# Draft Initial Environmental Examination

October 2013

# BAN: Coastal Towns Infrastructure Improvement Project – Amtali Water Supply

Prepared by the Local Government Engineering Department and Department of Public Health Engineering, Government of Bangladesh for the Asian Development Bank.

## CURRENCY EQUIVALENTS

(as of 10 October 2013)

| | | |
|---|---|---|
| Currency unit | – | Taka (Tk) |
| BDT.1.00 | = | $.01287 |
| $1.00 | = | Tk 77.69 |

## ABRREVIATIONS

| | | |
|---|---|---|
| ADB | – | Asian Development Bank |
| AP | – | affected person |
| DoE | – | Department of Environment |
| DPHE | – | Department of Public Health Engineering |
| EARF | – | environmental assessment and review framework |
| ECA | – | Environmental Conservation Act |
| ECC | – | environmental clearance certificate |
| ECR | – | Environmental Conservation Rules |
| EIA | – | environmental impact assessment |
| EMP | – | environmental management plan |
| ETP | – | effluent treatment plant |
| GRC | – | grievance redressal committee |
| GRM | – | grievance redress Mechanism |
| IEE | – | initial environmental examination |
| LCC | – | location clearance certificate |
| LGED | – | Local Government Engineering Department |
| MLGRDC | – | Ministry of Local Government, Rural Development, and Cooperatives |
| O&M | – | operations and maintenance |
| PMU | – | project management unit |
| PPTA | – | project preparatory technical assistance |
| REA | – | rapid environmental assessment |
| RP | – | resettlement plan |
| SPS | – | Safeguard Policy Statement |
| ToR | – | terms of reference |

## GLOSSARY OF BANGLADESHI TERMS

| | | |
|---|---|---|
| *crore* | – | 10 million (= 100 lakh) |
| *ghat* | – | boat landing station |
| *khal* | – | drainage ditch/canal |
| *khas, khash* | – | belongs to government (e.g. land) |
| *katcha* | – | poor quality, poorly built |
| *lakh, lac* | – | 100,000 |
| *madrasha* | – | Islamic college |
| *mahalla* | – | community area |
| *mouza* | – | government-recognized land area |
| *parashad* | – | authority (pourashava) |
| *pourashava* | – | municipality |
| *pucca* | – | good quality, well built, solid |
| *thana* | – | police station |
| *upazila* | – | subdistrict |

## WEIGHTS AND MEASURES

| | | |
|---|---|---|
| ha | – | hectare |
| km | – | kilometer |
| m | – | meter |
| mm | – | millimeter |

## NOTES

(i) In this report, "$" refers to US dollars.
(ii) —BDT. refers to Bangladeshi Taka

## TABLE OF CONTENTS

**LIST OF TABLES:**



**LIST OF FIGURES:**



**LIST OF APPENDICES:**

## EXECUTIVE SUMMARY

1. The Coastal Towns Infrastructure Improvement Project (the project) is a key infrastructure initiative of the Government of Bangladesh. The project is located in the coastal area of Bangladesh, and is designed to improve and expand municipal infrastructure and related services in selected pourashavas (municipalities) incorporating climate chance resilience measures. The project consists of four components (i) improved climate-resilient municipal infrastructure, (ii) strengthened governance and institutional capacity, (iii) enhanced public awareness, behavior change, and community-based climate adaptation, and (iv) project management support. The impact of the project will be improved climate change resilience and natural disaster preparedness in coastal towns. The outcome of the project will be improved access to climate-disaster resilient municipal services, including (i) municipal infrastructure such as drainage, cyclone shelters, urban roads, bridges, culverts, solid waste management, bus terminals, slum improvements, boat landings, and markets, (ii) water supply, and (iii) sanitation. The project is to be implemented in 6 years from 2014 to 2020.

2. The project is a project lending modality using a sector approach for selection of subprojects. The release of project funds to the pourashavas will be administered under a 2-stage process known as Performance Criteria Mechanism, whereby the project pourashavas have to meet certain institutional capacity and governance criteria to receive funding. Infrastructure subprojects are therefore divided between Stage I funding and Stage II funding.

3. Amtali water supply subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered to improve water supply system and increase coverage to meet additional demand. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS, 2009).

4. **Categorization.** 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. Amtali water supply subproject is classified as Environmental Category B as per the SPS as no significant impacts are envisioned. This initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject.

5. 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.

6. **Subproject Scope.** The subproject is formulated under this project to provide more accessible, reliable and climate-resilient municipal services in a holistic and integrated manner. Investments under this subproject include (i) installation of 2 production tube wells; (ii) construction of 1 overhead tank; (iii) installation of 37 km of transmission and distribution pipelines; (iv) replacement of 5 km of existing distribution pipelines; (v) laying of service connections including water meter chambers; (vi) reconnection of existing service connections; (vii) procurement and installation of water meters; (viii) procurement and installation of bulk water meters; (ix) installation of 30 hand deep tube wells for rural areas; (x) provision of mini-water testing equipment; and (xi) procurement of items for logistical support.

7. **Implementation Arrangements.** Local Government Engineering Department (LGED) is the executing agency (EA), and Department of Public Health Engineering (DPHE) is co-executing agency.[1] LGED is responsible for providing support and guidance to pourashavas concerning performance criteria and pourashava development planning. Implementation activities will be overseen by a separate program management unit (PMU). The participating pourashavas are the implementing agencies (IA), with a project implementation unit (PIU) within the pourashava structure. Local LGED and DPHE offices will be involved in the functioning of the PIUs to provide technical support. Consultant teams[2] 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 studies/surveys on flood inundation and climate change impacts, facilitating disaster risk management capacity building and community level adaptation through locally managed climate resilience funds; and (iv) community-based climate adaptation and disaster preparedness, awareness raising on behavioural change in water, sanitation and hygiene (WASH) activities and facilitating resettlement procedures.

8. **Description of the Environment.** Subproject components are located in Amtali urban area or in its immediate surroundings which were converted into urban use for many years ago, and there is no natural habitat left at these sites. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Amtali. The subproject sites are located in existing right of ways (ROWs) and government-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location.

9. **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.

10. Locations and siting of the proposed infrastructures were considered to further reduce impacts. The concepts considered in design of Amtali water supply subproject are: (i) demand for new piped water supply; (ii) maximum population coverage with pipe layout mostly in residential areas and areas of high growth rate; (iii) avoidance of water-use conflicts; (iv) 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 (iv) 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.

11. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Amtali water supply subproject, including: (i) structural protection of facilities from future floods; (ii) location of components where there is no risk of flooding or other hazards; and (iii) promote more efficient use of water by reducing losses and

[1] LGED is responsible for (i) roads, (ii) bridges, (iii) solid waste management, (iv) cyclone shelters, and (v) drainage and flood control. DPHE is responsible for (i) water supply, and (ii) sanitation.

[2] Consultant teams are composed of project design advance (PDA) detailed design consultants, project management and supervision consultants (PMSC), and institutional capacity and community development consultants (ICCDC).

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.

12. Key construction phase impacts identified and addressed in the IEE include: (i) impacts on low-lying areas and water bodies where protection measures are required to minimize impacts on water quality, disposal of wastes/debris in the water bodies, and potential disruption of flows; (ii) air, noise, and vibration impacts due to construction vehicles, equipment, and machinery in the vicinity of construction site and inhabited sections; (iii) management of spoils due to excavation for the distribution and transmission mains; (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.

13. 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.

14. 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.

15. **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, LGED, and DPHE 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.

16. **Monitoring and Reporting.** The PMU and project management and supervision consultants (PMSC) will be responsible for monitoring. The PMSC 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.

17. **Conclusions and Recommendations.** The citizens of Amtali 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. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Amtali 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.

18. 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

1. The Coastal Towns Infrastructure Improvement Project (the project) is a key infrastructure initiative of the Government of Bangladesh. The project is located in the coastal area of Bangladesh, and is designed to improve and expand municipal infrastructure and related services in selected pourashavas (municipalities) incorporating climate chance resilience measures. The project consists of four components (i) improved climate-resilient municipal infrastructure, (ii) strengthened governance and institutional capacity, (iii) enhanced public awareness, behavior change, and community-based climate adaptation, and (iv) project management support. The impact of the project will be improved climate change resilience and natural disaster preparedness in coastal towns. The outcome of the project will be improved access to climate-disaster resilient municipal services, including (i) municipal infrastructure such as drainage, cyclone shelters, urban roads, bridges, culverts, solid waste management, bus terminals, slum improvements, boat landings, and markets, (ii) water supply, and (iii) sanitation. The project is to be implemented in 6 years from 2014 to 2020.

19. The project is a project lending modality using a sector approach for selection of subprojects. The release of project funds to the pourashavas will be administered under a 2-stage process known as Performance Criteria Mechanism, whereby the project pourashavas have to meet certain institutional capacity and governance criteria to receive funding. Infrastructure subprojects are therefore divided between Stage I funding and Stage II funding.

2. Amtali water supply subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered to improve water supply system and increase coverage to meet additional demand. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in 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 project is unlikely to cause significant adverse impacts. Thus, this initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

# II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

## A. ADB Policy

3. 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 project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

4. **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.

5. **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.

6. **Public disclosure.** ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

(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 project management unit (PMU) during project implementation upon receipt.

## B. National Laws

7. 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).

8. In addition to the Environmental Conservation Act and Rules, there are a number of other policies, plans and strategies which deal with the water sector, coastal areas, and climate change. These are the Forest Act 1927 (last modified 30th April 2000); National Water Policy, 1999; Coastal Zone Policy, 2005; Coastal Development Strategy, 2006; Bangladesh Climate Change Strategy and Action Plan, 2009; and National Safe Drinking Water Supply and Sanitation Policy of 1998. Table 1 provides salient features, applicability of the legislations and specific requirements for the project. Appendix 2 provides the environmental standards for air, surface water, groundwater, drinking water, emissions, noise and vehicular exhaust.

**Table 1: Applicable Government of Bangladesh Environmental Legislations**

| | Legislation | Requirements for the Project | Relevance |
|---|---|---|---|
| 1. | Environmental Conservation Act of 1995 | - Restriction on operation and process, which can be continued or cannot be | The provisions of the act apply to the entire subproject in the construction and |

| | Legislation | Requirements for the Project | Relevance |
|---|---|---|---|
| | and amendments in 2000, 2002 and 2010 [3] | initiated in the ecologically critical areas<br>- Regulation on vehicles emitting smoke harmful to the environment<br>- Remedial measures for injuries to ecosystems<br>- Standards for quality of air, water, noise and soil for different areas for various purposes and limits for discharging and emitting waste<br>- Environmental guidelines | operation and maintenance (O&M) phases. |
| 2. | Environmental Conservation Rules of 1997 and amendments in 2002 and 2003 | - Environmental clearances<br>- 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 (LCC and ECC) 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. |
| 4. | Bangladesh Climate Change Strategy and Action Plan of 2009 | - Ensure existing assets (e.g., coastal and river embankments) are well maintained and fit for purpose and that urgently needed infrastructures (cyclone shelters and urban drainage) is put in place to deal with the likely impacts of climate change.<br>- enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change | Considered in subproject preparation. |
| 5. | National Water Policy of 1998 | - EIA for water development projects and increase surface water flow<br>- Pre-screening of IEEs/EIAs for water sector projects by WARPO, in advance of submission to DOE for final clearance.<br>- Augmentation for dry season water flow<br>- Awareness-raising in consumptive use of surface and groundwater for irrigation<br>- Structural and non-structural mitigation (early warning and flood proofing) | Considered in subproject preparation. The subproject proposes to improve the water system for Amtali residents. |
| 6. | National Policy for Arsenic Mitigation of 2004 | - Guideline for mitigating the effect of arsenic on people and environment in a holistic and sustainable way.<br>- Supplement the National Water Policy 1998 and National Policy for Safe Water Supply and Sanitation 1998<br>- Provides a framework for provision of water supply for areas/aquifers with high arsenic levels. Roles of agencies are specified for development of water supply systems, certification of arsenic removal technology, and disposal of | Considered in subproject preparation |

[3] *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.

| | Legislation | Requirements for the Project | Relevance |
|---|---|---|---|
| | | treatment sludge. Also, arsenic-prone *upazila* are identified. | |
| 7. | National Safe Drinking Water Supply and Sanitation Policy of 1998 | - Pourasavhas and WASAs will take actions to prevent wastage of water. In addition they will take necessary steps to increase public awareness to prevent misuse of water.<br>- Sanitation systems shall be self-sufficient and self- sustaining.<br>- Pourasavhas shall be responsible for solid waste collection, disposal and their management. DOE shall be consulted on solid waste management.<br>- Where WASAs exists, they shall be responsible for sewerage and storm water drainage systems. | The provisions of the act apply to the entire subproject in the construction and operation and maintenance (O&M) phases. |
| 8. | 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<br>- Prohibition of employment of children and adolescent | The provisions of the act apply to the entire subproject in the construction and operation and maintenance (O&M) phases. Provides for safety of workforce during construction phase. |

## C. Government of Bangladesh Environmental Assessment Procedures

9. Under the ECR 1997 industrial units and projects are classified into four categories according to "their site and impact on the environment", and each category (green, orange-A, orange-B and red) requires a different level of environmental assessment as a prerequisite for granting the ECC that allows the project to proceed. The ECA indicates that all industrial units or projects must obtain a Location Clearance Certificate (LCC) and Environmental Clearance Certificate (ECC) from the Department of Environment (DoE).

10. Schedule 1 of the law provides a classification for industrial projects and types of development that are common in Bangladesh. Table 2 indicates that the proposed subproject components are likely to be classified as red category.

**Table 2: Likely Government of Bangladesh Classification of Amtali Water Supply Subproject**

| Subproject | Component | Equivalent in Schedule I of ECR 1997 | DoE Classification |
|---|---|---|---|
| Water supply | Source augmentation (includes tube wells, surface water intake, overhead or ground reservoir, pumps and pump house, water treatment plant [WTP] or chlorination facility) | Engineering works (up to 10 hundred thousand Taka capital | Red<br>Per preliminary quantity and cost estimate, Amtali water supply subproject is 1,269.69 Lac Taka (US$1.62 million) |
| | Water transmission (includes pumping main, overhead reservoir, or pumps and pump houses) | Water, power and gas distribution line laying/relaying/extension. | Red |
| | Network improvements (include ring main, distribution/ carrier mains, bulk valves and flow meter, household connections or household meters) | | |
| | Secondary network (includes secondary drains) and tertiary network (includes main drains and drainage outfalls) | | |

11. Rule 7 of the ECR 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).

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

## III. DESCRIPTION OF THE PROJECT

### A. The Study Area

13. The Amtali pourashava was established on 23 August 1998 and composed of 9 wards. It is located between latitude 21º51' and 22º18' north and between longitude 90º00' and 90º23' east; bordered in the north and the east by Chaora Union, in the west by Payera River and in the south by Amtali Union. It occupies an area of 8.75 $km^2$.

14. Subproject components are located in Amtali urban area or in its immediate surroundings which were converted into urban use for years ago, and there is no natural habitat left at these sites. The components will be located on vacant government-owned lands. Water distribution and transmission mains will be laid on existing right of ways (ROWs). There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject sites. There are no forest areas within or near Amtali. The location map is shown as Figure 1.

### B. Existing Condition and Need for the Project

15. The existing water supply system of Amtali pourashava is shown in Figure 2. It covers Wards 4, 5, 6 and part of 2 and 3, which is only about 35% of the total urban area.

16. **Water sources.** A hydro-geological investigation in Amtali pourashava was carried out under the DPHE-Danish International Development Agency (DANIDA) Water Supply and Sanitation (WSS) Project in coastal belt. The investigation shows that there are three main zones: inter-bedded clay and saline sand to 170 meters below ground level (mbgl); a thick silty/sand clay to 270 mbgl; and inter-bedded clay and fresh water sand from 270 mbgl to the total drilling depth of 380 mbgl. The good potential abstraction rate and acceptable water quality make the aquifer suitable as a source for the town water supply.

17. Two production tube wells (PTWs), supplying the pourashava water supply system were installed in 1998 by DANIDA. The PTWs were subsequently handed over to the pourashava authority for operation and maintenance (O&M). Both PTWs are located in the Amtali Degree College Compound with 100 meters (m) distance between them. The PTWs run for 15 hours in summer and 12 hours in winter at 118 $m^3$ per hour. The average water production is estimated

at 1,652 $m^3$/day (1.65 MLD). PPTA team monitored the PTWs with the assistance of the Pourashava Water Supply Section in April 2013, and the findings together with description of the PTWs are presented in Table 3.

**Table 3: Existing Production and Performance Data of 2 Tube Wells in Amtali**

| | Parameter | PTW No. 01 | PTW No. 02 |
|---|---|---|---|
| 1. | Year of installation | 1998 | 1998 |
| 2. | Size of well | 150mm x 600mm | 150mm x 600mm |
| 3. | Drilled depth | 380 m | 375 m |
| 4. | Production capacity | 50 $m^3$/h | 90 $m^3$/h |
| 5. | Specific capacity | 8.33 $m^3$/h/m | 12.5 $m^3$/h/m |
| 6. | Static water level (SWL) | 2.28 mbgl | 2.28 mbgl |
| 7. | Dynamic water Level (DWL) | 6.70 mbgl | 8.00 mbgl |
| 8. | Water production Rate | 38 $m^3$/h | 80 $m^3$/h |
| 9. | Specific capacity | 8.60 $m^3$/h/m | 14 $m^3$/h/m |

Source: DPHE-DANIDA Water Supply and Sanitation Project and PPTA field investigation on 24 Feb 2013.
Note: PTW = production tube well; mm = millimeters; m = meters; h = hour; m = minute; $m^3$/h = cubic meters per hour; mbgl = meters below ground level

18. **Water Quality.** During the commissioning of PTWs, water samples were collected and analyzed in Bangladesh University of Engineering and Technology (BUET) laboratory. The analyzed parameters were found to be below the limit of the Bangladesh standards, except pH for PTW No. 2 which is not in the standard's pH range of 6.5 to 8.5. The CDTA and PPTA teams collected water samples from the PTWs in May 2012 and March 2013, respectively and had them analyzed in the DPHE Central Laboratory (Dhaka). All tested parameters were found well below Bangladesh standards.

