

Draft Initial Environmental Examination

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BAN: Coastal Towns Environmental Infrastructure 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)
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\$1.00	=	Tk 77.69

ABBREVIATIONS

ADB	– Asian Development Bank
AP	– affected person
CTEIP	– Coastal Towns Environmental Infrastructure Project
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

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

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TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK	1
	A. ADB Policy	1
	B. National Laws	2
	C. Government of Bangladesh Environmental Assessment Procedures	4
III.	DESCRIPTION OF THE PROJECT	5
	A. The Study Area	5
	B. Existing Condition and Need for the Project	5
	C. Proposed Components	7
	D. Implementation Schedule	9
IV.	DESCRIPTION OF THE ENVIRONMENT	14
	A. Methodology Used for the Baseline Study	14
	B. Physical Characteristics	14
	C. Biological Characteristics	15
	D. Socioeconomic Characteristics	15
	E. Historical, Cultural and Archaeological Characteristics	20
V.	ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS	20
	A. Methodology	20
	B. Screening Out Areas of No Significant Impact	20
	C. Anticipated Impacts and Mitigation Measures – Planning and Design Phase	22
	D. Anticipated Impacts and Mitigation Measures – Construction Phase	23
	E. Anticipated Impacts and Mitigation Measures – Operations and Maintenance Phase	29
	F. Cumulative Impact Assessment	30
VI.	INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION	32
	A. Public Consultation Conducted	32
	B. Future Consultation and Disclosure	33
VII.	GRIEVANCE REDRESS MECHANISM	34
VIII.	ENVIRONMENTAL MANAGEMENT PLAN	36
	A. Safeguard Implementation Arrangement	37
	B. Environmental Monitoring Program	59
	C. Institutional Capacity Development Program	60
	D. Staffing Requirement and Budget	61
IX.	MONITORING AND REPORTING	63
X.	CONCLUSION AND RECOMMENDATIONS	64

LIST OF TABLES:

Table 1: Applicable Government of Bangladesh Environmental Legislations	2
Table 2: Likely Government of Bangladesh Classification of Amtali Water Supply Subproject ...	4
Table 3: Existing Production and Performance Data of 2 Tube Wells in Amtali	6
Table 4: Details of Existing Distribution Pipelines in Amtali	6
Table 5: Details of Existing Service Connections in Amtali	7
Table 6: Components of Proposed Amtali Water Supply Subproject	8
Table 7: Amtali Pourashava Population Data	15
Table 8: Existing Road Situations in Amtali	16
Table 9: Existing Solid Waste Management and Generation Estimates	18
Table 10: Fields in Which the Subproject Is Not Expected to have Significant Impacts	20
Table 11: Possible Actions to Mitigate against Projected Effects of Climate Change on Water Supply Infrastructure and Improve Climate Resilience	22
Table 12: Anticipated Impacts and Mitigation Measures – Construction Phase	24
Table 13: Anticipated Impacts and Mitigation Measures – O&M Phase	29
Table 14: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase	40
Table 15: Environmental Management and Monitoring Plan – O&M Phase	55
Table 16: Environmental Monitoring Program	59
Table 17: Training Program for Environmental Management	60
Table 18: Indicative Cost of EMP Implementation	61

LIST OF FIGURES:

Figure 1: Location Map	10
Figure 2: Map of Existing Amtali Water Supply System	11
Figure 3: Map of Proposed Amtali Water Supply System	12
Figure 4: Proposed Amtali Production Tube Wells and Overhead Tank – Site Plan	13
Figure 5: Grievance Redress Process	36
Figure 6: Safeguards Implementation Arrangement	39

LIST OF APPENDIXES:

Appendix 1: Rapid Environmental Assessment Checklist	66
Appendix 2: Environmental Standards and Application Fees	69
Appendix 3: Sample Outline Spoils Management Plan	71
Appendix 4: Sample Outline Traffic Management Plan	72
Appendix 5: Records of Public Consultations and FGDs	82
Appendix 6: Sample Grievance Registration Form	85
Appendix 7: Sample Semi-Annual Reporting Format	86

EXECUTIVE SUMMARY

1. The Coastal Towns Environmental Infrastructure 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 change 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.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. The Local Government Engineering Department (LGED) is the lead executing agency (EA), and the Department of Public Health Engineering (DPHE) is the co-executing agency (for water supply and sanitation components).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 teams² 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,

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).

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.

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 Environmental Infrastructure 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 change 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 - Regulation on vehicles emitting smoke harmful to the environment - Remedial measures for injuries to ecosystems - Standards for quality of air, water, noise and soil for different areas for various purposes and limits for discharging and emitting waste - Environmental guidelines	operation and maintenance (O&M) phases.
2.	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	- Environmental clearances - Compliance to environmental quality standards	The subproject is categorized as red and requires locational clearance certificate (LCC) and environmental clearance certificate (ECC). All requisite clearances (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. - 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 - Pre-screening of IEEs/EIAs for water sector projects by WARPO, in advance of submission to DOE for final clearance. - Augmentation for dry season water flow - Awareness-raising in consumptive use of surface and groundwater for irrigation - 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. - Supplement the National Water Policy 1998 and National Policy for Safe Water Supply and Sanitation 1998 - 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 <i>upazila</i> are identified.	
7.	National Safe Drinking Water Supply and Sanitation Policy of 1998	<ul style="list-style-type: none"> - 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. - Sanitation systems shall be self-sufficient and self-sustaining. - Pourasavhas shall be responsible for solid waste collection, disposal and their management. DOE shall be consulted on solid waste management. - Where WASAs exist, 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	<ul style="list-style-type: none"> - Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement - Prohibition of employment of children and adolescent 	The 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 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 21°51' and 22°18' north and between longitude 90°00' and 90°23' 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 km².

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 m³ per hour. The average water production is estimated at 1,652 m³/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; m³/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 500m³ 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% 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 m³/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 °C 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

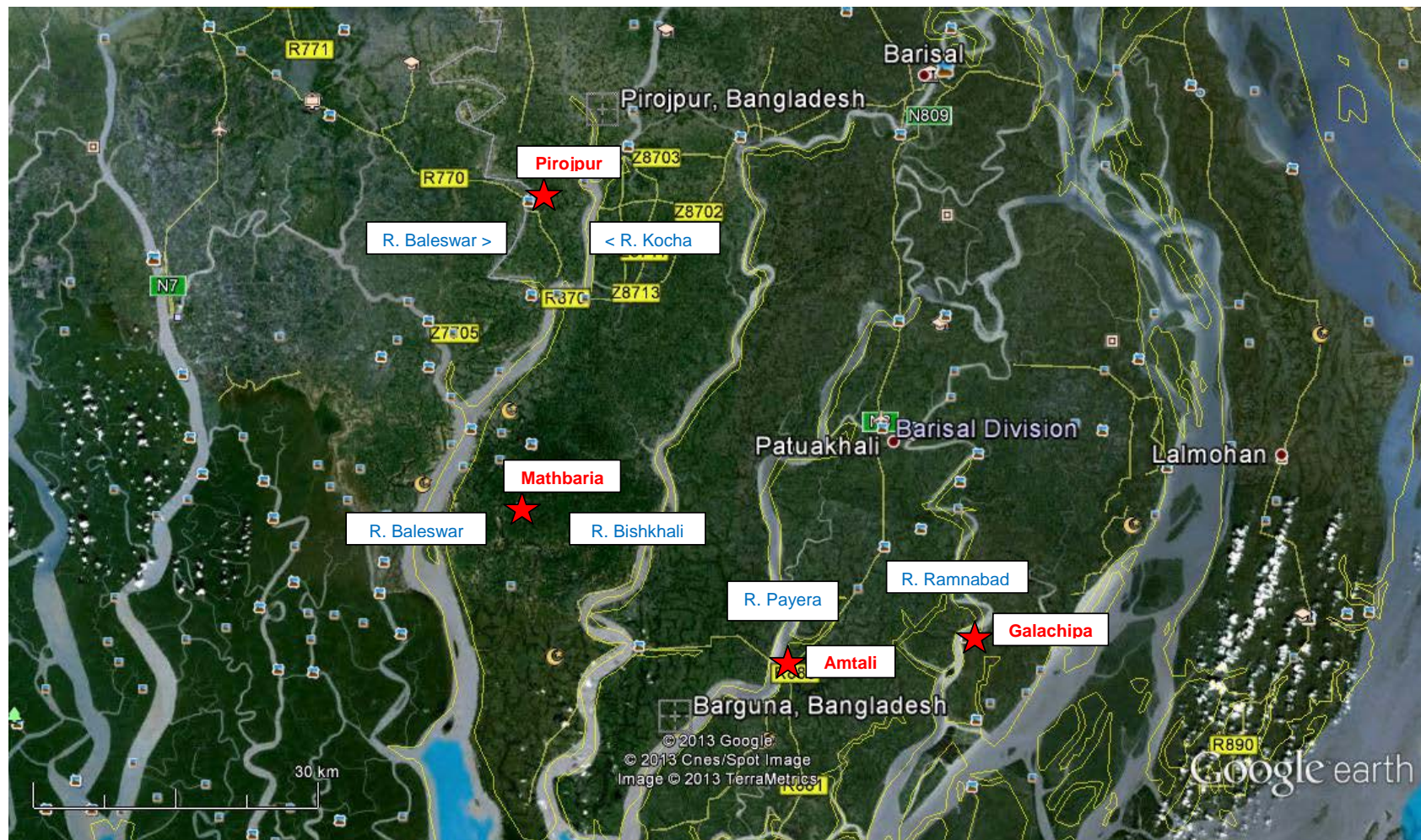
	Items	Unit	Quantity	Remarks
1.0	Installation of production tube well - Well capacity = 100 m ³ /hr - Well size = 150 mm x 350 mm - Drilling depth = 350 m - Upper well casing = 35 m - Lower well casing = 250 m - Screen length = 35 m - Column pipe diameter = 125 mm - Column pipe length = 30 m - Pump = 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 - Capacity = 500 m ³ - 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. 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. 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 <i>E. coli</i> .
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

