cultivated lands. Homesteads and orchards have: betel, betel nut, kadam, coconut, date palm, sofeda, mango, jackfruit, pomegranate, guava, grapefruit, lemon, blackberries, plum, toddy palm, koroi, shisoo, shirish, rain tree, evcaiytta, bamboo, babla, jeol, neem, tamarind, banana, ipil-ipil, papaya, mehgani, debdaru, shimul, akashmoni, khai babla, jamrul, chalta, bel, amra, amloki, segun, etc. Roadside plantations includes: datepalm, road chambol, koroi, krishnachura, rain tree, banyan, shisoo, babla, akashmoni, eucalyptus, mango, blackberries, raj koroi, etc. Main crops are Paddy, jute, wheat, oilseed, pulse, onion, garlic, potato, sugarcane, vegetables, turmeric etc. None of these species are listed as Threatened, Nearly Threatened or Rare list in IUCN Red List.

76. Fish species include ruhi (Labeo rohita), mrigel (Cirrhinus mrigala), kalbous (Labeo calbasu) katla (Catla catla) etc. soalfish/magur (Amblyceps mangois) scorpion-fish/singi (Heteropneustes fossilis) are also found in large quantity in beels and khals , Many other spieces of river and fresh water fishes are also found in the district. Of these the principal varieties are koral/vetki (Lates calcarifer), tapasi (Polynemus paradiseus), dhain, chital (Notopterus chitala), ghona (Labeo gonius), airh (Mystas aor), bagair (Bagarius bagarius), pangas (Pangasius pangasius), boal (Wallago attu), ritha (Rita rita), bain or eel (Mastacembelus armatus), chapila (Gudusia chapra), bhagna (Labeo boga), nandail bacha (Eutropichthys vacha), pon, gargle, kaulia, kapali, khorsols mehsir, golsa (Mystus bleekeri), tengra (Mystus vittatus), chanda (Mene muculata), tekchanda, kachki (Corica soborna) baila (Awaous gutum), bheda (Nendus randus), batashi (Pseudoutropius atherinoides), kakila (Strogylura strogylura), phalli (Notopterus notopterus), tatkeni, pabda (Ompok pabda), chela (Chela atpar), gangchela, gazar (Channa marulius), koi (Anabas testudineus), khalisha (Colisa fasciatus), puti (Barbus puntius), malandi, bashpata (Ailia punctata), lengra, kakra (Scylla serrata), meai, shrimps, and prawn (Farfantepenaeus aztecus), etc.

77. Reptile includes Anjila, Dhura Shap, Matia Shap, Tiktiki, Daraish Shap, Gui Shap, etc. Comon mamals are Babur, Idur, Shial, Chika, Beji, etc. Avifauna (birds) includes Choroi, Doyel, Kak, Ghugho, Shalik, Tuntuni, Machranga, Haludpakhi, Gangchil, etc. Insect fauna includes Dragon fly nymph, Damsel fly nymph, Water strider, Midge, Flies, Ant, Caddisfly, etc. None of these species are listed as Threatened, Nearly Threatened or Rare list in IUCN Red List.

78. This bio-survey data might not reflect the actual biodiversity of that area. One species found in the monsoon might not be seen in the winter. Extensive survey over the year might give an actual status of biodiversity. Present bio-survey list is a snapshot prepared based on the species found during the field visit time.

79. There are no protected areas, forests, wetlands, or environmentally sensitive areas within or in the vicinity of the subproject sites.

C. Physical and Cultural Heritage

80. In 1582 in the reign of Emperor Akbar, the province of Bengal was formed into 33 sarkars or financial subdivision, and Faridpur area appears to have been included with in the sarkar of Muhammad Abud. In 1765 the financial administration of Faridpur, together with the rest of Bangal was captured by the English. The greater portion of Faridpur was next comprised in “Dacca Jalalpur”. In 1811 Faridpur was alienated from Dhaka collectorate. The quarter was initially known as Fatehabad. In 1860 the district was name as Faridpur after 12th Century Sufi saint Shah Sheikh Fariduddin.

81. Faridpur is famous in Archaeological as physical and cultural heritage. Archaeological heritage sites are Gerda mosque (1013 AH), Pathrail mosque and dighee (1493-1519 AD), Satoir mosque (1519 AD), District judge court building(1889 AD), Bhanga munsif court building (1889) are some historical places. Palli Kabi Jasim Uddin’s house & graveyard are located at Faridpur District. River research institute, Hazrat Shah Farid mazar, Gour Gopal Angina, Jagabandhu angina, Atrashi and Chandrapara Pak Darbar Sharif, Baish roshi Jamidar bari(Sadarpur),Satair Masjid(Boalmari),Mothurapur deul(Modhukhali), Pathrail mosjid (Bhanga) etc.

82. There are about 48 daily bazars and 26 weekly hats in Faridpur Sadar upazila (BBS 2013). There are also 353 restaurants and 17 residential hotels in the project area.

D. Socio-economic environment

1. Population

83. Faridpur (Town) consists of 9 wards and 41 mahallas. The *pourashava* covers an area of 17.38sq.km (BBS, 2011). In 2011 the population of the *pourashava* was 121,632 (BBS, 2011); the population density is 6,999 persons per km^2; male 51%, female 49%. The literacy rate among the people of Faridpur sadar upazila is 55.8%; male 53.7%, female 45.4%.

84. Faridpur has been experiencing reasonably high annual average population growth comparing with the national average urban population growth over a long period in the past (1981-2011). The annual population growth rate varies between various inter-census periods. The *pourashava* has experienced 3.27 percent annual average population growth rate during the period of 1991-2011, which shows significant potential of the *pourashava*. Infrastructure improvements will help sustain a reasonably higher growth of population in the *pourashava* in the future. The *pourashava* is an old district headquarters and may become a divisional headquarters in the near future. The opening of the Padma Bridge in 2019 may further accelerate the growth of the town. These positive qualities in favor of the *pourashava* may help to sustain a higher growth rate than before. An average annual population growth of 3.50 percent, therefore, seems to be reasonable and may continue in the future.

2. Livelihood Practices and Economic Activities

85. Main occupations Agriculture 39.72%, nonagricultural laborer 4.03%, industry 1.65%, commerce 17.49%, transport and communication 9.19%, service 14.23%, construction 3.68%, religious service 0.15%, rent and remittance 1.41% and' others 8.45%. (Source: BBS 2011). Ownership of agricultural land Landowner 77.77%, landless 22.23%; agricultural landowner: urban 72.28% and rural 77.95%. Both fresh water and marine fishes as very essential staple play a very important role in the economy of the locality. With large water area the district is well stocked with fish, of which hilsa is found so abundantly in the river Padma that it earns good amount of foreign exchange apart from meeting domestic demand. The fresh water fishes are commonly found in the district. However, some of these varieties, especially those of which inhabit the marshes and tanks, are dwindling due to over catching and other reasons such as use of insecticides and pesticides for crop production, etc. Intake of surface water might have impact on the fishes in the Padma River.

86. In the past, Faridpur served as a regional growth center, and following a long period of decline, is slowly regaining its historic position. Faridpur is becoming a strong regional trade base for a large region that encompasses Rajbari, Gopalganj, Madaripur, Sariatpur and Magura districts. The climate resilient integrated urban plan (CRIUP) report prepared by TA 8913 consultants for preparation of additional financing observes that this fast growth in trade is also evident in the growth of the banking sector. The CRIUP presents a short account of Faridpur's present economic strength. In the immediate vicinity of the municipality, there are jute mills, lentil processing factory, a cable factory, brickfields and a plastic factory. The municipality also hosts two medical colleges, an engineering college, a polytechnic institute, a paramedic institute as well as a number of reputable colleges.

87. Other than these, diary, poultry and hatchery are also present. Noted manufactories are sugar mill, jute mill, pipe factory, textile mill, rice mill, flour mill, pulse mill, ice cream factory. Among small industries citable are cottage industries, Goldsmith, blacksmith, potteries, wood work, bamboo work, cane work etc. Main exports are Jute, onion, garlic, sugarcane molasses, pulse, vegetables, turmeric etc.

88. The planned construction of the Padma Bridge, a part of the National Development Plan, will enhance the town's economic activities, transport network and industrial development. With construction of the bridge, the connecting roads to the Mongla port will open up additional development opportunities for the local resource-based industries in the district, as well as the municipality. It is reported that Faridpur will soon be declared a city corporation. Based on similar changes in other locations, in the initial years following that declaration it is expected that migration to the *pourashava* will increase.

3. Infrastructures

89. **Electricity.** All the wards and unions of the upazila are under rural electrification network. However 35.41% (urban 79.96% and rural 22.12%) of the dwelling households have access to electricity.

90. **Water Supply.** The existing water supply system is capable to supply 8,800 m3/day for 6,760 residential connections and 308 commercial connections. 40% of the total population is covered by the piped water supply system, and 60% depends on shallow hand tube wells and other own sources.

91. **Sanitation.** In Faridpur 60% of the area is belongs to suburban pattern and housing which are not developed in a planned way. Overall sanitation is not hygienic. During the monsoon most of the suburban areas are over flooded due to poor drainage. Moreover the latrines are not well maintained; sludge from pits flow over the ground to nearby ditches, khals or canals, causing environmental and health hazards. Most latrines, especially in slum and low income areas, are unhygienic. Present sanitation status of Faridpur*:* sanitary latrine with septic tank 58%, pit latrine 25%, latrine without water seal 9%, very unhygienic 6%, Hanging 2%.

92. **Drainage system:** Water flow is not continuous in Kumar River throughout the year. The re–excavation of Kumar River is being implemented by BWDB as a priority project, and has resulted in better flow in all seasons. The existing drainage system of Faridpur is open and natural; however, roadside katcha and pucca drains are limited. The major outfall locations are khals and Kumar River. Main canals are Anginar jola Khal, Mosibari Khal and Faridpur Khal. Length of primary drains, secondary drains and tertiary drains are 14 km, 25 km and 110 km respectively and total is 149 km. Highest water level of the river is 4.20 m in September with respect to mean sea level. Elevation of the *pourashava* is 6.25 to 9.00 m above mean sea level. Annual rainfall is 1583 mm (10 years average). Drainage capacity is also affected by expansion of informal settlements, lack of proper maintenance and insufficient retention and detention capacity to support overflow conditions.

93. **Water logging**: Water logging is typically up to 20 to 30 cm and lasts for 2 to 4 hours and is associated with heavy rainfall during the monsoon. Wards 5, 6 and 7 are comparatively low elevation and suffer most. Ward 1,2,3,4 and 9 have some scattered low lying areas. South Alipur, Goalchamat, Jhiltuli, Khabaspur are comparatively high elevation areas and suffer least.

94. **Disposal sites.** Currently, the municipality is disposing all the collected waste in an unofficial waste disposal site at the Angina area. Recently, the municipality has acquired 1 acre of land as the official designated landfill site. This land is located at Guha Lakshmipur Mouza. The site is currently being developed with the municipality's own funds. The municipality is planning to use 50% of the 1 acre landfill site for fecal sludge management. The municipality is also planning to acquire another 12 acres of land at the same location adjacent to the current landfill site for sanitary landfill development.

E. Description of Site and Surroundings

95. The *pourashava* is free from any large scale carbon emission as there is moderate number of vehicular transport and small number of smoke emitting industries in the *pourashava*. However, its river water is contaminated by salinity due to have direct link with the sea. Most of its groundwater is also saline due to saline water intrusion into the aquifer.

96. The *pourashava* is an old district headquarters and may become a divisional headquarters in the near future. The planned construction of the Padma Bridge, a part of the National Development Plan, will enhance the town's economic activities, transport network and industrial development. With construction of the bridge, the connecting roads to the Mongla port will open up additional development opportunities for the local resource-based industries in the district, as well as the municipality.

97. Municipal systems that are currently contributing to Faridpur's vulnerability include: i) urban infrastructure and service deficit; ii) undirected urbanization in high-risk areas; iii) continued reliance on climate dependent livelihoods; iv) incongruity of housing and

transportation supply and demand, and their suitability to existing and planned urban land uses; and v) limited technical, administrative and management capacity. There is lack of infrastructure for drainage, roads, solid waste, water supply and sanitation. Identification of the resilience dimensions and prioritization of goals for development would be the major tasks for climate resilient integrated urban development in the *pourashava*. Proposed water supply subproject is very important in respect to current development of the *pourashava*.

F. Impact of Climate Change

98. Besides, as an old district town, Faridpur is under severe threat of climate change impact. It is likely to face the following potential climate change impacts:

(i) Due to increase of rainfall, drainage congestion, water logging and flash flood will increase. Low laying areas will be inundated, prevail unhygienic condition in drainage and sanitation, will result disease spreading.
(ii) There will be an increase in the number and severity of tropical cyclones causing damage to property and life.
(iii) The major problem contributing to Faridpur vulnerability as a whole is the lack of basic services, especially water supply, drainage, sanitation and waste management.
(iv) Unplanned development and lack of control over development arising from lack of attention to urban planning, will cost dearly in the long run.
(v) There will be increased costs of infrastructure development, and O&M.
(vi) Agriculture will be affected leading to an increase in poverty. More funds will have to be injected to tackle unemployment and poverty.
(vii) River bed rise already makes gravitational flow of drainage water into the river difficult.
(viii) With agriculture affected in rural areas, there will be poverty and increased rural-urban migration. Urban poverty will increase, requiring more money for poverty alleviation.

V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS

A. Methodology

99. Issues for consideration have been raised by the following means: (i) input from interested and affected parties; (ii) desktop research of information relevant to the proposed subproject; (iii) site visits; and (iv) evaluation of proposed design scope and potential impacts.

100. The corridors of impact considered include: (i) existing ROWs for the new pipes. Pipe laying will require maximum of 0.5 m for excavation. No additional land is required beyond the ROWs and existing facilities. Area of influence is limited within the alignments, ROWs, and sites for proposed civil works (ii) impact of intake on fish especially hilsa fish. Intake screen design will consider this impact to take proper mitigation measures (iii) impact of use, storage and transportation of chemicals for water treatment plant- proper design will consider this impact (iv) handling of generated sludge from treatment plant- landfill[9] will be considered for disposal. Categorization of the subproject and formulation of mitigation measures have been guided by ADB's REA checklist for water supply (**Appendix 1**) and ADB SPS, 2009.

[9] The sludge from the water treatment plant will be quantified and its management will be determined during the detailed design.

B. Screening out Areas of No Significant Impact

101. From the preliminary design and results of the rapid environmental assessment, it is clear that implementation of Faridpur water supply subproject will not have major negative impacts because activities will be localized/site-specific and short in duration; corridors of impact during pipelaying works will be on existing public ROWs, and construction will be conducted within a relatively small area. Impact of intake on fisheries will be mitigated through proper design of intake screen, handling of sludge from treatment plant is proposed to be disposed on the solid waste landfill. Because of these there are several aspects of the environment that are not expected to be affected by the subproject (Table 20), thus can be screened out of the assessment at this stage but will be assessed again during detailed design stage and before implementation.

Table 18: Fields in Which the Subproject Is Not expected to have Significant Impacts

Field	Rationale
A. Physical Characteristics	
Topography, landforms, geology and soils	Required amount of materials will not cause alteration of topography, landforms, geology and soils. Erosion hazard is insignificant as trenching and excavation works will be conducted only during construction stage (short-term) and specific to water treatment plant sites and along public ROWs.
Climatic conditions	Short-term production of dust is the only effect on atmosphere. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Acoustic environment	Construction activities will be on settlements, along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will be on vacant agricultural land and will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
B. Biological Characteristics	
Biodiversity	Activities being located in the built-up area of Faridpur will not cause direct impact on biodiversity values. The construction activities do not anticipate any cutting of trees.
C. Socioeconomic Characteristics	
Land use	No alteration on land use. Surface Water Treatment Plant (STP) and OHT construction and operation will be on government-land and will not affect the surrounding lands. Laying of pipelines will be limited to ROWs.
Type of community spread	No alteration on type of community spread.
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Socio-economic status	The resettlement impacts are discussed in details in the subproject's resettlement plan. Impacts are limited to economic displacement in the form of loss of land, assets, income sources, and means of livelihoods as a result of involuntary resettlement. Manpower will be required during the construction stage. This can result in generation of contractual employment and increase in local revenue. Thus potential impact is positive

Field	Rationale
	and long-term.
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Faridpur where there are a variety of human activities, will result in impacts to the sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration.
D. Historical, Cultural, and Archaeological Characteristics	
Physical and cultural heritage	There are no scheduled or unscheduled archaeological, paleontological, or architectural sites of heritage significance listed by local and/or national authority and/or internationally (UNESCO) within or adjacent to subproject sites. The subproject components are not located in or near and excavation works will not be conducted in the vicinities of the historical sites.

C. Anticipated Impacts and Mitigation Measures – Planning and Design Phase

102. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. All locations for the subproject components will be on properties held by the *pourashava*. Access to the subproject sites is thru public ROW and existing roads.

103. Locations and siting of the proposed infrastructures were considered to further reduce impacts. The concepts considered in design of Faridpur water supply subproject are: (i) demand for new piped water supply through surface water treatment plant; (ii) A pontoon-mounted intake to be installed in the River Padma to readily adjust with seasonal water fluctuation, which may exaggerate due to climate change; (iii) use existing Tapakhola lake as impounding reservoir (primary sedimentary tank) to reduce the treatment load on the treatment plant; (iv) maximum population coverage with pipe layout mostly in residential areas and areas of high growth rate; (v) avoidance of water-use conflicts; (vi) locating pipelines within right of way (ROW) to reduce acquisition of land; (vii) locating pipelines at least 10 meters from latrines, septic tanks and any main drains to avoid contamination; and (viii) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting inputs from public consultation and disclosure for site selection. Water pipe laying works should be coordinated with road improvement works to minimize disturbance.

104. **Subproject selection criteria.** The project environmental assessment and review framework specifies environmental criteria to avoid or minimize adverse impacts during the identification and finalization of drainage subprojects. Table 21 summarizes site and design considerations as per preliminary design.

Table 19: Site and Design Considerations to Meet EARF Environmental Criteria

	Components	Environmental Selection Guidelines	Remarks
1.	Overall selection guideline	i. Comply with all requirements of relevant national and local laws, rules, and guidelines.	- Requisite LCC and ECC to be obtained prior to commencement of works
		ii. Avoid/minimize where possible locations in protected areas, including notified reserved forests or biodiversity conservation hotspots (wetlands, national reserves, forest reserves, and sanctuaries).	-- Not present in Faridpur
		iii. Avoid possible locations that will result in destruction/disturbance to historical and cultural places/values.	-- Use of “chance find” procedures in the EMP that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.