19. **Water storage.** Amtali has one reinforced cement concrete (RCC) overhead tank (OHT) of 500$m^3$ capacity in waterworks compound. The height of the tank is 26.3 m from ground level with water from all production wells supplied through to this OHT. The present condition of OHT and pump house is good.

20. **Water distribution pipelines.** Under the DPHE-DANIDA WSS Project, piped water supply system based on groundwater source was built up and commissioned in 2005. Under the project, 1.5 kilometer (km) transmission pipeline and 17 km distribution line were installed. Latter on the pourashava installed another 5 km of pipelines, to a total of 24 km at present. Details are given in Table 4.

**Table 4: Details of Existing Distribution Pipelines in Amtali**

| | Pipe Diameter (mm) | Length (km) | Material | Remarks |
|---|---|---|---|---|
| 1 | 200 | 1.50 | uPVC | Total length 23.00 km of PVC pipelines of diameter ranging from 40 mm to 200 mm. |
| 2 | 150 | 5.00 | uPVC | |
| 3 | 100 | 9.50 | uPVC | |
| 4 | 75 | 2.00 | uPVC | |
| 5 | 50 | 6.00 | uPVC | |

Source: Amtali Pourashava, PPTA field investigation in March to April 2013.

21. **Service connections and population coverage.** As reported by the pourashava in June 2012, there are 1,174 domestic service connections and 25 commercial connections, mostly hotels and restaurants. Details of connections are given in Table 5.

**Table 5: Details of Existing Service Connections in Amtali**

| Type of Connection | Diameter of Connection (mm) | Number of Connection | Population Served | Service Coverage of Total Population* |
|---|---|---|---|---|
| Domestic | 13 | 935 | 5,163 | 30% |
| | 19 | 239 | 1,320 | 8% |
| Non-domestic | 13 | 23 | - | - |
| | 19 | 2 | - | - |
| Total | | 1,199 | 7,203 | 38%<br>Population served = 6 persons per service connection |

Source: Amtali Pourashava, PPTA field investigation in March to April 2013.
Note: * = service coverage is based on census 2011 population

22. Additional water demand till 2040 is 2,845 $m^3$/day. This has taken into account projected population, 100% domestic service connection, 15% of production as unaccounted for water, and 15% of average daily demand for resilience to climate change (increased water demand due to temperature rise).

## C. Proposed Components

23. The interventions to improve water supply system and increase coverage has been proposed based on the results of field investigations, analysis and review of current water supply system, water demand projection for the year 2040, and climate change impacts for the year 2050. The daily demand has been considered as 100 liters per capita per day (lpcd) for the purpose of forecasting aggregate daily demand for the year 2040 (considering 25 years of design horizon) as the design year for the subproject. The climate change adaptation has also been taken into account for water demand projection. It is predicted that 1.2 to 2.40 ºC temperature will increase by 2050. Due to heat, overall per capita water needs will increase.

24. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Amtali water supply subproject, including: (i) structural protection of facilities from future floods; (ii) location of components where there is no risk of flooding or other hazards; and (iii) promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures.

25. Investments under this subproject include (i) installation of 2 PTWs; (ii) construction of 1 OHT; (iii) installation of 37 km of transmission and distribution pipelines; (iv) replacement of 5 km of existing distribution pipelines; (v) laying of service connections including water meter chambers; (vi) reconnection of existing service connections; (vii) procurement and installation of water meters; (viii) procurement and installation of bulk water meters; (ix) installation of 30 hand deep tube wells for rural areas; (x) provision of mini-water testing equipment; and (xi) procurement of items for logistical support.

26. It is also proposed to divide the entire Amtali pourashava service area into two service zones: (i) Zone – 01 consists of the area to be supplied by existing PTWs and OHT through existing network with proposed extension towards north boundary and partly in Ward 08 in the south; and (ii) Zone – 02 includes area is bordered by Patuakhali-Barguna Highway and Amtali Lake in the west to be served by the new PTWs and OHT. District metering areas (DMA) will be set up within the service zones to monitor production, supply and consumption of water supplied and monitor unaccounted for water and non-revenue water.

27. The inventory and proposed interventions are listed in Table 6. The two service zones with proposed extension in water supply are shown in Figure 3. The preliminary site plans for the PTWs and OHT are shown in Figures 4.

28. Underground water of sufficient quantity is available within the area. The water quality from all of the test results indicates that aquifer is confined and fully protected by an impermeable layer. The potential abstraction rate and acceptable water quality make the aquifer suitable for the pourashava water supply.

**Table 6: Components of Proposed Amtali Water Supply Subproject**

| | Items | Unit | Quantity | Remarks |
|---|---|---|---|---|
| **1.0** | **Installation of production tube well**<br>- Well capacity = 100 $m^3$/hr<br>- Well size = 150 mm x 350 mm<br>- Drilling depth = 350 m<br>- Upper well casing = 35 m<br>- Lower well casing = 250 m<br>- Screen length = 35 m<br>- Column pipe diameter = 125 mm<br>- Column pipe length = 30 m<br>- Pump = submersible | No. | 2 | To be constructed in Poura Graveyard in Ward No. 03 (densely populated area). The site may be inundated due to monsoon flooding thus the upper well casing will be extended vertically to protect the wells from inundation. Provision for proper drainage is necessary to make the infrastructure climate resilient. |
| **2.0** | **Construction of overhead tank**<br>- Capacity = 500 $m^3$<br>- Height = 25 m | No. | 1 | To be constructed in XXX. The cyclonic strong wind will be taken into account during detail design of the structure to make it strong enough to withstand cyclones and be climate resilient. |
| **3.0** | **Installation of water transmission and distribution pipelines** | | | To be laid in the 2 zones along roads right of way (ROW). uPVC pipes will be used for the water distribution system. |
| 3.1 | 100 mm diameter (dia) | km | 18 | |
| 3.2 | 150 mm dia. | km | 9 | |
| 3.3 | 200 mm dia. | km | 3 | |
| 3.4 | 250 mm dia. | km | 1.5 | |
| **4.0** | **Replacement of existing 50 mm distribution pipelines by 100 mm pipes** | km | 5 | The existing pipelines will be replaced by higher diameter pipes. |
| **5.0** | **Laying of service connections including water meter chambers** | | | Projected population of 16,552 (60% of the projected population of 27,587) by 2020 has been considered for estimating number of service connections. The total predicted number of service connections by 2020 will be 2,759 and the additional number of service connections is 1,560 as 1,199 connections already exist.<br><br>In addition to 1,560 new service connections about 400 more will be relayed and reconnected to the pipelines replacing the existing 50 mm pipelines.<br><br>All future connections will be metered. All water meters will be protected by water meter chambers. |
| 5.1 | 13 mm connection | Nos. | 1,400 | |
| 5.2 | 20 mm connection | Nos. | 145 | |
| 5.3 | 25 mm connection | Nos. | 10 | |
| 5.4 | 50 mm connection | Nos. | 5 | |
| **6.0** | **Reconnection of existing service connections with 50 mm pipelines** | | | |
| 6.1 | 13 mm connection | Nos. | 350 | |
| 6.2 | 20 mm connection | Nos. | 50 | |
| **7.0** | **Procurement and installation of water meters in service connections** | | | |
| 7.1 | 13 mm connection | Nos. | 1,400 | |
| 7.2 | 20 mm connection | Nos. | 145 | |
| 7.3 | 25 mm connection | Nos. | 10 | |
| 7.4 | 50 mm connection | Nos. | 5 | |
| **8.0** | **Procurement and installation of bulk water meter** | | | There are three DMA junctions connecting the two service zones in the distribution network. The bulk water meters will be |
| 8.1 | 150 mm dia. | Nos. | 3 | |

| | Items | Unit | Quantity | Remarks |
|---|---|---|---|---|
| | | | | installed at each of the DMA junctions. |
| **9.0** | **Installation of hand deep tube well (depth 300 m) for rural area** | Nos. | 30 | To be constructed in rural areas not covered by piped water supply system. |
| **10.0** | **Mini water testing laboratory** | Lump sum | 1 | To be established in order to create facilities to monitor water quality produced and supplied to the consumers. The laboratory will have testing facilities for pH, iron (Fe), chlorine (Cl), arsenic (As), magnesium (Mg) and fecal coliform and *E. coli*. |
| **11.0** | **Logistics** | | | For continuous and smooth operation of the water supply system. |
| 11.1 | Pick-up | No. | 1 | |
| 11.2 | Motorcycle | Nos. | 2 | |
| 11.3 | Computer and software, etc. | Lump sum | 1 | |
| 11.4 | Generator for existing system | No. | 1 | Power backup for water supply is urgently needed if infrastructures get damaged by cyclone/storm |
| 11.5 | Generator for proposed System | No. | 1 | |

## D. Implementation Schedule

29. The subproject is to be implemented over a period of 6 years. The detailed design stage is expected to commence in 2013, and the construction period will cover 24 months.

**Figure 1: Location Map**


★ **Study town**

**Figure 2: Map of Existing Amtali Water Supply System**

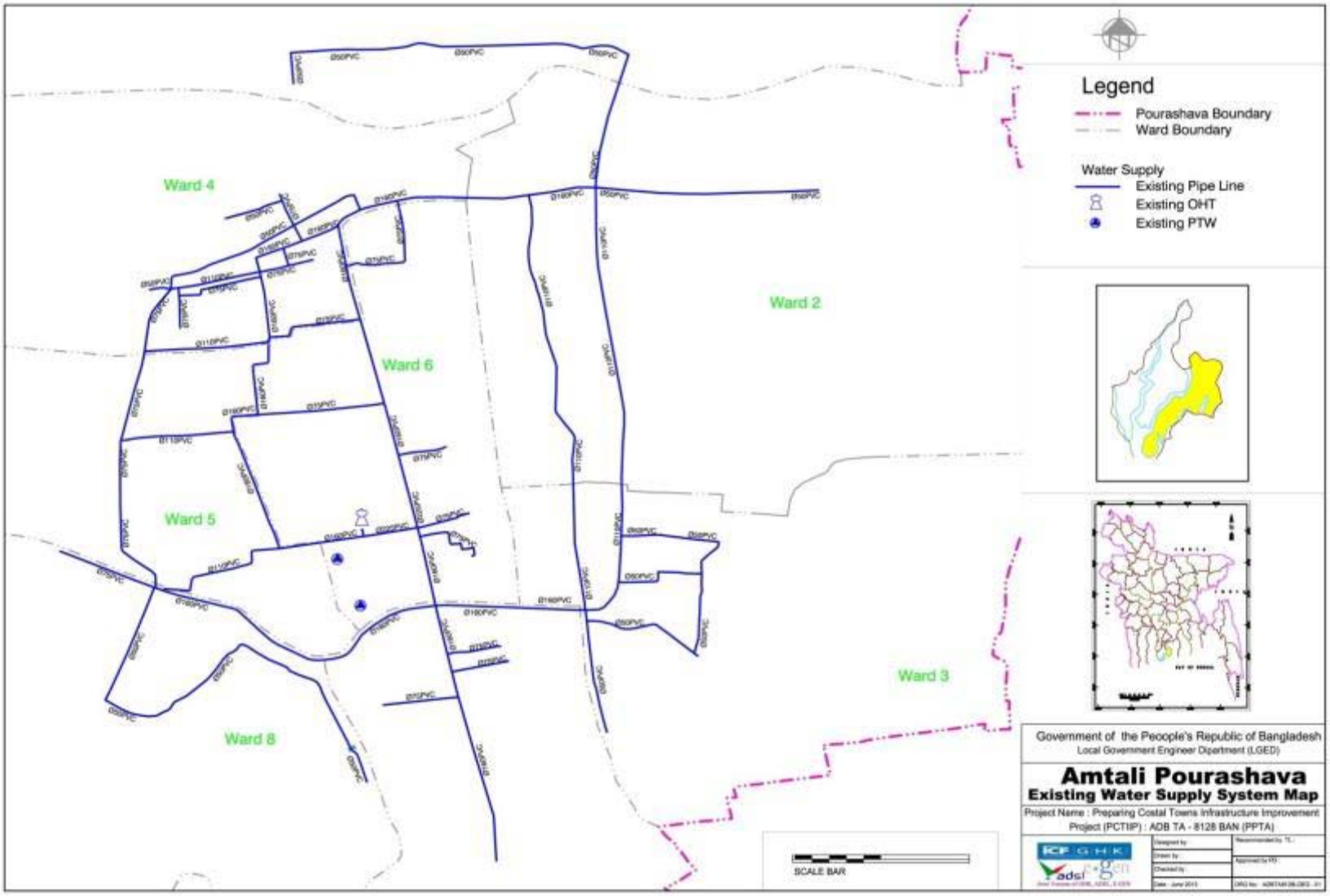


**Figure 3: Map of Proposed Amtali Water Supply System**

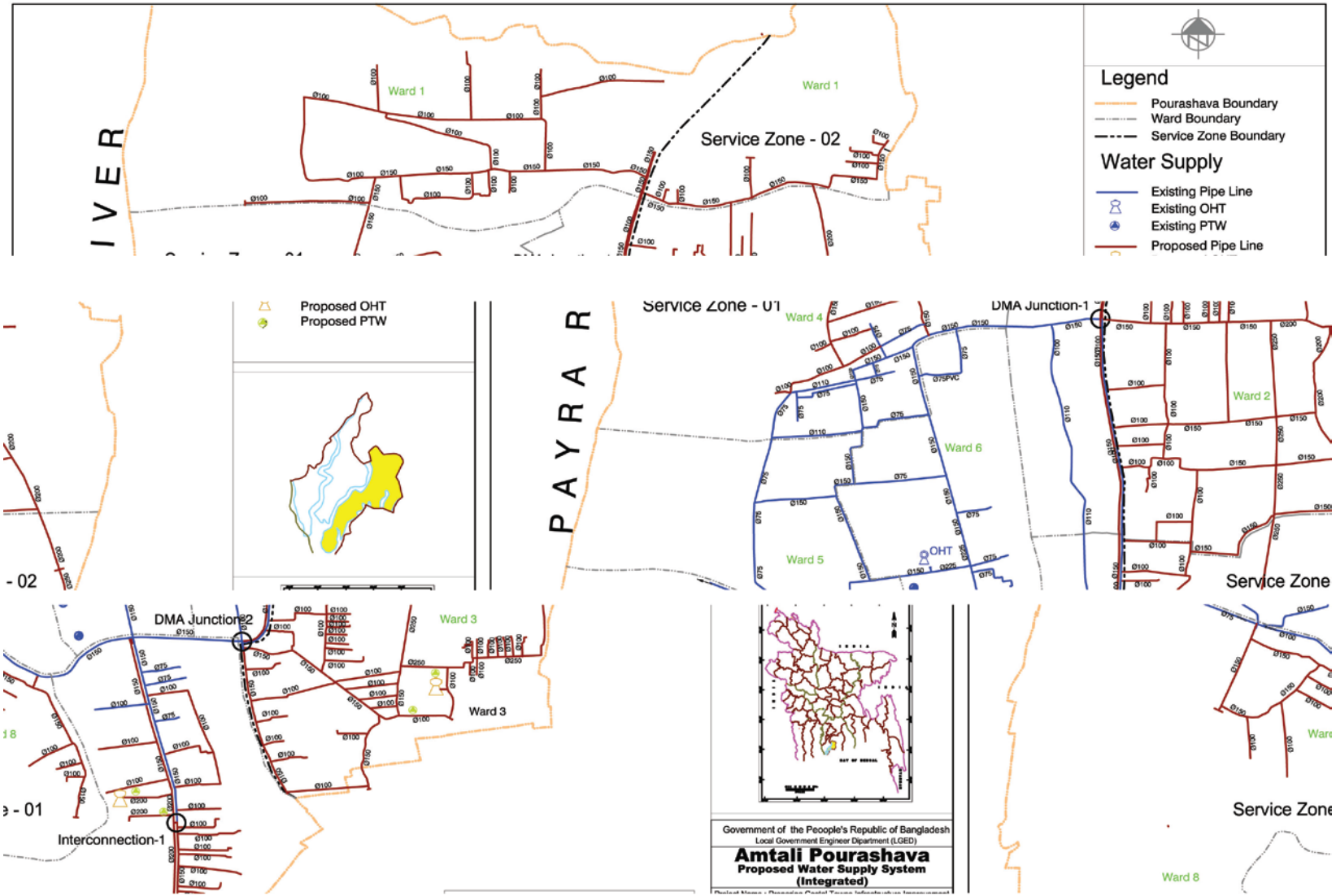
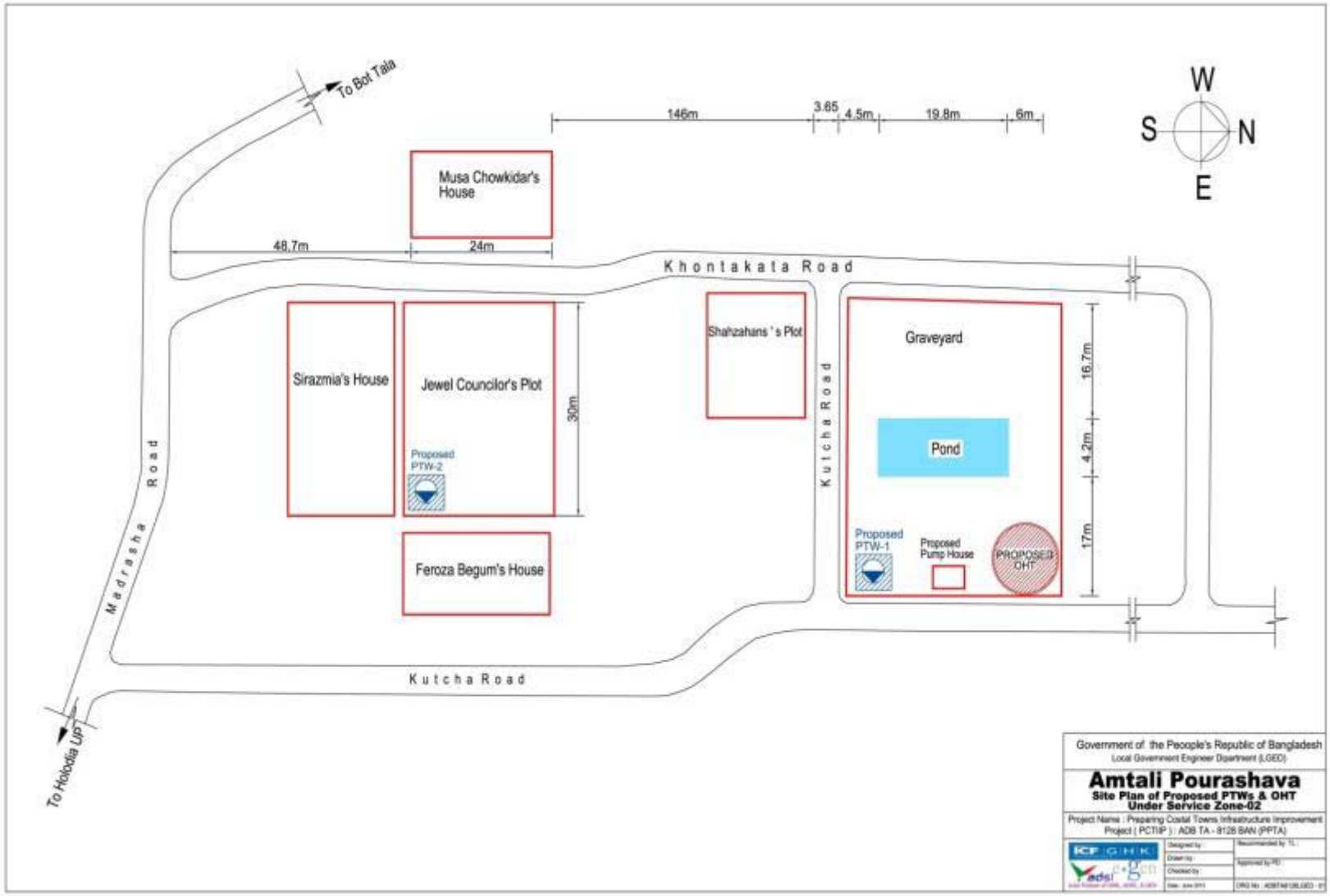