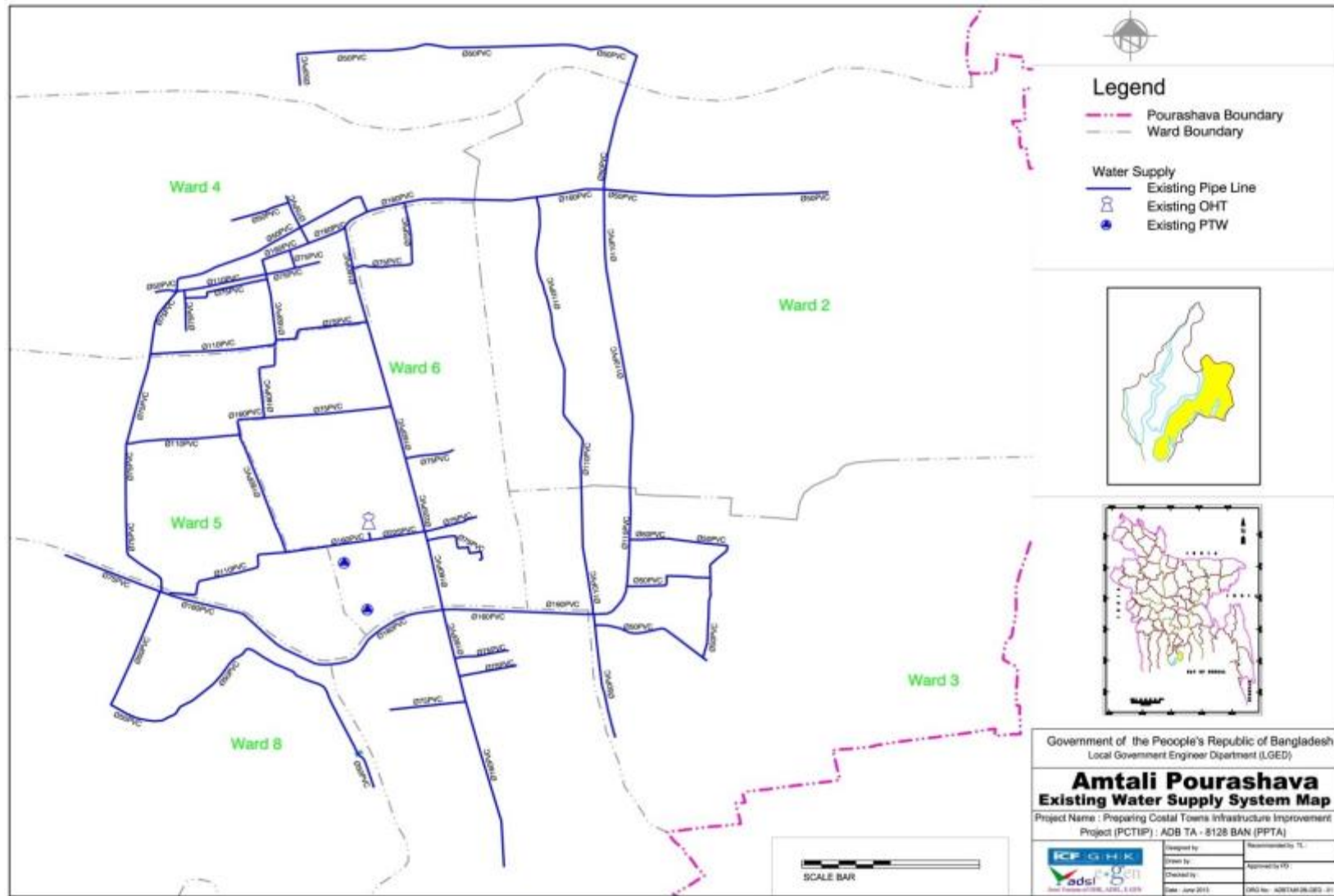


Figure 3: Map of Proposed Amtali Water Supply System

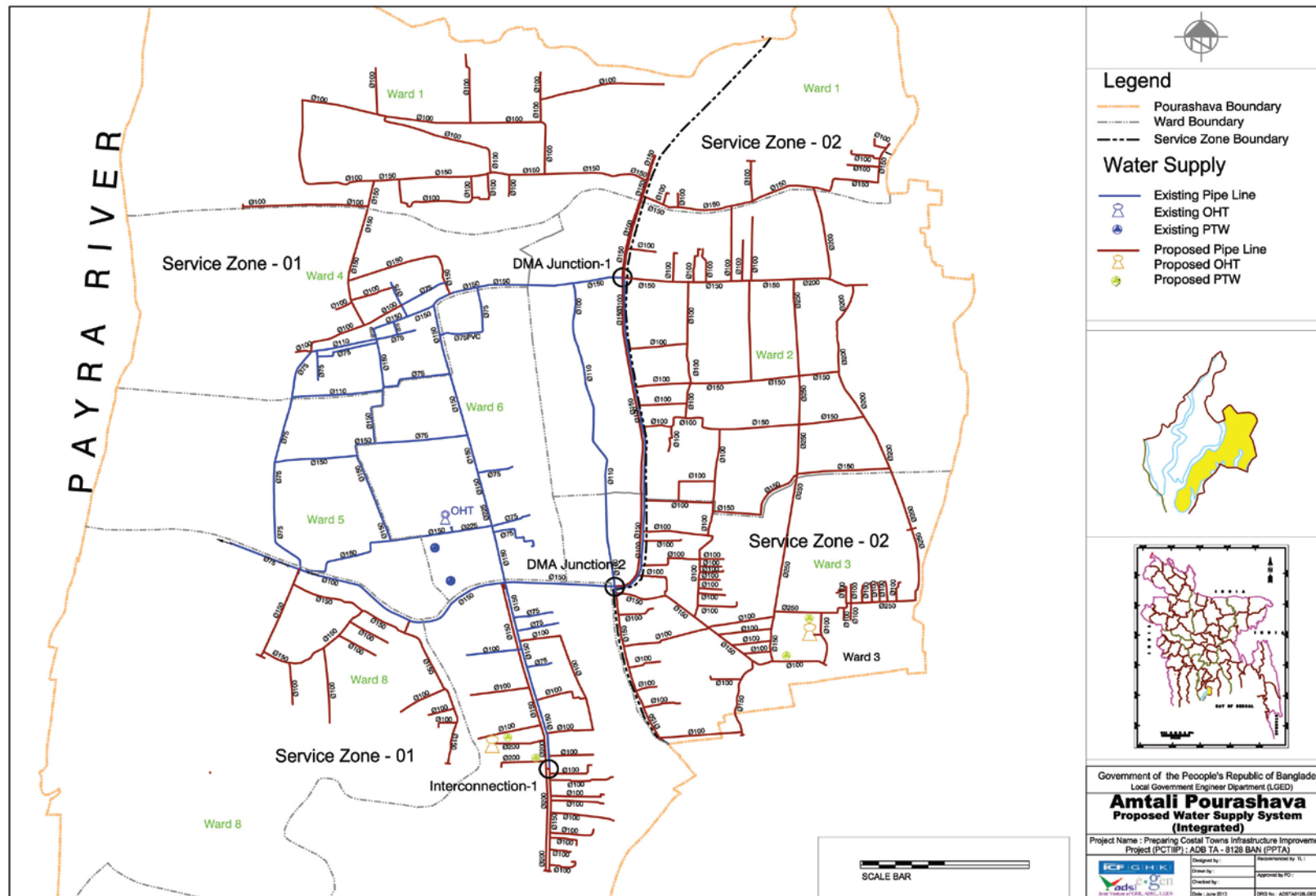
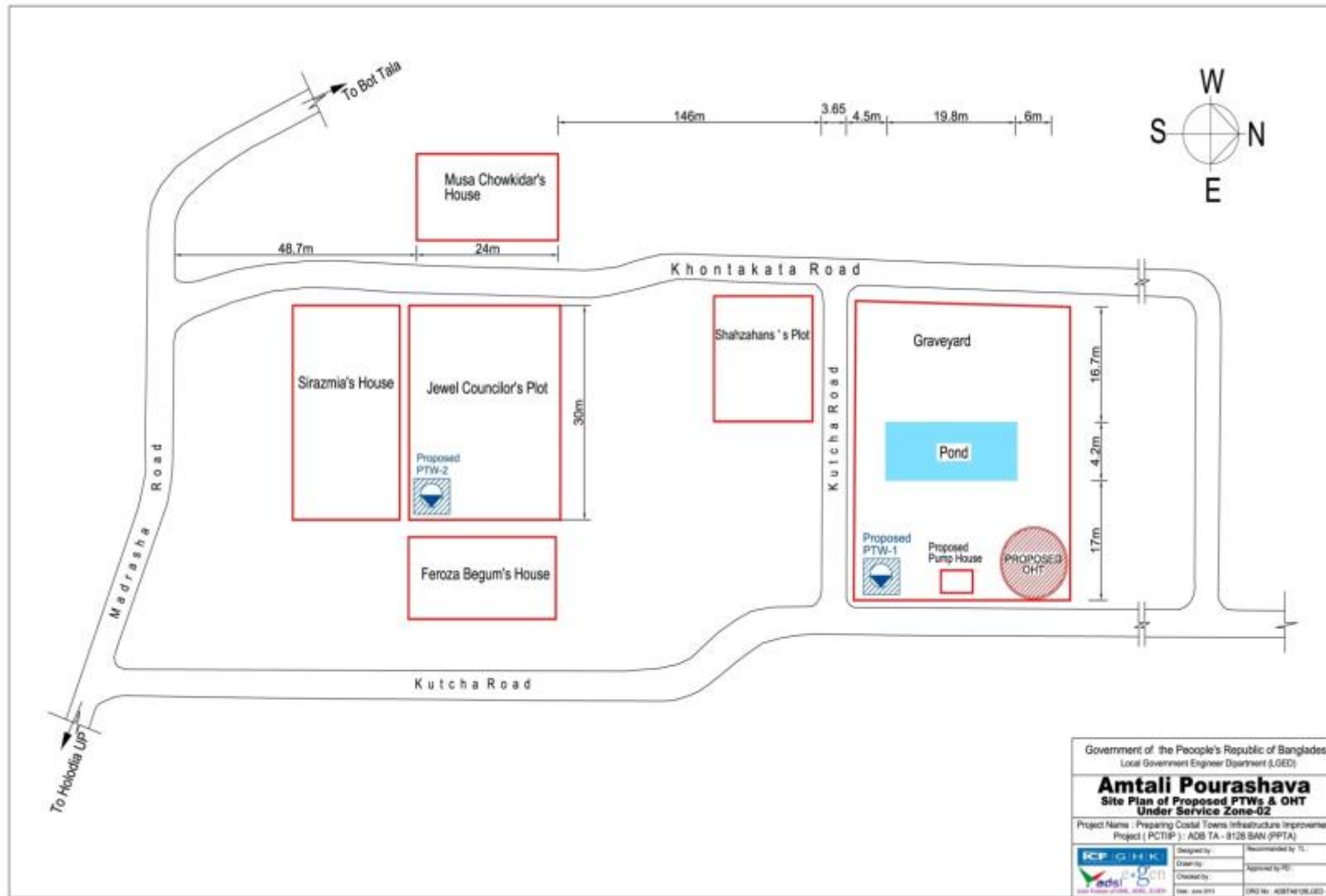


Figure 4: Proposed Amtali Production Tube Wells and Overhead Tank – Site Plan



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 °C (78 °F) and April the warmest with temperatures from 33 to 36 °C (91 to 96 °F). 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-poor⁵ 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 issues⁷ 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 Khulna⁸ has been used to estimate solid waste generation rates. A study by Alamgir and Ahsan in 2007⁹ in Khulna estimated that waste generation from 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. 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	- 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 °C by 2050) in addition to that due to increase of population and future demand.
Sea level rise (SLR)	- 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.
Increased frequency of severe cyclones	- superstructures to be strong to cope with cyclone	It is recommended to take into account cyclonic strong wind during detailed design of the structures.
Rising temperatures	- 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.
Flooding		

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 or 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.	<ul style="list-style-type: none"> - Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 3). - 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. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to minimize the wastage of water in the construction activities. - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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.	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.
Acoustic environment	Construction activities will be on settlements, along and near	<ul style="list-style-type: none"> - 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.	<p>scheduled to avoid sensitive times.</p> <ul style="list-style-type: none"> - 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. - Use of high noise generating equipment shall be stopped during night time. - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
Aesthetics	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.	<ul style="list-style-type: none"> - Prepare a debris disposal plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with Amtali local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas. Avoid stockpiling of any excess spoils. - All vehicles delivering fine materials to the site and carrying debris for disposal shall be covered to avoid spillage. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. - The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas.
B. Biological Characteristics		
Biodiversity	Activities being located in the built-up area of 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.	<ul style="list-style-type: none"> - Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity.

Field	Impacts	Mitigation Measures
		<ul style="list-style-type: none"> - Prohibit employees from poaching wildlife and cutting of trees for firewood. - 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.	<ul style="list-style-type: none"> - Prepare and implement a traffic management plan (Appendix 4) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Socio-economic status	Manpower will be required during the 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.	<ul style="list-style-type: none"> - Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market.
Other existing amenities for 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	<ul style="list-style-type: none"> - Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in 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. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served

Field	Impacts	Mitigation Measures
	measures.	<p>7 days in advance and again 1 day prior to start of construction.</p> <ul style="list-style-type: none"> - 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.	<ul style="list-style-type: none"> - Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Amtali local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.¹¹ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. - The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.
Workers health and safety	There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers' health and safety (H&S). - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of

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.	<p>environmental or social behavior that are unclear.</p> <ul style="list-style-type: none"> - 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) training¹² for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to noise level greater than 85 dBA for 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	<ul style="list-style-type: none"> - 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 be 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).	<ul style="list-style-type: none"> - Store sodium hypochlorite in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials. - Store calcium hypochlorite away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year. - Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruptions in supply. - Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures.

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. - 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. - Ensure that all site personnel have a basic level of H&S training. - Produce and implement a O&M H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training ¹³ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. - Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

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 vulnerable¹⁴ 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

¹⁴Vulnerable 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 parties 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.

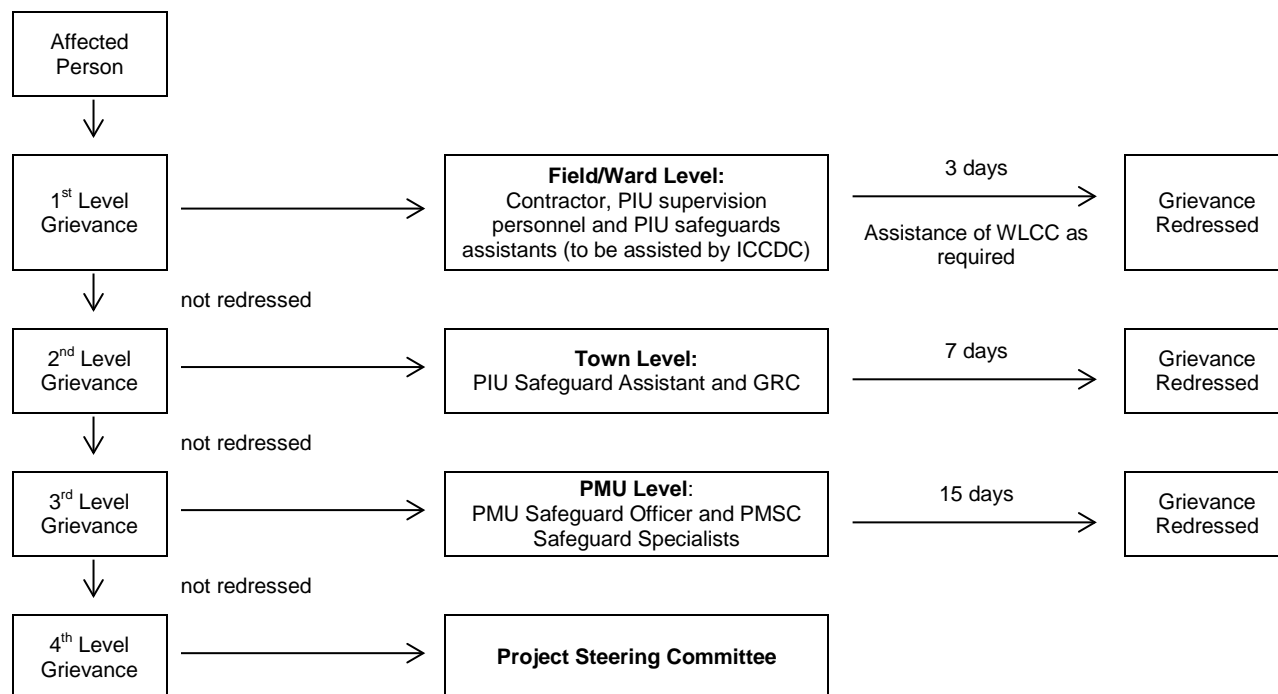
97. **Periodic review and documentation of lessons learned.** The PMU safeguard officer will periodically review the functioning of the GRM in each town and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

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. The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. LGED will be the lead executing agency (EA) for the project, and DPHE will be the co-executing agency (for water supply and sanitation components). 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.