	Components	Environmental Selection Guidelines	Remarks
		iv. Avoid tree-cutting where possible. Retain mature roadside trees which are important/valuable or historically significant. If any trees have to be removed, plant two new trees for every one that is lost.	- Permit for tree-cutting to be obtained by contractor/s prior to commencement of work - Compensatory plantation for trees lost at a rate of 2 trees for every tree cut, in addition to tree plantation as specified in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract.
		v. Ensure all planning and design interventions and decisions are made in consultation with local communities and include women. Reflect inputs from public consultation and disclosure for site selection.	- All consultations during project preparation are documented and concerns expressed by public addressed in the IEE.
		vi. Synchronize all road improvement and pipe laying works (to extent possible) to minimize disturbance and optimize use of resources (e.g., water pipes laid prior to road improvements).	-included in the preliminary design and EMP
2.	Water supply improvement	**I.** Utilize water sources at sustainable levels of abstraction only (i.e. without significant reductions in the quantity or quality of the source overall).	- abstraction is insignificant compared to the flow of Padma river even in the lean period: no impact is anticipated in the source Padma river flow
		ii. Avoid using water sources that may be polluted by upstream users.	- No such impact is anticipated
		iii. Avoid water-use conflicts by not abstracting water that is used for other purposes (e.g. irrigation).	- No such impact is anticipated. However, recommendation is to obtain No Objection Certificate (NOC) from Irrigation Department and/or Bangladesh Water Development Board
		iv. Locate all new facilities/buildings at sites where there is low risk of flooding or other hazards that might impair functioning of, or present a risk of damage to water treatment plants, tanks/reservoirs, or their environs.	- location is considered low risk flooding area, design of facilities to be considered highest flood level and flood protection measures
		v. Avoid all usage of pipes that are manufactured from asbestos concrete, and avoid disturbance to existing asbestos[10] concrete pipes (keep in the ground).	- Considered in the preliminary design. Asbestos pipes will not be used. Any asbestos piped to be found will not be removed.
		vi. Ensure water to be supplied to consumers will meet national drinking water standards at all times.	- Considered in the preliminary design. Water to be supplied will be ensured to meet Bangladesh Standards for Drinking Water. It will further considered in detailed design
		vii. Include measures to address additional sewage/domestic wastewater due to improved/new water supply system	- Considered in the subproject preliminary design and it will further considered in detailed design

105. **Land acquisition and resettlement.** The existing SWTP, OHT, and offices/structures to be constructed, all are located in government-owned lands. There are no encroachers or residential/commercial structures in the ROWs. Cutting of trees will not be required as per preliminary design. This will be reassessed during detailed design stage and if cutting of trees will be required, compensatory plantation for trees lost at a rate of 2 trees for every tree cut will

[10] Existing Asbestos pipes will not be disturbed and will be left in-situ.

be implemented by the contractor, who will also maintain the saplings for the duration of his contract.

106. **Impacts on fisheries/river ecology:** In the detailed design stage, intake screens are to be designed according to the swimming characteristics of Hilsa (the key species in the Padma), to ensure that the impacts on Hilsa as well as the smaller fish, including the jatka, are minimized. Consulting with a fisheries expert as part of the detailed design is proposed, to provide inputs on the design of the intake screen to minimize impacts on fish. However, followings are to be considered in the detailed design:

(i) The screen face will be oriented in the same direction as the flow.
(ii) The water velocity flowing through the structure against which the fish will have to swim must be lower than the fishes' swimming capability.
(iii) Screens will be located above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
(iv) Screen sizes will be determined based on assessment of fish sizes at the location and the swimming characteristics of hilsa.

107. **Impacts on downstream water uses in Padma river:** The proposed abstraction was checked with the lean flow (Q95) for 2040, and the maximum flow (Q5) for 2040, which is insignificant (less than 0.1% of lean flow). Therefore, the level of abstraction is not adversely impacted the downstream uses or ecological flows of the Padma River. Further, these levels of abstraction will not be resulted in any flow modifications, which can potentially lead to salinity intrusion or impacts on downstream water uses. The abstraction is very minor. However, it should be reassessed during detailed design phase.

108. **Upstream pollution impacts and protection of source:** Though during preliminary design water quality of intake waste tested and found within the limit of inland surface water for recreational purpose. However, the water quality monitoring program should be carried out as part of the feasibility study to confirm that the key water quality parameters at the intake location are within permissible limits for inland surface waters designated for use for water supply after conventional treatment. Protection of the source through regulation of upstream developments, especially discharge of industrial effluents (either untreated or partially treated), needs to be identified as a key policy level intervention, which requires inter-departmental coordination. While consultations with the other line departments, such as the Department of Industries and the Bangladesh Water Development Board (BWDB), should ensure future large-scale industrial development upstream of the intake, enforcement of discharge standards and treatment of industrial wastes. It will be critical to ensure the long-term protection of the water quality at the intake.

109. While the waste discharges from the existing stationery ghat are not significant in terms of quantum of wastes, provision of sanitation facilities and waste collection facilities at the ghat will provide a good starting point to communicate the need for protection of source and to avoid direct discharges into the river.

110. **Transmission Mains—Intake to WTP:** Water mains will be installed alongside the Bhubonessar River to Tapakhola lake as impounding reservoir. A corridor is proposed to accommodate the transmission mains from Tapakhola lake to WTP. The alignment is supposed to passes underneath ROW of roads. There are no environmentally sensitive areas in the vicinity of the proposed transmission main/access road. Land acquisition and resettlement of private lands are not envisaged. However, any resettlement impacts are addressed through the provisions of the RP. Cutting of trees is not anticipated, however, it will be reassessed during

detailed design phase. Compensatory plantation for trees lost at a rate of 02 trees for every tree cut will be implemented by the contractor. Impact on inland water bodies, including khals and fishponds, will be addressed in the detailed designs through appropriate measures to provide for cross-drainage to minimize severance impacts.

111. Design Impacts for All Components: There are asbestos cement pipes in Faridpur. The contractor will (i) train all personnel (including manual laborers) to enable them to understand the dangers of asbestos cement pipes and to be able to recognize them in situ; (ii) report to management immediately if asbestos cement pipes are encountered; and (iii) use asbestos cement handling guideline (Appendix 9). This guideline should be reviewed updated during detailed design phase and should be approved by ADB.

112. The MDSC, as part of the detailed designs, shall develop a protocol to be applied in any instance that asbestos cement pipes are found, to ensure that appropriate action is taken. This shall be based on the approach recommended by the United States Environmental Protection Agency (USEPA), and among other things, shall involve (i) developing reporting procedures to inform the environmental officer of the PMU immediately if asbestos cement pipes are encountered; and (ii) requiring the MDSC to update and apply an asbestos cement management plan, as part of the overall health and safety plan, to protect both workers and citizens in case of accidental uncovering of asbestos cement pipes.

113. **Inappropriate Design:** Impacts arising from the inappropriate designs of proposed facilities would in general include poor design of sedimentation unit, coagulation unit, filtration unit, disinfection unit and sludge drying beds, etc. These shall be addressed through adoption of good engineering practices as part of the detailed design.

114. **Impacts of distribution network.** A 0.5 m-wide, 3 km-long corridor on public ROWs is proposed to accommodate the distribution network. The alignment passes through the built-up areas. There are no environmentally sensitive areas in the vicinity of the proposed alignment. Traffic management plans and spoil management plans will be updated as part of the detailed designs.

115. **Climate Change Adaptation and Disaster Risk Management Considerations.** The *pourashava* needs to deal with the impacts of climate change that are mainly associated with increased rainfall, and rain-driven drainage congestion and urban flash flooding. The majority of waterlogged areas seem to be in the municipality's newer areas, away from its historic business district. Inadequate drainage and waste management systems are contributing to localized flooding, drainage congestion, water logging and water pollution. While there is a lack of infrastructure for drainage, roads, solid waste, water supply and sanitation, identification of the resilience dimensions and prioritization of goals for development would be the major tasks for climate resilient integrated urban development in the *pourashava*.

116. It is recommended that project design construction, especially design material, method of construction should be taken appropriate to make the Project climate-proof and disaster resilient. During the detailed design, the Environment Specialist properly consulted with the design team to incorporate this impact. The climate change impact and necessary consideration in design for adaptation is shown in Table 22.

Table 20: Climate change impact and design considerations

Climate change effect/impact factor	Impact	Design consideration for mitigation
Water level high/Sea level rise	erosion/damage of intake of water supply	Tree plantation need both side of the embankment, create buffer zone beside embankment, use climate change consideration in structural design of intake and other construction element; intruding floating connecting bridge for pontoon intake
Salinity	Water source becomes saline, all construction material will be impacted due to salinity: corrosion and dampness	Source needs to be changed, surface water source should be taken, saline removal technology can be introduced for treatment; All construction material should saline resistant, anti-saline admixture can be used
Cyclone and tidal surge	Wind speed will damage structurally to WTP, OHT, intake and other structures, damage to plant and vegetation, tidal surge will damage intake	Structural design should consider cyclone wind speed; wind breaker can be introduced around the building; Plant timber trees, proper cross drainages should be provided to road and embankment design should consider height of the storm surge;.
Floods and water logging	Elements of water supply tube-well can be can be contaminated due to intrusion of flood water	All design should consider high flood level, plinth level of building should be raised considering high flood level, all water supply elements including tube-well should be also placed raised ground
Lack of drinking water	Effect on water supply, disease can be spread due to drink impure water	Water supply should consider water demand properly, surface water should be used as water source for treatment plant
Drought	Impact on plant and vegetation, water scarcity, load shedding of electricity	Pond should be excavated and re-excavated, Proper electric supply system should be established, solar electric should be used rather than conventional electric supply, Proper water supply should be introduced
Construction materials' quality		Most durable materials possible, even if higher cost, e.g. concrete, high quality bricks should be chosen; anti saline admixture should be used; Construction quality should be monitored and controlled
Rising temperatures		Works during most favorable times of year and day should be executed; Preparing, placing and curing concrete and mortar, to ensure placement, etc., during most favorable times should be monitored and controlled; plain high-quality un-rendered brickwork and high quality cement mortar in preference to rendered low-grade bricks should be used; sulphate resisting cement should be used in vulnerable locations (higher heat gain during curing) or cement containing fly ash (less heat gain, so preferred)
Runoff		Trapezoidal section side drains with small low-flow section (cunette) for low flows should be used; Side drains should be lined to achieve higher discharge velocities without increasing risk of scour, etc.

D. Anticipated Impacts and Mitigation Measures – Construction Phase

117. In the case of this subproject (i) most of the individual elements are relatively small and involve straightforward construction, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements; and (iii) being located in the built-up area of the *pourashava*, will not cause direct impact on biodiversity values.

118. **Construction method.** The infrastructures will be constructed manually according to design specifications. Trenches will be dug by backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed nearby, and the materials (brought to site on trucks and stored on unused land nearby) will be placed in the trench by crane or using a small rig. Once pipes are laid these will be joined as per specification and tested for any cracks of leakages. The minimum working hours will be 8 hours daily, the total duration of each stage depends on the soil condition and other local features. Any excavated road will be reinstated.

119. There is sufficient space for a staging area, construction equipment, and stockpiling of materials. However, the contractor will need to remove all construction and demolition wastes on a daily basis.

120. Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the project sites in built-up areas of Faridpur where there are a variety of human activities, will result to impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are short-term, site-specific and within a relatively small area. There are no impacts that are significant or complex in nature, or that need an in-depth study to assess the impact. Thus, Faridpur water supply subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with construction activities can be mitigated to acceptable levels with the following mitigation measures (Table 23).

Table 21: Anticipated Impacts and Mitigation Measures – Construction Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may cause localized changes in topography and landforms. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Utilize readily available sources of materials. If contractor procures materials from existing burrow pits and quarries, ensure these conform to all relevant regulatory requirements. • Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall, which may cause siltation and reduction in the quality of adjacent bodies of water. Impacts on the river courses and the water quality during the construction of the transmission mains along side the rivers. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Prepare and implement a spoils management plan (see **Appendix 3** for outline). • Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Faridpur local authority on designated disposal areas. • All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. • Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. • Take all precautions to minimize the wastage of water in the construction activities. • Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. • Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. • While working across or close to any water body (working alongside the Bhubonessar River for laying transmission main), the flow of water must not be obstructed. Ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of any watercourse and cross drainage channels. Ensure proper management of spoil disposal due to the excavation for the transmission mains. • Monitor water quality according to the environmental management plan.
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; • Use tarpaulins to cover soils, sand and other loose material when transported by trucks. • Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. • Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject).

Field	Impacts	Mitigation Measures
		• Monitor air quality.
Acoustic environment	Construction activities will be on settlements, along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. • Plan activities in consultation with Faridpur local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. • Use of high noise generating equipment shall be stopped during night time. • Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; • Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. • All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). • Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. • If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. • Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
Aesthetics	The construction activities do not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Prepare a debris disposal plan • Remove all construction and demolition wastes on a daily basis. • Coordinate with Faridpur local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas. Avoid stockpiling of any excess spoils. • All vehicles delivering fine materials to the site and carrying debris for disposal shall be covered to avoid spillage. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. • Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. • In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. • The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas.
B. Biological Characteristics		
Biodiversity	Activities being located in the built-up area of	• Check if tree-cutting will be required during detailed design stage. No trees,

Field	Impacts	Mitigation Measures
	Faridpur. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Preliminary design shows there are no trees at the sites that need to be removed.	shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. • All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. • Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. • Prohibit employees from poaching wildlife and cutting of trees for firewood. • Implement compensatory plantation for trees lost at a rate of 2 trees for every tree cut. Maintain the saplings for the duration of contract.
C. Socioeconomic Characteristics		
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject will follow existing ROW alignment. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Prepare and implement a traffic management plan (see **Appendix 4** for sample) • Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. • Maintain safe passage for vehicles and pedestrians throughout the construction period. • Schedule truck deliveries of construction materials during periods of low traffic volume. • Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. • Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. • Leave spaces for access between mounds of soil. • Provide walkways and metal sheets where required to maintain access across for people and vehicles. • Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. • Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Socio-economic status	Manpower will be required during the 30-month construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.	• Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. • Secure construction materials from local market.
Other existing amenities for	Although construction of subproject components involves quite simple techniques	• Obtain details from *pourashava* nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible;

Field	Impacts	Mitigation Measures
community welfare	of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Faridpur where there are a variety of human activities, will result to impacts to the sensitive receptors such as residents, businesses, and the community in general. Excavation may also damage existing infrastructure (such as water distribution pipes, electricity pylons, etc) located alongside the roads. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Integrate construction of the various infrastructure subprojects to be conducted in Faridpur (roads, drainage, etc.) so that different infrastructure is located on opposite sides of the road where feasible and roads and inhabitants are not subjected to repeated disturbance by construction in the same area at different times for different purposes. • Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. • Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. • Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. • If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Contractor's activities and movement of staff will be restricted to designated construction areas. • Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. • Consult with Faridpur local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. • If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. • Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.[a] • Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. • Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. • A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the

Field	Impacts	Mitigation Measures
		construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. • Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. • The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.
Workers health and safety	There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers' health and safety (H&S). • Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. • Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training[b] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. • Provide medical insurance coverage for workers; • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Ensure moving equipment is outfitted with audible back-up alarms; • Mark and provide sign boards for hazardous areas such as energized electrical

Field	Impacts	Mitigation Measures
		devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and • Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
D. Historical, Cultural, and Archaeological Characteristics		
Physical and cultural heritage	There are no scheduled or unscheduled archaeological, paleontological, or architectural sites of heritage significance listed by local and/or national authority and/or internationally (UNESCO) within or adjacent to subproject sites. The subproject components are not located in or near and excavation works will not be conducted in the vicinities of the 4 historical sites. Thus risk for chance finds is low.	• Stop work immediately to allow further investigation if any finds are suspected.

[a] These products come in powder forms, and once mixed with water (being the catalyst) simply expand, and crack the rock from hole to hole. This product is environmentally friendly and can be washed away after it has been used.

[b] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

E. Anticipated Impacts and Mitigation Measures – Operations and Maintenance Phase

121. **Operation of WTP.** In the operations and maintenance (O&M) phase, the water supply system will operate with routine maintenance, which should not affect the environment. For proper operation of the WTP, experienced staff for the *pourashava* is proposed as Executive Engineer: 2 persons, Assistant Engineer: 4 persons, Sub Assistant Engineer: 6 persons, Water Works Supper: 2 persons and proportionate other supportive staff.

122. The infrastructures will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. O&M will be the responsibility of Faridpur, which will be given training by this project.

123. Routine repairs and maintenance works will be very small in scale, to conducted manually by small teams of men and works will be very short in duration thus will not cause significant physical impacts.

124. **Hazardous/non-hazardous chemicals for treatment plant use, storage and transportation**. Water treatment at WTP and OHT prior to distribution may involve the use of chemicals for coagulation and disinfection and water conditioning. Recommended measures to prevent, minimize, and control potential environmental impacts associated with the storage, handling and use of disinfection chemicals in WTP include (i) alum and store sodium hypochlorite in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials; (ii) store calcium hypochlorite away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year; (iii) minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruptions in supply; (iv) develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures; and (v) develop and implement a plan for responding to accidental releases.

125. **Sludge handling**. During operation of the WTP, physical and chemical sludge will be generated. The disposal of the alum sludge is proposed at the landfill site of Faridpur.

126. **Emergency and risk management:** To address risks during the operation of the proposed facilities, *pourashava* shall implement an emergency action plan, which shall include environmental risks and potential pollution incidences. This will be prepared during detailed design stage by MDSC and will be reviewed by PMU. Capacity building and training of personnel on the emergency response systems and procedures shall be incorporated in the project.

127. **Increased sewage generation:** The project will result in increased sewage generation. *Pourashava* will address additional wastewater to be generated and improve the overall condition of domestic wastewater pollution in p*ourashava*.

128. **Impact on Socio-economic Environment**: *Impact on Employment and Family Finance*- The subproject envisages providing permanent employment of some number of skilled and unskilled personnel during its operation phase. This would obviously help to present unemployment burden of the country to some extent. A person with an average gross salary of

about BDT 3000 per month will able to increase his family income by BDT 100 per day. This will definitely provide an opportunity to improve his basic living standard. Apart from this direct benefit, there would other indirect beneficial impacts on national economy through foreign investment.

129. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 24).

Table 22: Anticipated Impacts and Mitigation Measures – O&M Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Water quality	Disposal of Wastewater from WTP, water testing laboratory, etc. to river. Disposal of sludge and other solid waste from WTP into river Run-off from stockpiled debris/sediments from drainages which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Strictly flow the wastewater quality standard before disposal, Conduct regular wastewater quality analysis and monitoring. Do not allow any wastewater including storm water from WTP directly disposal to river without treatment or analysis of quality before disposal. • Dispose sludge including debris/sediments/other solid waste at a designated site such as landfill. Remove all debris/sediments immediately. It is important that the designated disposal site's base is of a non-permeable membrane in order to prevent leachate that can contaminate the soil and groundwater • Take all precautions to prevent entering of run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies.
Air quality	Air emissions from WTP and OHT operations may include gaseous or volatile chemicals used for disinfection processes (e.g., chlorine).	• Store sodium hypochlorite in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials. • Store calcium hypochlorite away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year. • Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruptions in supply. • Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures. • Develop and implement a plan for responding to accidental releases.
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Plan activities in consultation with Faridpur local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance.
B. Biological Characteristics		
Biodiversity	Activities in the built-up area of Faridpur. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	• No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal).
C. Socioeconomic Characteristics		
Workers health and safety	Workers need to be mindful of the occupational hazards working with chemicals at SWTP and OHT. Potential impacts are	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. • Ensure that all site personnel have a basic level of H&S

Field	Impacts	Mitigation Measures
	negative and long-term but reversible by mitigation measures.	training. • Produce and implement a O&M H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training[a] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. • Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

[a] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

F. Cumulative Impact Assessment

130. The cumulative impact assessment examined the interaction between the subproject's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing, and reasonably foreseeable future projects or activities. The interaction of residual effects associated with multiple projects and/or activities can result in cumulative impacts, both positive and negative. The subproject's potential cumulative effects were considered with respect to valued components in environmental and socioeconomic categories, in four areas:

(i) of any potential residual project effects that may occur incrementally over time;
(ii) consideration of other known relevant projects or activities within the specified study area boundaries, even if not directly related to the project;
(iii) potential overlapping impacts that may occur due to other developments, even if not directly related to the proposed subproject; and
(iv) future developments that are reasonably foreseeable and sufficiently certain to proceed.