**Figure 4: Proposed Amtali Production Tube Wells and Overhead Tank – Site Plan**



# IV. DESCRIPTION OF THE ENVIRONMENT

## A. Methodology Used for the Baseline Study

30. **Data collection and stakeholder consultations.** Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites. The literature survey broadly covered the following:

(i) subproject details, reports, maps, and other documents available with the ADB CDTA and PPTA consultants, LGED, and Amtali pourashava;
(ii) relevant acts and extraordinary gazettes, and guidelines issued by Government of Bangladesh agencies; and
(iv) literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and environmental planning documents collected from Government of Bangladesh agencies and websites.

31. Several visits to the subproject sites were made during the PPTA stage to assess the existing environment (physical, biological, and socioeconomic) and gather information with regard to the proposed sites and scale of the proposed subproject. A separate socioeconomic study was conducted to determine the demographic information, archeological and religious places, densely populated pockets, and settlements.

32. **Data analysis and interpretation.** The data collected was analyzed and interpretations made to assess the physical, biological, and socioeconomic features of the project area. The relevant information is presented in the succeeding paragraphs.

## B. Physical Characteristics

33. **Topography, landforms, geology and soils.** A topographic and physical feature survey of Amtali pourashava was conducted by the Sheltech consultants Pvt. Ltd. (SCPL) in 2009 to 2010. Amtali pourashava area is flat with slightly higher land at its central part; the lowest spot height is 1.17 m and the highest spot height is 3.4 m PWD.[4] Average height of land in Amtali is 1.67 m. A substantial part of the town (116 ha) is covered by water bodies like river, ponds, ditches and *khals*. Some water body areas especially ditches are not under water throughout the year. But some ponds have water all year round. These latter water bodies act as water reservoirs in the area.

34. **Climatic conditions.** Amtali has a tropical monsoon-type climate. January is the coolest month with temperatures averaging near 26 ºC (78 ºF) and April the warmest with temperatures from 33 to 36 ºC (91 to 96 ºF). The climate is one of the wettest in the world. Most places receive more than 1,525 mm of rain a year. Most rains occur during the monsoon (June-September) and little in winter (November-February). Amtali is subject to devastating cyclones, originating over the Bay of Bengal, in the periods of April to May and September to November. Often accompanied by surging waves, these storms can cause great damage and loss of life.

35. **Hydrology.** Normal tide level in the area is 2.69 m PWD as compared to the average elevation of the land here which is 1.67 m PWD. A number of *khals* run through the pourashava

[4] Public Works Datum (PWD) originally set to mean sea level with a vertical error of 0.45m. Observation wells and surface water gauges of Bangladesh Water Development Board (BWDB) were set using this datum. Normally, depths of water levels are measures with respect to this datum.

which serve as drainage arteries. There are approximately 20 km of drains in the pourashava. The drainage system is not well planned despite undergoing improvement as part of the DANIDA project. As the system is under-designed even with relatively little rainfall, the drains overflow. Minor flooding is observed during periods of heavy rain due to inadequate drainage. More severe flooding occurs when there is an extreme tide and water flows back up the drains.

36. **Groundwater availability and quality.** The hydro-geological investigation in Amtali pourashava carried out under the DPHE-DANIDA WSS Project shows underground water of sufficient quantity is available within the area. The water quality from all of the test results indicates that aquifer is confined and fully protected by an impermeable layer. The potential abstraction rate and acceptable water quality make the aquifer suitable for the pourashava's water supply.

37. **Air quality.** As there are no major air pollution sources, the air quality of Amtali pourashava, in general, is within acceptable limits. Currently, no air quality monitoring stations are in operation within the pourashava limit.

38. **Acoustic environment.** Subproject components are in the built-up part of Amtali, with residential, commercial, and institutional establishments. The volume of traffic that passes through these sections is not significant and traffic jams are not frequent. However vehicular movement can be considered as major cause of noise pollution.

## C. Biological Characteristics

39. **Flora and fauna.** Subproject components are located in Amtali urban area or in its immediate surroundings which were converted into urban use for years ago, and there is no natural habitat left at these sites. Animals and plants in the subproject area are those commonly found in urban and built-up areas. No endangered/protected species of either flora or fauna are found in the pourashava or its immediate surroundings.

40. **Protected areas.** There are no forest areas, wetlands, mangroves, or estuaries in or near the subproject sites. No natural forest exists in the subproject sites or in the surrounding areas.

## D. Socioeconomic Characteristics

41. **Population.** As recorded in the 2011 census, Amtali Pourashava had a population of 17,300 with 4,067 households giving an average household size of 4.3. The Pourashava officials led by the Mayor himself conveyed to the CDTA team on several occasions (FGDs, Workshops and consultation meetings) that population as estimated by the Pourashava is 23,272 with 4,713 households as in 2012. Information about the total number of households with average size and density per ward for 2011 and projected population up to 2050 is given in Table 7.

**Table 7: Amtali Pourashava Population Data**

| Amtali Pourashava | Area ($km^2$) | 2,011 | | | Projected | | | |
|---|---|---|---|---|---|---|---|---|
| | | Population | Household Average size | Density (per $km^2$) | 2020 | 2030 | 2040 | 2050 |
| Ward No. 01 | 1.50 | 1,011 | 4.5 | 1,774 | 3,231 | 4,205 | 5,472 | 7,121 |
| Ward No. 02 | 0.96 | 1,800 | 4.4 | 1,651 | 2,761 | 3,593 | 4,676 | 6,085 |
| Ward No. 03 | 0.86 | 2,718 | 4.2 | 4,118 | 1,861 | 2,422 | 3,152 | 4,102 |

| Amtali Pourashava | Area ($km^2$) | 2,011 | | | Projected | | | |
|---|---|---|---|---|---|---|---|---|
| | | Population | Household Average size | Density (per $km^2$) | 2020 | 2030 | 2040 | 2050 |
| Ward No. 04 | 0.36 | 2,662 | 4.3 | 1,823 | 2,960 | 3,852 | 5,013 | 6,524 |
| Ward No. 05 | 0.59 | 2,441 | 4.3 | 10,171 | 2,284 | 2,972 | 3,867 | 5,032 |
| Ward No. 06 | 0.59 | 1,901 | 4.2 | 5,138 | 4,362 | 5,677 | 7,388 | 9,611 |
| Ward No. 07 | 1.18 | 2,018 | 4.1 | 834 | 4,097 | 5,332 | 6,939 | 9,030 |
| Ward No. 08 | 0.88 | 1,648 | 4.3 | 1,288 | 2,994 | 3,896 | 5,070 | 6,598 |
| Ward No. 09 | 1.84 | 1,112 | 4.3 | 1,340 | 3,037 | 3,952 | 5,143 | 6,693 |
| **Total** | **8.75** | **17,311** | **4.3** | **1,941** | **27,587** | **35,901** | **46,720** | **60,796** |
| Growth Rate | | | | | 2.67% | 2.67% | 2.67% | 2.67% |

Source: PPTA Consultant.

42. **Land use.** A land use survey was conducted by SCPL to establish the current land use. The survey results shows that there is dominance of agricultural land (68%) followed by residential land (13%) and water bodies (13%). The survey clearly shows that the land use pattern does not reveal much urbanized land use. According to Amtali pourashava land use plan, the housing area is comprised of mixed residential, commercial, urban, semi-urban and rural homesteads, slums and squatters. Most of housing areas have developed in spontaneous and unplanned which resulted to quality of housing underprivileged and sub-standard. About 89% of the households at Amtali pourashava own their housing units.

43. **Type of community spread.** Amtali is composed of Muslim 92.45%, Hindu 6.60%, Christian 0.05%, Buddhist 0.86% and others 0.04%. Educational institutions in Amtali include 4 colleges, 2 collegiate schools, 27 high schools, 13 junior schools, 43 *madrasha* (any type of religious school or college for the study of the Islamic religion, though this may not be the only subject studied), 101 government primary schools, and 97 private primary school. Important among these are Amtali Degree College and Amtali Pilot High School established in 1969 and 1934, respectively.

44. **Existing provisions for pedestrians and other forms of transport.** Pourashava roads generally fall into two categories: *katcha* (earthen) construction and *pucca* (formed) roads. Formed roads are mainly black-topped (BT) asphalt roads with some concrete (CC) roads in a few places for main roads, while minor roads may also be brick-on-edge soling, known locally as herring bone bond (HBB). Nearly all roads are built above the existing ground level, not only to avoid inundation during storms, but as the silty loam and alluvial soils typical of the area compact easily, roads need a supporting base layer that is often built up to around one meter above ground level. Table 8 summarizes existing condition of roads in Amtali.

**Table 8: Existing Road Situations in Amtali**

| Town | Length of Road (km) | | | |
|---|---|---|---|---|
| | Earthen | BT & CC | HBB | Total |
| **Amtali** | 30.80 | 35.95 | 15.00 | 81.75 |

Source: PPTA Consultant.

45. Management Survey results reveal that there is no public or private bus service available for internal movement of passengers at Amtali. At present, there is no designated authority for the management of traffic at Amtali pourashava, the owners of the transport agencies decide about their routes and manage their traffic.

46. **Socio-economic status.** Poverty in Amtali as estimated during CDTA shows that the average monthly income of 25% of the households is less than Tk. 6,000. 55% of households

are in category 1 and 2, the ultra-poor[5] and poor, and can hardly manage two meals a day and suffer from food insecurity and malnutrition throughout the year. The middle-income group with income of Tk. 10,000 to 30,000 per month accounted for 30% of households in Amtali. People of this category are dependent on farming in their own land and/ or share cropping and earn additional income from small businesses. A study by the LGED showed that there is diversity of occupations in the Pourashava. The occupation pattern shows that agriculture, small business and education are the predominant occupations.

47. **Other existing amenities for community welfare.** 66% of the population in Amtali has attended school for six years or more. The socio-economic survey for Amtali revealed that prevalent diseases are either water borne or water related. The incidence of diarrhea, dysentery and jaundice were high. Other water related diseases included worm infections and skin diseases. This establishes a clear linkage with occurrences of water borne and water related diseases, and poor water and sanitation services and personal hygienic practices in the town. 186. During periods of flooding, drinking water sources are affected and contaminated as the piped network and hand pump tube wells become submerged. Consequently, the communities suffer from water-sanitation related diseases. Recently, Cyclones Sidr and Aila had a severe impact on public health, with phenomenal increases in cases of diarrheal, skin, and eye infection diseases.

48. **Cyclone shelter situation.** Research commissioned by the various development partners in Bangladesh,[6] shows that 13 types of cyclone shelters have been constructed in Bangladesh. Generally they all follow similar designs, using a framed structure that can withstand storm flows and high winds. A slightly raised unenclosed ground floor, either concrete or earth with external steps leading up to a roofed and walled first floor. This area provides the main protection from cyclones.

49. Two cyclone shelters are available in the Amtali, one in Ward 7 and the other in Ward 8 that can accommodate 300-400 people. Key issues[7] with existing cyclone shelters are (i) shelters are not located close to human settlements, particularly where the poor and vulnerable reside. This is a particular issue with those living outside embankments; (ii) approach roads do not have all-weather surfacing and thus access during cyclones, particularly at night, can be difficult. In addition, the crest level of the roads is often below flood levels, making access dangerous; (iii) structures have not been maintained, which is exacerbated by inadequate specifications and construction supervision. Wooden doors and windows rot, while steel hinges and frames rust, and concrete seem to have spalled revealing reinforcing bars which are also rusting; (iv) structures lack basic services such as water supply and sanitation facilities. If these are provided they are in poor condition and located at ground level, rendering them useless during cyclones. Power supply and backup is also lacking; (v) there are no separate sections for women or secure storage areas for personnel effects; (vi) as many shelters are not used apart from during cyclones, they are not maintained and even maintenance responsibilities sometimes seem unclear; and (vii) many shelters are located below road level and the ground floor is often in a shallow hollow that could be one of the first areas to flood. Inspection during

[5] Ultra poor: No fixed income with uncertain one full meal, no homestead; Poor: Irregular income with one fixed full meal may or may not have homestead; Middle income group: Involve in cultivation in own land/share cropping, depend on farming, and earn additional income from small business; Rich: Belongs to service holder, teacher, medium type business, remittance etc.

[6] Coastal Climate Resilient Infrastructure Project, TA 7902 – BAN, Annex N, Cyclone Shelters, kfW, ADB, IFAD, Sept 2012.

[7] Based upon findings from Coastal Climate Resilient Infrastructure Project, TA 7902 – BAN, Annex N, Cyclone Shelters, kfW, ADB, IFAD, Sept 2012.plus PPTA consultant's observations.

PPTA of existing shelters in Amtali confirmed these findings.

50. **Solid waste management situation.** Compared to many urban areas of South Asia, and Bangladesh, solid waste is not such a noticeable issue in the Amtali pourashava. This is notable, despite the fact that there is no formal solid waste management in the pourashava. No information is available on either solid waste generation or collection rates. The low waste generation can be mainly being attributed to (i) lower-incomes that create much higher levels of recycling plus the ban on plastic bags; (ii) waste produced is largely vegetable matter; (iii) the semi-rural nature of the Amtali's peripheral areas means that much of this waste is left in courtyards and gardens, and semi-composted into fertilizer with little waste actually reaching the waste stream; and (iv) waste that enters the waste stream and is collected, particularly construction waste and non-recyclable items, is mainly used as filling for low lying areas, which is an ongoing process. Previously, some NGOs were involved in solid waste management but are not currently active. As there has been no detailed analysis of solid waste generation rates in the PPTA study towns, information from Khulna[8] has been used to estimate solid waste generation rates. A study by Alamgir and Ahsan in 2007[9] in Khulna estimated that waste generation form different household income levels varied from 0.368 kg/capita/day (high income) to 0.203 kg/capita/day (low income) with an average of 0.297 kg/capita/day. This aligns closely with generation rates of medium sized urban cities in South Asia. Existing solid waste equipment and generation estimates in Amtali is outlined in Table 9. As can be seen from the table, assuming similar waste densities as in Khulna, the waste generation is still very low. While this calculation is only for domestic waste, the non-domestic waste is mainly commercial waste from shops and offices of which most is recycled. Hence, the table shows that the existing waste generated is very low and currently justifies the small sized solid waste trucks.