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

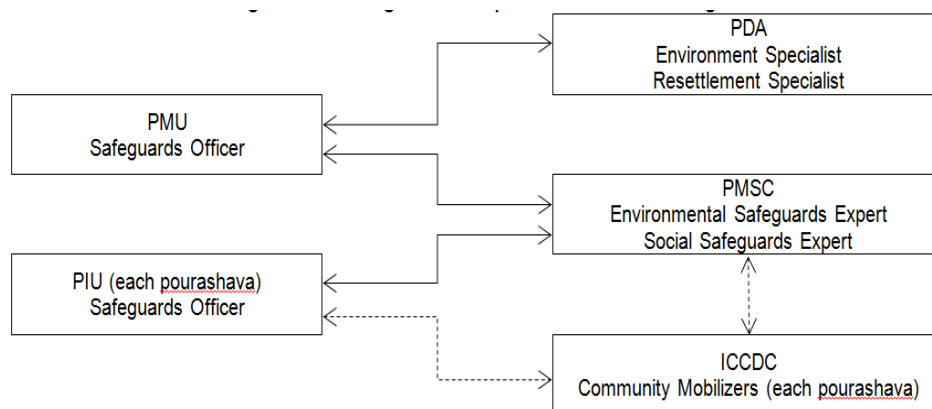
Figure 6: Safeguards Implementation Arrangement

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	<ul style="list-style-type: none"> - Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. - Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. - Include in detailed design drawings and documents all conditions and provisions if necessary 	PMU, PIU, PDA detailed design consultants, and PMSC	Incorporated in final design and communicated to contractors.	Prior to award of contract	<p>No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PMU and PIU.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
Existing utilities	Disruption of services.	<ul style="list-style-type: none"> - Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction activities - Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. - Require contractors to prepare spoils management plan (Appendix 3) and traffic management plan (Appendix 4) 	PMU, PIU, PDA and PMSC	<ul style="list-style-type: none"> - List of affected utilities and operators; - 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) 	<p>During detailed design phase</p> <p>- Review of spoils management plan: Twice (once after first draft and once before final approval)</p>	<p>No cost required.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
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	<p>No cost required.</p> <p>Mitigation</p>

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
areas, storage areas, and disposal areas.	receptors			camp, hot mix plants, stockpile areas, storage areas, and disposal areas. (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; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	During detailed design phase, as necessary with discussion with detailed design engineers and PIUs	No cost required. Mitigation measures are included as part of TOR of PMU, PIU, 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) (ii) Posting of proof of completion at worksites (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. 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 borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.		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). - 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. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to minimize the wastage of water in the	Construction Contractor	- Areas for stockpiles, storage of fuels and lubricants and waste materials; - Number of silt traps installed along trenches leading to water bodies; - Records of surface water quality inspection; - Effectiveness of water management measures; - No visible degradation to nearby drainages, <i>khals</i> or water	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	area and reversible by mitigation measures.	<p>construction activities.</p> <ul style="list-style-type: none"> - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). 	Construction Contractor	<ul style="list-style-type: none"> - Location of stockpiles; - Number of complaints from sensitive receptors; - Heavy equipment and machinery with air pollution control devices; - Certification that vehicles are compliant with air quality standards. 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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	<ul style="list-style-type: none"> - Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with 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. - Use of high noise generating equipment shall be stopped during night time. - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not 	Construction Contractor	<ul style="list-style-type: none"> - Number of complaints from sensitive receptors; - Use of silencers in noise-producing equipment and sound barriers; - Equivalent day and night time noise levels 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	relatively small area and reversible by mitigation measures.	<p>exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.</p> <ul style="list-style-type: none"> - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly. 				
Aesthetics	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	<ul style="list-style-type: none"> - Prepare a debris disposal plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with Amtali local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas. Avoid stockpiling of any excess spoils. - All vehicles delivering fine materials to the site and carrying debris for disposal shall be covered to avoid spillage. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or 	Construction Contractor	<ul style="list-style-type: none"> - Number of complaints from sensitive receptors; - Worksite clear of hazardous wastes such as oil/fuel - Worksite clear of any wastes, collected materials from drainages, unutilized materials and debris - Transport route and worksite cleared of any dust/mud 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

[illegible]

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.	<ul style="list-style-type: none"> - Prepare and implement a traffic management plan (Appendix 4) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties 	Construction Contractor	<ul style="list-style-type: none"> - Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 4); - Number of complaints from sensitive receptors; - Number of signages placed at project location - Number of walkways, signages, and metal sheets placed at project location 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		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.	<ul style="list-style-type: none"> - Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market. 	Construction Contractor	<ul style="list-style-type: none"> - Employment records; - Records of sources of materials - Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components 	Cost for implementation of mitigation measures responsibility of contractor.
Other existing amenities for community welfare	Although construction of subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of 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	<ul style="list-style-type: none"> - Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in 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. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity 	Construction Contractor	<ul style="list-style-type: none"> - Utilities Contingency Plan - Number of complaints from sensitive receptors 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Amtali local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators	Construction Contractor	- Number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 4); - Number of complaints from sensitive receptors; - Number of walkways, signages, and metal sheets placed at project location - Agreement between	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.¹⁸</p> <ul style="list-style-type: none"> - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book 		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
		<p>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.</p> <p>- 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.</p>				
Workers health and safety	<p>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</p>	<p>- Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers' health and safety (H&S).</p> <p>- 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.</p> <p>- 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</p>	Construction Contractor	<p>- Site-specific H&S Plan</p> <p>- Equipped first-aid stations</p> <p>- Medical insurance coverage for workers</p> <p>- Number of accidents</p> <p>- Records of supply of uncontaminated water</p> <p>- Condition of eating areas of workers</p> <p>- Record of H&S orientation trainings</p> <p>- Use of personal</p>	<p>- Visual inspection by PIU and supervision consultants on monthly basis</p> <p>- Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components</p>	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.	<p>times; (iii) providing H&S training¹⁹ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.</p> <ul style="list-style-type: none"> - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s 		<p>protective equipment</p> <ul style="list-style-type: none"> - % of moving equipment outfitted with audible back-up alarms - Permanent sign boards for hazardous areas - Signages for storage and disposal areas - Condition of sanitation facilities for workers 		

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; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to 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 - 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 (ii) Timely submission of monitoring reports including pictures	Construction contractor	- Availability and competency of appointed supervisor - Monthly report	- Monthly monitoring report to be submitted by PIU to PMU - PMU to submit semi-annual monitoring report to ADB	Cost for implementation of mitigation measures responsibility of contractor.
3. Post-construction Activities						
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (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. (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. (vii) The contractor must arrange the cancellation of all temporary services. (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).	<ul style="list-style-type: none"> - Store sodium hypochlorite in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials. - Store calcium hypochlorite away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year. - Isolate ammonia storage and feed areas from chlorine and hypochlorite storage and feed areas. - Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent 	Amtali pourashava	<ul style="list-style-type: none"> - No complaints from sensitive receptors - Inventory of chemicals - Air emission monitoring - Record of chemical-related accidents 	<ul style="list-style-type: none"> - Daily inspection by PTW operator at storage areas of chemicals - Quarterly (environmental monitoring of air quality to be finalize in accordance to the LCC and ECC by DoE) 	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>disruptions in supply.</p> <ul style="list-style-type: none"> - Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures. - Develop and implement a plan for responding to accidental releases. 				
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - 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.	<ul style="list-style-type: none"> - No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal). 	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.	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Produce and implement a O&M 	Amtali pourashava	<ul style="list-style-type: none"> - No complaints from sensitive receptors - No complaints from workers related to O&M activities 	<ul style="list-style-type: none"> - Duration of repair work - Daily inspection 	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	Potential impacts are negative and long-term but reversible by mitigation measures.	<p>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) training²⁰ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.</p> <ul style="list-style-type: none"> - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general 		- 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. - 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 - Construction phase	SPM PM2.5 PM10 SO2 NOx CO	- PTWs location - OHT location - Along water transmission main 1-km interval from PTWs - construction campsite locations	24-hour monitoring once in a season (except monsoons) for the construction period	Bangladesh Standards for Ambient Air Quality Schedule-2; Rule 12, Environment Conservation Rules of 1997	Contractor
2.	Noise and vibration levels	- Prior to construction to establish baseline - Construction phase	Equivalent day and night time noise levels	- PTWs location - OHT location - Along water transmission main 1-km interval from PTWs - construction campsite locations	Once in a season (except monsoons) for the construction period	Bangladesh Standards for Noise, Schedule 4; Rule 12, Environment Conservation Rules, 1997	Contractor
3.	Water quality	- Prior to construction to establish baseline - Construction phase	TDS, TSS, pH, hardness, BOD, fecal coliform, total nitrogen, total phosphorus, heavy metals, temperature, DO, hydrocarbons, mineral oils, phenols, cyanide, temperature	- Along <i>khals</i> 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 - ADB Safeguards Policy Statement - Government of Bangladesh Environmental Laws and Regulations Module 2 – Environmental Assessment Process - ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements - Review of environmental assessment report to comply with ADB requirements - Incorporation of EMP into the project design and contracts	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 - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day	PMU PIUs Contractors
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed	1 day on a regular period to be determined by PMU, PIUs, and PMSC	PMU PIUs 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 - Construction	Per location	20	30,000	60,000	Civil works contract
2.	Noise levels monitoring	- Pre-construction - 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 Module 2 – prior	lump sum		Module 1 – 30,000 Module 2 – 30,000 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) 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 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 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 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
<ul style="list-style-type: none"> Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities? 		✓	Not applicable.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Dislocation or involuntary resettlement of people? 		✓	No displacement of communities is required in this subproject.
<ul style="list-style-type: none"> Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups? 		✓	Not applicable.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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. .
<ul style="list-style-type: none"> Accidental leakage of chlorine gas? 		✓	Not anticipated. Chlorine gas will not be used. Sodium or calcium hypochlorite will be used in the chlorination process.
<ul style="list-style-type: none"> Excessive abstraction of water affecting downstream water users? 		✓	Not applicable.
<ul style="list-style-type: none"> Competing uses of water? 		✓	Not applicable.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> • Social conflicts if workers from other regions or countries are hired? 		✓	Priority in employment will be given to local residents.
<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • 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	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
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
6.	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 10,00,00,000	Tk. 10,000	-Do-

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

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224

(1)	(2)	(3)
(e) Between Tk. 10,00,000 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.

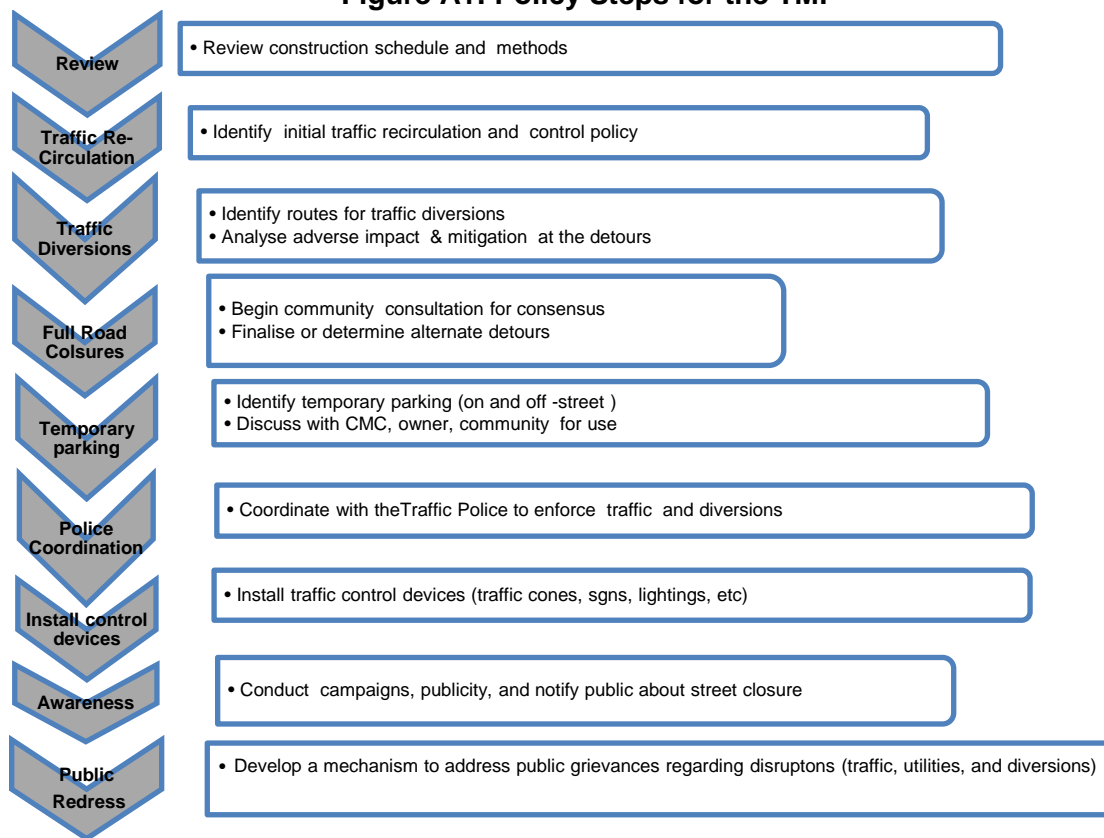
C. Analyze the impact due to street closure