131. The project has identified the valued components as water quality, socio-economic and socio-community components, and human health and safety. The spatial boundary of the subproject is the area along alignment of the distribution network, treatment plant, OHT, etc. The temporal boundary can be considered as the whole Faridpur *pourashava*.

132. Locations and siting of the proposed infrastructures were considered to reduce impacts. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Faridpur water supply subproject, including: (i) structural protection of facilities from future floods; (ii) standalone power backup for the SWTP and pumping stations; and (iii) promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures. Residual impacts during O&M will be much less than those of the construction phase as the work will be infrequent, affecting small areas only thus considered to be negligible.

133. **Water quality**. Total abstraction from Padma river is negligible compared to its flow. There is no impact anticipated in the downstream water quality due to this abstraction. Intake water and treated water quality will be monitored regularly to check the performance of the WTP. The subproject will improve existing water supply scenario of the *pourashava* including distribution and non-revenue water therefore potential residual effects is considered to be negligible and cumulative impact is not significant.

134. **Socioeconomic and socio-community**. Concerns on existing provisions for pedestrians and other forms of transport will occur spatially during construction and O&M activities. Traffic movement along the pipe alignments will be improved once the activities are completed. The subproject will not conflict with existing or planned land use. However, following improvement in infrastructures and services, added residential developments, commercial, and business facilities and increased densities are expected to develop and enhance Faridpur. This can be considered a long-term cumulative benefit of the subproject.

135. Given the scale of the project it is likely that local people will obtain at least temporary socio-economic benefits, by gaining employment in the construction workforce, and thus raising their levels of income. These benefits can bring wider social gains if they are directed at vulnerable[11] groups.

136. Upon completion of the subproject, the socio-community will be the major beneficiaries. With the improved water supply, they will be provided with reliable and climate-resilient municipal services. In addition to improved environmental conditions, the subproject will reduce occurrence of water-related diseases and exposure to climate extremes. People would spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health. Beyond reducing the water-borne and water-washed diseases, providing better access to improved municipal services confers many other diverse benefits ranging from the easily identifiable and quantifiable (costs avoided, time saved) to the more intangible and difficult to measure (convenience, well-being). One set of benefits related to health impacts that are relatively easy to quantify, are the cost-offsets (costs avoided due to less illness). Cost savings in health care are mainly due to the reduced number of treatments of diarrheal cases. Also, patients will avoid costs incurred by seeking treatment,

[11] Vulnerable groups as those without legal title to land and other assets; households headed by single earner females, the elderly or disabled; indigenous peoples (based on ADB OM); and households with incomes that are below the poverty line.

including expenditures on care, drugs and transport and the opportunity costs of time spent on seeking care. Another set of benefits related to less illness are the avoided days lost, with respect to formal or informal employment, other productive activities in the household, or school attendance. These are considered a long-term cumulative benefit.

137. **Community and workers health and safety**. No adverse residual effects to human health will occur as a result of construction or O&M activities. While exposure to elevated noise levels, fugitive dust and common air pollutants will occur in proximity to work sites, due to their short-term and localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health.

138. Therefore the project will benefit the general public by contributing to the long-term improvement of municipal services and community livability in Faridpur.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Approach

139. During inception stage of TA 8913 consultants team engagement, consultations were held with the LGED, ADB and during site visits, consultation were held with *pourashava* local staff, local people and beneficiaries on issues pertaining to the selection of subprojects and identification of key issues including addressing the current gaps in provision of basic services and improvement of municipal infrastructures within Faridpur *pourashava*. These consultations provided inputs in identification of the subprojects' needs of the communities, and the relevant stakeholders, awareness about subprojects, benefits of subprojects, possible environmental impacts and possible mitigation measures. The REA Checklist for each subproject was also shared during the consultations. Table 25 provides the summary of consultations carried out.
The environmental experts of the TA 8913 consultants (Safeguard Specialists and Junior Environmental Engineers) has contacted the local people through field workers and Faridpur *pourashava* staff. Meetings were arranged in the form of Focus Group Discussion (FGD) with the consent of the local stakeholders at scheduled venues chosen by the locals (Figure 8). Participant attendance is attached in Appendix 5.

B. Major Findings

140. The information on the conducted FGD and key issues identified during consultations is presented on the Table 25. No vulnerable groups are identified during the consultations in the subproject area. Consultation process will continue during implementation and vulnerable groups, if any, will be included.

Figure 7: Stakeholders consultations at Faridpur

Table 23: Focus group discussion and key issues identified during Consultations

Place, Date and Discussion on Subprojects	Participants	Key issues discussed
Location: Kabi Jashim Uddin Road, Ward-7 Meeting Place: RiazSanitary Shop Date: 23-08-16 Time: 3.32 pm	Municipal staff, business man, service, driver, student No. of participants: 19	All the proposed infrastructure implementation is needed for Faridpur town, all will provide benefit, no major environmental concern All development works are essential but sound design and construction is necessary so that they are not affected by environmental pollution. During construction period public safety and workers' safety is important Noise and air pollution is required to be controlled No special or rare species have been encountered in this stretch. Species such as pabda and kalboush have become more rare in the past few years. The larger fishes are usually found in the deeper channels of the river, and the catch is significantly less along the banks of rivers and in shallow waters. The community was aware of the arsenic and iron contamination of groundwater and was averse to using it. The community said that they have had experienced salinity in river water, and mentioned that salinity intrusion will be a problem for intake. Tare no specific locations identified as breeding grounds near the intake. The breeding season differs for different species, and as per the orders of the government, hilsha fishing is totally banned for particular period The communities said that if land acquisition is required, it will result in loss of agricultural lands, their only source of livelihood

C. Summary

141. People want to have all development works but they want to have sound design and construction so that they are not affected by environmental pollution. This is to be addressed in design stage. Construction supervision should ensure sound and sustainable engineering practice so that there is no further environmental impact to people's life. Following points from FGD can be cited:

(i) All the proposed infrastructure implementation is needed for Faridpur town, all will provide benefit, no major environmental concern;
(ii) All development works are essential but sound design and construction is necessary so that they are not affected by environmental pollution;
(iii) Water logging and flooding are major concerns, road and drains needs to be improved;
(iv) Special safety measures should be taken to avoid land subsidence due to heavy construction activities;
(v) Flooding and water logging both affect access to key activities;
(vi) Traffic management is important, separate parking is necessary;
(vii) During construction period public safety and workers' safety is important;
(viii) Noise and air pollution is required to be controlled;
(ix) No special or rare species have been encountered in this stretch. Species such as pabda and kalboush have become rarer in the past few years. The larger fishes are usually found in the deeper channels of the river, and the catch is significantly less along the banks of rivers and in shallow waters; and

(x) The community was aware of the arsenic and iron contamination of groundwater and was averse to using it and they like to have surface water treatment plant.

D. Proposed Future Consultation Plan

142. The future public involvement in monitoring impacts and mitigation measures during the construction and operation stages and includes a Public Consultation Plan as shown in Table 26, Public consultation plans are part of the project implementation and management plan. The Executive Agency (LGED) and Implementing Agency (Faridpur *pourashava*) are responsible for public consultation during project implementation. Costs for public consultation activities during construction are proposed to be covered from budget of supervision consultancy contract.

Table 24: Public Consultation Plan

Organizer	Approach	Time and Frequency	Subject	Participants
Pre-Construction stage				
LGED and Faridpur *pourashava*	Workshop	Before starting of construction	Disclosure of all development activities, potential impacts, mitigation measures and GRM	All people of Faridpur local government people, administrative staff, LGED local staff, *pourashava* staff, PWD, RHD, Water Development Board, BMD, DPHE and other government departments, local public representatives, educationalist, environmentalist, business man, service holder, beneficiaries, NGOs, local leaders, local concerned people, general peoples, media, etc.
Construction stage				
LGED and Faridpur *pourashava*	Public consultation and site visits	At least once a year	Adjusting mitigation measures if necessary, construction impacts, comments and suggestions	Work staff within construction area; Residents within Construction area
	Expert workshop or press conference	As needed, based on public consultation	Comments and suggestions on mitigation measures, public opinions; adjusting mitigation measures accordingly	Experts from various sectors, media
	Public workshop	At least once a year	Adjusting mitigation measures if necessary construction impacts, comments and suggestions	Representatives of residents and social sectors
Operation Stage				
Faridpur pourashava	Public consultation and site visits	At least once	Effectiveness of mitigation measures, impacts of operation, mitigation measures, comments and suggestions	Residents adjacent to project sites, users and beneficiaries
	Public satisfaction survey	At least once	Comments and Suggestions	Project beneficiaries and users

VII. GRIEVANCE REDRESS MECHANISM

143. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of AP's concerns, complaints, and grievances about the social and environmental performance at the level of the project. The GRM will aim to provide a

time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

144. **Common GRM.** A common GRM will be in place for social, environmental, or any other grievances related to the project; the resettlement plans (RPs) and IEEs will follow the GRM described below, which is developed in consultation with key stakeholders. The GRM will provide an accessible and trusted platform for receiving and facilitating resolution of affected persons' grievances related to the project. The multi-tier GRM for the project is outlined below, each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required.

145. *Pourashava*-wide public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the campaign. The project implementation unit (PIU) designated safeguard focal person and governance improvement and capacity development consultants (GICDC) will conduct *pourashava*-wide awareness campaigns to ensure that poor and vulnerable households are made aware of grievance redress procedures and entitlements, and will work with the PMU and management, design and supervision consultants (MDSC) to help ensure that their grievances are addressed.

146. Affected persons (APs) will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes that have already been installed by project *pourashavas* or through telephone hotlines at accessible locations, by e-mail, by post, or by writing in a complaints register in *pourashava* offices. Appendix 6 has the sample grievance registration form. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. The PMU safeguard officer will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party through the PIU designated safeguard focal person.

147. **Grievance redress process.** In case of grievances that are immediate and urgent in the perception of the complainant, the contractor and MDSC on-site personnel will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact phone numbers and names of the concerned PIU safeguard focal person and contractors will be posted at all construction sites at visible locations.

(i) **1st Level Grievance.** The phone number of the PIU office should be made available at the construction site signboards. The contractors and PIU safeguard focal person can immediately resolve on-site in consultation with each other, and will be required to do so within 7 days of receipt of a complaint/grievance.

(ii) **2nd Level Grievance.** All grievances that cannot be redressed within 7 days at field/ward level will be reviewed by the grievance redress cell (GRC) headed by Panel Mayor of the *pourashava* with support from PIU designated safeguard focal person and MDSC regional environment and resettlement specialists. GRC will attempt to resolve them within 15 days. The PIU designated safeguard focal person will be responsible to see through the process of redressal of each grievance.

(iii) **3rd Level Grievance.** The PIU designated safeguard focal person will refer any unresolved or major issues to the PMU safeguard officer and MDSC national environmental and resettlement specialists. The PMU in consultation with these officers/specialists will resolve them within 30 days.

147. Despite the project GRM, an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

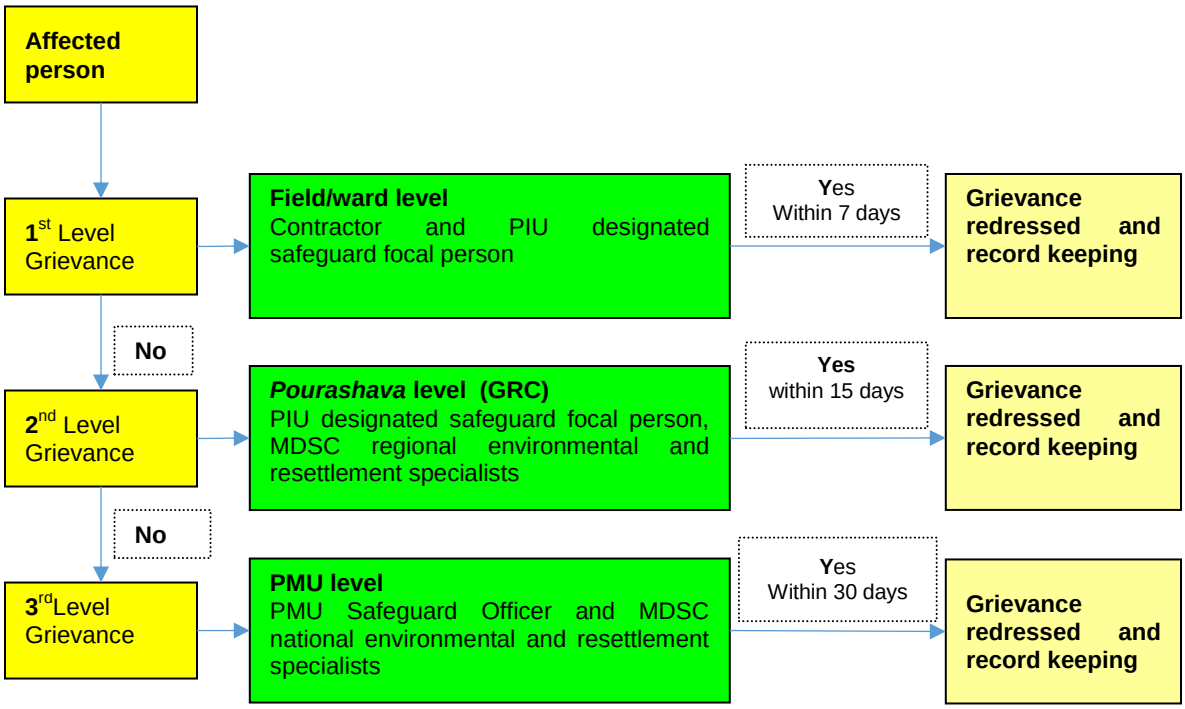
148. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism (AM) through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB Bangladesh Resident Mission (BRM). The complaint can be submitted in any of the official languages of ADB's DMCs. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the project GRM.

149. **Recordkeeping.** 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 affected and final outcome will be kept by PIU. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PMU office, *pourashava* office, and on the web, as well as reported in monitoring reports submitted to ADB on a semi-annual basis.

150. **Periodic review and documentation of lessons learned.** The PMU safeguard officer will periodically review the functioning of the GRM in each *pourashava* and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

151. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the concerned PIU at *pourashava*-level; while costs related to escalated grievances will be met by the PMU. Cost estimates for grievance redress are included in resettlement cost estimates.

Figure 8: Grievance Redress Process



Note: GRC = Grievance Redressal Cell, GICDC = governance improvement and capacity development consultants, PIU = project implementation unit, MDSC = management design and supervision consultants, PMU =project management unit.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

152. The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of: (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and (iv) ensuring that safety recommendations are complied with.

153. A copy of the EMP must be kept on work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

154. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate a budget for compliance with these EMP measures, requirements and actions.

A. Institutional Arrangement

155. **Executing and implementing agencies**. LGED and DPHE, both under the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MLGRDC), are the executing agencies (EA). LGED is responsible for providing support and guidance to *pourashavas* concerning performance criteria and *pourashava* development planning. DPHE will provide support in water supply and sanitation schemes. Participating *pourashavas* are the implementing agencies (IA).

B. Safeguard Implementation Arrangement

156. **Project management unit.** A PMU is established for the overall management of the project. The PMU is headed by Project Director (PD) supported by officials including three project managers in charge of (i) municipal infrastructure (excluding water supply and sanitation), (ii) water supply and sanitation, and (iii) governance improvement and capacity development, respectively. The PMU will receive support from national environmental specialist and national resettlement specialist on the MDSC team. Key tasks and responsibilities of the PMU safeguard (environment) officer are as follows:

(i) confirm existing IEEs/EMPs are updated based on detailed designs, and that new IEEs/EMPs are prepared in accordance with the EARF and subproject selection criteria related to safeguards;
(ii) confirm whether IEEs/EMPs are included in bidding documents and civil works contracts;
(iii) provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by project implementation unit (PIU) and contractors;
(iv) establish a system to monitor environmental safeguards of the project, including monitoring the indicators set out in the monitoring plan of the EMP;
(v) facilitate and confirm overall compliance with all government rules and regulations regarding site and environmental clearances, as well as any other environmental requirements (e.g., location clearance certificates, environmental clearance certificates, etc.), as relevant;
(vi) supervise and provide guidance to the PIUs to properly carry out the environmental monitoring and assessments as per the EARF;
(vii) review, monitor, and evaluate the effectiveness with which the EMPs are implemented, and recommend necessary corrective actions to be taken as necessary;
(viii) consolidate monthly environmental monitoring reports from PIUs and submit semi-annual monitoring reports to ADB;
(ix) ensure timely disclosure of final IEEs/EMPs in locations and form accessible to the public; and
(x) address any grievances brought about through the grievance redress mechanism in a timely manner.

157. **Project implementation unit.** The participating *pourashavas* will establish a PIU within the *pourashava* structure. The PIUs will (i) be responsible for land acquisition; (ii) take necessary action for obtaining rights of way; (iii) plan, implement and monitor public relations activities, gender mainstreaming initiatives and community participation activities at *pourashava* level; (iv) disseminate information related to the project to the public and media; (v) ensure

compliance with loan covenants concerning safeguards measures; and (vi) facilitate implementation of safeguards plans. The PIUs will each designate a Safeguard Officer[12] and will receive assistance from the assigned MDSC regional environmental specialist to:

(i) update IEEs/EMPs during detailed design stage and prepare new IEEs/EMPs in accordance with the EARF;
(ii) conduct environmental compliance audit of existing facilities as per Item F, Appendix 6 of ADB SPS, 2009;
(iii) include IEEs/EMPs in bidding documents and civil works contracts;
(iv) comply with all government rules and regulations;
(v) take necessary action for obtaining rights of way;
(vi) oversee implementation of EMPs including environmental monitoring by contractors;
(vii) take corrective actions when necessary to ensure no environmental impacts;
(viii) submit monthly environmental monitoring reports to PMU,
(ix) conduct continuous public consultation and awareness;
(x) address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs; and
(xi) organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.