**Table 9: Existing Solid Waste Management and Generation Estimates**

| Town | Existing | | | | Generation Estimates | | |
|---|---|---|---|---|---|---|---|
| | Estimated Waste Generated | Disposal Equipment | Existing Disposal Site | Equipment | Waste Generated (tons per day) | 50% Waste Reaching Waste Stream (tons per day) | Volume ($m^3$/day) |
| Amtali | No record | 2 x 3-ton truck | 01 (dumpsite) | Truck -1 Rickshaw - Van -2 | 4.4 | 2.2 | 4.7 |

Source: PPTA Consultant. Estimate based upon data from Khulna.

51. Apart from medical waste, there is not much waste that is hazardous, such as used fluorescent tubes and batteries. Amtali has clinics and while some medical waste from the hospitals is disposed of in pits, much of the waste, particularly from small private clinics, enters the domestic solid waste stream. Amtali has no sanitary landfill and waste is just dumped in low lying areas. Identifying suitable landfill sites is the major issue with solid waste management in Amtali. Applying typical environmental norms for the location of a landfill site such as distance to habitation, surface and groundwater and free from flooding, etc, indicates that there are no suitable areas for landfill sites in the vicinity of Amtali.[10]

[8] Cities Development Initiative for Asia (CDIA), Support to Khulna City Corporation (KCC), Sector Report 4. Solid Waste Management, June 2009

[9] SAP 2008 contains substantial detailed information on waste generation in Khulna based Alamgir and Ahsan's work. Appendix C contains comparable data on waste generation from other cities in Bangladesh and Asia.

[10] Standard landfill site selection criteria will need to be modified if landfill sites are to be developed in the Stage 1 towns. This should not involve an environmental compromise as greater protection such as thicker lining to protect

52. **Slum situation.** Amtali pourashava has 6 slum areas (defined as areas where the inhabitants lack secure tenure, and are usually located on government land or private land where a rent may be paid). Estimated population in the slum areas is 1,850 or 6% of the total population of Amtali pourashava. Many slums are located on recently formed land that has emerged on the edge of existing polders, often outside the existing embankments such these slums are much more exposed to sea or river level fluctuations.

53. **Drainage and flood control.** Amtali pourashava is protected by from tidal flooding by a BWDB polder embankment on its west along the Payra River. The main drainage canal Basaki flows into the Payra or Buriswar River through a sluice gate at its outfall. The southern section of the Amtali River drains to Suhandi *khal* that is regulated 15 km away at Suhandi. The sluice gates are in a damaged condition and need repair and rehabilitation. The natural drainage flow near the existing launch terminals has been blocked by the construction of the polder by BWDB, which causes long time water congestion in the large area of the pourashava. The Amtali canal draining to the Payra River through the sluice gate in Ward 1 has been blocked by sand filling for Eid-gah. This has blocked the flowing canal and turned it into a large lake which inundates the surrounding area for a long time during rainfall in the monsoon. The residential areas suffer from extended periods of water logging due to the lack of drains with most areas within the pourashava. Frequent localized flooding is reported. The khals inside the polder have been silted up or encroached at several locations. During severe storm surges such as those associated with Cyclones Sidr and Aila, the embankments of the polder were breached or over topped to inundate the whole area of the pourashava.

54. **Water supply situation.** The existing water supply system of Amtali pourashava is shown in Figure 2. It covers Wards 4, 5, 6 and part of 2 and 3, which is only about 35% of the total urban area. 2 PTWs located in the compound of Amtali Degree College were installed by DANIDA in 1998 and currently being operated and maintained by the pourashava. Water is being stored in 1 OHT and pumped through existing 24 km distribution network. Water quality parameters are well below Bangladesh standards. Underground water of sufficient quantity is available within the area. The water quality from all of the test results indicates that aquifer is confined and fully protected by an impermeable layer. The potential abstraction rate and acceptable water quality make the aquifer suitable for the pourashava water supply.

55. **Sanitation situation.** The sanitary condition in Amtali pourashava is relatively poor. About 41.2% of the latrines are sanitary water sealed, 38.5% latrines are sanitary non-water sealed, 18.3% latrines are non-sanitary and 2% have no toilets. The majority of pit latrines are generally located in relatively low areas in the household. The latrines consists of 4/5 number of rings placed to the depth of around 3 to 4 feet in the ground; a platform is simply positioned on the upper most ring of the pit which is almost at the ground level. Consequently the latrines are easily getting inundated during monsoon flooding resulting in loss of accessibility to the latrine and pollution caused by discharge of the contents. Moreover the latrines are not well maintained; sludges from pits flow to nearby ditches or canals causing environmental and health hazards. There are few public toilets in Amtali but those are in worse condition as the pits/septic tanks and superstructures are mostly damaged, no arrangement for electricity and water supply, and lack of separate provision for girls. Most of the schools (primary schools, high schools and *madrashas*) have inadequate sanitation facilities with conditions similar to public toilets. There are no community latrines, sewerage system, or disposal and treatment facility in the

---

groundwater and embankments to prevent flooding will have to be constructed. The main issue is proximity to habitation and the increased costs of developing a landfill site that is both environmentally protected and resilient to climate change.

pourashava. It also does not have de- sludging equipment for cleaning latrines pits and septic tanks. As a result the pourashava dwellers themselves take the initiative of cleaning latrine pits and septic tanks mainly through sweepers. At present sweepers manually clean the latrines, and sludge is buried underground at the cost of Taka 500 to Taka 1,000 depending on the size of pit and septic tank.

### E. Historical, Cultural and Archaeological Characteristics

56. There are 2 historical places in Amtali: Tomb of Kazi Kalu at Tepura and clay fort at Chaora Patakata. The subproject components are not located in or near and excavation works will not be conducted in the vicinities of these sites.

57. There are no other 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. Though it is not a major religious/cultural destination, there is a graveyard at the location of one of the PTW and OHT, as well as religious properties along the transmission alignments. Efforts to avoid and minimize impacts on these areas and structures through slight alignment shifts shall be taken up as part of the detailed design. If unavoidable, impacts shall be addressed in consultation with the affected groups as per provisions of the resettlement plan (RP) for common properties.

## V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS

### A. Methodology

58. 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. 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.

### B. Screening Out Areas of No Significant Impact

59. From the preliminary design and results of the rapid environmental assessment, it is clear that implementation of Amtali water supply subproject will not have major negative impacts because activities will be localized/site-specific and short in duration, corridors of impact during pipe laying works will be on existing public ROWs, and construction will be conducted within a relatively small area. Because of these there are several aspects of the environment that are not expected to be affected by the subproject (Table 10) thus can be screened out of the assessment at this stage but will be assessed again during detailed design stage and before implementation.

**Table 10: 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 PTWs sites and along public ROWs. |
| Climatic conditions | Short-term production of dust is the only effect on atmosphere. |

| Field | Rationale |
|---|---|
| | 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 Amtali pourashava will not cause direct impact on biodiversity values. Based on preliminary designs, construction activities do not anticipate any cutting of trees (to be reassessed during detailed design stage) |
| **C. Socioeconomic Characteristics** | |
| Land use | No alteration on land use. PTWs 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.<br>Manpower will be required during the 24-months construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive 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 Amtali pourashava 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. 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 2 historical sites. |

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

60. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. Locations and siting of the proposed infrastructures were considered to further reduce impacts. 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.

61. The concepts considered in design of Amtali water supply subproject are: (i) demand for new piped water supply; (ii) maximum population coverage with pipe layout mostly in residential areas and areas of high growth rate; (iii) avoidance of water-use conflicts; (iv) 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 (iv) 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.

62. Possible actions to mitigate against the main projected effects of climate change on water supply infrastructure and service are described in Table 11. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Amtali water supply subproject, including: (i) structural protection of facilities from future floods; (ii) location of components where there is no risk of flooding or other hazards; and (iii) 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.

**Table 11: Possible Actions to Mitigate against Projected Effects of Climate Change on Water Supply Infrastructure and Improve Climate Resilience**

| Climate Change Effect | Mitigation Measures | Remarks |
|---|---|---|
| Increased rainfall quantity and runoff<br><br>Sea level rise (SLR)<br><br>Increased frequency of severe cyclones<br><br>Rising temperatures<br><br>Flooding | - include future increased water demand due to temperature rise | It is recommended to take into account a 15% increased water demand due to temperature rise prediction (1.2 to 2.4 ºC by 2050) in addition to that due to increase of population and future demand. |
| | - protect water supply infrastructure such as PTW, pump house etc. from flooding due to intensive rainfall. | It is recommended to keep the upper well casing of tube well 1.5 m extended from the ground so that floodwater cannot move inside the well. The pump house will be constructed above flood level. |
| | - superstructures to be strong to cope with cyclone | It is recommended to take into account cyclonic strong wind during detailed design of the structures. |
| | - provide emergency power back up | A generator is included in the subproject to keep water supply operational if normal power supply gets interrupted/stopped from the national grid during cyclones/storms. |

Source: PPTA Consultant.

63. **Land acquisition and resettlement.** The proposed PTWs and OHT will be located in government-owned lands. There are no encroachers or residential/commercial structures within the identified land. Cutting of trees, if required based on detailed design, will be minimized.

Compensatory plantation for trees lost at a rate of 10 trees for every tree cut will be implemented by the contractor, who will also maintain the saplings for the duration of his contract.

64. **Impacts of groundwater abstraction.** Underground water of sufficient quantity is available within the area. The water quality from all of the test results indicates that aquifer is confined and fully protected by an impermeable layer. The potential abstraction rate is considered not to adversely impact the aquifer and is not envisaged to cause land subsidence or salinity intrusion.

65. **Impacts of transmission mains and distribution network.** A 0.5 m-wide, 37 km-long corridor on public ROWs is proposed to accommodate the transmission mains and distribution network. The alignment passes through agriculture fields and low-lying areas. There are no environmentally sensitive areas in the vicinity of the proposed transmission main/access road. Traffic management plans and spoil management plans will be prepared as part of the detailed designs.

## D. Anticipated Impacts and Mitigation Measures – Construction Phase

66. 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.

67. **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. The excavation will be done in such a way that there will be a minimum depth of 1 m above the pipes. 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.

68. 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.

69. 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 Amtali 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, Amtali 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 12).

## Table 12: 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.<br>- 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. 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 (Appendix 3).<br>- Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Amtali local authority on designated disposal areas.<br>- 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.<br>- 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.<br>- Take all precautions to minimize the wastage of water in the construction activities.<br>- 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.<br>- Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas.<br>- While working across or close to any water body, 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.<br>- 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;<br>- Use tarpaulins to cover soils, sand and other loose material when transported by trucks.<br>- Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free.<br>- 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).<br>- Monitor air quality. |
| Acoustic environment | Construction activities will be on settlements, along and near | - Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be |

| Field | Impacts | Mitigation Measures |
|---|---|---|
| | 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. | scheduled to avoid sensitive times.<br>- Plan activities in consultation with Amtali 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.<br>- Use of high noise generating equipment shall be stopped during night time.<br>- Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;<br>- 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.<br>- All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required).<br>- 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.<br>- 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.<br>- 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 | Based on preliminary design construction activities do not anticipate any cutting of trees (to be reassessed during detailed design stage) 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<br>- Remove all construction and demolition wastes on a daily basis.<br>- Coordinate with Amtali local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas. Avoid stockpiling of any excess spoils.<br>- 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.<br>- Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses.<br>- 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.<br>- 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 Amtali pourashava. 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.<br>- All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees.<br>- Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation.<br>- 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. |

| Field | Impacts | Mitigation Measures |
|---|---|---|
| | | - Prohibit employees from poaching wildlife and cutting of trees for firewood.<br>- Implement compensatory plantation for trees lost at a rate of 10 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 (Appendix 4)<br>- Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites.<br>- Maintain safe passage for vehicles and pedestrians throughout the construction period.<br>- Schedule truck deliveries of construction materials during periods of low traffic volume.<br>- Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required.<br>- Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints.<br>- Leave spaces for access between mounds of soil.<br>- Provide walkways and metal sheets where required to maintain access across for people and vehicles.<br>- Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools.<br>- 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.<br>- 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 24-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.<br>- Secure construction materials from local market. |
| 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 Amtali pourashava 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 | - Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible;<br>- Integrate construction of the various infrastructure subprojects to be conducted in Amtali (roads, water supply, 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.<br>- 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.<br>- Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites.<br>- 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.<br>- If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served |

| Field | Impacts | Mitigation Measures |
|---|---|---|
| | measures. | 7 days in advance and again 1 day prior to start of construction.<br>- 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.<br>- 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.<br>- Consult with Amtali local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials.<br>- 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.<br>- 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.[11]<br>- Under no circumstances may open areas or the surrounding bushes be used as a toilet facility.<br>- Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged.<br>- 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 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.<br>- 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.<br>- 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 | - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers' health and safety (H&S).<br>- 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 |

[11] 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.

| Field | Impacts | Mitigation Measures |
|---|---|---|
| | and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. | environmental or social behavior that are unclear.<br>- 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[12] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.<br>- Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances<br>- 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.<br>- Provide medical insurance coverage for workers;<br>- 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;<br>- 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;<br>- Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;<br>- Ensure moving equipment is outfitted with audible back-up alarms;<br>- 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<br>- Disallow worker exposure to 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 | - Stop work immediately to allow further investigation if any finds are suspected. |

[12] 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.

| Field | Impacts | Mitigation Measures |
|---|---|---|
| | 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. | |

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

70. In the operations and maintenance (O&M) phase, the water supply system will operate with routine maintenance, which should not affect the environment. 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 Amtali local authority, which will be given training by this project.

71. 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.

72. **Hazardous chemicals use and storage.** Water treatment at PTWs and OHT prior to distribution may involve the use of chemicals for 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 PTWs and OHT include (i) 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.

73. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 13).

**Table 13: Anticipated Impacts and Mitigation Measures – O&M Phase**

| Field | Impacts | Mitigation Measures |
|---|---|---|
| **A. Physical Characteristics** | | |
| Air quality | Air emissions from PTWs 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.<br>- 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.<br>- Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruptions in supply.<br>- Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures. |

| Field | Impacts | Mitigation Measures |
|---|---|---|
| | | - 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 Amtali 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 Amtali 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.<br>- 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 PTWs and OHT. 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.<br>- Ensure that all site personnel have a basic level of H&S training.<br>- 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[13] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.<br>- Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances<br>- 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;<br>- Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;<br>- 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.<br>- 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. |

## F. Cumulative Impact Assessment

74. The cumulative impact assessment examined the interaction between the subproject's

[13] 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.

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 is reasonably foreseeable and sufficiently certain to proceed.

75. The project has identified the valued components as water quality, air quality, acoustic environment, socioeconomic and socio-community components, and human health and safety. There are no foreseeable projects that will overlap with the subproject. The spatial boundary of the subproject is the area along alignment of the drainage and flood control structures. The temporal boundary can be considered as the whole Amtali pourashava.

76. **Water quality.** 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 subproject. Short-term negative impacts considering climate change resilience measures are the same but with increased demand for construction materials and time to complete the works. Potential long-term environmental impacts are positive; including: (i) mainstreaming climate risk reduction into infrastructure development ensures subprojects infrastructure are less vulnerable to floods, storm surge, landslides and impacts of other extreme weather events. (ii) improved climate change data management and availability resulting to improved risk assessment; (iii) improved environmental planning guidelines and procedures will be improved, and (iv) evidence-based decision making, with the application of climate impact and screening procedures emphasized as part of environmental assessment. 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.

77. **Air quality.** Emissions of common air contaminants and fugitive dust may be elevated in proximity to active work sites during construction and O&M phases, these impacts will be short-term and localized to the immediate vicinity of drainage and flood control structures. Greenhouse gas (GHG) emissions may increase as a result of the subproject activities (i.e., vehicle and equipment operation, concrete production, disposal of excavated material, landfilling of residual wastes). Given the subproject's relatively minor contribution to common air contaminants and GHG emissions during construction, the overall significance rating of both these potential residual effects is considered to be negligible.

78. **Acoustic environment.** Noise levels during construction and O&M activities in immediate proximity of work sites are expected to increase. The duration of exposure will be relatively brief and imperceptible. The exposure represents a temporary, localized, adverse residual effect of low significance for affected receptors. While building damage due to ground vibrations is unlikely, there may be annoyance to spatially located receptors during construction and O&M activities. The overall significance rating of potential residual effects is considered to

be negligible.

79. **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 Amtali pourashava. This can be considered a long-term cumulative benefit of the subproject.

80. Given the scale of the project it is likely that large numbers of 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[14] groups.

81. Upon completion of the project, the socio-community will be the major beneficiaries of this subproject. 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, 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.

82. **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.

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

## VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

### A. Public Consultation Conducted

84. The public participation process included (i) identifying interested and affected parties (stakeholders); (ii) informing and providing the stakeholders with sufficient background and technical information regarding the proposed development; (iii) creating opportunities and

[14] 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.

mechanisms whereby they can participate and raise their viewpoints (issues, comments, and concerns) with regard to the proposed development; (iv) giving the stakeholders feedback on process findings and recommendations; and (v) ensuring compliance to process requirements with regards to the environmental and related legislation.