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

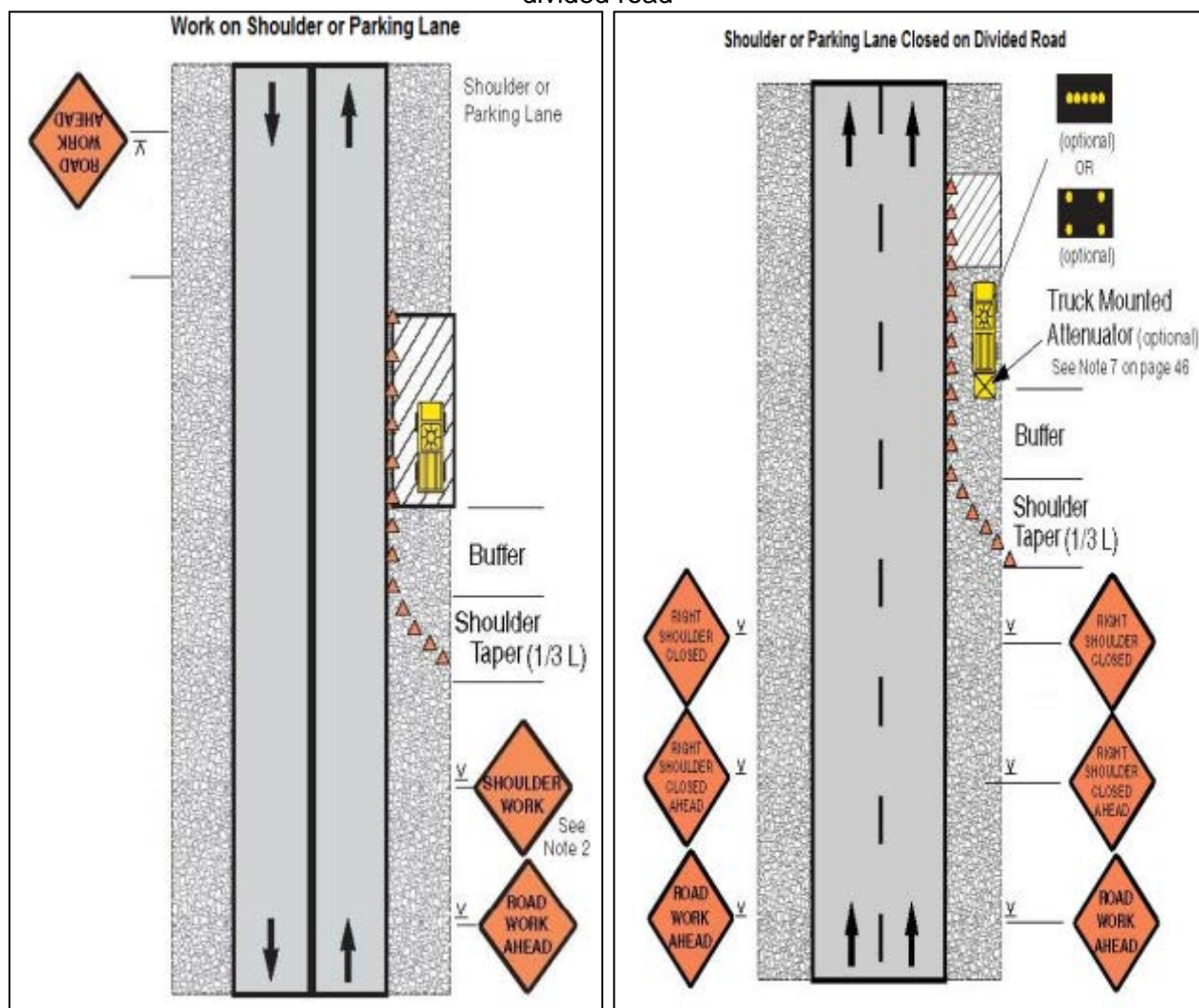


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

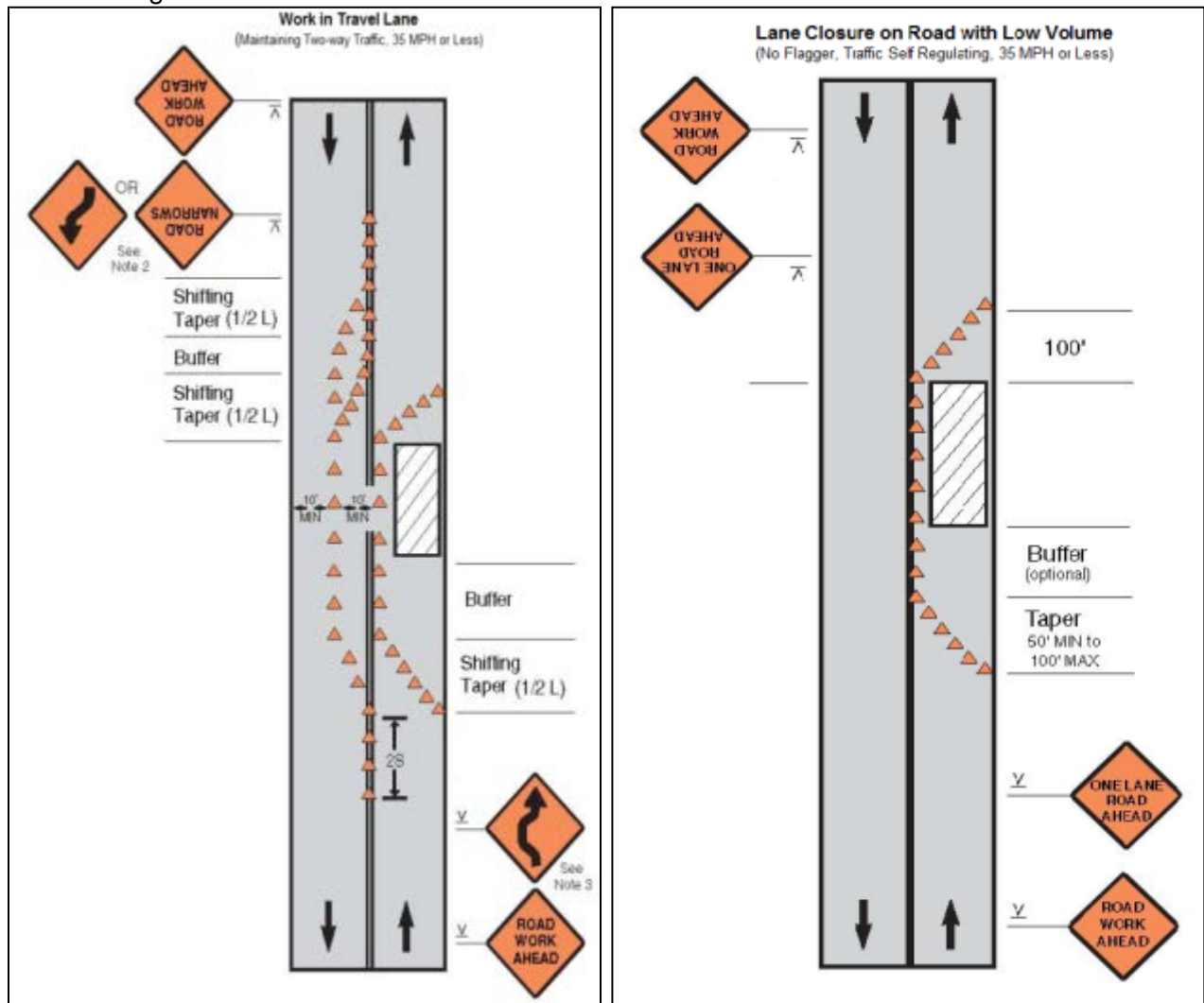


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)

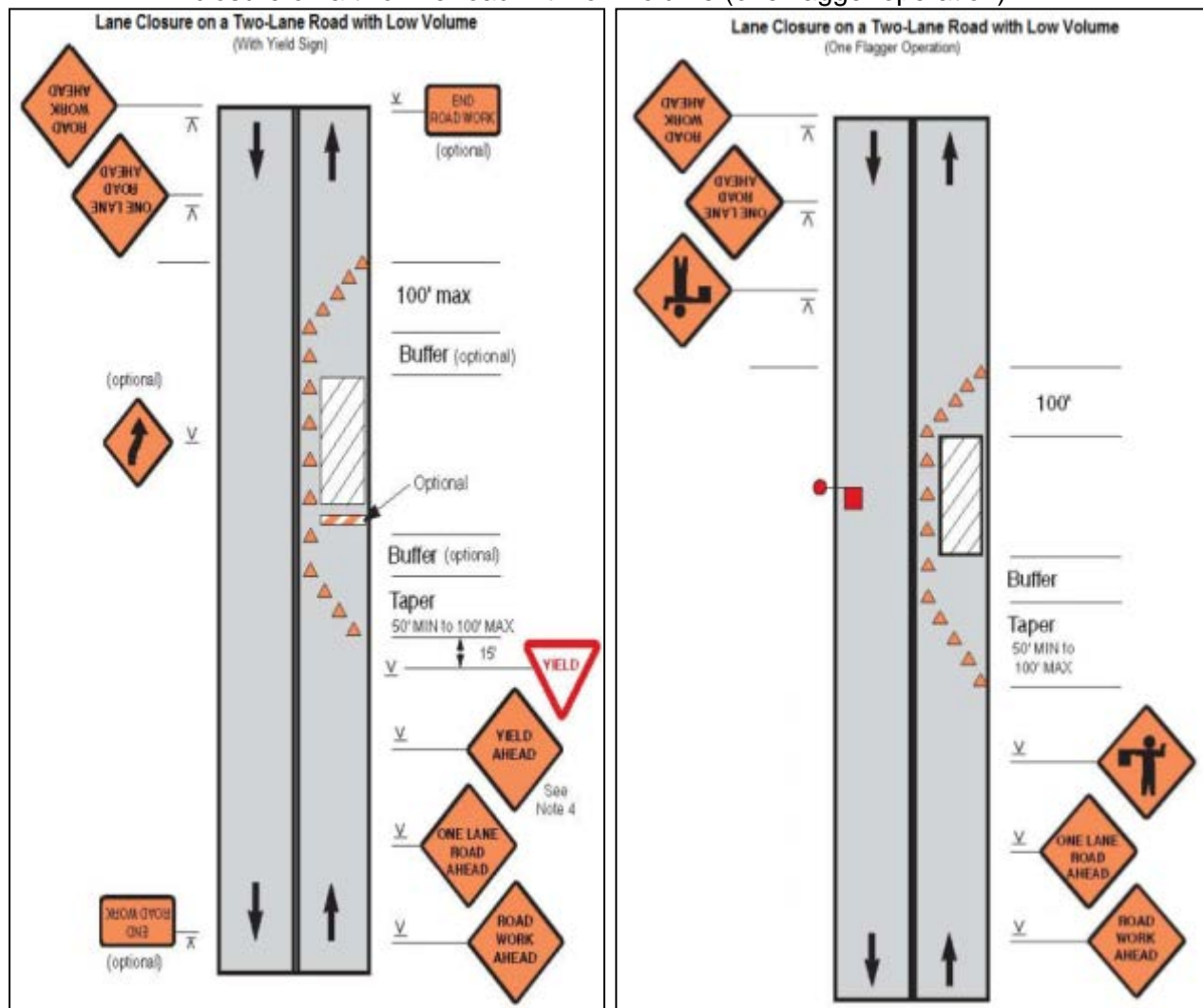


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

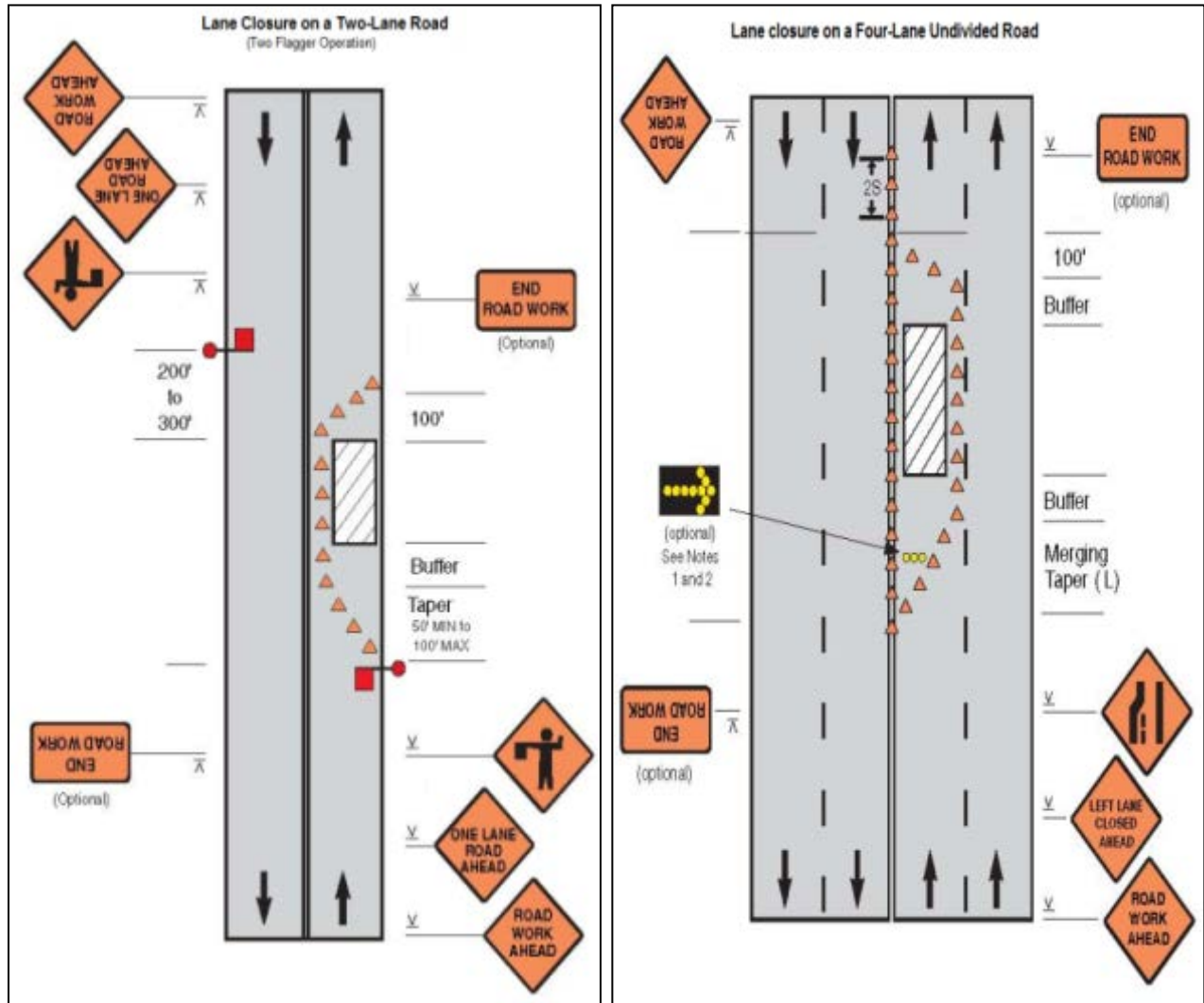


Figure A10 & A11: Lane Closure in Divided Roadway & Half Road Closure On Multi-Lane Roadway