158. **Project Management, Design and Supervision Consultants (MDSC).** MDSC will be engaged to work closely with and advise the PMU, to be involved in project supervision including monitoring during construction phase. The MDSC will have one national environmental specialist and three regional environmental specialist as well as one national resettlement specialist and three regional resettlement specialist. The MDSC national environmental specialist will, but not limited to:

(i) work under the general supervision of the team leader and the deputy team leader;
(ii) review the environmental guidelines and requirement of the government of Bangladesh and ADB SPS, 2009, environmental subproject selection guidelines and EARF;
(iii) Guide the implementation of future subprojects;
(iv) provide technical support to the PMU and PIUs including review and update of EARF and guidelines for specific type of subprojects and assist in preparing terms of reference for environmental assessment;
(v) assist and guide the MDSC regional environmental specialists to provide support to environmental management functions including updating subproject IEEs in respect to EMP;
(vi) assist in preparing IEEs and in monitoring impact and mitigation measures associated with subprojects;

[12] It is recommended that existing *pourashava* health officer or executive engineer will also work as safeguard officer in addition to his/her regular responsibilities within the *pourashava*.

(vii) assist PIUs and MDSC regional environmental specialists working in the steps for preparing the EIA/IEE, capacity building and training, preparation of guidelines and procedure and subproject specific guidance;
(viii) provide support and guidance to PIUs in undertaking environmental monitoring
(ix) support PMU in submitting semi-annual environmental monitoring reports to ADB;
(x) facilitate in grievance redress and corrective actions;
(xi) train PIU officials regarding environmental requirement and issues; and
(xii) perform any other task assigned by the team leader, deputy team leader and the project director.

159. The MDSC regional environmental specialists will, but not limited to:

(i) work under the supervision and guidance of the team leader, deputy team leader and MDSC national environmental specialist;
(ii) assist PIUs in preparing and updating IEEs including EMPs in accordance with the EARF, and assist in monitoring impact and mitigation measures associated with subprojects including implementation of EMPs by contractors;
(iii) assist in preparation of IEEs and in the environmental review of subproject consisting of screening at *pourashava* level by PIU through a committee formed with municipal mayor as chairman and representatives from DOE, LGED and other relevant district office as members;
(iv) assist PIUs in the steps for preparing EIA/IEE, capacity building and training, preparation of guidelines and procedure and subproject specific guidance;
(v) support PIU in environmental monitoring and submit monitoring reports to PMU as inputs into the semi-annual monitoring report submitted to ADB;
(vi) undertake mitigation measures and other specific measures in the construction contract;
(vii) facilitate in grievance redress and corrective actions;
(viii) follow subproject selection guidelines and EARF to ensure compliance with the environmental guidelines and requirement of the Government of Bangladesh and ADB SPS, 2009;
(ix) support PMU and MDSC national environment specialist by providing data, information and all other requested assistance;
(x) train PIU officials regarding environmental issues
(xi) perform any other task assigned by MDSC national environment specialist, team leader, deputy team leader and the project director.

160. **Civil works contracts and contractors.** EMPs are to be included in bidding and contract documents and verified by the PIUs and PMU. The contractor will be required to designate an environmental supervisor to (i) coordinate with MDSC on updating the IEE/EMP based on detailed designs, and (ii) ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract.

161. **Governance Improvement and Capacity Development Consultants (GICDC).** The PMU and PIUs will require support on a range of activities related to governance improvement and capacity development of *pourashavas*. The GICDC will support PMU and PIUs in implementing urban government improvement action plan (UGIAP) by providing capacity development, community mobilization and other facilitation services. There will be 4 GICDC regional offices consisting of 4 regional coordinators at each regional office. There will be

2community mobilizers in each project *pourashava*. The regional coordinators will assist *pourashavas* and the local capacity development experts in the activities related to community participation and inclusive development. The community mobilizers will be posted at the *pourashava* and will (i) have to work maintaining close liaison with the mayor, councilors, *pourashava* staffs and communities, (ii) provide assistance and support to PIU regarding planning and implementation of citizen awareness and participation activities, urban planning, equity and inclusiveness of women and urban poor. The GICDC will also have a training specialist who will be responsible for identifying and coordinating capacity building activities at *pourashava* level.

Figure 9: Safeguards Implementation Arrangement

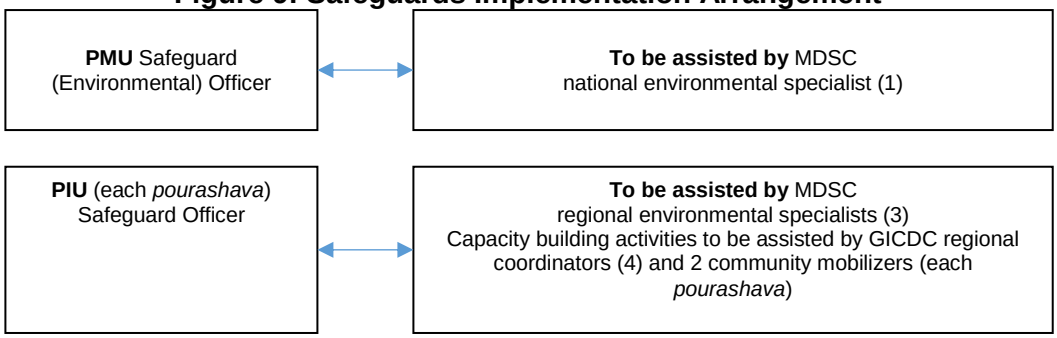


Table 25: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
1. Prior to Construction Activities						
Land acquisition and resettlement impacts	Impact due to land acquisition and resettlement for construction of project components	There is no land acquisition envisaged for water supply subproject as it will be constructed on the government land. Pipe layout, OHT and some other activities may require some sorts of resettlement. However, this issue is covered under social safe guard separately as per ADB's SPS 2009.	PMU, PIU, and MDSC	Covered under RP	Covered under RP	Covered under RP
Abstraction of water from intake	Impacts on fisheries and other aquatic ecology of Padma River due to abstraction from intake	Design of the water intake will be carried out to avoid impacts on hilsa fish, the key species found in Padma River requiring protection. The design of the intake screen will be based on the following key considerations as per the recommendations of the fisheries expert of the SC: 1. The screen face will be oriented in the same direction as the flow. 2. The water velocity flowing through the structure against which the fish will have to swim must be lower than the fishes' swimming capability. 3. Screens will be located above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area. 4. Screen sizes will be determined based on assessment of fish sizes at the location and the swimming characteristics of hilsa.	PMU and MDSC	Incorporated in final design and incorporated in bid document.	During detailed design stage	No cost, detailed design is a part of MDSC Terms of Reference
Downstream water uses	Impacts on downstream uses and ecological flows of Padma River,	The proposed abstraction is checked with the lean flows for the ultimate intake capacities (2040), which is observed insignificant (less	PMU and MDSC	Incorporated in final design	During detailed design stage	No cost, detailed design is a part of MDSC Terms of

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	especially in lean flow	than 0.1%). Therefore, no impact on downstream uses or impairment of ecological flows in Padma River is envisaged, however, it will be further assessed during detailed design.				Reference
Seismic considerations in design of structures	Damage to structure due to not taking seismic consideration in design	The designs of the project components, including intake structures, WTP and transmission mains, will conform to Bangladesh National Building Code, 2006.	PMU and MDSC	Incorporated in final design	During detailed design stage	No cost, detailed design is a part of MDSC Terms of Reference
Tree cutting or damage	Damage to trees and clearance of vegetation	**Intake and WTP:** Only trees that will require removal within the proposed construction areas of the sites will be cut. After the finalization of the designs and layout of the project components, the trees within proposed construction areas will be marked. For trees not proposed to be cut, taking all precautions to protect them from any damage from construction activities, including placement of tree guards, will be taken up. **Transmission mains:** Trees within the corridor of impact (area required for construction) will be felled after prior approval. **Tree Plantation:** Log trees will be planted at the suggested/appropriate distances on both slopes of the service roads, alongside river which will surplus the loss of trees cut by many times. Two trees plantation can be considered for one tree cut	PMU, PIU, MDSC and contractor	Number of tree cut	Detailed Design stage	To be included in Contract document
Pollution of intake	Pollution control and activities upstream of the source, including sanitation facilities and	A feasibility study is proposed to select the option of water transmission from intake to WTP site. The water quality monitoring	PMU, PIU, MDSC	A feasibility study is conducted and incorporated in	Detailed Design stage	No cost, can be part of MDSC terms of reference

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	waste collection facilities at Pontoon/ ghat	program should be carried out as part of the feasibility study Protection of the source through regulation of upstream developments, especially discharge of industrial effluents (either untreated or partially treated), needs to be identified as a key policy level intervention, which requires inter-departmental coordination. While consultations with the other line departments, such as the Department of Industries and the Bangladesh Water Development Board (BWDB), should ensure future large-scale industrial development upstream of the intake, enforcement of discharge standards and treatment of industrial wastes. In consultation with the BIWTA, design of sanitation facilities and solid waste collection facilities shall be provided on ghat and within those Pontoons that belonging to the BIWTA. The *pourashava* shall be assigned responsibilities to carry out awareness campaigns on source protection at key locations within 50 km upstream of the source.		final design		
Sludge management and disposal	Impact due to improper sludge disposal	Design of WTP to include sludge drying beds, and sludge management plan to be prepared. In corporate sludge disposal in landfill design	PMU, MDSC	Incorporated in final design	Detailed Design stage	No cost, detailed design is a part of MDSC Terms of Reference
Locations for disposal of spoil	Impact due to improper disposal of spoils	**Transmission** mains: A utilization plan for the disposal of earth resulting from the excavation will be prepared by the contractor as part of the spoil management plan. It is	PMU, PIU, MDSC and Contractors	List of spoil sites	Detailed Design Stage	No cost, To be included BoQ and in the contract document

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		envisaged that nearly 90% of the excavated earth will be reused. The sites for disposal of the remaining quantities will be identified prior to finalization of the designs, and the same incorporated into the BoQs. **Distribution pipes within road ROW:** The entire volume of spoil generated from the trenches laid for the distribution pipes will be required for refilling upon laying of the pipes. The contractor will identify locations for temporary storage of spoil outside the ROW. The identification of suitable locations shall be carried out by the contractor in line with the siting criteria for temporary construction areas				
Consents, permits, clearances, no objection certificate (NOC), etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	• Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. • Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. • Include in detailed design drawings and documents all conditions and provisions if necessary	PMU, PIU, and MDSC	• Incorporated in final design and communicated to contractors.	• Prior to award of contract	• No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PMU and PIU. • Mitigation measures are included as part of TOR of PMU, PIU, and MDSC.
Existing utilities	Disruption of services.	• Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of	PMU, PIU, and MDSC	• List of affected utilities and operators; • Bid document	• During detailed design phase • Review of	• No cost required. • Mitigation

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		services during construction activities • Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • Require contractors to prepare spoils management plan (see **Appendix 3** for outline) and traffic management plan (see **Appendix 4** for sample) • Water pipe laying works should be coordinated with road improvement works to minimize disturbance.		to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), spoil management plan (see **Appendix 3** for outline), and traffic management plan (see **Appendix 4** for sample)	spoils management plan: Twice (once • after first draft and once • before final • approval)	measures are included as part of TOR of PMU, PIU, and MDSC.
Updating of IEE based on detailed design	Site-specific impacts not identified, mitigation measures not appropriate and sufficient to address impacts	• Update IEE and EMP based on detailed design • Ensure updated EMP is provided to contractors • Relevant information disclosed	PMU	• Updated IEE and EMP reviewed, approved and disclosed	• Upon completion of detailed design	• No additional cost required
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	• Determine locations prior to award of construction contracts.	PMU, PIU, and MDSC	• List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. • Written consent of landowner/s (not lessee/s) for reuse of excess spoils	• During detailed design phase	• No cost required. • Mitigation measures are included as part of TOR of PMU, PIU, and MDSC.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
				to agricultural land		
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	• Prepare list of approved quarry sites and sources of materials	PMU, PIU, and MDSC	• List of approved quarry sites and sources of materials; • (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	• During detailed design phase, as necessary with discussion with detailed design engineers and PIUs	• No cost required. • Mitigation measures are included as part of TOR of PMU, PIU, and MDSC.
EMP Implementation Training	Irreversible impact to the environment, workers, and community	• Project manager and all key workers will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for construction works; health and safety (H&S), core labor laws, applicable environmental laws, etc	Construction Contractor	• Proof of completion (Safeguards Compliance Orientation) • Posting of proof of completion at worksites • Posting of EMP at worksites	• During detailed design phase prior to mobilization of workers to site	• Cost of EMP Implementation Orientation Training to contractor is responsibility of PMU and PIU. • Other costs responsibility of contractor.
2. During Construction Activities						
A. Physical Characteristics						
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may cause localized changes in topography and	• Utilize readily available sources of materials. If contractor procures materials from existing burrow pits and quarries, ensure these conform to all relevant regulatory requirements. • Borrow areas and quarries (If these are being opened up exclusively for the subproject)	Construction Contractor	• Records of sources of materials	• Monthly by PIU	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	landforms. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.				
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall, which may cause siltation and reduction in the quality of adjacent bodies of water. Impacts on the river courses and the water quality during the construction of the transmission mains along side the rivers. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Prepare and implement a spoils management plan (see Appendix 3 for outline). • Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Faridpur local authority on designated disposal areas. • All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. • Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. • Take all precautions to minimize the wastage of water in the construction activities. • Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies.	Construction Contractor	• Areas for stockpiles, storage of fuels and lubricants and waste materials; • Number of silt traps installed along trenches leading to water bodies; • Records of surface water quality inspection; • Effectiveness of water management measures; • - No visible degradation to nearby drainages, *khals* or water bodies due to construction activities	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		• Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. • While working across or close to any water body (working along side the Bhubonessar River for laying transmission main), the flow of water must not be obstructed. Ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of any watercourse and cross drainage channels. Ensure proper management of spoil disposal due to the excavation for the transmission mains. • Monitor water quality according to the environmental management plan.				
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. The impacts are negative but short-term, site-specific	• Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; • Use tarpaulins to cover soils, sand and other loose material when transported by trucks. • Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. • Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the	Construction Contractor	• Location of stockpiles; • Number of complaints from sensitive receptors; • Heavy equipment and machinery with air pollution control devices; • Certification that vehicles are compliant with air quality standards.	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	within a relatively small area and reversible by mitigation measures.	subproject). • Monitor air quality.				
Acoustic environment	Construction activities will be on settlements, along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. • Plan activities in consultation with Faridpur local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. • Use of high noise generating equipment shall be stopped during night time. • Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; • Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. • All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). • Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. • If it is not practicable to reduce	Construction Contractor	• Number of complaints from sensitive receptors; • Use of silencers in noise-producing equipment and sound barriers; Equivalent day and night time noise levels	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. • - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.				
Aesthetics	The construction activities do not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Prepare a debris disposal plan • Remove all construction and demolition wastes on a daily basis. • Coordinate with Faridpur local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas. Avoid stockpiling of any excess spoils. • All vehicles delivering fine materials to the site and carrying debris for disposal shall be covered to avoid spillage. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. • Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. • In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade	Construction Contractor	• Number of complaints from sensitive receptors; • Worksite clear of hazardous wastes such as oil/fuel • Worksite clear of any wastes, collected materials from drainages, unutilized materials and debris • Transport route and worksite cleared of any dust/mud	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		cloth, temporary walls, or other suitable materials prior to the beginning of construction. • The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas.				
B. Biological Characteristics						
Biodiversity	Activities being located in the built-up area of Faridpur. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Preliminary design shows there are no trees at the sites that need to be removed.	• Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. • All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. • Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. • Prohibit employees from poaching wildlife and cutting of trees for firewood. • Implement compensatory plantation for trees lost at a rate	Construction Contractor	• PMU and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be determined during detailed design stage) • Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc.	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		of 2 trees for every tree cut. Maintain the saplings for the duration of contract.				
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject will follow existing ROW alignment. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Prepare and implement a traffic management plan (see **Appendix 4** for sample) • Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. • Maintain safe passage for vehicles and pedestrians throughout the construction period. • Schedule truck deliveries of construction materials during periods of low traffic volume. • Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. • Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. • Leave spaces for access between mounds of soil. • Provide walkways and metal sheets where required to maintain access across for people and vehicles. • Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools.	Construction Contractor	• Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (see **Appendix 4** for sample); • Number of complaints from sensitive receptors; • Number of signages placed at project location • Number of walkways, signages, and metal sheets placed at project location	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		• Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Socio-economic status	Manpower will be required during the 30-months construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.	• Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. • Secure construction materials from local market.	Construction Contractor	• Employment records; • Records of sources of materials • Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Faridpur *pourashava* where there are a variety of	• Obtain details from *pourashava* nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; • Integrate construction of the various infrastructure subprojects to be conducted in Faridpur (roads, water supply, etc.) so that different infrastructure is located on opposite sides of the road	Construction Contractor	• Utilities Contingency Plan • Number of complaints from sensitive receptors	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	human activities, will result to impacts to the sensitive receptors such as residents, businesses, and the community in general. Excavation may also damage existing infrastructure (such as water distribution pipes, electricity pylons, etc.) located alongside the roads. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	where feasible and roads and inhabitants are not subjected to repeated disturbance by construction in the same area at different times for different purposes. • Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. • Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. • Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. • If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.			and final location of) subproject components	
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-	• Contractor's activities and movement of staff will be restricted to designated construction areas. • Locations of hot-mix plants, batching plants and crushers (if these establishments are being	Construction Contractor	• Number of permanent signages, barricades and flagmen on worksite as per Traffic	• Visual inspection by PIU and supervision consultants on monthly basis	• Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	specific within a relatively small area and reversible by mitigation measures.	set up exclusively for the subproject) shall be shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. • Consult with Faridpur local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. • If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. • Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.[a] • Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. • Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. • A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of		Management Plan (see **Appendix 4** for sample); • Number of complaints from sensitive receptors; • Number of walkways, signages, and metal sheets placed at project location • Agreement between landowner and contractors in case of using private lands as work camps, storage areas, etc.	• Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. • Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. • The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.				
Workers health	There is invariably a	• Comply with requirements of	Construction	• Site-specific	• Visual	• Cost for

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
and safety	safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers' health and safety (H&S). • Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. • Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing H&S training[b] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas	Contractor	H&S Plan • Equipped first-aid stations • Medical insurance coverage for workers • Number of accidents • Records of supply of uncontaminated water • Condition of eating areas of workers • Record of H&S orientation trainings • Use of personal protective equipment • % of moving equipment outfitted with audible back-up alarms • Permanent sign boards for hazardous areas • Signages for storage and disposal areas • Condition of sanitation facilities for workers	inspection by PIU an supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. • Provide medical insurance coverage for workers; • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Ensure moving equipment is outfitted with audible back-up alarms; • Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and • Disallow worker exposure to				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.				
D. Historical, Cultural, and Archaeological Characteristics						
Physical and cultural heritage	There are no scheduled or unscheduled archaeological, paleontological, or architectural sites of heritage significance listed by local and/or national authority and/or internationally (UNESCO) within or adjacent to subproject sites. The subproject components are not located in or near and excavation works will not be conducted in the vicinities of the 4 historical sites. Thus risk for chance finds is low.	• Stop work immediately to allow further investigation if any finds are suspected.	Construction Contractor	• Records of chance finds	• Visual inspection by PIU and supervision consultants on monthly basis • Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	• Cost for implementation of mitigation measures responsibility of contractor.
E. Others						
Submission of EMP implementation report	Unsatisfactory compliance to EMP	• Appointment of supervisor to ensure EMP implementation • (ii) Timely submission of monitoring reports including pictures	Construction contractor	• Availability and competency of appointed supervisor • - Monthly report	• Monthly monitoring report to be submitted by PIU to PMU • PMU to submit semi-annual monitoring report to ADB	• Cost for implementation of mitigation measures responsibility of contractor.
3. Post-construction Activities						
Post-construction clean-up	Damage due to debris, spoils, excess	• Remove all spoils wreckage, rubbish, or temporary structures	Construction Contractor	• PMU/PIU report in writing	• Prior to turn-over of	• Cost for implementation

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	construction materials	(such as buildings, shelters, and latrines) which are no longer required; and • (All excavated roads shall be reinstated to original condition. • All disrupted utilities restored • All affected structures rehabilitated/compensated • The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. • All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document. • The contractor must arrange the cancellation of all temporary services. • Request PMU/PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.		that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and (iv) worksite clean-up is satisfactory.	completed works to *pourashava*	of mitigation measures responsibility of contractor.