85. Public consultations and focus group discussions (FGDs) were conducted by PPTA on 22 June 2013. The objective of the meetings was to appraise the stakeholders about environmental and social impacts of the proposed subproject and safeguards to mitigate the same. A questionnaire was designed and environmental information was collected. Key respondents included project-affected persons, who may suffer temporary access disruptions during construction activities, shopkeepers/businessmen from the subproject area, and daily commuters consulted randomly. Issues discussed and feedback received along with details of date, time, location, and list of participants are given in Appendix 5. The environmental concerns and suggestions made by the participants were listed, and discussed, and suggestions accordingly incorporated in the EMP.

### B. Future Consultation and Disclosure

86. This IEE and other relevant documents will be made available at public locations in the pourashava and posted on the websites of executing agencies and ADB. The consultation process will be continued and expanded during the project implementation to ensure stakeholders participate fully in project execution, as well as to implement comprehensive information, education, and communication plan.

87. The public consultation and disclosure program with all interested and affected partied will remain a continuous process throughout the project implementation, and shall include the following:

(i) **Consultations during construction phase:** (a) public meetings with affected communities to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and (b) smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and to provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

(ii) **Project disclosure:** (a) public information campaigns (via newspaper, flyers, and media) to explain the project to the wider city population and prepare them for disruptions they may experience once construction is underway; (b) public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in local language; (c) formal disclosure of completed project reports by making copies available at convenient locations in the study areas, and informing the public of their availability; and (d) providing a mechanism through which comments can be made.

88. For the benefit of the community, the summary of the IEE will be translated in the local language and made available at (i) offices of executing and implementing agencies, (ii) area offices, (iii) consultant teams' offices; and (iv) contractor's campsites. It will be ensured that the hard copies of IEE are kept at places which are conveniently accessible to people, as a means to disclose the document and at the same time creating wider public awareness. An electronic version of the IEE will be placed in the official website of executing and implementing agencies and the ADB website after approval of the IEE by ADB.

# VII. GRIEVANCE REDRESS MECHANISM

89. 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.

90. **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.

91. Pourashava-wide public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the campaign. The project implementation unit (PIU) safeguards assistant and institutional capacity and community development consultants (ICCDC) that 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 PIU safeguards assistant to help ensure that their grievances are addressed.

92. 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 project management unit (PMU) safeguards 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 safeguards assistant.

93. **Grievance redress process.** In case of grievances that are immediate and urgent in the perception of the complainant, the contractor and supervision personnel from the project management and supervision consultants (PMSC) on-site 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 safeguards assistant, contractors, PMU safeguards officer, PMSC environmental and social safeguards specialists will be posted at all construction sites at visible locations.

(i) **1st Level Grievance.** The contractors, PIU supervision personnel and PIU safeguards assistant can immediately resolve issues on-site in consultation with each other, and will be required to do so within 3 days of receipt of a complaint/grievance. Assistance of ward level coordination committees (WLCC) will be sought if required for resolution of the issue, by any one or all of them jointly.

(ii) **2nd Level Grievance.** All grievances that cannot be redressed within 3 days at field/ward level will be jointly reviewed by the grievance redress committee (GRC) at town-level and PIU safeguards assistant (the second level of grievance redress), who

will attempt to resolve them within 7 days.[15] The PIU safeguards assistant will be responsible to see through the process of redressal of each grievance.

(iii) **3rd Level Grievance.** The PIU safeguards assistant will refer any unresolved or major issues to the PMU safeguards officer and PMSC (third level of grievance redress), who will resolve them within 15 days.

(iv) **4th Level Grievance.** Very major issues that are beyond the jurisdictional authority of the GRC or those that have the potential to cause social conflicts or environmental damage or those that remain unresolved at PMU level, will be referred to the project steering committee (PSC)[16]. All paperwork (details of grievances) needs to be completed by the PIU safeguards assistant and circulated to the respective WLCC, GRC and PSC members at least a week in advance of the scheduled meetings. All decisions taken by the GRC and PSC will be communicated to the APs by the PIU safeguards assistant.

94. 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.

95. 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.

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

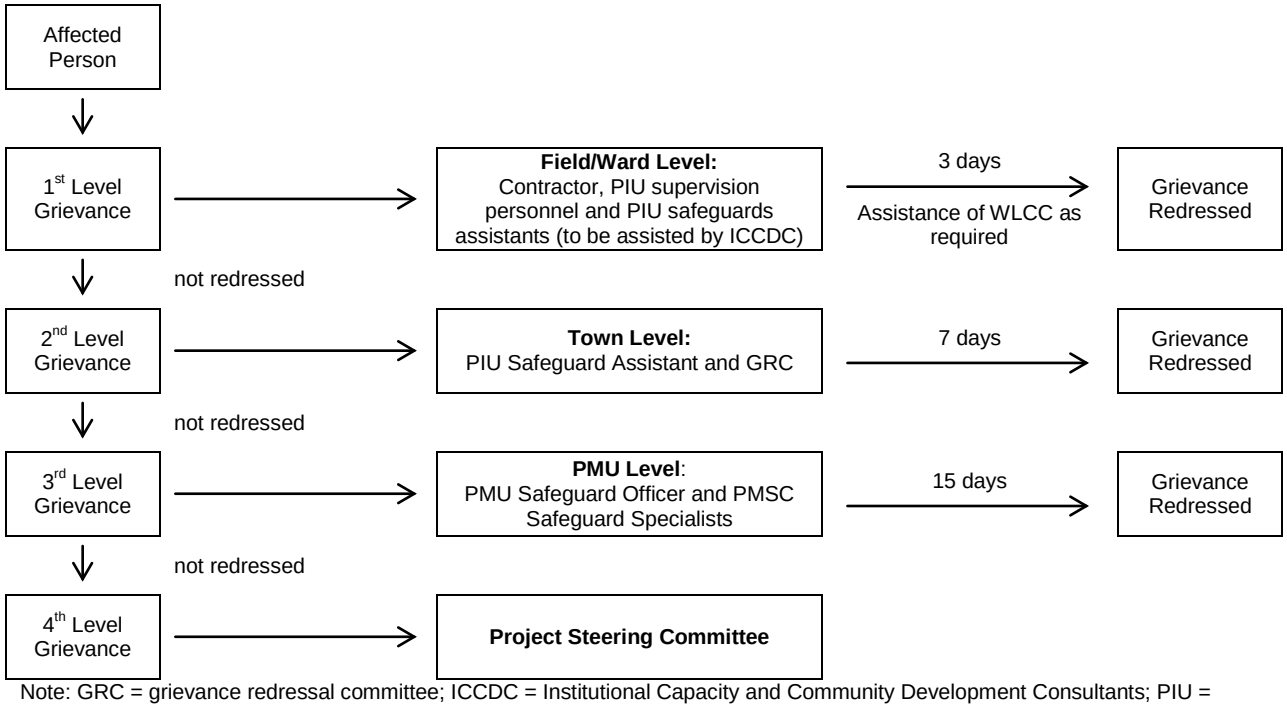
97. **Periodic review and documentation of lessons learned.** The PMU safeguard officer will periodically review the functioning of the GRM in each town and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

[15] Grievance redress committees (GRC) have already been formed at town-level. For example in Pirojpur pourashava, the GRC comprises: Panel Mayor as Chairperson, and 1 councilor, the pourashava Executive Engineer, Secretary pourashava and pourashava administrative officer, as members. All town-level GRCs shall have at least one woman member/chairperson and AP representative or independent NGO as committee member. In addition, for project-related grievances, representatives of APs, community-based organizations (CBOs), and eminent citizens must be invited as observers in GRC meetings.

[16] The project steering committee (PSC) responsible for grievance redress will have the following as members: Secretary, Local Government Department, as chair; Chief Engineer, LGED; Chief Engineer, DPHE; Project Director, member secretary; General Economic Division, Planning Commission; Physical Planning, Water Supply and Housing (PPWS&H) Sector, Planning Commission; Representative of Implementation, Monitoring, and Evaluation Division of the Ministry of Planning; Representative of Economic Relations Division and Finance Division of the Ministry of Finance; Representative of Ministry of Environment and Forest (Climate Change Unit); Representative of Bangladesh Water Development Board (BWDB); Urban Development Directorate; Disaster Management Bureau; representatives of pourashavas (mayor, engineer, secretary/ chief executive officer, LGD engineer, DPHE engineer) and special invitees to advise the committee on technical issues.

98. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the concerned PIU at town-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 5: Grievance Redress Process**




Note: GRC = grievance redressal committee; ICCDC = Institutional Capacity and Community Development Consultants; PIU = project implementation unit; PMSC = project management and supervision consultants; PMU = project management unit; WLCC = ward level coordination committee

## VIII. ENVIRONMENTAL MANAGEMENT PLAN

99. 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.

100. 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.

101. 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. Safeguard Implementation Arrangement

102. **Executing Agency.** LGED will be the lead EA for the project, and DPHE will be a co-executing agency (for water supply and sanitation). A PMU will be established in LGED.

103. **Project Management Unit.** The PMU will be staffed with a safeguards officer and will receive support from safeguards specialists (environment and resettlement) on the DDS and PMSC consultant team. Key tasks and responsibilities of the PMU safeguards 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.

104. **Implementing Agencies.** The participating pourashavas will be the IAs, and will establish a PIU within the pourashava structure.

105. **Project Implementation Unit.** The PIU will be staffed with a safeguards officer and will receive support from the PMU safeguards officer and safeguards specialists (environment and resettlement) on the DDS and PMSC consultant team. Key tasks and responsibilities of the PMU safeguards officer are as follows:

(i) include IEEs/EMPs in bidding documents and civil works contracts;
(iv) oversee day-to-day implementation of EMPs by contractors including compliance with all government rules and regulations;

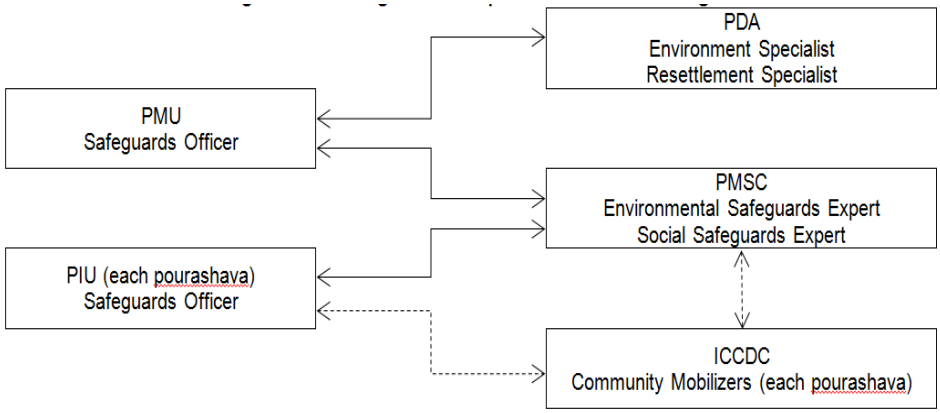
(v) take necessary action for obtaining rights of way;
(vi) oversee implementation of EMPs including environmental monitoring by contractors;
(vii) take corrective actions when necessary to ensure no environmental impacts;
(viii) submit monthly environmental monitoring reports to PMU,
(ix) conduct continuous 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.

106. The community mobilizers in the Institutional Capacity and Community Development Consultants (ICCDC) will be responsible for formation of water and sanitation user groups identify follow-up actions to ensure sustainability of user groups formed; and implement and follow-up on behavioral change, 3R and WASH programs;[17]

107. **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 environment supervisor to ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract.

108. The government will ensure that bidding and contract documents include specific provisions requiring contractors to comply with all: (i) applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities, on (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste, and on (c) elimination of forced labor; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS to employees and local communities surrounding the project sites.

Figure 6: Safeguards Implementation Arrangement




[17] Reduce, reuse and recycle (3R) and water, sanitation, and hygiene program (WASH)

**Table 14: 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** | | | | | | |
| 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.<br>- Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc.<br>- Include in detailed design drawings and documents all conditions and provisions if necessary | PMU, PIU, PDA detailed design consultants, and PMSC | 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.<br><br>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC. |
| Existing utilities | Disruption of services. | - Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction activities<br>- Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.<br>- Require contractors to prepare spoils management plan (Appendix 3) and traffic management plan (Appendix 4) | PMU, PIU, PDA and PMSC | - List of affected utilities and operators;<br>- Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), spoil management plan (Appendix 3), and traffic management plan (Appendix 4) | During detailed design phase<br><br>- Review of spoils management plan: Twice (once after first draft and once before final approval) | No cost required.<br><br>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC. |
| Construction work camps, hot mix plants, stockpile | Disruption to traffic flow and sensitive | - Determine locations prior to award of construction contracts. | PMU, PIU, PDA and PMSC | (i) List of selected sites for construction work | During detailed design phase | No cost required.<br><br>Mitigation |

| Field | Impacts | Mitigation Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| areas, storage areas, and disposal areas. | receptors | | | camps, hot mix plants, stockpile areas, storage areas, and disposal areas.<br>(ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land | | measures are included as part of TOR of PMU, PIU, PDA and PMSC. |
| 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, PDA and PMSC | (i) List of approved quarry sites and sources of materials;<br>(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.<br><br>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC. |
| 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)<br>(ii) Posting of proof of completion at worksites<br>(iii) 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.<br><br>Other costs responsibility of contractor. |
| **2. During Construction Activities** | | | | | | |
| **A. Physical Characteristics** | | | | | | |
| Topography, landforms, | Significant amount of gravel, | - Utilize readily available sources of materials. If contractor procures | Construction Contractor | - Records of sources of | Monthly by PIU | Cost for implementation of |

| Field | Impacts | Mitigation Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| geology and soils | 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. | materials from existing burrow pits and quarries, ensure these conform to all relevant regulatory requirements.<br>- 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. | | materials | | mitigation measures responsibility of 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. The impacts are negative but short-term, site-specific within a relatively small | - Prepare and implement a spoils management plan (Appendix 3).<br>- Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Amtali local authority on designated disposal areas.<br>- 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.<br>- 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.<br>- Take all precautions to minimize the wastage of water in the | Construction Contractor | - Areas for stockpiles, storage of fuels and lubricants and waste materials;<br>- Number of silt traps installed along trenches leading to water bodies;<br>- Records of surface water quality inspection;<br>- Effectiveness of water management measures;<br>- No visible degradation to nearby drainages, *khals* or water | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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 |
|---|---|---|---|---|---|---|
| | area and reversible by mitigation measures. | construction activities.<br>- 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.<br>- Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas.<br>- While working across or close to any water body, 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.<br>- Monitor water quality according to the environmental management plan. | | bodies due to construction activities | | |
| 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 | - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather;<br>- Use tarpaulins to cover soils, sand and other loose material when transported by trucks.<br>- Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free.<br>- 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). | Construction Contractor | - Location of stockpiles;<br>- Number of complaints from sensitive receptors;<br>- Heavy equipment and machinery with air pollution control devices;<br>- Certification that vehicles are compliant with air quality standards. | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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 |
|---|---|---|---|---|---|---|
| | and work near the sites. The impacts are negative but short-term, site-specific within a relatively small area and reversible by 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 | - Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times.<br>- Plan activities in consultation with Amtali 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.<br>- Use of high noise generating equipment shall be stopped during night time.<br>- Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;<br>- 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.<br>- All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required).<br>- Monitor noise levels. Maintain maximum sound levels not | Construction Contractor | - Number of complaints from sensitive receptors;<br>- Use of silencers in noise-producing equipment and sound barriers;<br>- Equivalent day and night time noise levels | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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 |
|---|---|---|---|---|---|---|
| | relatively small area and reversible by mitigation measures. | exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.<br>- 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.<br>- 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 | Based on preliminary design construction activities do not anticipate any cutting of trees (to be reassessed during detailed design stage) 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 | - Prepare a debris disposal plan<br>- Remove all construction and demolition wastes on a daily basis.<br>- Coordinate with Amtali local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas. Avoid stockpiling of any excess spoils.<br>- 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.<br>- Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses.<br>- 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 | Construction Contractor | - Number of complaints from sensitive receptors;<br>- Worksite clear of hazardous wastes such as oil/fuel<br>- Worksite clear of any wastes, collected materials from drainages, unutilized materials and debris<br>- Transport route and worksite cleared of any dust/mud | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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 |
|---|---|---|---|---|---|---|
| | negative but short-term, site-specific within a relatively small area and reversible by mitigation measures. | other suitable materials prior to the beginning of construction.<br>- 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 Amtali pourashava. 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.<br>- All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees.<br>- Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation.<br>- 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.<br>- Prohibit employees from poaching wildlife and cutting of trees for firewood.<br>- Implement compensatory plantation for trees lost at a rate of 10 trees for every tree cut. Maintain the saplings for the duration of contract. | 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)<br>- Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc. | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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. |
| **C. Socioeconomic Characteristics** | | | | | | |

| Field | Impacts | Mitigation Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| 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 (Appendix 4)<br>- Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites.<br>- Maintain safe passage for vehicles and pedestrians throughout the construction period.<br>- Schedule truck deliveries of construction materials during periods of low traffic volume.<br>- Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required.<br>- Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints.<br>- Leave spaces for access between mounds of soil.<br>- Provide walkways and metal sheets where required to maintain access across for people and vehicles.<br>- Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools.<br>- 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.<br>- Ensure any damage to properties | Construction Contractor | - Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 4);<br>- Number of complaints from sensitive receptors;<br>- Number of signages placed at project location<br>- Number of walkways, signages, and metal sheets placed at project location | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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 |
|---|---|---|---|---|---|---|
| | | and utilities will be restored or compensated to pre-work conditions. | | | | |
| Socio-economic status | Manpower will be required during the XXX-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.<br>- Secure construction materials from local market. | Construction Contractor | - Employment records;<br>- Records of sources of materials<br>- Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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 Amtali pourashava where there are a variety of human activities, will result to impacts to the sensitive receptors such as residents, businesses, and the community in | - Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible;<br>- Integrate construction of the various infrastructure subprojects to be conducted in Amtali (roads, water supply, 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.<br>- 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.<br>- Existing infrastructure (such as water distribution pipes, electricity | Construction Contractor | - Utilities Contingency Plan<br>- Number of complaints from sensitive receptors | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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 |
|---|---|---|---|---|---|---|
| | 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. | pylons, etc.) shall be relocated before construction starts at the subproject sites.<br>- 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.<br>- 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.<br>- 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.<br>- 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.<br>- Consult with Amtali local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials.<br>- 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.<br>- Use small mechanical excavators | Construction Contractor | - Number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 4);<br>- Number of complaints from sensitive receptors;<br>- Number of walkways, signages, and metal sheets placed at project location<br>- Agreement between | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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 |
|---|---|---|---|---|---|---|
| | | to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.[18]<br>- Under no circumstances may open areas or the surrounding bushes be used as a toilet facility.<br>- Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged.<br>- 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 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.<br>- Interested and affected parties need to be made aware of the existence of the complaints book | | landowner and contractors in case of using private lands as work camps, storage areas, etc. | | |