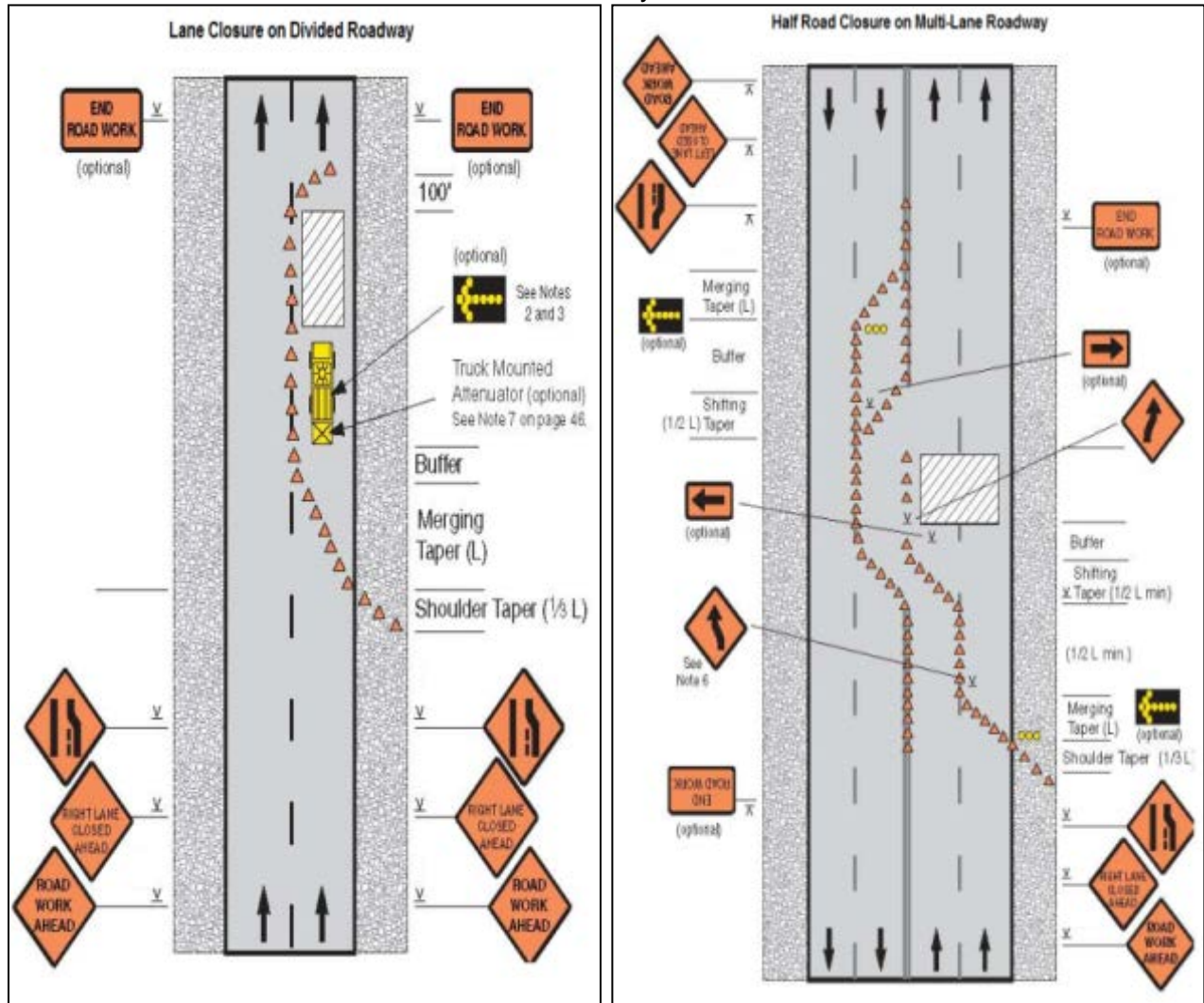
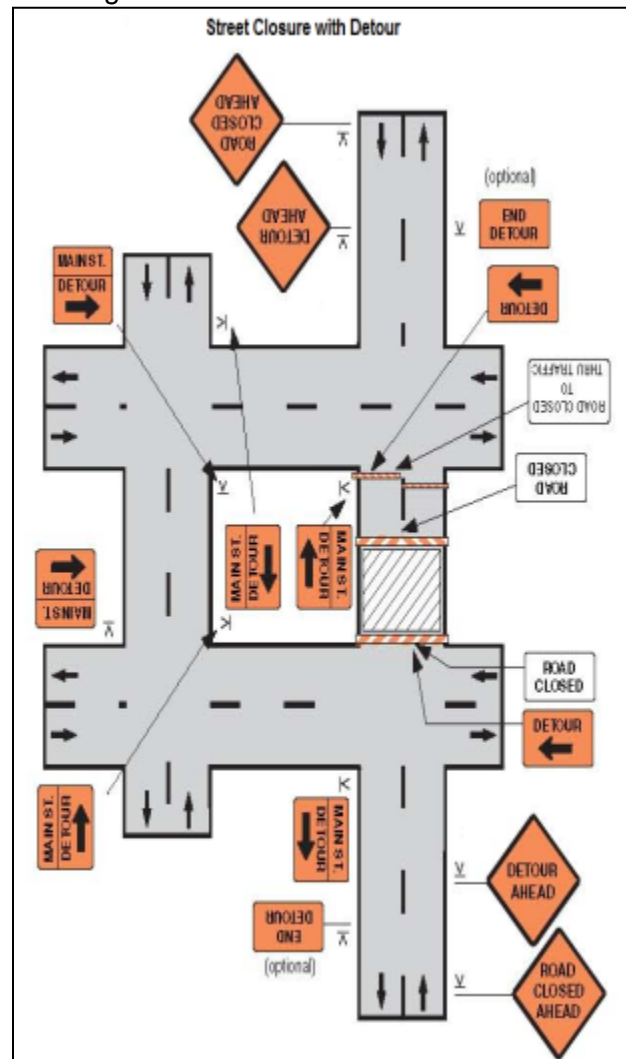


Figure A12: Street closure with detour



Appendix 5: Records of Public Consultations and FGDs

Minutes of Discussion Meeting held in DOE Office regarding EARF of CTEIP 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), CTEIP, Cell:+88-0171-1665408; +88-0173-1062331, email: yasin_afroza@yahoo.com

Agenda of Discussion:

Following item are discussed:

1. Classification of CTEIP subprojects components as per 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 Environmental Infrastructure Project (CTEIP) 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.
- CTEIP, 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 F=7 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
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 * Female	Age	
Home Address					
Place					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where, and how) of your grievance below:					
If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

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

Appendix 7: Sample Semi-Annual 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		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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

Draft Initial Environmental Examination

October 2013

BAN: Coastal Towns Environmental Infrastructure Project – Galachipa Sanitation

Prepared by the Local Government Engineering Department, 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

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	affected person
CTEIP	–	Coastal Towns Environmental Infrastructure Project
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

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

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

CONTENTS

I.	INTRODUCTION	1
II.	POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK	1
	A. ADB Policy	1
	B. National Laws	2
	C. Government of Bangladesh Environmental Assessment Procedures	3
III.	DESCRIPTION OF THE PROJECT	4
	A. The Study Area	4
	B. Existing Condition and Need for the Project	4
	C. Proposed Components	5
	D. Implementation Schedule	7
IV.	DESCRIPTION OF THE ENVIRONMENT	10
	A. Methodology Used for the Baseline Study	10
	B. Physical Characteristics	11
	C. Biological Characteristics	11
	D. Socioeconomic Characteristics	12
	E. Historical, Cultural and Archaeological Characteristics	13
V.	ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS	13
	A. Methodology	13
	B. Screening Out Areas of No Significant Impact	14
	C. Anticipated Impacts and Mitigation Measures – Planning and Design Phase	15
	D. Anticipated Impacts and Mitigation Measures – Construction Phase	15
	E. Anticipated Impacts and Mitigation Measures – Operations and Maintenance Phase	21
	F. Cumulative Impact Assessment	25
VI.	INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION	26
	A. Public Consultation Conducted	26
	B. Future Consultation and Disclosure	27
VII.	GRIEVANCE REDRESS MECHANISM	27
VIII.	ENVIRONMENTAL MANAGEMENT PLAN	30
	A. Safeguard Implementation Arrangement	31
	B. Institutional Capacity Development Program	60
	C. Staffing Requirement and Budget	60
IX.	MONITORING AND REPORTING	63
X.	CONCLUSION AND RECOMMENDATIONS	64

LIST OF TABLES:

Table 1: Applicable Government of Bangladesh Environmental Legislations	3
Table 2: Likely Government of Bangladesh Classification of Galachipa sanitation subproject	4
Table 3: Basic Data on Proposed Sanitation in Galachipa (Civil Works).....	5
Table 4: Population of Galachipa Pourashava	12
Table 5: Fields in Which the Subproject Is Not Expected to have Significant Impacts	14
Table 6: Anticipated Impacts and Mitigation Measures – Construction Phase	16
Table 7: Anticipated Impacts and Mitigation Measures – O&M Phase.....	23
Table 11: Program of Actions – Prior, During, and Post Construction Phase	34
Table 12: Program of Actions – O&M Phase	53
Table 11: Training Program for Environmental Management	60
Table 11: Indicative Cost of EMP Implementation	61

LIST OF FIGURES:

Figure 1: Location Map	8
Figure 2: Preliminary Design for Improved Septic Tank.....	9
Figure 3: Preliminary Design for Improved Twin Pit System	9
Figure 4: Preliminary Design for Proposed Septage Management System at WAPDA Road	9
Figure 5: Preliminary Design for Proposed Public Sanitation Facility near Bailey Bridge.....	10
Figure 6: Preliminary Design for Proposed Wastewater Management in Launch Ghat Road	10
Figure 7: Grievance Redress Process.....	30
Figure 6: Safeguards Implementation Arrangement	33

LIST OF APPENDICES:

Appendix 1: Rapid Environmental Assessment Checklist.....	66
Appendix 2: Environmental Standards and Application Fees	69
Appendix 3: Sample Outline Spoils Management Plan.....	70
Appendix 4: Sample Outline Traffic Management Plan	71
Appendix 5: Records of Public Consultations and FGDs.....	81
Appendix 6: Sample Grievance Registration Form.....	91
Appendix 7: Sample Semi-Annual Reporting Format	92

EXECUTIVE SUMMARY

1. The Coastal Towns Environmental Infrastructure 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 change 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. Galachipa sanitation subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical as existing sanitation facilities, mostly latrines, are easily inundated due to rain water accumulation in the monsoon season resulting in loss of accessibility to latrines and pollution caused by discharge of the contents. The findings of the socio-economic and willingness to pay survey conducted during project preparation indicate that there is hardly any usage of existing public toilets as these are poorly maintained and equipped (no water line or electricity). The pourashava does not have de-sludging equipment for cleaning latrine pits and septic tanks. Consequently, the communities suffer from water-sanitation related diseases.

4. **Subproject Scope.** The subproject is formulated under this project to provide accessible, reliable and climate-resilient sanitation facilities in a holistic and integrated manner. Investments under this subproject include (i) construction of 5 public toilets, 3 school latrines, 8 community latrines, and 3 pilot septage treatment plants; and (ii) provision of 1 de-sludging equipment in Galachipa.

5. **Categorization.** 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 sanitation (Appendix 1) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Galachipa sanitation 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.

6. 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.

7. **Implementation Arrangements.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. The Local Government Engineering Department (LGED) is the lead executing agency (EA), and the Department of Public Health Engineering (DPHE) is the co-executing agency (for water supply and sanitation components).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 teams² 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 Galachipa 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. The subproject sites are located in government-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Galachipa.