[a] These products come in powder forms, and once mixed with water (being the catalyst) simply expand, and crack the rock from hole to hole. This product is environmentally friendly and can be washed away after it has been used.

[b] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

Table 26: Environmental Management and Monitoring Plan – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
Water quality	Disposal of Wastewater from WTP, water testing laboratory, etc. to drain/khal/river. Disposal of sludge and other solid waste from WTP into river Run-off from stockpiled debris/sediments from drainages which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Strictly flow the wastewater quality standard before disposal, Conduct regular wastewater quality analysis and monitoring. Do not allow any wastewater including storm water from WTP directly disposal to river without treatment or analysis of quality before disposal. • Dispose sludge including debris/sediments/other solid waste at a designated site such as landfill. Remove all debris/sediments immediately. It is important that the designated disposal site's base is of a non-permeable membrane in order to prevent leachate that can contaminate the soil and groundwater • Take all precautions to prevent entering of run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies.	Faridpur pourashava	• Visual observation to check disposal of wastewater or any kind of waste from WTP, water testing laboratory, etc. to drain/khal/river • No visible degradation to nearby drainages, khals or water bodies due to construction activities	• Daily inspection by WTP operator • Duration of repair works	• Included in O&M cost
Air quality	Air emissions from WTP and OHT operations may include gaseous or volatile chemicals used for disinfection processes (e.g., chlorine).	• Store sodium hypochlorite in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials. • Store calcium hypochlorite away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year. • Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruptions in supply. • Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and	Faridpur *pourashava*	• No complaints from sensitive receptors • Inventory of chemicals • Air emission monitoring • Record of chemical-related accidents	• Daily inspection by WTP operator at storage areas of chemicals • Quarterly (environmental monitoring of air quality to be finalize in accordance to the LCC and ECC by DoE)	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		accident investigation procedures. • Develop and implement a plan for responding to accidental releases.				
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Plan activities in consultation with Faridpur local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance.	Faridpur *pourashava*	• No complaints from sensitive receptors	• Duration of repair work	• Included in O&M cost
Biodiversity	Activities in the built-up area of Faridpur *pourashava*. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	• No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal).	Faridpur *pourashava*	• No complaints from sensitive receptors	• Duration of repair work	• Included in O&M cost
Workers health and safety	Workers need to be mindful of the occupational hazards working in confined spaces such as closed drains. Potential impacts are negative and long-term but reversible by mitigation measures.	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. • Ensure that all site personnel have a basic level of H&S training. • Produce and implement a O&M health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training[a] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site,	Faridpur *pourashava*	• No complaints from sensitive receptors • No complaints from workers related to O&M activities • Zero accident	• Duration of repair work • Daily inspection	• Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		personal protective protection, and preventing injuring to fellow workers; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. • Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.				

[a] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

C. Environmental Monitoring Program

162. Environmental monitoring will be done during construction on three levels:

(i) monitoring development of project performance indicators by the MDSC environmental management specialist;
(ii) monitoring implementation of mitigation measures by the contractor; and
(iii) overall regulatory monitoring of environmental issues by the PMU.

163. In addition to regular monitoring onsite by PIU and MDSC on the EMP implementation of the mitigation measures, monitoring of key environmental parameters is proposed. Table 29 presents the indicative environmental monitoring plan for the subproject, which includes relevant environmental parameters, with a description of the sampling stations, frequency of monitoring, applicable standards, and responsible agencies. This will be updated during detailed design to ensure EMP and monitoring program is commensurate to the impacts of the subproject.

Table 27: Environmental Monitoring Program

	Field	Stage	Parameters	Location	Frequency	Standards	Responsibility
1.	Air quality	• Prior to construction to establish baseline • Construction phase	SPM PM2.5 PM10 SO2 NOx CO	• WTP location • OHT location • Along water transmission main 1-km interval from WTP • Construction campsite locations	• 24-hour monitoring once in a season (except monsoons) for the construction period	• Bangladesh Standards for Ambient Air Quality Schedule-2; Rule 12, Environment Conservation Rules of 1997	Contractor
2.	Noise and vibration levels	• Prior to construction to establish baseline • Construction phase • O & M phase	Equivalent day and night time noise levels	• WTP location • OHT location • Along water transmission main 1-km interval from WTP • Construction campsite locations	• Once in a season (except monsoons) for the construction period	• Bangladesh Standards for Noise, Schedule 4; Rule 12, Environment Conservation Rules, 1997	Contractor
3.	Water quality	• Prior to construction to establish baseline • Construction phase • O & M phase	TDS, TSS, pH, hardness, BOD, faecal coliform, total nitrogen, total phosphorus, heavy metals, temperature, DO, hydrocarbons, mineral oils, phenols, cyanide, temperature	• Along *khals* adjacent to construction sites (to be identified by the and MDSC) • At intake, upstream and down stream	• Twice a year (pre-monsoon and post-monsoon) for the entire period of construction	• Bangladesh Standards for Industrial and Project Effluent, Schedule 10; Rule 13, Environment Conservation Rules, 1997	Contractor
4.	Survival rate of landscaping, tree plantation	• O&M phase	Survival rate	• In the areas where re-plantation/ landscaping proposed	• Twice a year for 2 years	• -	Faridpur *pourashava*

D. Institutional Capacity Development Program

164. The MDSC national and regional environmental specialists will be responsible for trainings on environmental awareness and management in accordance with both ADB and government requirements. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project along with the frequency of sessions is presented in Table 30.

Table 28: Training Program for Environmental Management

Items	**Pre-construction/prior to construction**	**Construction**	
Training Title	Orientation workshop	Orientation program/ workshop for contractors and supervisory staffs	Experiences and best practices sharing
Purpose	To aware the participants of the environmental safeguard requirements of ADB and GOB and how the project will meet these requirements	To build the capacity of the staffs for effective implementation of the designed EMPs aimed at meeting the environmental safeguard compliance of ADB and GOB	To share the experiences and best practices aimed at learning lessons and improving implementation of EMP
Contents	**Module 1: Orientation** • ADB Safeguards Policy Statement • Government of Bangladesh Environmental Laws and Regulations **Module 2: Environmental Assessment Process** • ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements • Review of environmental assessment report to comply with ADB requirements • Incorporation of EMP into the project design and contracts	• Roles and responsibilities of officials/contractors/consultants towards protection of environment • Environmental issues during construction • Implementation of EMP • Monitoring of EMP implementation • Reporting requirements	Experiences on EMP implementation – issues and challenges Best practices followed
Duration	1 day	1 day	1 day on a regular period to be determined by PMU, PIUs, and MDSC
Participants	LGED, DPHE, PMU, and PMU staffs (technical and environmental) involved in the project implementation	PMU PIUs Contractors	PMU PIUs Contractors

E. Staffing Requirement and Budget

165. Costs required for implementing the EMP will cover the following activities:

(i) Updating IEE, preparing and submitting reports and public consultation and disclosure;

(ii) Application for environmental clearances; and
(iii) Implementation of EMP, environmental monitoring program and long-term surveys.

166. The infrastructure involved in each scheme is generally straightforward and will take between three and nine months to build. Environmental monitoring during construction will also be straightforward and will involve periodic site observations and interviews with workers and others, plus checks of reports and other documents. This will be conducted by MDSC environmental management specialist assisted by the PMU environment officer. The environmental management specialist will use the IEE as necessary and perform tasks as specified in the TOR. Therefore no separate budget required for MDSC environment management specialist.

167. The cost of mitigation measures and surveys during construction stage will be incorporated into the contractor's costs, which will be binding on him for implementation. The surveys will be conducted by the contractors.

168. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of Faridpur *pourashava*. All monitoring during the operation and maintenance phase will be conducted by LGED and DPHE, therefore, there are no additional costs.

169. The indicative costs to implement the EMP are shown in Tables 31-32 (by source of funds).

Table 29: Cost Estimates to Implement the EMP

	Particulars	Stages	Sub-project /package	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
A. Mitigation Measures							
1.	Environmental mitigation / enhancement measures integrated into the designs and costs included as part of civil works	Construction				Covered under BoQ of Construction Document (CCD)	Civil Works Contract
2	Compensatory plantation measures	Construction	Per tree	50	1,500	75,000	Civil works contract
B. Monitoring parameter before construction							
1.	Air Quality Monitoring	Before construction	Per contract package	10	200,000	20,000	Civil works contractor
2.	Noise level	Before construction	Per contract package	25	5,000	125,000	MDSC Cost/ Civil works contractor
3.	Water Quality monitoring (Surface water)	Before construction	Per contract package	5	20,000	100,000	MDSC Cost/ Civil works contractor
C. Monitoring parameter during construction							
1.	Air Quality monitoring	Construction	Per contract package	10	20,000	200,000	Civil works Contract
2.	Noise level	Construction	Per	25	5,000	125,000	Civil work

			contract package				contractor
3.	Water Quality monitoring (Surface water)	Construction	Per contract package	5	20,000	100,000	Civil work Contractor
4.	Survival Rate of Plantation and landscaping	Post construction	Per contract package,	2	5,000	10,000	Civil work Contractor
D. Monitoring Parameter during operation							
1.	Water Quality monitoring (Surface water)	Operation	Per subproject per year	10	20,000	200,000	Faridpur *pourashava* by water testing laboratory
2.	Noise level	Operation	Per contract package	10	5,000	50,000	Faridpur *pourashava*
3.	Survival Rate of Plantation and landscaping	Operation	Per subproject per year (where applicable)	2	5000	10,000	Faridpur *pourashava*
E. Capacity Building							
1.	i) Orientation workshop for officials involved in the project implementation on ADB Safeguards Policy Statement, Government of Bangladesh environmental laws and regulations, and environmental assessment process; (ii) induction course contractors, preparing them on EMP implementation and environmental monitoring requirements related to mitigation measures; and taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation;	Module 1 – immediately upon engagement of the MDSC environmental specialists Module 2 – prior to award of civil works contracts (twice a year for 3.5 years) Module 3 – prior to start of Phase 3 and upon completion of the project	lump sum 1 times 7 times 1 times (Combined for all subprojects)		Module 1 –50,000 Module 2 –50,000 Module 2 –50,000	450,000	Covered under MDSC
3.	Experiences and best practices sharing	Construction (before phase 2)	Cumulative for all subprojects	LS		100,000	Covered under MDSC

4	Public Consultation	During detailed design (For update of IEE/EIA) and preconstruction		LS		500,000	Covered under MDSC
5	GRM implementation	During construction	As per requirement			As per PMU budget	Covered under PMU & PIUs
F. Consultant cost							
	MDSC national environmental specialist (1 person)	Responsible for environmental safeguards of the project	person months (spread over entire project implementation period)	36 person months	320,000 per person month	11,520,000	Remuneration and budget for travel covered in the MDSC contract
	MDSC regional environmental specialists (2 persons)	Responsible for environmental safeguards of the project	person months (spread over entire project implementation period)	36+17 each = 53 person-months	320,000 per person-month	16,960,000	Remuneration and budget for travel covered in the MDSC contract
G. Administrative cost							
	Legislation, permits, and agreements	During construction Permit for excavation, tree-cutting permits, etc.	Per package	LS		50,000	These consents are to be obtained by contractor at his own expense.
	Environmental assessment and environmental clearances as per ECA and ECR requirements	Before construction ECC for red and Orange subproject	Per subproject (where applicable)	LS		500,000	LGED cost for municipal infrastructure
H. Other costs							
	Any unanticipated impact due to project implementation	Mitigation of any unanticipated impact arising during construction phase and defect liability period		LS		Contractors' liability	Can be covered through contractor's insurance

Table 30: Cost Estimates to Implement the EMP (by source funding)

	Particulars	Stages	Sub-project/ package	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
A. Contractor							
1.	Environmental mitigation / enhancement measures integrated into the designs and costs included as part of civil works	Construction				Covered under BOQ of Construction Document (CCD)	Civil Works Contract
2	Compensatory plantation measures	Construction	Per tree	50	1,500	75,000	Civil works contract
3.	Air Quality Monitoring	Before construction	Per contract package	10	20,000	200,000	Civil works contractor
4.	Noise level	Before construction	Per contract package	25	5,000	125,000	Civil works contractor
5.	Water Quality monitoring (Surface water)	Before construction	Per contract package	5	20,000	100,000	Civil works contractor
6.	Air Quality monitoring	Construction	Per contract package	10	20,000	200,000	Civil works Contract
7.	Noise level	Construction	Per contract package	25	5,000	125,000	Civil work contractor
8.	Water Quality monitoring (Surface water)	Construction	Per contract package	10	20,000	200,000	Civil work Contractor
9.	Survival Rate of Plantation and landscaping	Post construction	Per contract package,	2	5,000	10,000	Civil work Contractor
10.	Any unanticipated impact due to project implementation	Mitigation of any unanticipated impact arising during construction phase and defect liability period		LS		Contractors' liability	Can be covered through contractor's insurance
B. PIU/*Pourashava*							
1.	Water Quality monitoring (Surface water)	Operation	Per subproject per year	10	20,000	200,000	Faridpur *pourashava* by water testing laboratory
2.	Noise level	Operation	Per contract package	10	5,000	50,000	Faridpur *pourashava*
3.	Survival Rate of Plantation and landscaping	Operation	Per subproject per year (where applicable)	2	5000	10,000	Faridpur *pourashava*
C. MDSC							
1.	i) Orientation workshop for officials involved in the project implementation	Module 1 – immediately upon engagement of the MDSC	lump sum 1 times		Module 1 – 50,000 Module 2 – 50,000 Module 2 –	450,000	Covered under MDSC

	Particulars	Stages	Sub-project/ package	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
	on ADB Safeguards Policy Statement, Government of Bangladesh environmental laws and regulations, and environmental assessment process; (ii) induction course contractors, preparing them on EMP implementation and environmental monitoring requirements related to mitigation measures; and taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation;	environmental specialists Module 2 – prior to award of civil works contracts (twice a year for 3.5 years) Module 3 – prior to start of Phase 3 and upon completion of the project	7 times 1 times (Combined for all subprojects)		50,000		
2	Experiences and best practices sharing	Construction (before phase 2)	Cumulative for all subprojects	LS		100,000	Covered under MDSC
3	Public Consultation	During detailed design (For update of IEE/EIA) and preconstructio n		LS		500,000	Covered under MDSC
4	MDSC national environmental specialist (1 person)	Responsible for environmental safeguards of the project	person months (spread over entire project implementati on period)	36 person months	320,000 per person month	11,520,000	Remuneration and budget for travel covered in the MDSC contract
5	MDSC regional environmental specialists (2 persons)	Responsible for environmental safeguards of the project	person months (spread over entire project implementati on period)	36+17 each = 53 person-months	320,000 per person-month	16,960,000	Remuneration and budget for travel covered in the MDSC contract
D. PMU							

	Particulars	Stages	Sub-project/ package	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
1	GRM implementation	During construction	As per requirement			As per PMU budget	Covered under PMU & PIUs
2	Legislation, permits, and agreements	During construction Permit for excavation, tree- cutting permits, etc	Per package	LS		50,000	These consents are to be obtained by contractor at his own expense.
3	Environmental assessment and environmental clearances as per ECA and ECR requirements	Before construction ECC for red and Orange subproject	Per subproject (where applicable)	LS		500,000	LGED cost for municipal infrastructure

IX. MONITORING AND REPORTING

170. PMU will monitor and measure the progress of EMP implementation. The monitoring activities will correspond with the project's risks and impacts, and will be identified in the IEEs for the projects. In addition to recording information on the work and deviation of work components from original scope PMU, PIUs, and MDSC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome.

171. MDSC will submit monthly monitoring and implementation reports to PMU, who will take follow-up actions, if necessary. PMU will submit semi-annual monitoring reports to ADB (as per sample in Appendix 7). Subproject budgets will reflect the costs of monitoring and reporting requirements. Monitoring reports will be posted in a location accessible to the public.

172. LGED will document monitoring results, identify the necessary corrective actions, reflect them in a corrective action plan, and for each quarter, will study the compliance with the action plan developed in the previous quarter. Compliance with loan covenants will be screened by the Local Government Division (LGD) of the Ministry of Local Government, Rural Development, and Cooperatives (MLGRDC).

173. ADB will review project performance against the MLGRDC's commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system. ADB will monitor projects on an ongoing basis until a project completion report is issued. ADB will carry out the following monitoring actions to supervise project implementation:

(i) conduct periodic site visits for projects with adverse environmental or social impacts;
(ii) conduct supervision missions with detailed review by ADB's safeguard specialists/officers or consultants for projects with significant adverse social or environmental impacts;
(iii) review the periodic monitoring reports submitted by EAs to ensure that adverse impacts and risks are mitigated, as planned and as agreed with ADB;
(iv) work with EAs to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the legal agreements, and exercise remedies 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.

X. CONCLUSION AND RECOMMENDATIONS

174. The process described in this document has assessed the environmental impacts of all elements of Faridpur water supply subproject. All potential impacts were identified in relation to design and location, construction, and operation phases.

175. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the subproject. Thus environmental impacts as being due to the project design or location were not significant.

176. Most of the individual elements of the subproject are relatively small and involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant. Most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving trenching and other excavation. However, the routine nature of the impacts means that most can be easily mitigated. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

177. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

178. The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB and LGED websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

179. The PMU and MDSC will be responsible for monitoring during implementation. *Pourashava* will be responsible for monitoring during operation period. The MDSC will submit monthly monitoring reports to PMU, and the PMU will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

180. The EMP will assist the PMU, MDSC, and contractors in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project. The EMP will also ensure efficient lines of communication between the implementing agency, project management unit, and contractors. A copy of the EMP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on

the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

181. The citizens of Faridpur will be the major beneficiaries of this subproject. With the new water supply system, they will be provided with a constant supply of better quality water piped into their homes and climate-resilient municipal services. In addition to improved environmental conditions, the subproject will reduce occurrence of water-related diseases and exposure to climate extremes. People would spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

182. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Faridpur will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

183. Per Government of Bangladesh Environment Conservation Act, 1995 (ECA, 1995) and Environment Conservation Rules (ECR, 1997), the subproject is categorized as “red” and Location Clearance Certificate (LCC) and Environmental Clearance Certificate (ECC) must be obtained from the DoE.

184. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject as Category “B” is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009).

APPENDIX 1: RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST

Country/Project Title: Bangladesh: Third Urban Governance and Infrastructure Improvement (Sector) Project (UGIIP-3) – Additional Financing

Water Supply Improvement Rapid Environmental Assessment (REA) Checklist

Town: Faridpur
Subproject Title: Surface Water Treatment plant with 540 m^3/h capacity and Intake in the Padma River at CNB ghat and Guccho gram

Screening Questions	Yes	No	Remarks
A. Project siting Is the project area…			
• Densely populated?	✓		Faridpur has a population of about 121,632 (Bangladesh Bureau of Statistics [BBS], 2011) living in an area of 17.38 sq.km, giving a population density of 6,999 persons per sq. km.
• Heavy with development activities?		✓	Faridpur is predominantly residential and the project sites are vacant areas.
Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site		✓	
• Protected area		✓	
• Wetland		✓	
• Mangrove		✓	
• Estuarine		✓	
• Buffer zone of protected area		✓	
• Special area for protecting biodiversity		✓	
• Bay		✓	
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?		✓	The source is Padma River. No upstream wastewater discharge from mentioned sources. Findings of water quality tests conducted for the subproject design and IEE show no issues.
• Impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	Not applicable.
• Hazard of land subsidence caused by excessive ground water pumping?		✓	Not applicable.
• Social conflicts arising from displacement of communities?		✓	Not anticipated.
• Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		✓	Not anticipated. Padma River is 120 kilometers (75 mi) with annual average discharge rate of 35,000 m3/s (1,200,000 cu ft/s). The discharge rate during monsoon season is 750,000 m3/s (26,000,000 cu ft/s) and during dry season, 15,000 m3/s (530,000 cu ft/s). Abstraction of water for the subproject from Padma River is negligible compared to its flow.
• Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		✓	Findings of water quality tests conducted for the subproject design and IEE show no issues.
• Delivery of unsafe water to distribution system?		✓	Not anticipated.
• Inadequate protection of intake works or wells, leading to pollution of water supply?		✓	Not anticipated.
• Over pumping of ground water, leading to salinization and ground subsidence?		✓	Not applicable.

Screening Questions	Yes	No	Remarks
• Excessive algal growth in storage reservoir?		✓	Not anticipated.
• Increase in production of sewage beyond capabilities of community facilities?	✓		UGIIP-3 includes sanitation improvement.
• Inadequate disposal of sludge from water treatment plants?		✓	Not anticipated.
• Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		✓	Not anticipated.
• Impairments associated with transmission lines and access roads?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate impacts.
• Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		✓	Chlorine dosing will be done through chlorinators. Separate storage areas for the chemicals have been included in the preliminary design.
• Health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?		✓	Personal protective equipment will be provided to workers. Regular training will also be conducted to ensure that workers are aware of construction hazards and risks of chemicals during O&M.
• Dislocation or involuntary resettlement of people?		✓	No displacement of communities is required in this subproject.
• Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?		✓	Not applicable.
• Noise and dust from construction activities?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate impacts.
• Increased road traffic due to interference of construction activities?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate impacts. Construction contractors will be required to coordinate with local traffic police.
• Continuing soil erosion/silt runoff from construction operations?	✓		The construction areas are all flat lands; soil erosion and silt run-off are least expected except during monsoon months. The EMP includes measures to mitigate impacts. Construction contractors will be required to include silt traps or canalizations where required.
• Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?		✓	The O&M Manuals include schedule for regular maintenance and appropriate chemical dosing.
• Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		✓	Not anticipated. Water quality will be regularly monitored by *pourashava* through the mini water testing laboratory.
• Accidental leakage of chlorine gas?		✓	Not anticipated. Chlorine gas will not be used. Sodium or calcium hypochlorite will be used in the chlorination process.
• Excessive abstraction of water affecting downstream water users?		✓	Not applicable.
• Competing uses of water?		✓	Not applicable.
• Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	✓		UGIIP-3 includes sanitation improvement.
• Large population influx during project		✓	Improved water supply management systems

Screening Questions	Yes	No	Remarks
construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?			through capacity building and institutional development will ensure reduced burden on services and infrastructure.
• Social conflicts if workers from other regions or countries are hired?		✓	Priority in employment will be given to local residents.
• 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 operation and construction?		✓	Not applicable. Construction will not involve use of explosives and chemicals. Trenching will be done manually. Use of chemical during O&M will be limited only on sites.
• 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?		✓	Operational area will be clearly demarcated and access will be controlled. Only worker and project concerned members will be allowed to visit the operational sites.

A Checklist for Preliminary Climate Risk Screening

Screening Questions		Score	Remarks[a]
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	During high Floods site may inundated
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
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)?	1	During inundated condition damage may occur to structure
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	1	During inundated condition damage to site may increase maintenance
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

[a] 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.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

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

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

Subproject Classification as per ADB SPS 2009
The impacts are minor, local and mostly construction related. No significant irreversible impacts are envisioned on human populations or environmentally sensitive areas including wetlands, forests, grasslands, and other natural habitats. All impacts can be mitigated under the scope of IEE.
Classification: Category B

Subproject Categorization as per DOE (ECR 1997)
Classification: Red

Environmental Assessment Requirements: IEE as per ADB SPS and EIA as per DOE

Prepared by: TA 8913 consultant team for project preparation of UGIIP-3 additional financing
Designation: International Environmental Safeguard Specialist and National Environmental Safeguard Specialist

Date: August-October 2016

APPENDIX 2: APPLICATION FEES FOR ECC

[This table (APPENDIX-2) Not Required as these rates are not updated]

[1]"SCHEDULE – 13

Fees for Environmental Clearance Certificate or Renewal

[See Rules 7(5), 8(2) and 14]

1. Industrial unit or project

Investment (in Taka)	Fees for Environmental Clearance Certificate (in Taka)	Certificate Renewal Fee
(1)	(2)	(3)
(a) Between Tk. 100,000 and 5,00,000	Tk. 1,500	One-fourth of the fees in Column (2).
(b) Between Tk. 5,00,000 and 10,00,000	Tk. 3,000	-Do-
(c) Between Tk. 10,00,000 and 50,00,000	Tk. 5,000	-Do-
(d) Between Tk. 50,00,000 and 10,000,000	Tk. 10,000	-Do-

[1] *Schedule-13 was substituted by Notification S.R.O. No. 234-Law/2002 dated 24/08/2002 and came into force on 26/08/2002 being the date of publication in Bangladesh Gazette extraordinary issue.*

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(1)	(2)	(3)
(e) Between Tk. 10,000,000 and 2,00,000,000	Tk. 25,000	One-fourth of the fees in Column (2).
(f) Between Tk. 2,00,000,000 and 5,00,000,000	Tk. 50,000	-Do-
(g) Above Tk. 5,00,000,000	Tk. 1,00,000	-Do-

APPENDIX 3: SAMPLE OUTLINE SPOILS MANAGEMENT PLAN

I. Spoils information

- A. Materials type
- B. Potential contamination
- C. Expected volume and sources
- D. Spoil classification

II. Spoils management

- A. Transportation of spoil
- B. Storage of spoil
- C. Contaminated spoil
- D. Approved reuse and/or disposal sites

III. Records of reuse and/or disposal

APPENDIX 4: SAMPLE OUTLINE TRAFFIC MANAGEMENT PLAN

A. Principles

1. One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:

(i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
(ii) protection of work crews from hazards associated with moving traffic;
(iii) mitigation of the adverse impact on road capacity and delays to the road users;
(iv) maintenance of access to adjoining properties; and
(v) addressing issues that may delay the project.

B. Operating Policies for TMP

2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.

(i) Make traffic safety and temporary traffic control an integral and high-priority element of every project from planning through design, construction, and maintenance.
(ii) Inhibit traffic movement as little as possible.
(iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
(iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
(v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
(vi) Train all persons that select, place, and maintain temporary traffic control devices.
(vii) Keep the public well informed.
(viii) Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

3. Figure A4.1 to Figure A4.12illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the impact due to street closure

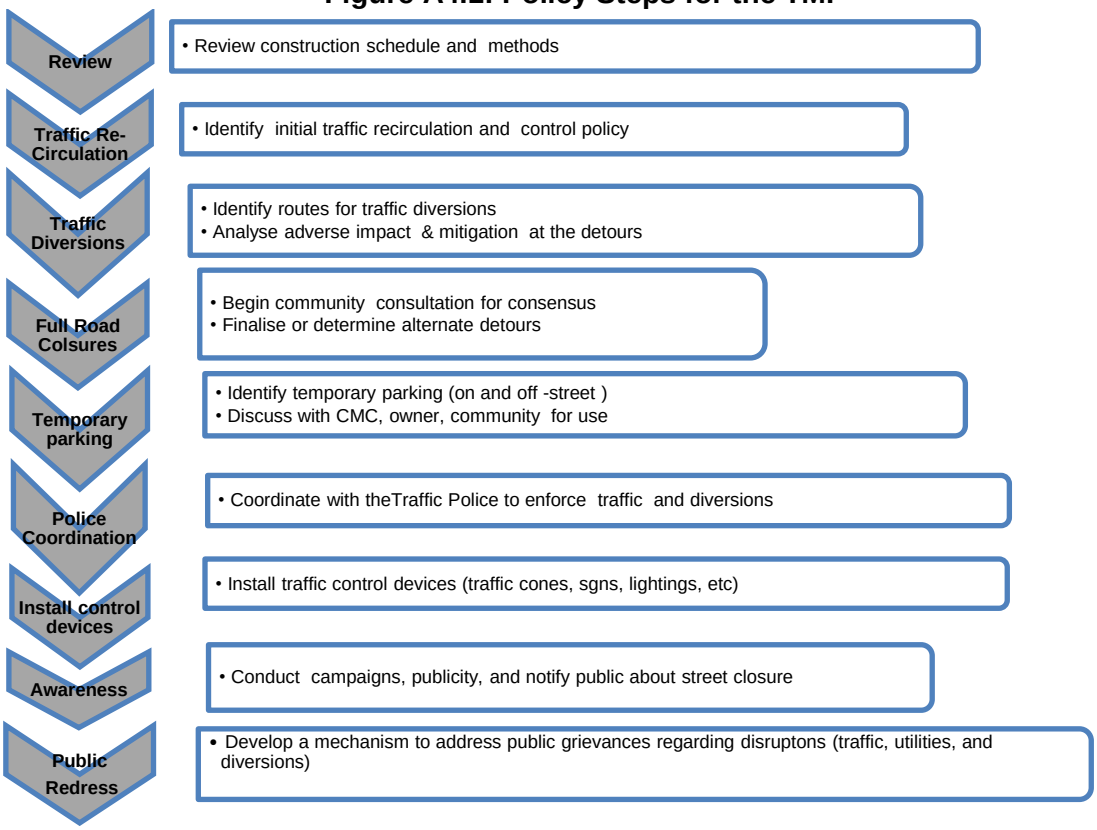
4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

(i) approval from the ULB/CMC/Public Works Department (PWD) to use the local streets as detours;
(ii) consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
(iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
(iv) determining if additional traffic control or temporary improvements are needed along the detour route;

(v) considering how access will be provided to the worksite;
(vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
(vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

5. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the detour street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Figure A4.1: Policy Steps for the TMP



D. Public awareness and notifications

6. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

7. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public

claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

8. The PIU will also conduct an awareness campaign to educate the public about the following issues:

(i) traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
(ii) defensive driving behaviour along the work zones; and
(iii) reduced speeds enforced at the work zones and traffic diversions.

9. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

10. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centers. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

(i) explain why the brochure was prepared, along with a brief description of the project;
(ii) advise the public to expect the unexpected;
(iii) educate the public about the various traffic control devices and safety measures adopted at the work zones;
(iv) educate the public about the safe road user behaviour to emulate at the work zones;
(v) tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
(vi) indicate the office hours of relevant offices.

E. Install traffic control devices at the work zones and traffic diversion routes

11. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

(i) Signs
(ii) Pavement Markings
(iii) Channelizing Devices
(iv) Arrow Panels
(v) Warning Lights

12. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry

considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

13. **Figure A4.2 to Figure A4.12** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

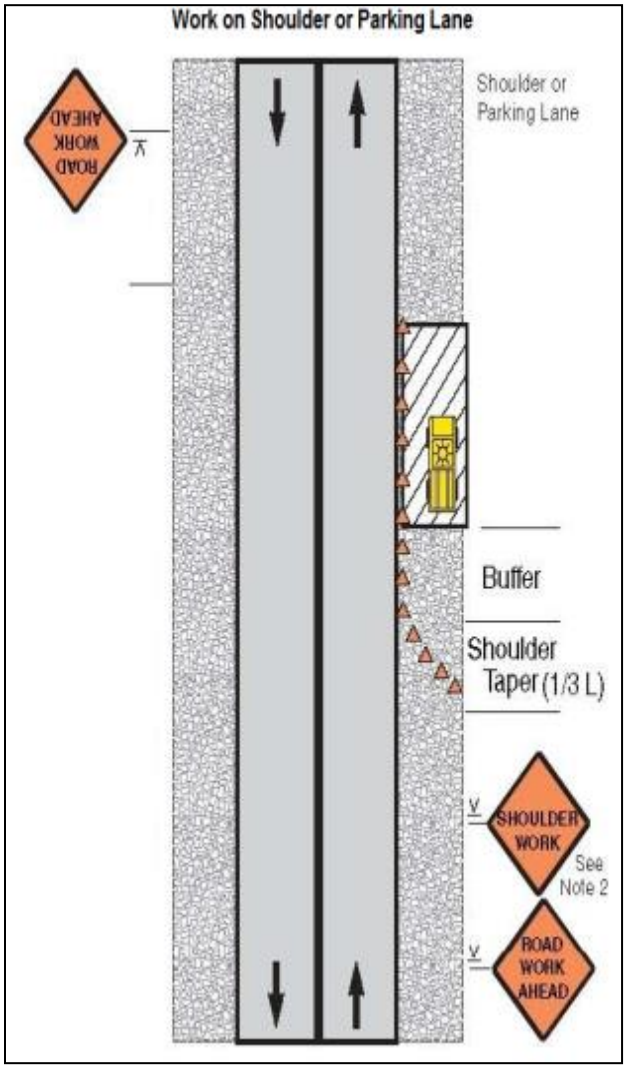
(i) Work on shoulder or parking lane
(ii) Shoulder or parking lane closed on divided road
(iii) Work in Travel lane
(iv) Lane closure on road with low volume
(v) Lane closure on a two-line road with low volume (with yield sign)
(vi) Lane closure on a two-line road with low volume (one flagger operation)
(vii) Lane closure on a two lane road (two flagger operation)
(viii) Lane closure on a four lane undivided Road
(ix) Lane closure on divided roadway
(x) Half road closure on multi-lane roadway
(xi) Street closure with detour

14. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

15. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

16. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

Figure A4.2 & A4.3: Work on shoulder or parking lane and shoulder or parking lane closed on divided road