[18] 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.

| Field | Impacts | Mitigation Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| | | 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.<br>- 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 | - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers' health and safety (H&S).<br>- 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.<br>- 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 | Construction Contractor | - Site-specific H&S Plan<br>- Equipped first-aid stations<br>- Medical insurance coverage for workers<br>- Number of accidents<br>- Records of supply of uncontaminated water<br>- Condition of eating areas of workers<br>- Record of H&S orientation trainings<br>- Use of personal | - Visual inspection by PIU and supervision consultants on monthly basis<br><br>- 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 |
|---|---|---|---|---|---|---|
| | mitigation measures. | times; (iii) providing H&S training[19] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.<br>- Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances<br>- 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.<br>- Provide medical insurance coverage for workers;<br>- 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;<br>- 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 | | protective equipment<br>- % of moving equipment outfitted with audible back-up alarms<br>- Permanent sign boards for hazardous areas<br>- Signages for storage and disposal areas<br>- Condition of sanitation facilities for workers | | |

[19] 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.

| Field | Impacts | Mitigation Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| | | do not enter hazard areas unescorted;<br>- Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;<br>- Ensure moving equipment is outfitted with audible back-up alarms;<br>- 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<br>- Disallow worker exposure to 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 | - 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<br><br>- Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject | 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 |
|---|---|---|---|---|---|---|
| | 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. | | | | components | |
| **E. Others** | | | | | | |
| Submission of EMP implementation report | Unsatisfactory compliance to EMP | (i) Appointment of supervisor to ensure EMP implementation<br>(ii) Timely submission of monitoring reports including pictures | Construction contractor | - Availability and competency of appointed supervisor<br>- Monthly report | - Monthly monitoring report to be submitted by PIU to PMU<br>- 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 construction materials | (i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and<br>(ii) All excavated roads shall be reinstated to original condition.<br>(iii) All disrupted utilities restored<br>(iv) All affected structures rehabilitated/compensated<br>(v) 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.<br>(vi) All hardened surfaces within the construction camp area shall be | Construction Contractor | PMU/PIU report in writing 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 | - Prior to turn-over of completed works to pourashava | 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 |
|---|---|---|---|---|---|---|
| | | 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.<br>(vii) The contractor must arrange the cancellation of all temporary services.<br>(viii) Request PMU/PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work. | | is satisfactory. | | |

## Table 15: 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** | | | | | | |
| Air quality | Air emissions from PTWs operations may include gaseous or volatile chemicals used for disinfection processes (e.g., chlorine and ammonia). | - Store sodium hypochlorite in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials.<br>- 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.<br>- Isolate ammonia storage and feed areas from chlorine and hypochlorite storage and feed areas.<br>- Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent | Amtali pourashava | - No complaints from sensitive receptors<br>- Inventory of chemicals<br>- Air emission monitoring<br>- Record of chemical-related accidents | - Daily inspection by PTW operator at storage areas of chemicals<br><br>- 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 |
|---|---|---|---|---|---|---|
| | | disruptions in supply.<br>- Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures.<br>- 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 Amtali 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. | Amtali pourashava | - No complaints from sensitive receptors | Duration of repair work | Included in O&M cost |
| Biodiversity | Activities in the built-up area of Amtali 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.<br>- Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal). | Amtali 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. | - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S.<br>- Ensure that all site personnel have a basic level of H&S training.<br>- Produce and implement a O&M | Amtali pourashava | - No complaints from sensitive receptors<br>- No complaints from workers related to O&M activities | - Duration of repair work<br>- Daily inspection | Included in O&M cost |

| Field | Impacts | Mitigation Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| | Potential impacts are negative and long-term but reversible by mitigation measures. | 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[20] for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.<br>- Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances<br>- 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;<br>- Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;<br>- 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 | | - Zero accident | | |

[20] 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.

| Field | Impacts | Mitigation Measures | Responsible for Implementation | Monitoring Indicator | Frequency of Monitoring | Cost and Source of Funds |
|---|---|---|---|---|---|---|
| | | public as appropriate.<br>- 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. | | | | |

## B. Environmental Monitoring Program

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

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

110. In addition to regular monitoring onsite by PIU and PMSC on the EMP implementation of the mitigation measures, monitoring of key environmental parameters is proposed. Table 13 presents the 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.

**Table 16: Environmental Monitoring Program**

| | Field | Stage | Parameters | Location | Frequency | Standards | Responsibility |
|---|---|---|---|---|---|---|---|
| 1. | Air quality | - Prior to construction to establish baseline<br>- Construction phase | SPM<br>PM2.5<br>PM10<br>SO2<br>NOx<br>CO | - PTWs location<br>- OHT location<br>- Along water transmission main 1-km interval from PTWs<br>- 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<br>- Construction phase | Equivalent day and night time noise levels | - PTWs location<br>- OHT location<br>- Along water transmission main 1-km interval from PTWs<br>- 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<br>- Construction phase | TDS, TSS, pH, hardness, BOD, fecal 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 PDA and PMSC) | 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 |

| | Field | Stage | Parameters | Location | Frequency | Standards | Responsibility |
|---|---|---|---|---|---|---|---|
| 4. | Survival rate of landscaping, tree plantation | O&M phase | Survival rate | In the areas where replantation/ landscaping proposed | Twice a year for 2 years | - | Amtali pourashava |

## C. Institutional Capacity Development Program

111. The PMSC environmental safeguards 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 17.

**Table 17: Training Program for Environmental Management**

| Description | Contents | Schedule | Participants |
|---|---|---|---|
| **Pre-construction stage** | | | |
| Orientation workshop | **Module 1 – Orientation**<br>- ADB Safeguards Policy Statement<br>- Government of Bangladesh Environmental Laws and Regulations<br><br>**Module 2 – Environmental Assessment Process**<br>- ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements<br>- Review of environmental assessment report to comply with ADB requirements<br>- Incorporation of EMP into the project design and contracts | 1 day | LGED, DPHE, PMU, and PIUs officials involved in the project implementation |
| **Construction stage** | | | |
| Orientation program/ workshop for contractors and supervisory staff | - Roles and responsibilities of officials/contractors/consultants towards protection of environment<br>- Environmental issues during construction<br>- Implementation of EMP<br>- Monitoring of EMP implementation<br>- Reporting requirements | 1 day | PMU<br>PIUs<br>Contractors |
| Experiences and best practices sharing | - Experiences on EMP implementation – issues and challenges<br>- Best practices followed | 1 day on a regular period to be determined by PMU, PIUs, and PMSC | PMU<br>PIUs<br>Contractors |

## D. Staffing Requirement and Budget

112. 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.

113. 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 PMSC environmental management specialist assisted by the PMU environment officer. The PDA environmental management specialist will update the IEE as necessary and perform tasks as specified in the TOR. Therefore no separate budget required for PMSC environment management specialist.

114. 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.

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

116. The indicative costs of EMP implementation are shown in Table 18.

**Table 18: Indicative Cost of EMP Implementation**

| | Particulars | Stages | Unit | Total Number | Rate (Taka) | Cost (Taka) | Cost covered by |
|---|---|---|---|---|---|---|---|
| **A.** | **Mitigation Measures** | | | | | | |
| 1. | Compensatory plantation measures | Construction | Per tree | 50 | 1,500 | 75,000 | Civil works contract |
| **B.** | **Monitoring Measures** | | | | | | |
| 1. | Air quality monitoring | - Pre-construction<br>- Construction | Per location | 20 | 30,000 | 60,000 | Civil works contract |
| 2. | Noise levels monitoring | - Pre-construction<br>- Construction | Per location | 20 | 10,000 | 200,000 | Civil works contract |
| **C.** | **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 | Module 1 – immediately upon engagement of the PMSC environmental safeguards specialist<br><br>Module 2 – prior | lump sum | | Module 1 – 30,000<br><br>Module 2 – 30,000<br><br>Module 3 – 30,000 | 90,000 | Covered under PMSC and ICCDC contracts |

| | Particulars | Stages | Unit | Total Number | Rate (Taka) | Cost (Taka) | Cost covered by |
|---|---|---|---|---|---|---|---|
| | 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; and (iii) lessons learned information sharing | to award of civil works contracts (twice a year for 4 years)<br><br>Module 3 – prior to start of Phase 2 and upon completion of the project | | | | | |
| **D. Consultants Costs** | | | | | | | |
| 1. | PMSC Environmental Safeguards Specialist | Responsible for environmental safeguards of the project | 24 person months (spread over entire project implementation period) | | | 7,000,000 | Remuneration and budget for travel covered in the PMSC contract |
| **E. Administrative Costs** | | | | | | | |
| 1. | Legislation, permits, and agreements | Permit for excavation, tree-cutting permits, etc | Lump sum | | 50,000 | 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<br><br>Obtaining right of way clearances with related national agencies. | Lump sum | | 100,000 | 100,000 | LGED DPD cost for municipal infrastructures |
| **F. Other Costs** | | | | | | | |
| 1. | Public consultations and information disclosure | Information disclosure and consultations during preconstruction and construction phase, including public awareness campaign through media | As per requirement | Lump sum | | 1,000,000 | Covered under PMSC contracts and ICCDC |

| | Particulars | Stages | Unit | Total Number | Rate (Taka) | Cost (Taka) | Cost covered by |
|---|---|---|---|---|---|---|---|
| 2. | GRM implementation | Costs involved in resolving complaints (meetings, consultations, communication, and reporting/information dissemination) | | Lump sum | | As per PMU budget | PMU cost |
| 3. | Any unanticipated impact due to project implementation | Mitigation of any unanticipated impact arising during construction phase and defect liability period | | Lump sum | Contractor's liability | As per insurance requirement | Contractor's insurance |

## IX. MONITORING AND REPORTING

117. 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 EIAs/IEEs for the projects. In addition to recording information on the work and deviation of work components from original scope PMU, PIUs, and PMSC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome.

118. PMSC 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. The suggested monitoring report format is in Appendix 8. Subproject budgets will reflect the costs of monitoring and reporting requirements. For projects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis. Monitoring reports will be posted in a location accessible to the public.

119. For projects likely to have significant adverse environmental impacts, LGED and DPHE will retain qualified and experienced external experts to verify its monitoring information. LGED and DPHE 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).

120. 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

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

122. 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.

123. 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.

124. 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.

125. 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, LGED, and DPHE 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.

126. The PMU and PMSC will be responsible for monitoring. The PMSC 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.

127. The EMP will assist the PMU, MASC, 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.

128. The citizens of Amtali 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.

129. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Amtali 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.

130. 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.

131. 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

| Screening Questions | Yes | No | Remarks |
|---|---|---|---|
| A. Project siting<br>Is the project area… | | | |
| • Densely populated? | ✓ | | Amtali pourashava covers an area of 8.75 $km^2$ with population density of 1,941 per $km^2$ |
| • Heavy with development activities? | | ✓ | The area is predominantly residential. |
| Adjacent to or within any environmentally sensitive areas? | | | |
| • Cultural heritage site | | ✓ | The subproject components are not within locations in or near sensitive and valuable ecosystems, including protected areas and forests. |
| • Protected area | | ✓ | |
| • Wetland | | ✓ | |
| • Mangrove | | ✓ | |
| • Estuarine | | ✓ | |
| • Buffer zone of protected area | | ✓ | |
| • Special area for protecting biodiversity | | ✓ | |
| • Bay | | ✓ | |
| B. Potential environmental impacts<br>Will the project cause… | | | |
| • Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff? | | ✓ | Groundwater will be the source. Underground water of sufficient quantity is available within the area. The water quality from all of the test results indicates that aquifer is confined and fully protected by an impermeable layer. |
| • Impairment of historical/cultural monuments/areas and loss/damage to these sites? | | ✓ | |
| • Hazard of land subsidence caused by excessive ground water pumping? | | ✓ | The potential abstraction rate is considered not to adversely impact the aquifer and is not envisaged to cause land subsidence. |
| • Social conflicts arising from displacement of communities? | | ✓ | The proposed production tube wells (PTWs) and OHTs will not require acquisition private land. There are no encroachers/squatters or residential/commercial structures within the identified land. |
| • Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters? | | ✓ | Not anticipated. Water quantity is sufficient. |
| • Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)? | | ✓ | Raw water will be treated prior to distribution. Water quality of treated water is ensured to comply with the Bangladesh Standards for Drinking Water. |
| • Delivery of unsafe water to distribution system? | | ✓ | The subproject will provide treated water through new distribution and rehabilitated network to prevent leakages and contamination. |
| • Inadequate protection of intake works or wells, leading to pollution of water supply? | | ✓ | The PTWs and OHT will be secured and accessible only to authorized persons. |
| • Over pumping of ground water, leading to salinization and ground subsidence? | | ✓ | The potential abstraction rate is considered not to adversely impact the aquifer and is not envisaged to cause land subsidence. |
| • Excessive algal growth in storage reservoir? | | ✓ | Not anticipated. The OHT will be fully enclosed. Water will only be stored in a short period of time. |
| • Increase in production of sewage beyond capabilities of community facilities? | | ✓ | Amtali will undertake sanitation improvement subproject. |
| • Inadequate disposal of sludge from water treatment plants? | | ✓ | Not applicable. |

| Screening Questions | Yes | No | Remarks |
|---|---|---|---|
| • Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities? | | ✓ | Not applicable. |
| • 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 in PTWs. Separate storage areas for the chemicals have been included in the preliminary design of the PTWs. |
| • 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 channelization 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 Amtali pourashava through the mini water testing laboratory to be procured under the subproject. . |
| • 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 | ✓ | | Amtali will undertake sanitation improvement subproject. No WTP to be constructed under the subproject. |
| • Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation | | ✓ | Improved water supply management systems through capacity building and institutional development will ensure reduced burden on services and |

| Screening Questions | Yes | No | Remarks |
|---|---|---|---|
| systems)? | | | 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 at PTW 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. |

| Climate Change and Disaster Risk Questions<br>The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks. | Yes | No | Remarks |
|---|---|---|---|
| Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? | ✓ | | Low lying areas of Amtali are subject to flooding during heavy rainfall in monsoon. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Amtali water supply subproject, including: (i) structural protection of facilities from future floods; (ii) location of PTWs where there is no risk of flooding or other hazards; (iii) standalone power backup for the PTWs and pumping stations; and (iv) promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures. |
| Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., increased extreme rainfall increases flooding, damaging proposed infrastructure)? | ✓ | | |
| Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? | | ✓ | Proposed project will not impact any marginalized population, rural-urban migrants, illegal settlement, etc. |
| Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by paving vulnerable groundwater recharge areas, or using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)? | | ✓ | |

## Appendix 2: Environmental Standards and Application Fees

The standards for air, water, sound, odor and other components of the environment applicable to the project shall be determined in accordance with the standards specified in Schedules 2, 3, 4, 5, 6, and 8 of ECR, 1997.

| | **Standards** | **ECR, 1997 (Rule 12) http://www.moef.gov.bd/html/laws/env_law/178-189.pdf** |
|---|---|---|
| 1. | Air | Schedule 2 |
| 2. | Inland surface water | Schedule 3 |
| | Drinking water | |
| 3. | Sound | Schedule 4 |
| 4. | Sound Originating from Motor Vehicles or Mechanized Vessels | Schedule 5 |
| 5. | Emission from Motor Vehicles | Schedule 6 |
| 7. | Odor | Schedule 8 |

The standard limits of discharge of liquid waste and gaseous emissions applicable to the project shall be determined in accordance with the standards specified in Schedule 9 and 10

| | **Environmental Component** | **ECR, 1997 (Rule 13) http://www.moef.gov.bd/html/laws/env_law/178-189.pdf** |
|---|---|---|
| 1. | Sewage Discharge | Schedule 9 |
| 2. | Waste from Industrial Units or Projects Waste (see discharge to inland surface water and irrigated land) | Schedule 10 |