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 the Galachipa sanitation subproject are: (i) sites should be located within or very close to locality of users; (ii) sites must be prioritized in educational or institutional compound where concerned authority has no objection; (iii) sites should be selected in the area where significant number of population live; (iv) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (v) sites are selected according to the environmental criteria for project selection specified in the environmental assessment and review framework; (vi) ensuring all planning and design interventions and decisions are made in consultation with local communities and reflecting

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)

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 Galachipa sanitation subproject, including: (i) proposed remedial measures to overcome existing problems in pit latrines; (ii) use of septic tanks in public toilets, school latrines and community latrines based on availability of land size, flooding condition, location and use; and (iii) combination of treatment modules that are applicable for diverse land uses for the pilot septage treatment plants. 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. During the construction phase, impacts mainly arise from (i) disturbance of residents, businesses, and traffic; (ii) need to manage excess construction materials and spoils; and (iii) community and workers health and safety. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Measures such as conducting work in lean season and minimizing inconvenience by best construction methods will be employed.

13. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. The toilets and latrines 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. While pit latrines must be emptied frequently, solids that accumulate in septic systems (septage) must also be removed periodically, usually every 2 to 5 years depending on design and usage to maintain proper function and prevent plugging, overflows, and the resulting release of septic tank contents. Recommended measures to prevent, minimize, and control releases of septage and other fecal sludge are included in the EMP. Operation and maintenance of pilot septage treatment plants will be shared responsibility between the user communities or maintenance committee formed by the local community, who will be educated on the technology and with support from the pourashava for periodical maintenance.

14. 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.

15. **Consultation, Disclosure and Grievance Redress.** The stakeholders were involved in developing the IEE through discussions on-site and public consultation. Their views 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 Galachipa will be the major beneficiaries of this subproject. The benefits of improved sanitation translate into improved health, an increase in productivity, fewer days absent from school for children, and improved quality of life. In addition to improved environmental conditions, the subproject will reduce exposure to climate extremes. On-site/decentralised systems of waste management will improve community health and hygiene, particularly in socially deprived groups, and reduce financial burden of Galachipa pourashava. 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 and health benefits to citizens of Galachipa 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.

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 Environmental Infrastructure 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 change 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. Galachipa sanitation subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical as existing sanitation facilities, mostly latrines, are easily inundated due to rain water accumulation in the monsoon season resulting in loss of accessibility to latrines and pollution caused by discharge of the contents. The findings of the socio-economic and willingness to pay survey conducted during project preparation indicate that there is hardly any usage of existing public toilets as these are poorly maintained and equipped (no water line or electricity). The pourashava does not have de-sludging equipment for cleaning latrine pits and septic tanks. Consequently, the communities suffer from water-sanitation related diseases.

4. 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 Urban Development (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

5. 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.

6. **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.

7. **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.

8. **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

9. 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).

10. 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 presents specific requirements for the subproject. 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 and amendments in 2000, 2002 and 2010 ³	<ul style="list-style-type: none"> - Restriction on operation and process, which can be continued or cannot be initiated in the ecologically critical areas - Regulation on vehicles emitting smoke harmful to the environment - Remedial measures for injuries to ecosystems - Standards for quality of air, water, noise and soil for different areas for various purposes and limits for discharging and emitting waste - Environmental guidelines 	The provisions of the act apply to the entire subproject in the construction and operation and maintenance (O&M) phases.
2.	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	<ul style="list-style-type: none"> - Environmental clearances - Compliance to environmental quality standards 	The subproject is categorized as Red and requires LCC and 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)	<ul style="list-style-type: none"> - Clearance for any felling, extraction, and transport of forest produce 	Considered in subproject preparation.
4.	Bangladesh Climate Change Strategy and Action Plan of 2009	<ul style="list-style-type: none"> - 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. - enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change 	Considered in subproject preparation.
5.	Bangladesh Labor Law of 2006	<ul style="list-style-type: none"> - Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement - Prohibition of employment of children and adolescent 	The provisions of the act apply to the entire subproject in the construction and O&M phases. Provides for safety of workforce during construction phase.

C. Government of Bangladesh Environmental Assessment Procedures

11. 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).

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.

12. 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 Galachipa sanitation subproject

	Subproject	Component	Equivalent in Schedule I of ECR	DoE Classification
1.	Sanitation	Toilet facilities and latrines	Public toilet	Orange-B
		Septage and wastewater treatment plants	Sewage treatment plant	Red

13. 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 for the EIA;⁴ 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).

14. 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

15. Galachipa is located in Patuakhali District of Barisal Division. It is the largest *upazila* of Patuakhali District in respect of both area and population. Galachipa is located between 21°48' and 22°21' north and between 90°15' and 90°37' east. The proposed sanitation facilities will be located in educational institutions, government-owned land, or community-managed lands. The location map of the town is shown as Figure 1.

B. Existing Condition and Need for the Project

16. As per Bangladesh Bureau of Statistics (BBS) census in 2011, 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.

17. **Public toilets.** There are few public toilets in Galachipa which are in bad condition as the pits/septic tanks and superstructures are mostly damaged. There are no arrangement for electricity and water supply, and no separate provision for females.

⁴ Consultations with DoE on 9 September indicate that ADB's environmental categorization is different from DoE's categorization. Projects categorized as "B" as per ADB SPS 2009 may be "Red" in DoE's categorization. DoE may require preparation and submission of an EIA during detailed design stage to obtain the necessary LCC and ECC. Minutes of the meeting is included in Appendix 6.

18. **Latrines.** The latrines are generally located in relatively low areas in the household. The latrines consists of 4/5 nos. rings placed to the depth of around 3-4ft (0.9-1.2m) in the ground; a platform is simply positioned on the uppermost ring of the pit which is almost at the ground level. Consequently the latrines are easily inundated due to rain water accumulation in the monsoon season, resulting in a loss of accessibility to the latrine and pollution caused by discharge of the contents. It was observed in some places during the field visits in March and September 2013 that holes have been made to allow the flow of sludge over the ground to a nearby ditches or *khals* (drainage channels).

19. **Septage management.** Galachipa does not have de-sludging equipment for cleaning pit latrines and septic tanks. As a result the community themselves take initiative of cleaning these facilities, mainly through sweepers at a cost of Tk 500 to Tk 1,000 depending on the size of the latrine pit or septic tank. Treatment facility is not available in Galachipa and presently the fecal sludge from pit latrines and septage from septic tanks are disposed unscientifically (buried into the nearby ground or sometimes disposed to nearby *khals*).

C. Proposed Components

19. Investments under this subproject include (i) construction of 5 public toilets, 3 school latrines, 8 community latrines, and 3 pilot septage treatment plants; and (ii) provision of 1 de-sludging equipment in Galachipa. Details are provided in Table 3 and proposed designs are shown in figures 2 to 6.

Table 3: Basic Data on Proposed Sanitation in Galachipa (Civil Works)

	Items	Unit	Quantity	Description
1.0 Public Toilets				
1.1	Udayan Madhyamik Vidyalaya	No.	1	- Semi-government institutional land; vacant land available - No Objection Certificate (NOC) required from school authorities - Improved septic tank with soak pit ⁵
1.2	Lipi Tokij Mor, Ward No. 5	No.	1	- Government land - NOC required from <i>upazila parishad</i> - Existing compound wall will need to be demolished - Improved septic tank with soak pit
1.3	Dhaka Launch Ghat, Ward No. 1	No.	1	- Khas land, presently vacant. - NOC required from District Commissioner (DC) - Improved septic tank with soak pit
1.4	Ferry Ghat, Ward No. 4	No.	1	- DC land, presently vacant - NOC required from DC - Improved septic tank with soak pit

⁵ Improved septic tank designs have been developed to enhance the removal efficiency of unsettled and dissolved solids, a major drawback of conventional septic tank. The basic principle of such a system is to increase contact between entering wastewater and active biomass in the accumulated sludge. This can be achieved by constructing additional compartments (2 to 3) with vertical baffle system in to the conventional septic tank to force the wastewater to flow through the accumulated biomass as it passes from the inlet to outlet. Wastewater flowing from bottom to top passes through the settled sludge and enables contact between incoming wastewater and bio mass. The treatment efficiency of this system is 20 to 30% higher than the conventional septic tank in terms of BOD and TSS removal. The first chamber is made twice the size of other chambers. In order to ensure anaerobic condition within the system, a minimum depth of 1.8 to 2 m is maintained. The retention time is designed for a minimum of 24 to 48 hrs. A vent pipe is provided over the tank slab so that gases produced in the degradation process can escape in the atmosphere. The system is designed for a minimum desludging period of 2 to 3 years. The effluent from the improved septic tank flows out into the soak pit for further treatment. Soak pits can be circular or like a trench in shape. In case of high ground water level, a collection device is provided along with the percolation system. This is mainly to prevent back flow of water from soak pit to septic tank. The soak pit is a covered, porous walled pit that allows water to slowly redistribute and infiltrate it in surrounding soil for absorption.

	Items	Unit	Quantity	Description
1.5	Galachipa Girls High School, Ward No. 4	No.	1	<ul style="list-style-type: none"> - Semi-government institutional land. - Toilets required for male and female teachers and students on ground floor - Preferable location: adjacent to existing toilet. - Wall/corridor required for privacy for girls (as expressed during focus group discussions) - Improved septic tank with soak pit
2.0 School latrines				
2.1	Ratandi Palli Unnayan Govt. Primary School, Ward No. 9	No.	1	<ul style="list-style-type: none"> - Government land - Toilets for male and female required at newly constructed cyclone shelter cum school building (minimum of 2 toilets for male and 2 toilet for female on each floor) - Tube wells will be required to supply water to each floor - Improved septic tank with soak pit
2.2	Galachipa Degree College, Ward No. 9	No.	1	<ul style="list-style-type: none"> - Existing toilet in disrepair to be replaced. - Few toilets available for use by students/authorities during construction period - Improved septic tank with soak pit
2.3	Ratandi Shishu Sadan Hafizia Madrasha, Ward No. 9	No.	1	<ul style="list-style-type: none"> - <i>Madrasha</i> land. - Proposed location is a vacant piece of land on south side of existing tin shed. - NOC required from <i>madrasha</i> - Improved septic tank with soak pit
3.0 Community latrines				
3.1	Shantibagh Sluice Gate Basti, Ward No. 3	No.	4	<ul style="list-style-type: none"> - Government land - Vacant land available - Improved twin pit system⁶ or improved septic tank with soak pit
3.2	Ratanpur Sluice Gate Basti, Ward No. 6	No.	4	<ul style="list-style-type: none"> - Government land - Vacant land available - Improved twin pit system or improved septic tank with soak pit
3.3	Along main <i>khal</i> for affected persons during drainage improvement works at Shanti Bagh and Shyamoli Bagh	No.	to be determined during detailed design stage	<ul style="list-style-type: none"> - Community toilets will be required to replace affected toilets encroaching drainages (minimum of 3 toilets for male and 3 toilets for female) - Improved twin pit system or improved septic tank with soak pit
4.0 Pilot Septage Treatment Plants				
5.0	Septage Management System at WAPDA Road	No.	1	<ul style="list-style-type: none"> - WAPDA land - Collection, conveyance, treatment and disposal of fecal sludge from the pit latrines and septage from septic tanks
5.1	Public sanitation facility near Bailey Bridge opposite Galachipa Degree College	No.	1	<ul style="list-style-type: none"> - <i>Upazila parishad</i> land - 2 abandoned tin sheds to be demolished - NOC required from <i>upazila parishad</i> - Toilet complex with at least 6 numbers of pour flush toilets and minimum 4 numbers of urinals for male. Out of the 6 proposed toilets, 3 toilet seats for male and 3 toilet seats for female - The design of the toilet complex needs to be finalized in consultation with the involved stakeholders of the project.
5.2	Wastewater management in housing settlement	No.	1	<ul style="list-style-type: none"> - 20 water flush toilets with 5 toilets for each cluster to serve 10 households. Each toilet is shared by two families.

⁶ The twin pit system is an improved version of a single pit system wherein two pits are provided to hold fecal matter. This provides a long holding period for digestion of fecal matter since pits are used alternatively. These systems retain the simplicity of construction and maintenance and fulfil the low cost requirements of single pit systems. The number of rings to be provided for each pit is arrived based on the number of users and desludging period. For a household with 5 persons, it is suggested to have 10 rings (5 rings for each pit) with a diameter of 75 cm and depth of 30 cm for each ring. It is recommended that grey water should not be discharged in the pits to avoid frequent desludging and maintain the required moisture level of the fecal matter. The contents of the first pit are emptied when the second pit is almost full. The dehydrated feces from the first pit are safe to handle. To stop the water from infiltrating, the pit should be covered with a watertight concrete top slab.

	Items	Unit	Quantity	Description
	covering 40 barracks at Launch Ghat Road			<ul style="list-style-type: none"> - It is proposed to (i) collect wastewater from each cluster and conveyed to respective treatment unit using the sewer pipes; (ii) provide one common treatment unit (1.0 cubic meter capacity per day) for two clusters (covering 20 houses); and (iii) treat the wastewater in the improved septic tank. The effluent from the treatment tank is further treated in the planted drain and discharged into the nearby drain. The possibility of disposal options needs to be explored during the detailed feasibility study and design stage. - Deep tube wells need to be shifted to at least 20 m from proposed treatment plant. Final distance to be determined during detailed design stage.

Source: PPTA Consultants.