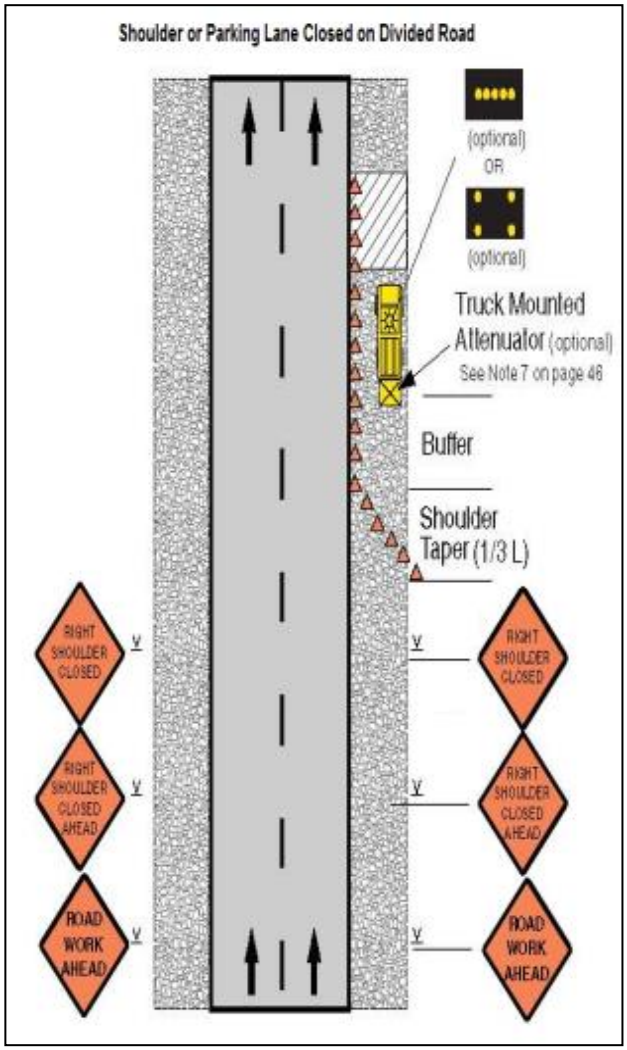


Figure A4.4 & A4.5: Work in Travel lane & Lane closure on road with low volume

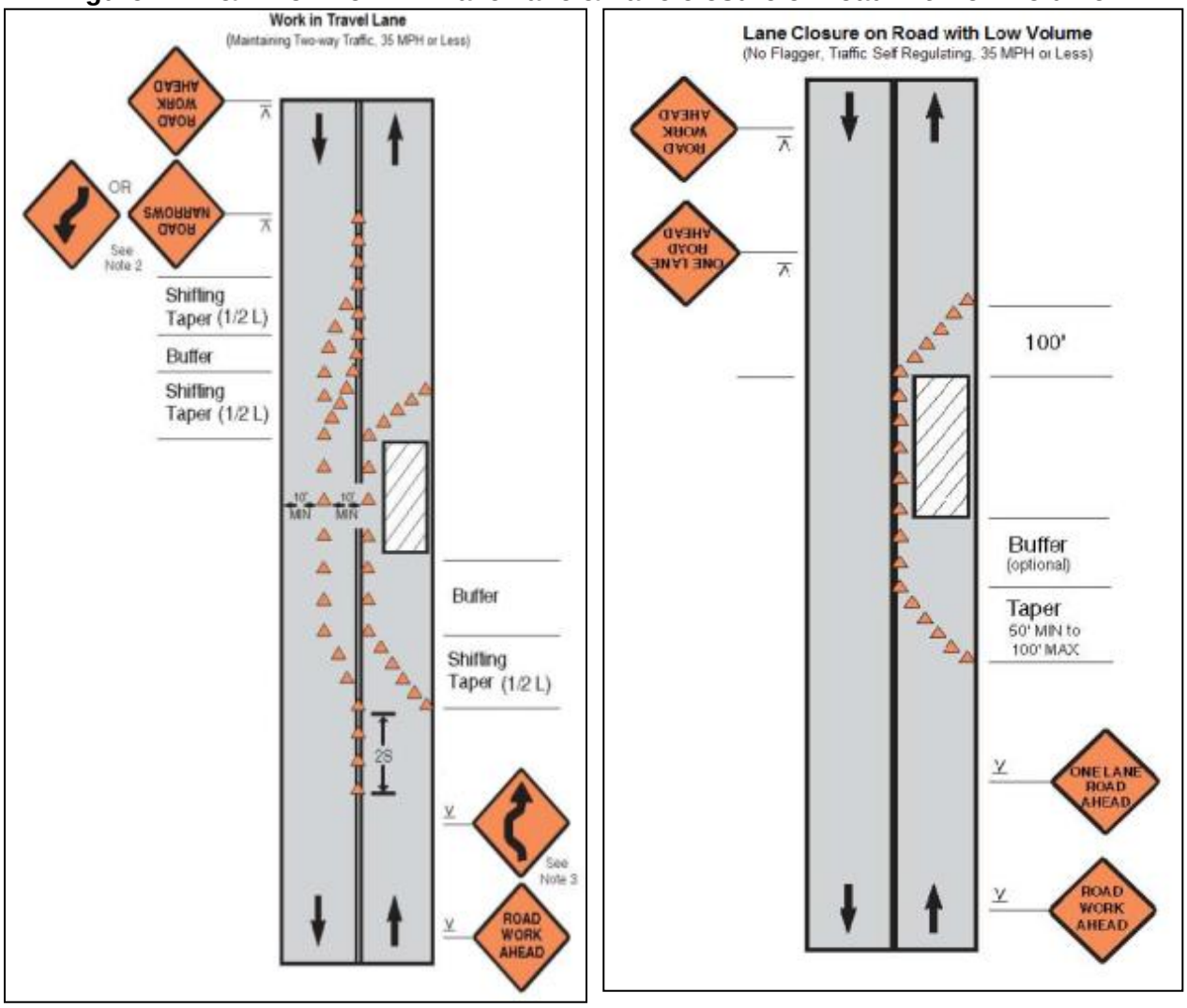
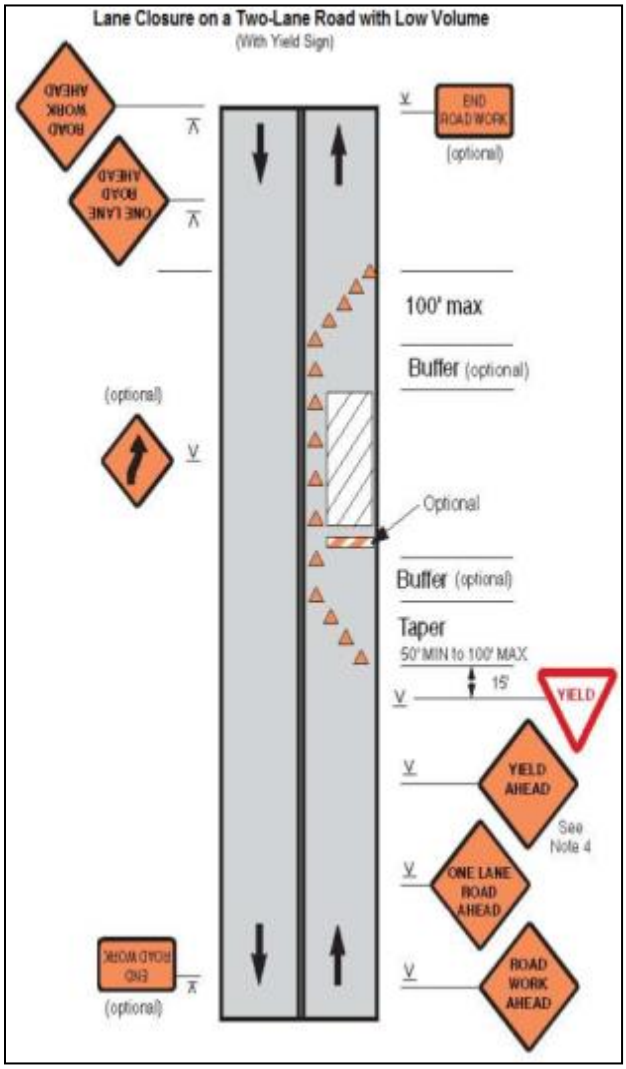


Figure A4.6 & A4.7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)



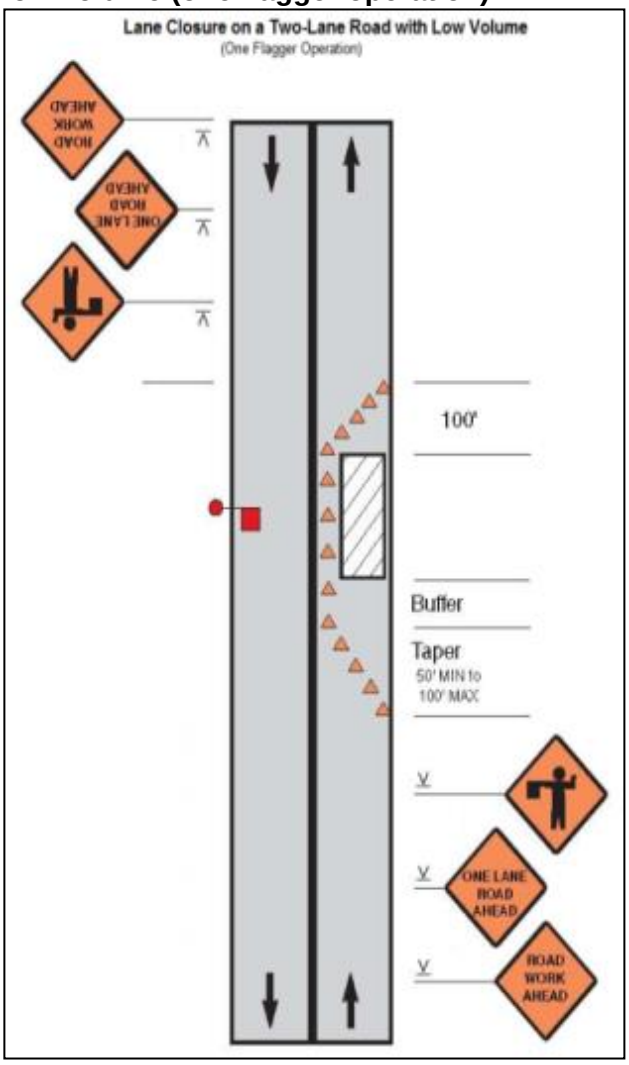
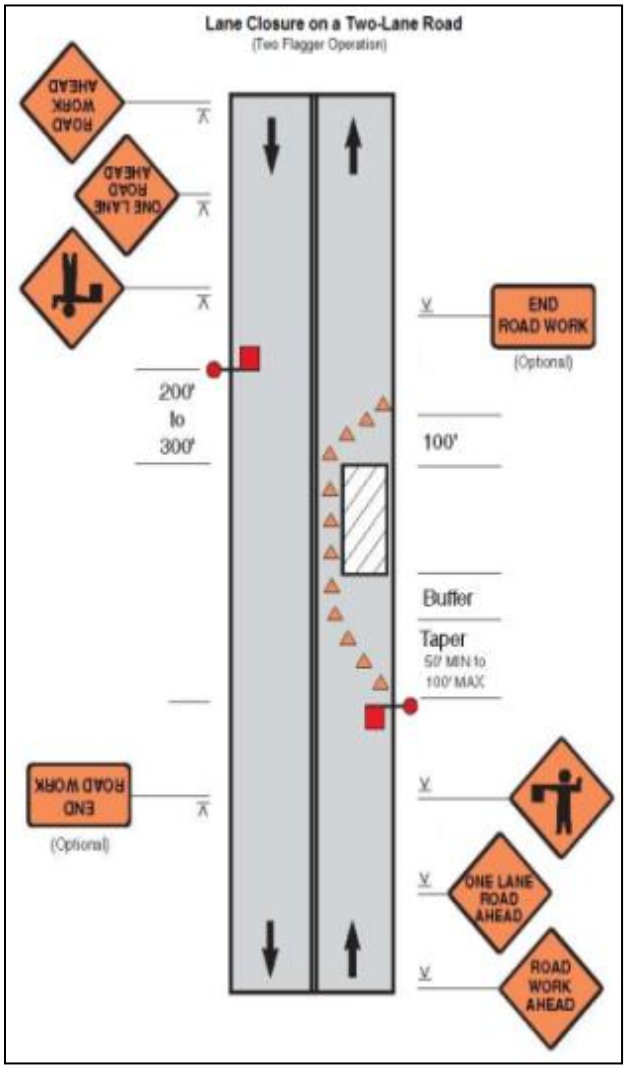


Figure A4.8 & A4.9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road



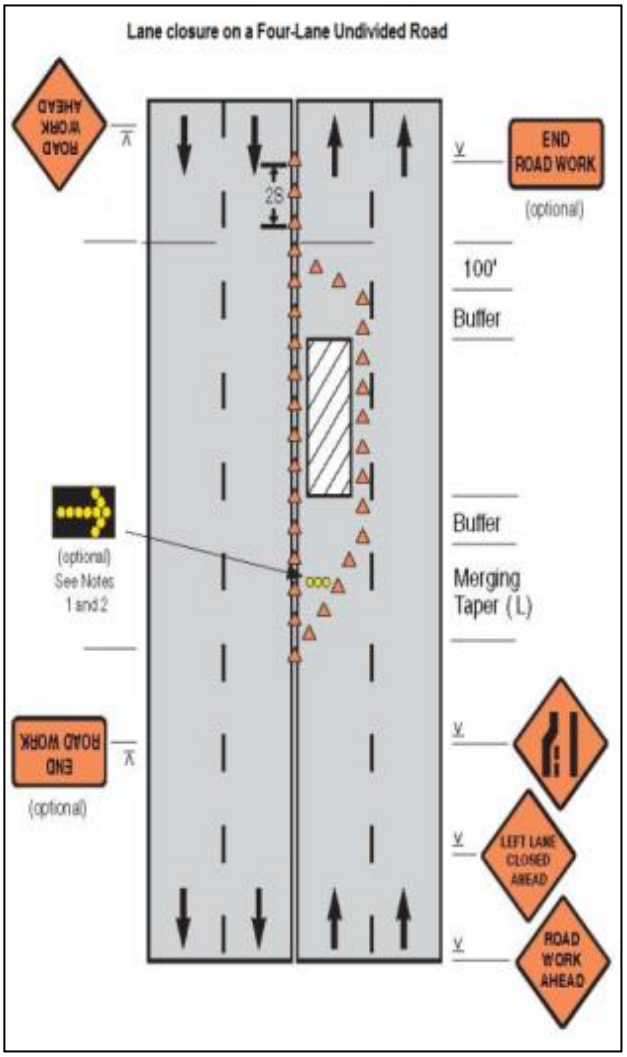
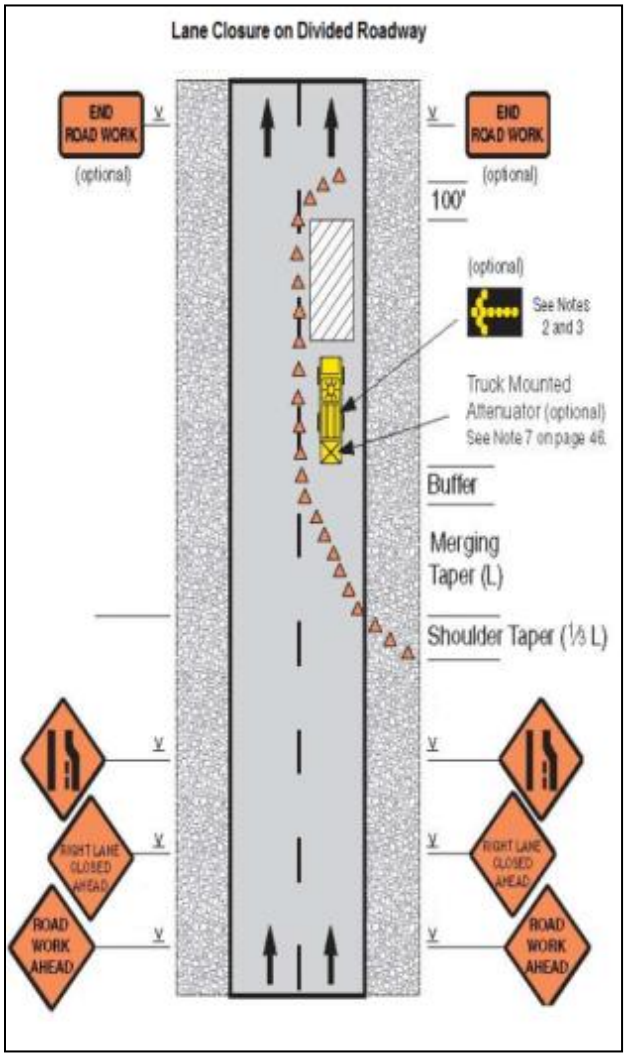


Figure A4.10 & A4.11: Lane Closure nn Divided Roadway & Half Road Closure On Multi-Lane Roadway



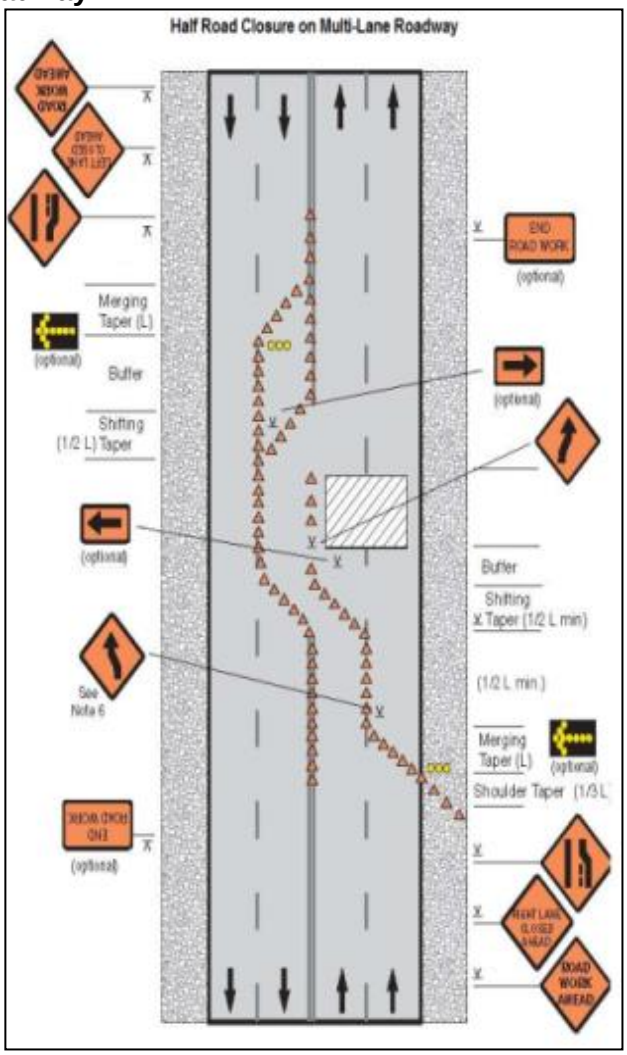
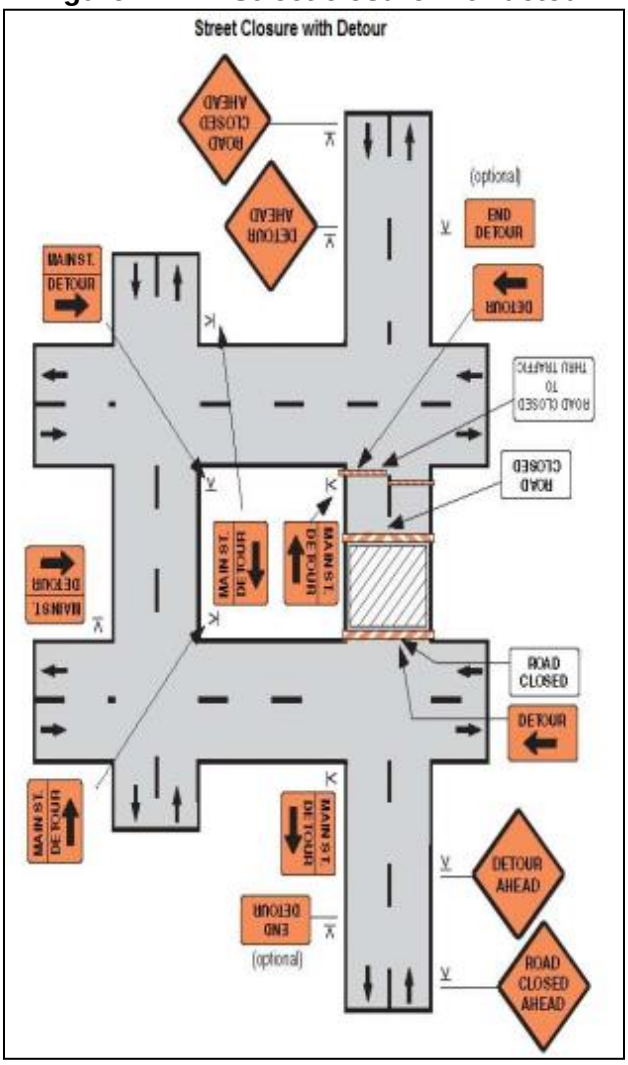


Figure A4.12: Street closure with detour



APPENDIX 5: FGD ATTENDANCE SHEET

PARTICIPANTS LIST
Faridpur Town
Component: Water Supply
Location: Kabi Jashim Uddin Road, Ward-7
Meeting Place: Riaz Sanitary Shop
Date: 23-08-16
Time: 3.30 pm

Sl. No.	Name of the Participant	Sex	Occupation	Cell Number
1	Md.Abul Basher	Male	Work Assistant, Faridpur	01718-417337
2	Khondakar Samsul Arefin	Male	Counselor, Ward-7	01711-486377
3	Md.AslamMian	Male	Business	01731-137710
4	Md.Iqbal Molla	Male	Business	01757-473552
5	Md.Feroze	Male	Business	01799-037933
6	Shovo	Male	Business	01725-429393
7	AMM Arif Ulla	Male	Student	01721-990090
8	Md.Zahidul	Male	Driver	01757-748792
9	Md.Bazlur Rahman Mian	Male	Service	01916-640881
10	Md.Abdul Barek Sheikh	Male	Business	01728-480715
11	Iqbql Sheikh	Male	Business	01715-290896
12	Md. Ilias	Male	Driver	01724-127241
13	Md. Murad Dewan	Male	Business	01724-419595
14	Md.Riad Sheikh	Male	Business	01744-843305
15	Abdul Aziz	Male	Business	01717-924061
16	Md. Shaheen	Male	Business	01730-958418
17	Enayet Sheikh	Male	Business	01720-649305
18	Rasel	Male	Student	01756-689630
19	Rayhan	Male	Student	01756-686161

APPENDIX 6: SAMPLE GRIEVANCE REGISTRATION FORM
(To be available in Bangla and English)

The _____Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date		**Place of Registration**			
Contact Information/Personal Details					
Name		**Gender**	* Male * Female	**Age**	
Home Address					
Place					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where, and how) of your grievance below: If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or u te on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of Official Registering Grievance)	
Mode of Communication: Note/Letter E-mail Verbal/Telephonic	
Reviewed by: (Names/Positions of Officials Reviewing Grievance)	
Action Taken:	
Whether Action Taken Disclosed:	Yes No
Means of Disclosure:	

APPENDIX 7: SAMPLE SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

This template must be included as an appendix in the EIA/IEE that will be prepared for the project. It can be adapted to the specific project as necessary.