The fees for issuance of environmental clearance certificate and its renewal shall be payable in accordance with Schedule 13. The fees for analysis of samples of water, liquid waste, air and sound and also the information or data derived from such analysis are described in Schedule 14.

| | **Fees** | **ECR, 1997 (Rule 14 and 15) http://www.moef.gov.bd/html/laws/env_law/178-189.pdf** |
|---|---|---|
| 1. | Environmental clearance certificate or renewal | Schedule 13 |
| 2. | Supplying various analytical information or data or test results of samples of water, effluent, air and sound | Schedule 14 |

## [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.*



| (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 A2 to Figure A12** illustrates 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

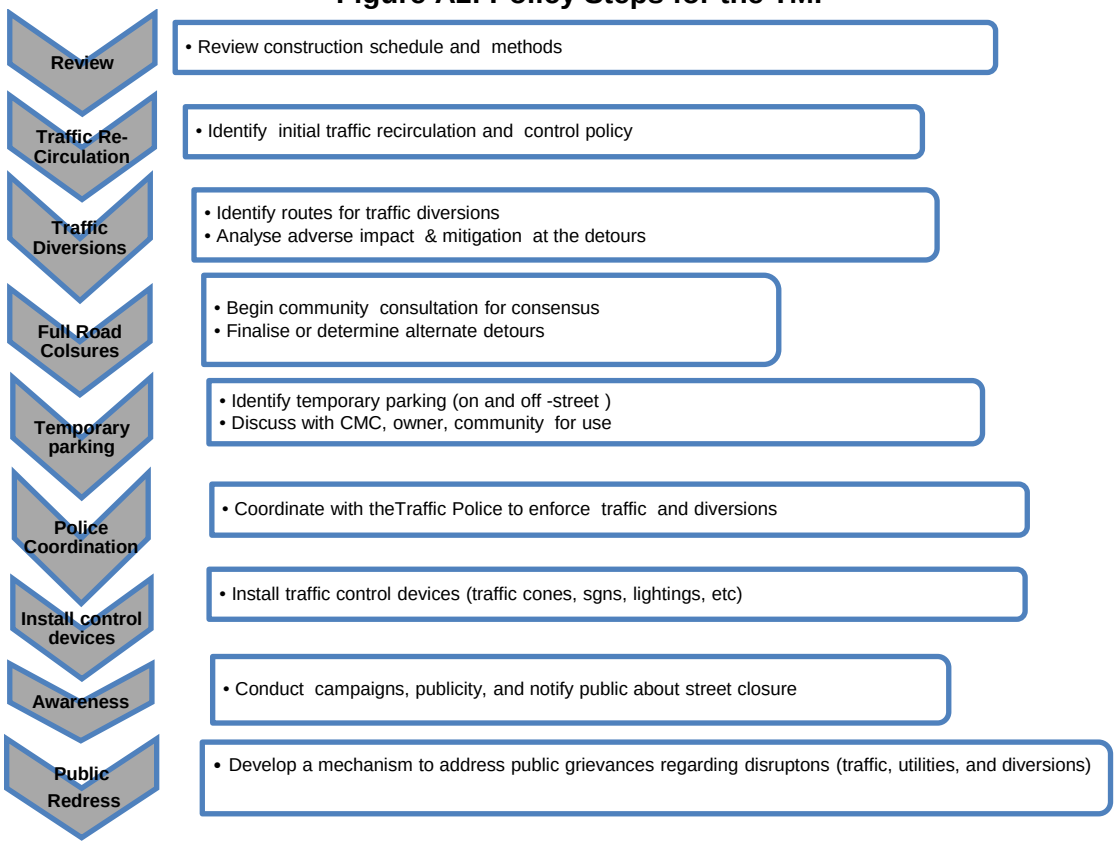
4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

(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 A1: Policy Steps for the TMP**




## D. Public awareness and notifications

5. 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.

6. 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.

7. 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.

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

9. 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**

10. 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:

- Signs
- Pavement Markings
- Channelizing Devices
- Arrow Panels
- Warning Lights

11. 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”).

12**.** **Figure A2 to Figure A12** 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:

- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- 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)
- Lane closure on a two lane road (two flagger operation)
- Lane closure on a four lane undivided Road
- Lane closure on divided roadway
- Half road closure on multi-lane roadway
- Street closure with detour

13. 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.

14. 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 A2 & A3: Work on shoulder or parking lane and shoulder or parking lane closed on divided road

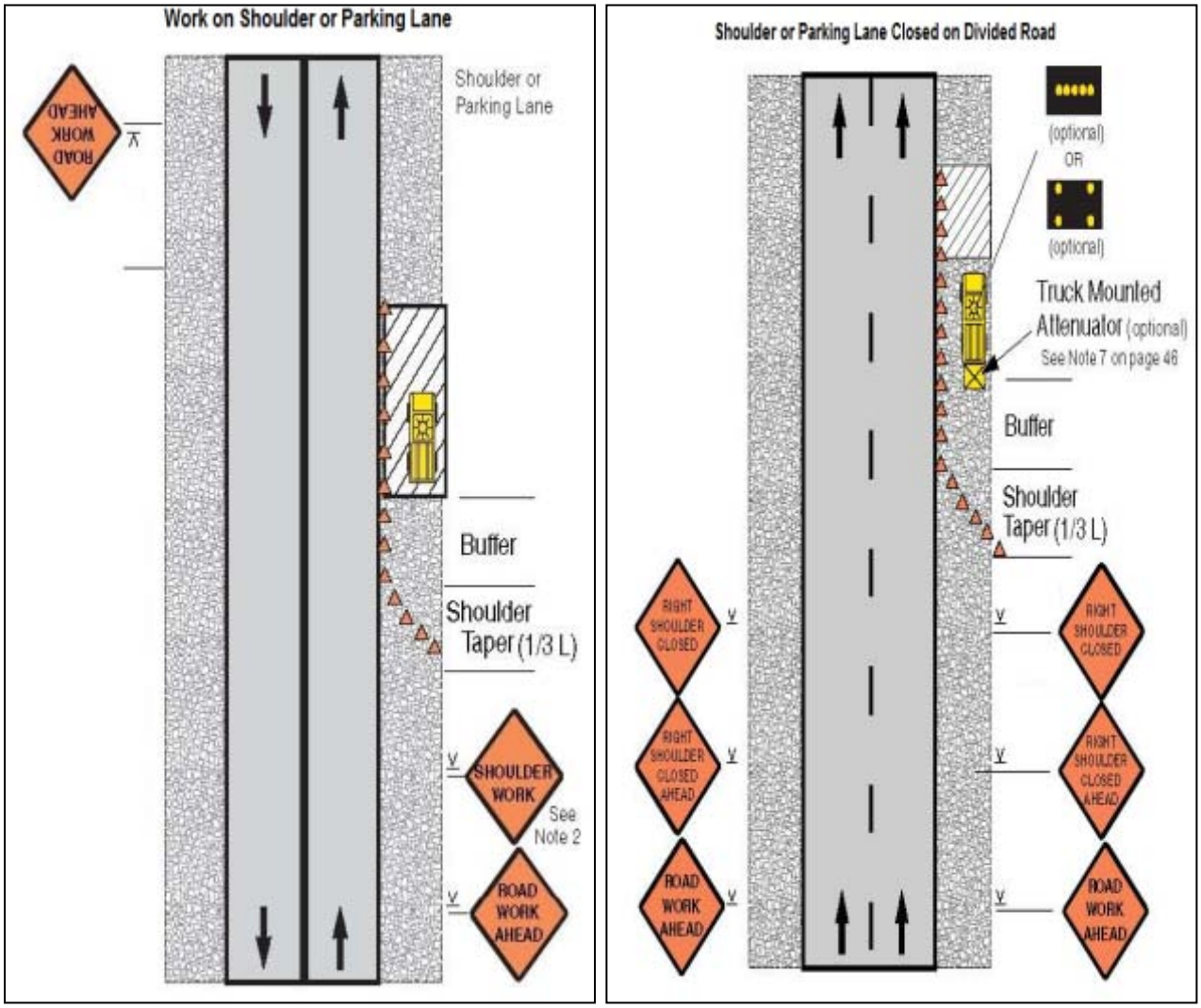


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

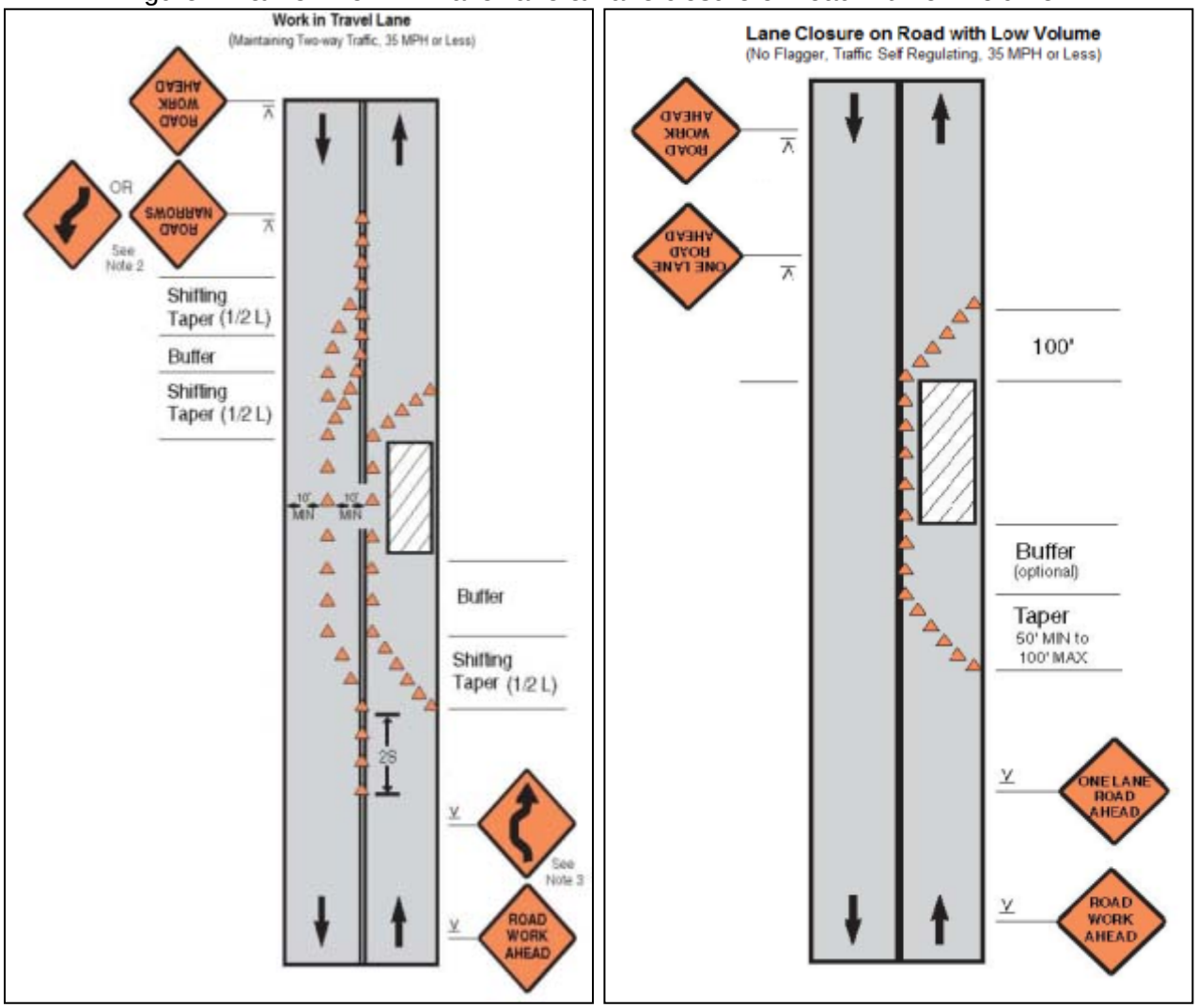
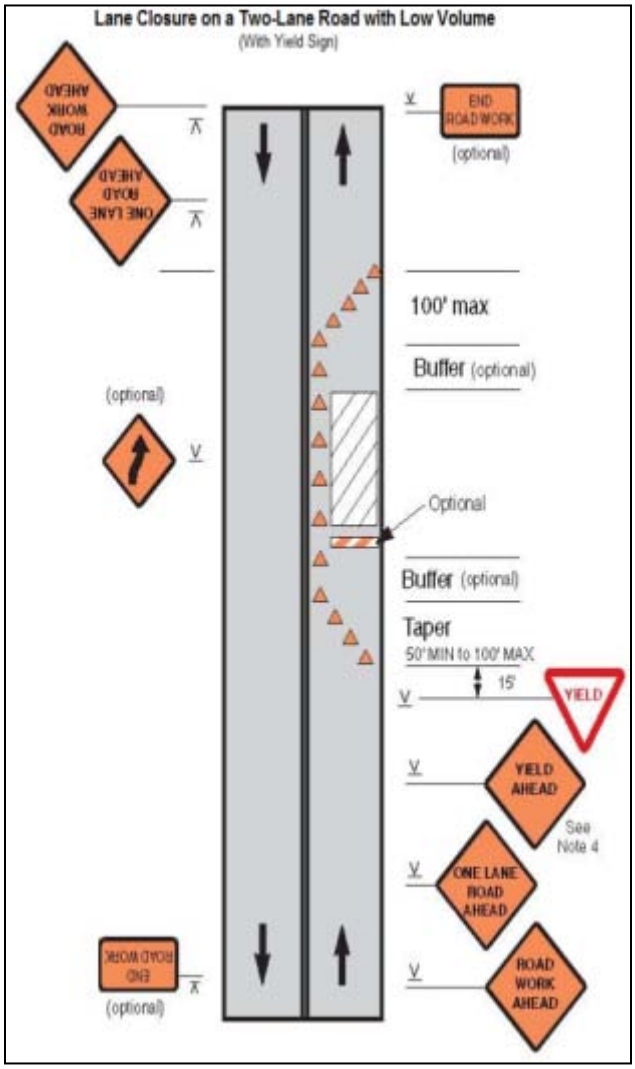


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)