D. Implementation Schedule

20. 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: Preliminary Design for Improved Septic Tank

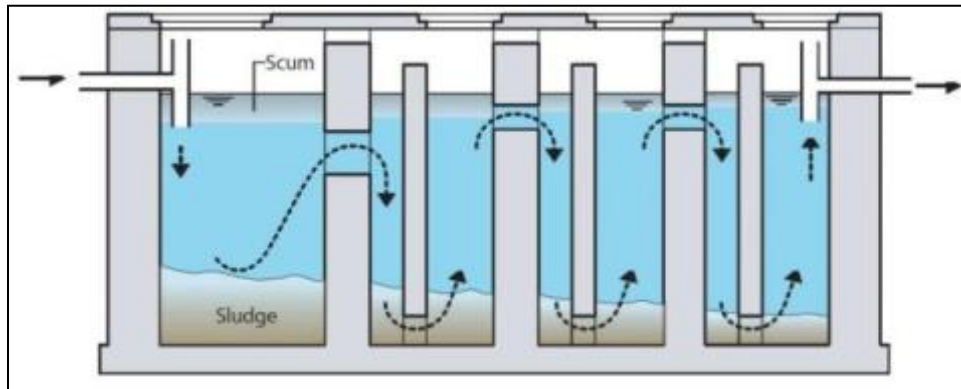


Figure 3: Preliminary Design for Improved Twin Pit System

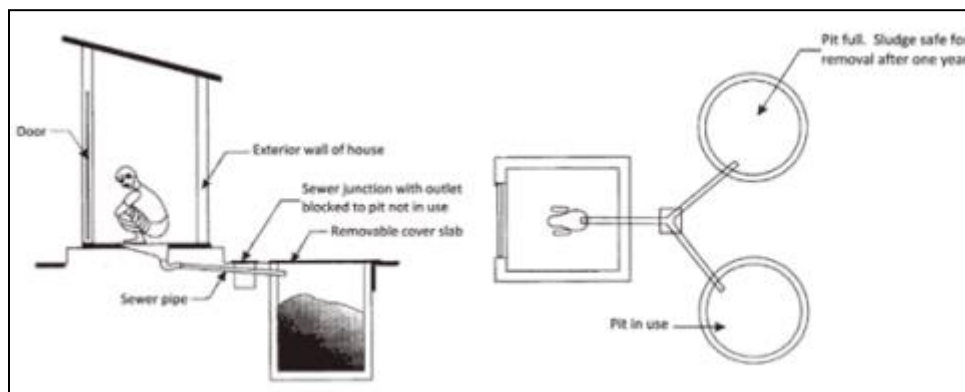


Figure 4: Preliminary Design for Proposed Septage Management System at WAPDA Road

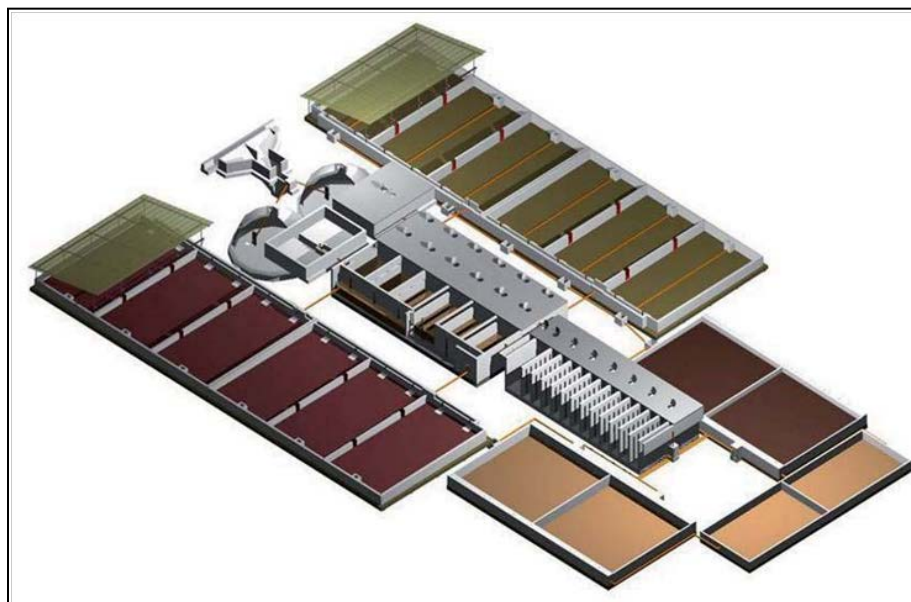


Figure 5: Preliminary Design for Proposed Public Sanitation Facility near Bailey Bridge

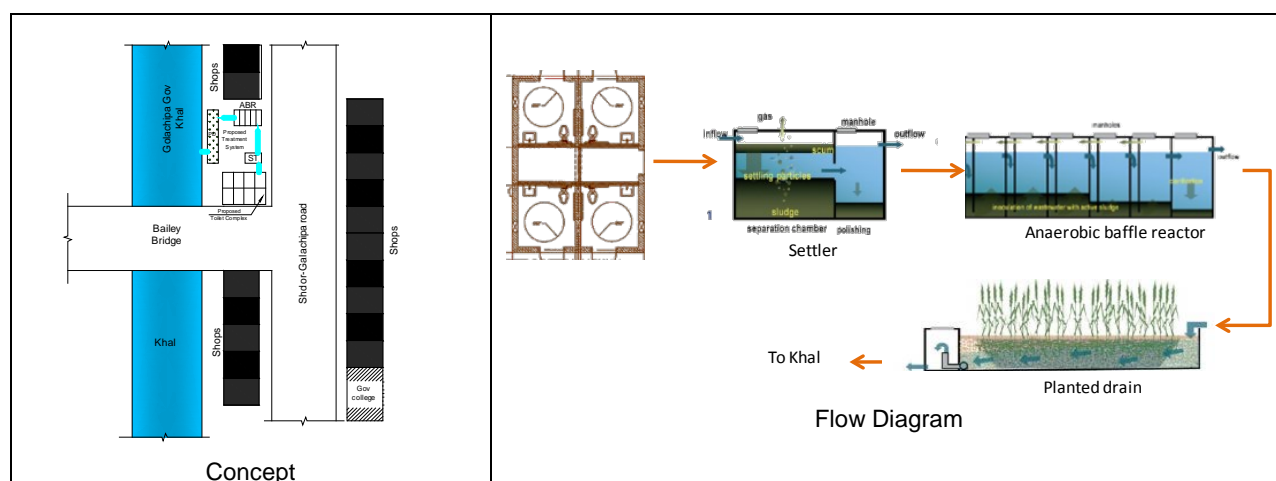
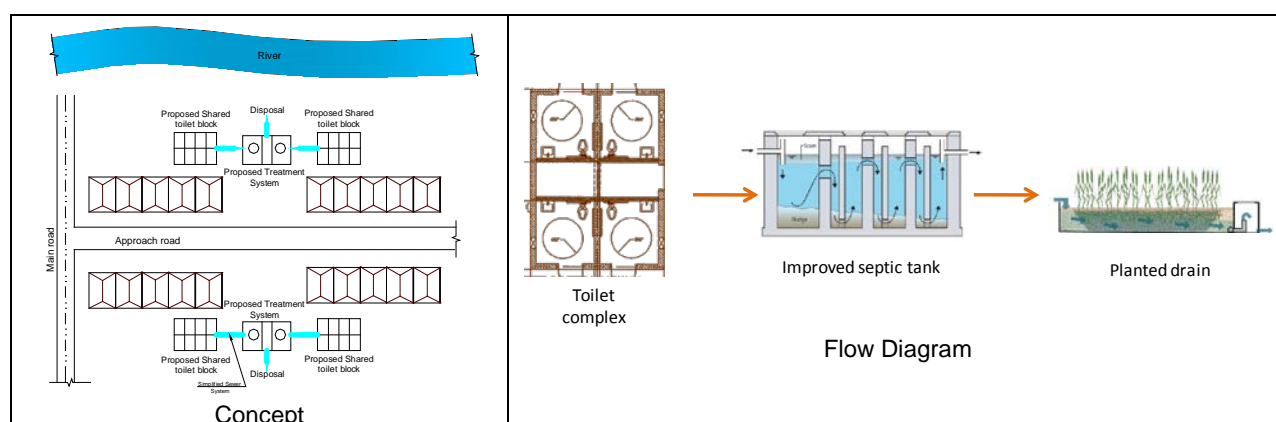


Figure 6: Preliminary Design for Proposed Wastewater Management in Launch Ghat Road



IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for the Baseline Study

21. **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 Galachipa 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.

22. Several visits to the subproject sites were made during the CDTA and PPTA stages 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.

23. **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

24. **Topography, landforms, geology and soils.** Galachipa pourashava, with an area of 3.4 km² located about 32 km from the sea, covers 9 wards and 2 *mouzas*. It is bordered by River Ramnabad, coast-estuary and Bay of Bengal. A topographic and physical feature survey of the pourashava was undertaken by Sheltech consultants in 2012. According to that survey, The minimum and maximum ground level varies from 1.5 m to 4.2 m and the average height is about 2.43 m. The physical survey found that all the wards have flat land. It is greatly influenced by the river network and *khals*.

25. **Climatic conditions.** Galachipa has a tropical monsoon-type climate. January is the coolest month with temperatures averaging near 26 °C (78 °F) and April the warmest with temperatures from 33 to 36 °C (91 to 96 °F). 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). Galachipa 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.

26. **Water quality.** Galachipa is bounded by the River Ramnabad however the subproject sites are not located in or adjacent to this river or *khals*.

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

28. **Acoustic environment.** Subproject components are in the built-up part of Galachipa, 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

29. **Flora and fauna.** Subproject components are located in Galachipa 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.

30. **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

31. **Population.** Information about the total number of households, with average size, and population of Galachipa pourashava is presented in Table 4.

Table 4: Population of Galachipa Pourashava

Administrative Unit	Area (km ²)	Households (nos.)	Population			Average HH Size	Density (per km ²)
			Total	Male	Female		
Galachipa	3.40	4,967	21,200	10,888	10,312	4.26	
Ward No - 01	0.27	595	2,483	1,279	1,204	4.17	9,196
Ward No - 02	0.28	502	2,122	1,080	1,042	4.22	7,578
Ward No - 03	0.39	326	1,430	695	735	4.38	3,666
Ward No - 04	0.16	560	2,275	1,255	1,020	4.06	14,218
Ward No - 05	0.23	446	1,755	915	840	3.93	7,630
Ward No - 06	0.68	720	3,352	1,717	1,635	4.65	4,929
Ward No - 07	0.35	746	3,148	1,632	1,516	4.22	8,994
Ward No - 08	0.36	524	2,301	1,158	1,143	4.39	6,391
Ward No - 09	0.67	548	2,334	1,157	1,177	4.26	3,483

Source: Bangladesh Bureau of Statistics Community Report, Zilla: Galachipa, 2011.

32. **Land use.** A land use survey was undertaken by Sheltech Consultants in 2009. The survey results shows that there is dominance of agricultural land (44%) followed by residential land (37%) and water bodies (10%). Galachipa has 12.7 ha of road area, 1.2 ha of katcha road, 4.3 ha of semi-pucca roads and 7.2 ha of pucca roads. There are 44 bridges, 1 box culvert, 6 pipe culverts and 2 sluice gates.

33. **Type of community spread.** Galachipa is composed of 92.01% Muslim, 7.95% Hindu, and 0.04% Buddhist. Average literacy is 34.8%.

34. **Existing provisions for pedestrians and other forms of transport.** Galachipa roads generally fall into two categories: *katcha* (earthen) construction and *pucca* (formed) roads. Formed roads are mainly BT asphalt roads with CC roads in a few places for main roads, while minor roads may also be brick-on-edge soling, known locally as 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. The transportation and traffic management survey results reveal that no public or private bus service is available for intra-zonal movement of passengers. Rickshaws are the most dominant transport for intra-zonal movement. The water transport network of Galachipa has significant importance in carrying goods.

35. **Socio-economic status.** Main occupations are agriculture, agricultural laborer, wage laborer, commerce, service, fishing, transport, construction, and others. Main crops are paddy. About 70% of the households own their house with 30% living in rented houses. At present, there is predominance (74%) of katcha structures. Most single storied structures are pucca structures.

36. **Other existing amenities for community welfare.** The Upazila Health Complex (UHC) in Galachipa is responsible for providing public health services although there are a few private doctors and pharmacies in the town. In the UHC there are 10 doctors and 16 nurses/health technicians.

37. **Water supply.** Under the DPHE-DANIDA water supply and sanitation project two production tube wells with 1 km transmission pipeline and 18 km distribution line were installed in 1999. Later on another 8 km pipeline was installed by the pourashava making the pipeline total up to 26 km. Water from the production tube wells is supplied through the only overhead tank available at present. It is estimated that about 76% of the pourashava area is covered by water supply piped networks – household connections and standpipes. The rest of the population has access to public and private hand tube-wells. Water test reports of 1999 and 2012 do not indicate any salinity increase in ground water. Hydro-geological status shows that the aquifer is well protected by confining clay layers.

38. **Drainage.** Primary drains at Galachipa are about 36 km of canals or khals covering 11.4 ha. There is no secondary drainage. There are 5 km of tertiary drains that collect discharged water from households together with storm water and are mainly manmade (some being upgraded now). Galachipa *khal* is the main canal that drains the waters of the town into the Ramnabad River.