I. 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
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number	Roles
1. PMU				
2. PIUs				
3. Consultants				

- 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	Contract Status (specify if under bidding or contract awarded)	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M)[a]	If On-going Construction	
				%Physical Progress	Expected Completion Date

[a] If on-going construction, include %physical progress and expected date of completion

II. COMPLIANCE STATUS WITH NATIONAL/ STATE/ LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS

Package No.	Subproject Name	Statutory Environmental Requirements[a]	Status of Compliance[b]	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish[c]

[a] Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.).
[b] Specify if obtained, submitted and awaiting approval, application not yet submitted
[c] *Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.*

III. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

IV. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

Package-wise IEE Documentation Status

Package Number	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
	Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		

- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.

Package-wise Contractor/s' Nodal Persons for Environmental Safeguards

Package Name	Contractor	Nodal Person	Email Address	Contact Number

- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below

Summary of Environmental Monitoring Activities (for the Reporting Period)[a]

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						

[a] Attach Laboratory Results and Sampling Map/Locations

Summary of Environmental Monitoring Activities (for the Reporting Period)[a]

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						

[a] Attach Laboratory Results and Sampling Map/Locations

Overall Compliance with CEMP / EMP

No.	Sub-Project Name	EMP / CEMP Part of Contract Documents (Y/N)	CEMP / EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

V. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

- Briefly describe the approach and methodology used for environmental monitoring of each sub-project

VI. MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (AMBIENT AIR, WATER QUALITY AND NOISE LEVELS)

(i) Discuss the general condition of surroundings at the project site, with consideration of the following, whichever are applicable:
- Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
- Identify if muddy water is escaping site boundaries or if muddy tracks are seen on adjacent roads.
- Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these are intact following heavy rain;
- Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area in the Appendix.
- Confirm spill kits on site and site procedure for handling emergencies.
- Identify any chemical stored on site and provide information on storage condition. Attach photograph.
- Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
- Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
- Provide information on barricades, signages, and on-site boards. Provide photographs in the Appendix.
- Indicate if there are any activities being under taken out of working hours and how that is being managed.

(ii) Brief discussion on the basis for monitoring
(iii) Indicate type and location of environmental parameters to be monitored
(iv) Indicate the method of monitoring and equipment to be used
(v) 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 (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Government Standard)	
			Day Time	Night Time

VII. GRIEVANCE REDRESS MECHANISM

- Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

VIII. COMPLAINTS RECEIVED DURING THE REPORTING PERIOD

- Provide information on number, nature, and resolution of complaints received during 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).

IX. 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
- Environmental site inspection report
- All supporting documents including signed monthly environmental site inspection reports prepared by consultants and/or contractors
- Others

APPENDIX 8: ENVIRONMENTAL STANDARDS

SCHEDULE-2
Standards for Air

Density in microgram per cusec meter

Sl. No.	Categories of Area	Suspended Particulate Maters (SPM)	Sulphur-dioxide	Carbon Monoxide	Oxides Nitrogen
a.	Industrial and mixed	500	120	5000	100
b.	Commercial and mixed	400	100	5000	100
c.	Residential and rural	200	80	2000	80
d.	Sensitive	100	30	1000	30

Notes:

(i) At national level, sensitive area includes monuments, health center, hospital, archeological site, educational institution, and government designated areas (if any).

(ii) Industrial units located in areas not designated as industrial areas shall not discharge pollutants which may contribute to exceeding the standard for air surrounding the areas specified at Sl. nos. c and d above.

(iii) Suspended Particulate Matter means airborne particles of a diameter of 10 micron or less.

SCHEDULE -3
Standards for Water

A. Standards for inland surface water

Best Practice based classification Parameter		Parameter			
		pH	**BOD mg/l**	**DO mg/l**	**Total Coliform number/100**
a.	Source of drinking water for supply only after disinfecting:	6.5-8.5	2 or less	6 or above	50 or less
b.	Water usable for recreational activity :	6.5 - 8.5	3 or less	5 of more	200 or less
c.	Source of drinking water for supply after conventional treatment :	6.5 - 8.5	6 of less	6 or more	5000 or less
d.	Water usable by fisheries:	6.5 - 8.5	6 of less	5 or more	---
e.	Water usable by various process and cooling industries :	6.5 - 8.5	10 or less	5 or more	5000 or less
f.	Water usable for irrigation:	6.5 - 8.5	10 or less	5 or more	1000 or less

Notes:

(i) In water used for pisiculture, maximum limit of presence of ammonia as Nitrogen is 1.2 mg/l.

(ii) Electrical conductivity for irrigation water - 2250 µmhoms/cm (at a temperature of 25°C); Sodium less than 26%; boron less than 0.2%.

Standards for drinking water

Sl. No	Parameter	Unit	Standards
1	2	3	4
2.	Aluminum	mg/l	0.2
3.	Ammonia (NH3)	"	0.5
4.	Arsenic	"	0.05
5.	Balium	"	0.01
6.	BOD5 20°C	"	0.2
7.	Boron	"	1.0
8.	Cadmium	"	0.005
9.	Calcium	"	75
10.	Chloride	"	150 - 600*
11.	Chlorinated alkanes carbontetrachloride	"	0.01
	1.1 dichloroethylene	"	0.001
	1.2 dichloroethylene	"	0.03
	tetrachloroethylene	"	0.03
	trichloroethylene	"	0.09
12.	Chlorinated phenols - pentachlorophenol	mg/l	0.03
	- 2.4.6 trichlorophenol	"	0.03
13.	Chlorine (residual)	"	0.2
14.	Chloroform	"	0.09
15.	Chromium (hexavalent)	"	0.05
16.	Chromium (total)	"	0.05
17.	COD	"	4
18.	Coliform (fecal)	"	0
19.	Coliform (total)	"	0
20.	Color	"	15
21.	Copper	"	1
22.	Cyanide	"	0.1
23.	Detergents	"	0.2
24.	DO	"	6
25.	Fluoride	"	1
26.	Hardness (as CaCO3)	"	200 - 500
27.	Iron	"	0.3 - 1.0
28.	Kjeldhl Nitrogen (total)	"	1
29.	Lead	"	0.05
30.	Magnesium	"	30 - 35
31.	Manganese	"	0.1
32.	Mercury	"	0.001
33.	Nickel	"	0.1
34.	Nitrate	"	10
35.	Nitrite	"	<1
36.	Odor	"	Odorless
37.	Oil and grease	"	0.01
38.	pH	"	6.5 - 8.5
39.	Phenolic compounds	"	0.002
40.	Phosphate	"	6
41.	Phosphorus	"	0
42.	Potassium	"	12
43.	Radioactive materials (gross alpha activity)	Bq/l	0.01
44.	Radioactive materials (gross beta activity)	Bq/l	0.1
45.	Selenium	mg/l	0.01
46.	Silver	"	0.02
47.	Sodium	"	200
48.	Suspended particulate matters	"	10

Sl. No	Parameter	Unit	Standards
1	2	3	4
49.	Sufide	"	0
50.	Sulfate	"	400
51.	Total dissolved solids	"	1000
52.	Temperature	°C	20-30
53.	Tin	mg/l	2
54.	Turbidity	JTU	10
55.	Zinc	mg/l	5

SCHEDULE - 4
Standards for Sound

Sl. No.	Category of areas	Standards determined at dBa unit	
		Day	Night
a.	Silent zone	45	35
b.	Residential area	50	40
c.	Mixed area (mainly residential area, and also simultaneously used for commercial and industrial purposes)	60	50
d.	Commercial area	70	60
e.	Industrial area	75	70

Notes:

(i) The time from 6 a.m. to 9 p.m. is counted as daytime.

(ii) The time from 9 p.m. to 6 a.m. is counted as night time.

(iii) 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.

SCHEDULE – 5
Standards for Sound originating from Motor Vehicles or Mechanized Vessels

Category of Vehicles	Unit	Standards	Remarks
*Motor Vehicles (all types)	dBa	85	As measured at a distance of 7.5 meters from exhaust pipe.
		100	As measured at a distance of 0.5 meter from exhaust pipe
Mechanized Vessels	dBa	85	As measured at a distance of 7.5 meters from the vessel which is not in motion, not loaded and is at two thirds of its maximum rotating speed.
		100	As measured at a distance of 0.5 meter from the vessel which is in the same condition as above.

Notes:

(i) At the time of taking measurement, the motor vehicle shall not be in motion and its engine conditions shall be as follows:-

(ii) Diesel engine - maximum rotating speed.

(iii) Gasoline engine -at two thirds of its maximum rotating speed and without any load.

(iv) Motorcycle - If maximum rotating speed is above 5000 rpm; two- thirds of the speed, and if maximum rotating speed is less than 5000 rpm, three-fourth of the speed.

SCHEDUEL - 6
Standards for Emission from Motor Vehicles

Parameter	Unit	Standard Limit
Black Smoke	Hartridge Smoke Unit (HSU)	65
Carbon Monoxide	gm/k.m.	24
	percent area	04
Hydrocarbon	gm/k.m.	02
	ppm	180
Oxides of Nitrogen	gm/k.m.	02
	ppm	600

As measured at two thirds of maximum rotating speed.

SCHEDULE- 7
Standards for Emission from Mechanized Vessels

Parameter	Unit	Standard Limit
Black Smoke*	Hartridge Smoke Unit (HSU)	65

As measured at two thirds of maximum rotating speed.

SCHEDULE - 8
Standards for Odor

Parameter	Unit	Standard Limit
Acetaldehyde	ppm	0.5 - 5
Ammonia	"	1 - 5
Hydrogen Sulfide	"	0.02-0.2
Methyl Disulfide	"	0.009 - 0.1
Methyl Sulfide	"	0.01 - 0.2
Styrene	"	0.4 - 2.0
Trim ethylamine	"	0.005 - 0.07

Notes:

(i) Following regulatory limit shall be generally applicable to emission/exhaust outlet pipe f above 5 meter height:

$Q = 0.108 \times He^2Cm$ (Where Q = Gas Emission rate Nm^3/hour)

He = Height of exhaust outlet pipe (m)

Cm = Above mentioned limit (ppm)

(ii) In case where a special parameter has been mentioned, the lower limit shall be applicable for warning purpose, and the higher limit shall be applicable for prosecution purpose or punitive measure.

SCHEDULE – 9
Standards for Sewage Discharge

Parameter	Unit	Standard Limit
BOD	miligram/l	40
Nitrate	"	250
Phosphate	"	35
Suspended Solids (SS)	"	100
Temperature	Degree Centigrade	30
Coliform	number per 100 ml	1000

Notes:

(i) This limit shall be applicable to discharges into surface and inland waters bodies.

(ii) Sewage shall be chlorinated before final discharge.

APPENDIX 9: GUIDANCE PROVISIONS FOR ASBESTOS CEMENT HANDLING

Breathing in asbestos fibres can lead to asbestos-related lung diseases, mainly cancer, killing more people than any other single work-related illness. It is carcinogenic. The diseases can take from 15 to 60 years to develop – so employees will not be immediately aware of a change in someone's health after breathing in asbestos fibres. The body gets rid of any asbestos fibres taken in with food and water naturally. Asbestos fibres cannot be absorbed through the skin. The danger, therefore, from exposure to asbestos fibres arises when asbestos fibres become airborne. Therefore, there is guideline to work with asbestos cement material by Health and Safety Authority, US EPA and other organizations. This document is prepared based on the guideline of USEPA.

A. Pre-Demolition/Renovation Survey

Asbestos regulation establishes that owner and operators (including contractors) are responsible for determining whether cement pipe in a particular utility conduit that will be subject to demolition or renovation contains asbestos. It is required to determine the location of asbestos containing materials before starting demolition or renovation.[1]

PIU, PMU and contractor will follow the guideline. However, PIU, PMU and contractor (including utilities conducting pipe repair or replacement), must conduct a "thorough inspection" to determine the location of any asbestos-containing pipe, insulation or other materials. PIU, PMU and contractor of underground cement pipes may satisfy this requirement with:

(i) As-built plans or other documents identifying the content of particular cement pipes or pipe segments and any other material in the conduit that may be affected by a removal or repair project, provided that the documentation has been updated to reflect any repairs or alterations; or

(ii) Other measures that demonstrate that a "thorough inspection" has been completed to identify asbestos cement pipe that will be affected by a removal or repair project. These measures can include visual identification through field observations of the pipe to be worked on (e.g., the manufacturer's brand-label markings indicating transite material or the source of the pipe); or sampling and analysis of cement pipe material at a laboratory approved by Department of Environment (DOE).

In addition, PIU, PMU and contractor may presume that a pipe or pipe segment contains asbestos and manage any repairs or removals in accordance with this guidance and the other applicable requirements of US EPA.

The PIU, PMU and contractor of the utility system at which the asbestos cement pipe will be removed, repaired or replaced must keep documentation of the pre-demolition/renovation survey, signed and dated by the person who conducted the inspection, for a minimum of two (2) years in the project file. The documentation must indicate what information was relied upon to determine whether the pipe contained asbestos.

[1] The USEPA Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) regulation requires that the owner or operator shall, "…prior to the commencement of the demolition or renovation, thoroughly inspect the affected facility or part of the facility where the demolition or renovation operation will occur for the presence of asbestos…" 40 CFR part 61.145(a).

B. Handling Practices

When repairing, removing or replacing asbestos cement pipe, it is important to handle the pipe in a manner that will minimize the risk of making it friable or releasing asbestos dust into the environment. Start by exposing the asbestos cement pipe with minimal disturbance. Excavate no closer than 6 inches of the pipe. Carefully uncover the remainder of the soil surrounding the pipe by hand or with a shovel. An assessment should then be made to determine if the pipe is damaged, cracked or broken.

(i) Not Damaged Asbestos Cement Pipe (intact and not deteriorated):

- Place 6 mil (0.006 inch) thick polyethylene ("poly") sheeting under the asbestos cement pipe to prevent soil contamination.
- Adequately wet the asbestos cement pipe with amended water using surfactant or liquid soap before and during removal to avoid creating airborne dust.
- Separate the asbestos cement pipe at the nearest coupling (bell or compression fitting).
- Slide the pipe apart at the joints (no saw cutting) or use other methods that do not cause the pipe to break, become friable or otherwise create the potential to release asbestos fibers.
- Wrap the wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label in accordance with all applicable regulatory requirements. This can be done in the trench or adjacent to the trench.
- If the trench is filled with water, the placement of polyethylene sheeting is not required.
- Refer to Section of this guidance document for packaging, labeling, disposal, and record retention requirements.

(ii) Damaged Asbestos Cement Pipe (deteriorated or not intact) or when cutting or mechanical breakage (e.g., with saws, snap or blade cutting, and/or tapping) is necessary:

- Place 6 mil (0.006 inch) thick polyethylene ("poly") sheeting under the asbestos cement pipe to prevent soil contamination.
- Adequately wet asbestos cement pipe with amended water where cutting or breaking will occur.
- Saw cutting of asbestos cement pipe shall only be conducted with a HEPA-shrouded vacuum attachment or wet cutting equipment, unless it is conducted within a small enclosure that isolates the area in which the saw cutting is being conducted to prevent the release of asbestos fibers to ambient air, .
- Wrap wet asbestos cement pipe in two layers of 6 mil polyethylene sheeting, seal with duct tape and label. This can be done either in the trench or adjacent to the trench.
- Manage wrapped asbestos cement pipe, polyethylene sheeting and any other material contaminated with visible asbestos debris as ACWM in accordance with USEPA.
- Refer to Section of this guidance document for packaging, labeling, disposal, and record retention requirements.

C. Packaging, Labeling, Disposal and Record Retention

All Asbestos-Containing Waste Material (ACWM) must be packaged, labeled, transported, stored and disposed of in accordance with USEPA requirements, including but not limited to the following:

(i) Place properly wrapped and labeled ACWM pipe as well as all other containerized ACWM and debris in a roll-off container(s), or covered trucks, trailers or vans that are lined with 2 layers of 6 mil polyethylene sheeting.
- The container shall be an enclosed and sealed leak-tight container having proper labels and U.S. Department of Transportation placards as required.
- If open-top roll-off containers are used, they must be properly sealed, labeled and secured inside a locked fenced area when they are not being loaded to prevent access by unauthorized personnel, and covered to prevent water accumulation.

(ii) Package, transport and dispose of ACWM in accordance with local, state, and federal regulations.

(iii) Complete waste shipment records must be retained for 2 years by the owner/operator of the facility that generated the ACWM.

(iv) Dispose of ACWM at a landfill permitted to accept ACWM.

(v) Design the landfill site for accepting asbestos cement

Please note: "Bulk Loading"[2] of ACWM is not permitted without written approval.

D. Visual Inspection Requirement

The asbestos project monitor (a person from PMU/MDSC should take this responsibility having training or experience) must inspect all surfaces within the work area for visible debris and if any is found, the contractor must re-clean the work areas until there is no visible debris.

When asbestos cement pipe removal is performed using the methods specified in this guidance document, the final visual inspection may be performed by an asbestos project monitor, provided that the following conditions have been met:

(i) The qualified person is physically present to conduct the final visual inspection of the work area prior to backfilling the trench;

(ii) The qualified person documents in writing that there was no visible debris remaining in the excavation trench, in soil excavated from the trench, in the surrounding area adjacent to the trench after the removal of the asbestos cement pipe, and on any tools used during the removal/repair/replacement activities; and

(iii) All ACWM has been removed for proper storage/disposal; and

(iv) The qualified person signs and dates the documentation of the final inspection as evidence that the inspection was performed and that the condition of no remaining visible debris was met.

The PIU, PMU and contractor of the utility system at which the asbestos cement pipe was repaired, removed or replaced must keep the documentation of the post-abatement visual

[2] "Bulk Loading" means the placement of unconfined ACWM in a vehicle or container, such as a roll-off, dumpster or truck *in lieu* of packaging the ACMW in individual leak tight containers.

inspection, signed and dated by the person who conducted the inspection, for a minimum of two (2) years in the project file. (See Attachment B for an example of a Post-Abatement Visual Inspection template.)