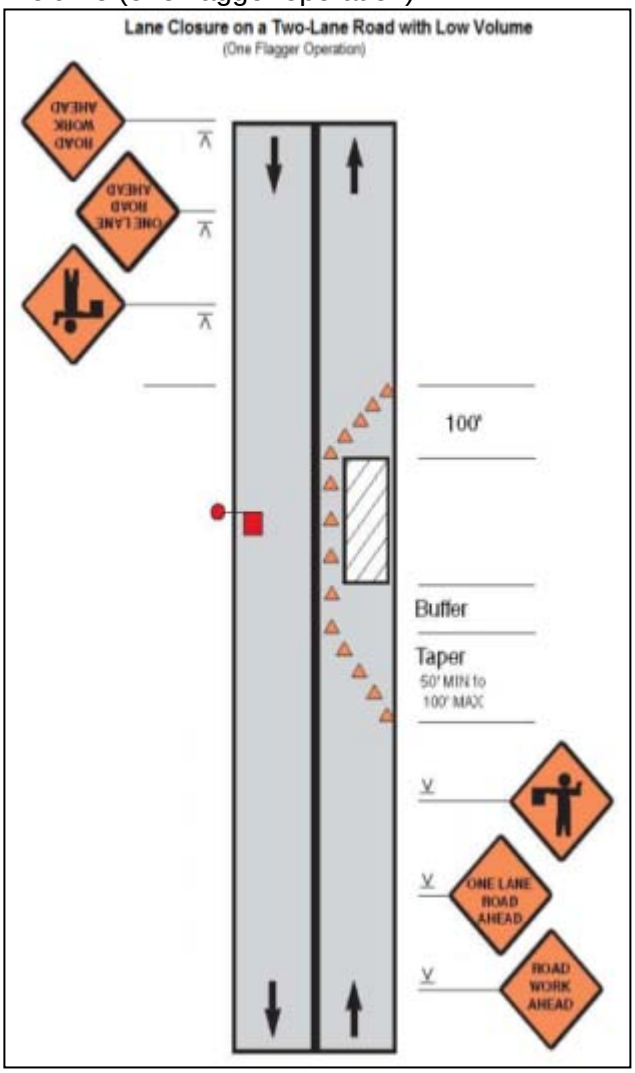



Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

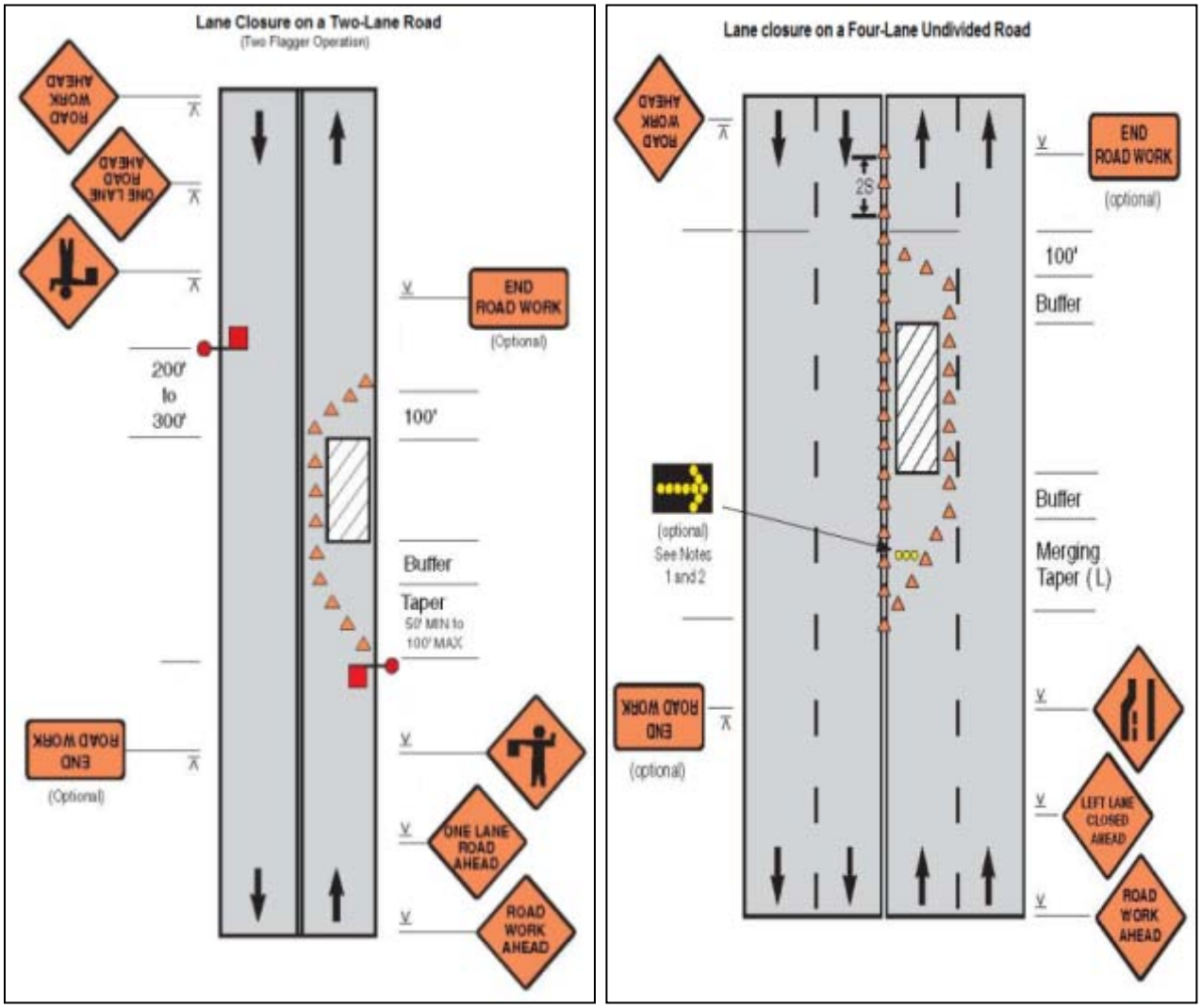


Figure A10 & A11: Lane Closure in Divided Roadway & Half Road Closure On Multi-Lane Roadway

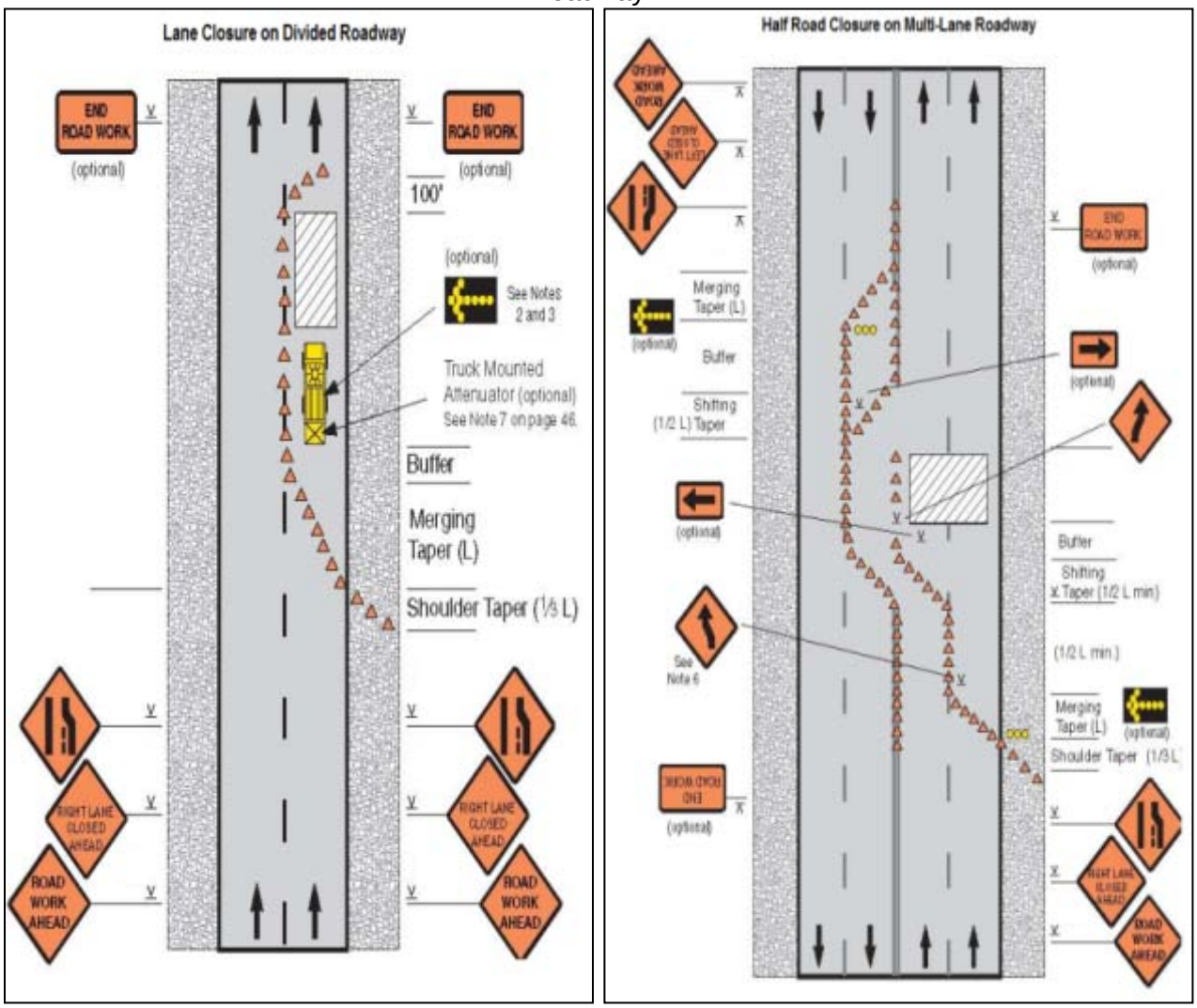
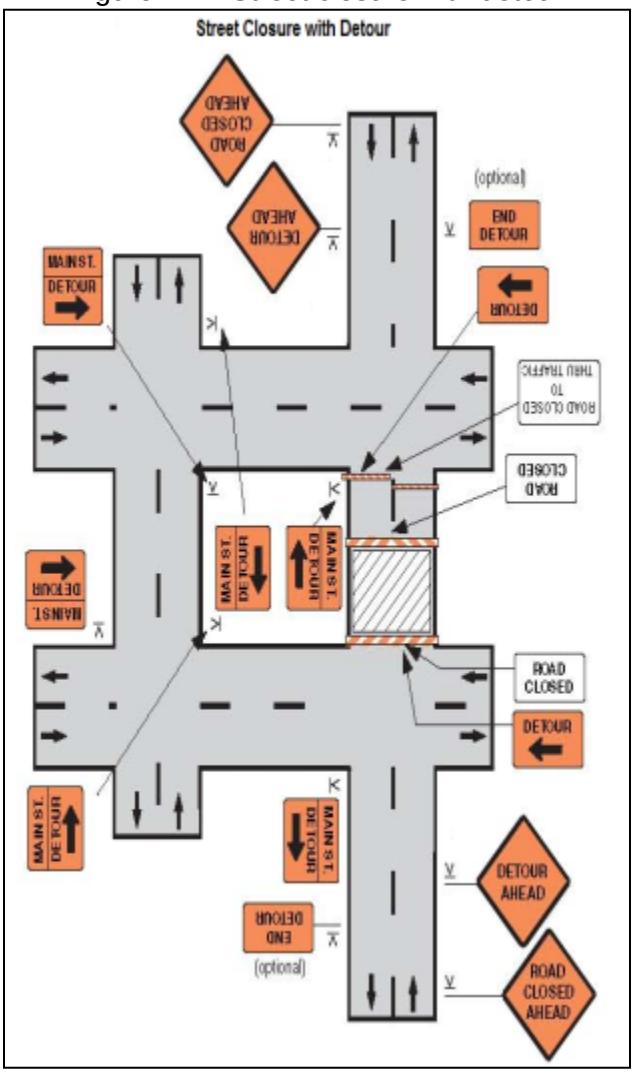


Figure A12: Street closure with detour



# Appendix 5: Records of Public Consultations and FGDs

**Minutes of Discussion Meeting held in DOE Office regarding EARF of CTIIP at 10:30AM on 09-09-2013**
**Venue:** Chamelee Conference Room
**Attendance in the Meeting:**

The following persons are present in the meeting
1. Md. Shahjahan, Addl. Director General, DOE, Dhaka. Tel:+88-02-8181767, email: shahjahan@doe-bd.org; shahjahan5519@yahoo.com
2. Dr. Sultan Ahmed, Joint Secretary, Director (Natural Resources Management and Research), DOE, Dhaka. Tel:+88-02-8181784; Cell:+88-0155-2328617, email: sulbul2002@yahoo.com
3. AKM Rafiqul Islam, Deputy Director (Research and Monitoring), DOE, Dhaka
4. SM Tarique, Deputy Director (EIA), DOE, Dhaka
5. Solaiman Haider, Deputy Director (Technical), DOE, Dhaka
6. Syed Nazmul Ahsan, Deputy Director (Environmental Clearance), DOE, Dhaka. Tel:+88-02-8181778; cell: +88-0181-9427358, email: nazmul@doe-bd.org; syednazmulahsan@yahoo.com
7. Md. Shamsuzzaman Shorkar, Assistant Director (EIA), DOE, Dhaka
8. Shah Md. Nur-e-Huda, Asst. Director (Environmental Clearance), DOE, Dhaka
9. Ninette, Ramirez, Environmental Specialist International (Recruited by ADB), email: ninette.ramirez@gmail.com
10. Md. Yasin Mozumder, Environmental Expert (National), CTIIP, Cell:+88-0171-1665408; +88-0173-1062331, email: yasin_afroza@yahoo.com

**Agenda of Discussion:**
Following item are discussed:
1. Classification of CTIIP subprojects components as pr ECR, 1997;
2. Nature of documentation required for the locational and environmental clearances;
3. Confirmation that conformance to ADB safeguard policies will be considered as compliance to government requirements;
4. Confirmation that no additional studies are envisaged as the environmental assessment documents have been prepared satisfying both ADB and government requirement.

**Background**

The Coastal Towns Infrastructure Improvement Project (CTIIP) is a key infrastructure initiative of the Government of Bangladesh. The outcome of the project will be improved access to climate-disaster resilient municipal services, including (i) municipal infrastructure such as drainage, cyclone shelters, urban roads, bridges, culverts, solid waste management, bus terminals, slum improvements, boat landings, and markets, (ii) water supply, and (iii) sanitation.

**Discussion:**

- A draft Environmental Assessment and Review Framework (EARF) prepared by LGED for submitting to ADB and Ms Ninette presented draft EARF.
- CTIIP, four (4) project towns (Amtali, Galachipa, Pirojpur and Mathbaria) are selected for improvement infrastructure.
- Six (6), Initial Environmental Examination (IEE), will be prepared for each project town for complying ADB Safeguard Policy.
- Ms Ninette Presented one draft sample of Water Supply component of Amtali Pourashava.

**View of Additional Director General (DG) (the Chairperson):**

- (i) Considering time and money, prepare one IEE/EIA Report for each project town the report may containing several sections for Identification, Assessment, Prediction of impact of each subproject components. EMP and monitoring plan should also be prepared accordingly; OR (ii) prepare individual IEE/EIA for each components subproject town, submit at a time to DOE for clearance (i.e., six IEE/EIA, six volumes at a time) for each subproject town.
- Executive Agency (EA), here DPHE and LGED, will prepare the IEE/EIA as per ECA/ECR of DOE and submit to and submit to DG for environmental clearance.
- The report should be in accordance to DOE guidelines
- Formally submit an EARF prepared for ADB through Project Director to DOE for reviewing.

- Coastal Towns (Amtali, Galachipa, Pirojpur and Mathbaria) are not situated in a ecological sensitive areas nor within the reserved clearance for location may approve.
- Finally, the DG assures providing every cooperation relating to environmental clearance.

**FGD Summaries-Water Supply Amtali Pourashava**

| | Proposed Project Facility/Alignment Related to Which Discussion Held | Date | Venue | No. of Participants & gender | Key Safeguard Issues Discussed | Overall Concerns Expressed Related to Project | Suggestions From People | Willingness to Participate in Project |
|---|---|---|---|---|---|---|---|---|
| 1 | Production Tube well (2), OHT (1) Pump House (1) and Water Distribution network | 22-June 2013 | Khuntacata Poura Graveyard, Ward No-3-Amtali | M=8<br>F=7<br>T=15 | Free land owned by graveyard authority (Pourashava) People have no objection as the site situated in a graveyard both Muslim and non-Muslim pourashava dwellers | Maintain by Pourashava | Water tap should be above the highest flood level, because during flood period all the outlet taps are inundated by flood water. | Assist and cooperate the construction team in taking safety measures during overhead tank construction; |

(M=No. of male participants; F= No. of female participants; T=Total participants)

Photograph




FGD- Khuntacata Pourashava Graveyard

PARTICIPANTs LIST
Town: Amtali Pourashava
Component: Water- Overhead Tank and Pump
Location: Khuntakata Pouragraveyard, Ward No: 3
Meeting Place: Khuntakata Pouragraveyard
Date: 22-06-2013 Time: 10.05 am

| Sl.No | Name | Occupation |
|---|---|---|
| 1 | Md. Delwar Hossain | Business |
| 2 | Md. Mizanur Rahman | Van puller |
| 3 | Md. Shahidul Islam | Carpenter |
| 4 | Md. Sona Mia | Carpenter |
| 5 | Md. Jashimuddin | Business |
| 6 | Biren Chndra Shen | Business |
| 7 | Abdur Rab Khalifa | Business |
| 8 | Shazeda Begum | Housewife |
| 9 | Bishnu Rani | Housewife |
| 10 | Supria Rani | Housewife |

| Sl.No | Name | Occupation |
|---|---|---|
| 11 | Helana Begom | Housewife |
| 12 | Anu Rani | Housewife |
| 13 | Shahinur | Housewife |
| 14 | Hasina Begom | Housewife |
| 15 | Shanu Bhuiyan | Farmer |

## 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<br>* 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:<br><br>If included as attachment/note/letter, please tick here: | | | | | |
| **How do you want us to reach you for feedback or update on your comment/grievance?** | | | | | |

### FOR OFFICIAL USE ONLY

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

## Appendix 7: Sample Semi-Annual Reporting Format

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
- Description of subprojects
- Environmental category of the sub-projects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and sub-project progress and status

| No. | Sub-Project Name | Status of Sub-Project | | | | List of Works | Progress of Works |
|---|---|---|---|---|---|---|---|
| | | Design | Pre-Construction | Construction | Operational Phase | | |
| | | ☐ | ☐ | ☐ | ☐ | | |
| | | ☐ | ☐ | ☐ | ☐ | | |
| | | ☐ | ☐ | ☐ | ☐ | | |

Compliance status with National/ State/ Local statutory environmental requirements

| No. | Sub-Project Name | Statutory Environmental Requirements | Status of Compliance | Action Required |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

Compliance status with environmental loan covenants

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

### II. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:

(i) What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;

(ii) If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;

(iii) Adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;

(iv) Are there designated areas for concrete works, and refueling;

(v) Are there spill kits on site and if there are site procedures for handling emergencies;

(vi) Is there any chemical stored on site and what is the storage condition?

(vii) Is there any dewatering activities if yes, where is the water being discharged;
(viii) How are the stockpiles being managed;
(ix) How is solid and liquid waste being handled on site;
(x) Review of the complaint management system;
(xi) Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

| 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 | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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 |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

**III. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT**

Brief description on the approach and methodology used for environmental monitoring of each subproject

- Monitoring of environmental IMPACTS on PROJECT SURROUNDINGS (ambient air, water quality and noise levels)
- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

| Site No. | Date of Testing | Site Location | Parameters (Government Standards) | | |
|---|---|---|---|---|---|
| | | | PM10 µg/m3 | SO2 µg/m3 | NO2 µg/m3 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| Site No. | Date of Testing | Site Location | Parameters (Monitoring Results) | | |
|---|---|---|---|---|---|
| | | | 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 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| Site No. | Date of Sampling | Site Location | Parameters (Monitoring Results) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 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 | LAeq (dBA) (Government Standard) | |
|---|---|---|---|---|
| | | | Day Time | Night Time |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| Site No. | Date of Testing | Site Location | LAeq (dBA) (Monitoring Results) | |
|---|---|---|---|---|
| | | | Day Time | Night Time |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## IV. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

Summary of follow up time-bound actions to be taken within a set timeframe.

## V. APPENDIXES

Photos
Summary of consultations
Copies of environmental clearances and permits

Sample of environmental site inspection report
Others