39. **Flood Control/Disaster Preparedness.** Galachipa is located adjacent to Bay of Bengal and is vulnerable to the flooding from cyclones and linked storm surges. The vulnerable period is between April-May and October-November when tropical cyclones form in the Bay of Bengal. Cyclones have struck the area in 1970, 1988, 1991, 2007 and 2008. Ward numbers 2, 3 and 4 are the most affected by flooding from high tides. Galachipa is protected by BWDB Polder 55/1. The polder embankments protect it against flood from the rivers while drainage inside the polder is affected through drainage *khals* with regulators at the outfall. The polder is 47 km long with 11 drainage sluices and 13 flushing inlets. Within the polder the maximum spot level is 5.71 m as measured by PWD (mPWD), the minimum level is 0.46 mPWD and the average ground level is 1.72 mPWD. However, a significant part of Galachipa pourashava is outside the polder.

40. **Sanitation.** 98% of population served by sanitary latrines with 40% having septic tanks, 40% having water sealed slab latrine and 18% simple pit latrines. There are only three public toilets.

41. **Solid waste management.** There is no solid waste management system in place.

E. Historical, Cultural and Archaeological Characteristics

42. **Physical and cultural heritage.** The historical places in Galachipa include the marks of war of liberation (2 monuments). The archaeological heritage and relics sites are Utabaria Dayamayee Mandir (built in 1208 BC) and the single domed Gurinda Mosque at Ratandi (built in 18th century). The subproject components are not located in or near the vicinities of these sites.

V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS

A. Methodology

43. 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 Urban Development (Appendix 1) and ADB SPS 2009.

B. Screening Out Areas of No Significant Impact

44. From the preliminary design and results of the rapid environmental assessment, it is clear that implementation of Galachipa sanitation subproject will not have major negative impacts because activities will be localized/site-specific and short in duration 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 5) thus can be screened out of the assessment at this stage but will be assessed again during detailed design stage and before implementation.

Table 5: 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 excavation works will be conducted only during construction stage (short-term) and specific to subproject sites.
Climatic conditions	Short-term production of dust is the only effect on atmosphere. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Water quality	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 (<i>nallahs</i>). 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, in 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 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 Galachipa pourashava will not cause direct impact on biodiversity values. Based on preliminary design 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. Sanitation facilities will be constructed in vacant government land, existing school compounds and built up areas of the pourashava.
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 impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Socio-economic status	There is no requirement for land acquisition or any resettlements. 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.
Other existing amenities for community	Although construction of subproject components involves quite simple

Field	Rationale
welfare	techniques of civil work, the invasive nature of excavation and the subproject sites being in built-up areas of Galachipa 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. Deep tube wells may be shifted to ensure water contamination is prevented.
D. Historical, Cultural, and Archaeological Characteristics	
Physical and cultural heritage	The subproject components are not located in or near and excavation works will not be conducted in the vicinities of identified historical and sites.

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

45. **Land acquisition and resettlement.** The proposed sanitation facilities will be located in government-owned land, semi-government institutional lands, existing school compounds, and common community areas. There are no encroachers or residential/commercial structures in these lands. 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, in addition to the required tree plantation in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract.

46. 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. The subproject will be in properties held by the pourashava and access to the subproject sites is thru public ROW and existing roads.

47. The concepts considered in design of the Galachipa sanitation subproject are: (i) sites should be located within or very close to locality of users; (ii) sites must be prioritized in educational or institutional compound where concerned authority has no objection; (iii) sites should be selected in the area where significant number of population live; (iv) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (v) sites are selected according to the environmental criteria for project selection specified in the environmental assessment and review framework; (vi) 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.

48. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Galachipa sanitation subproject, including: (i) raising the floor level of latrines and associated facilities including access, to protect them from flooding; (ii) application of sufficient buffer zones between water supply and sanitation facilities to protect contamination of the water supply; and (iii) use of appropriate liner materials to protect the groundwater from contamination in septage treatment sites as the project sites are low lying. 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.

D. Anticipated Impacts and Mitigation Measures – Construction Phase

49. 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.

50. **Construction method.** Tasks to be performed for construction of the sanitation facilities are: (i) demolition of any existing structures; (ii) site clearing and shifting of any affected deep tube wells; (iii) laying of foundations; (iv) casting of ground floor slab; (v) construction of floor beams and floor slabs; (vi) construction of roof beams and roofing; (vii) installation of doors; (viii) architectural components and finishes; and (ix) ordering, procurement and installation of water and electrical services. Excavation for the foundation will be dug by backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed nearby, and the materials (brought to site on trucks and stored on unused land nearby) will be placed in the trench by crane or using a small rig. The infrastructures will be constructed manually according to design specifications. Any excavated road will be reinstated.

51. 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.

52. Although construction of these subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites in built-up areas of Galachipa 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, Galachipa sanitation 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 6).

Table 6: 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.	<ul style="list-style-type: none"> - Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.
Water quality	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	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Galachipa local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place

Field	Impacts	Mitigation Measures
	reversible by mitigation measures.	<p>storage areas for fuels and lubricants away from any drainage leading to water bodies.</p> <ul style="list-style-type: none"> - Take all precautions to minimize the wastage of water in the construction activities. - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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.	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.
Acoustic environment	Construction activities will be on settlements, in and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Galachipa local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during night time. - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
Aesthetics	The construction activities do	<ul style="list-style-type: none"> - Prepare the Debris Disposal Plan

Field	Impacts	Mitigation Measures
	not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Remove all construction and demolition wastes on a daily basis. - Coordinate with Galachipa local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas Avoid stockpiling of any excess spoils - Suitably dispose of collected materials from drainages, unutilized materials and debris either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. - The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
B. Biological Characteristics		
Biodiversity	Activities being located in the built-up area of Galachipa pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design there are no trees at the site that need to be removed (to be reassessed based on detailed design).	<ul style="list-style-type: none"> - 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. - If during detailed design cutting of trees will be required, compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to tree plantation as specified in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood.
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.	<ul style="list-style-type: none"> - Prepare and implement a Traffic Management Plan (Appendix 5) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints.

Field	Impacts	Mitigation Measures
		<ul style="list-style-type: none"> - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Socio-economic status	Subproject components will be located in government land and existing school compounds thus there is no requirement for land acquisition or any resettlements. 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.	<ul style="list-style-type: none"> - Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market.
Other existing amenities for 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 Galachipa 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 measures.	<ul style="list-style-type: none"> - Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in Galachipa (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. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Galachipa local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage

Field	Impacts	Mitigation Measures
		<p>area on private land, he must get prior permission from the environment management specialist and landowner.</p> <ul style="list-style-type: none"> - Use small mechanical excavators to attain faster excavation progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.⁷ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. - The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.
Workers health and safety	There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers health and safety (H&S). - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing H&S training⁸ for all site personnel; (iv) documenting procedures to

⁷ 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.

⁸ 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

Field	Impacts	Mitigation Measures
		<p>be followed for all site activities; and (v) maintaining accident reports and records.</p> <ul style="list-style-type: none"> - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
D. Historical, Cultural, and Archaeological Characteristics		
Physical and cultural heritage	Construction works will be in built-up areas of Galachipa thus risk for chance finds is low.	<ul style="list-style-type: none"> - All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected.

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

53. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. The toilets and latrines 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. While pit latrines must be emptied frequently, solids that accumulate in septic systems (septage) must also be removed periodically, usually every 2 to 5 years depending on design and usage to maintain proper function and prevent plugging, overflows, and the resulting release of septic tank

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.

contents. Recommended measures to prevent, minimize, and control releases of septage and other fecal sludge are included in the EMP. Operation and maintenance of pilot septage treatment plants will be shared responsibility between the user communities or maintenance committee formed by the local community, who will be educated on the technology and with support from the pourashava for periodical maintenance. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 7).

54. Improved twin pit system. The pits must be used alternately and the diversion chamber must be accessible so that flow can be diverted between chambers. Wastewater should never be diverted back to the first chamber before digested sludge has been removed from it. The seal on 'Y' junction should be checked regularly to prevent infiltration of water. To avoid the clogging in the pipes as well as 'Y' junction a minimum of 1.5 to 2 L of water should be used for each flush. If the pits are directly below the superstructure then adequate access to each pit should be ensured for regular maintenance. If digestion of fecal matter cannot be ensured due to high moisture content then it has to be transported for further treatment in sludge drying beds (or can be used in co-composting) prior to reuse or disposal. Collection methods need to be hygienic, preventing contact between workers and feces. Operation and maintenance of the improved twin pit system will be shared responsibility between the user communities or maintenance committee formed by the local community

55. Improved septic tank with soak pit. One of the major advantages of the septic tank is that it has no moving parts and, therefore, needs very little routine maintenance. A well-designed and maintained concrete, fiberglass, or plastic tank should last for 50 years. The inlet, outlet and tank condition has to be monitored regularly. The scum generated from the system should be removed regularly. Desludging needs to be carried out as per the design period (2-3 years). The sludge has to be removed manually or by pumping. Some amount of activated sludge should be left in the baffle compartments to ensure continuity of treatment process. If the soak pit is provided with a filter media, then once in 3-5 years it needs to be removed and cleaned or replaced. If not provided with filter media, then desludging of accumulated biomass needs to be ensured. If discharge of effluent is not possible through soak pit, then further treatment needs to be ensured. The sludge accumulated in the septic tank needs to be desludged through appropriate mechanical means and transported to designated sludge treatment facility. Operation and maintenance of the toilets will be shared responsibility between the user communities or maintenance committee formed by the local community

56. Pilot projects. The site specific O&M manual needs to be developed as per the actual designs of the chosen treatment modules and handed over to the owner of the facility, concerned staff/unit or agency dedicated to O&M with adequate training.

57. Hazard potentials. Biosolids are non-hazardous and non-toxic. If a spill occurs, there is no need for special equipment or emergency protocol. Biosolids are primarily processed solids produced by sewage treatment plants. Biosolids are not combustible under ordinary circumstances. If stored in airtight containers for an extended period, methane gas may be produced which could ignite in the presence of a spark or open flame. Hydrogen sulfide may also be generated in sufficient quantities to be a hazard in enclosed areas. Hydrogen sulfide gas, which smells like rotten eggs, can be toxic. Biosolids spilled onto pavement pose a potential road hazard because they can create wet, slick surfaces for motor vehicles, and/or can obstruct traffic flow.

58. Land application of biosolids. Land application is an economical and environmentally

sound method of handling biosolids that is the method of choice for most rural communities with sufficient suitable land. A properly managed land application program achieves beneficial reuse of waste organic matter and nutrients without adversely affecting public health. Meeting regulatory requirements, finding suitable sites, and overcoming local opposition may be difficult, however. In many cases, septage is stabilized before application to land to reduce levels of pathogenic organisms, lower the potential for putrefaction, and reduce odors. The simplest and most economical technique for stabilization of septage is the addition of lime or other alkaline material which is added to liquid septage in quantities sufficient to increase the pH of the septage to at least 12.0 for 30 minutes. O&M requirements for land application of biosolids vary widely depending on the application technique and the type of equipment used.

Table 7: Anticipated Impacts and Mitigation Measures – O&M Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Sludge from twin pit latrines	Source of potential contamination of nearby storm drains, waterways, or groundwater.	<ul style="list-style-type: none"> - Re-use sludge from twin pits - Use adequate water for flushing to prevent clogging - Further treatment of sludge if sludge is not fully digested - Temporary stockpiles of biosolids to be covered with lime mud (high pH) that acts as an odor control measure until material is reused
Septage from septic tanks	Groundwater contamination	<ul style="list-style-type: none"> - Secondary treatment for sludge required - Temporary stockpiles of biosolids to be covered with lime mud (high pH) that acts as an odor control measure until material is reused - Construct roofed facilities to prevent water or precipitation from contacting biosolids, and provide additional water management as needed.
Odor	Nuisance to community	<ul style="list-style-type: none"> - Ensure that only properly treated biosolids. Unless biosolids will be stored for limited periods (60 days) and/or during cool weather months, vector attraction reduction should be met prior to storage. Reduce the potential for unacceptable off-site odors by minimizing storage time. - Develop written odor control and response plans. - Operator training can increase sensitivity of personnel to odor concerns and ensure proper implementation of the odor control plan. - Regular inspections and odor monitoring, coupled with appropriate corrective action and recordkeeping, will help site and facility managers maintain good neighbor status and public acceptance of the project. - Conduct loading/unloading and spreading operations as quickly and efficiently as possible to minimize the time that odors may be emitted - Observe good housekeeping practices during facility loading and unloading. Clean trucks and equipment regularly to prevent biosolids build-up that may give rise to odors. If biosolids spills occur, clean up promptly. - If significant odor should develop during handling operations, the following remedial measures can be taken: (i) immediately correct any poor housekeeping problems (such as dirty equipment); (ii) immediately treat any accumulated water that has turned septic with lime, chlorine, potassium permanganate or other odor control product; remove the water as quickly as possible to a suitable land application site; or (iii) cover biosolids with compost or sawdust.
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-	<ul style="list-style-type: none"> - Plan activities in consultation with Galachipa local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in

Field	Impacts	Mitigation Measures
	term, site-specific within a relatively small area and reversible by mitigation measures.	least disturbance. - 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.
Collection and conveyance	Septage spilled onto pavement pose a potential road hazard because they can create wet, slick surfaces for motor vehicles, and/or can obstruct traffic flow.	- Regular check of desludging pump and attending the wear and tear - Regular check of desludging equipment and attending the wear and tear - Regular chemical coating of the collection tank - Prevent biosolids from being tracked onto public roadways - Desludging equipment should be inspected for cleanliness before leaving the site - Use mud flaps on the back of desludgers to preclude biosolids getting on tires or undercarriage during unloading operations - Public roadways accessing the site should be inspected each day during operational periods, and cleaned promptly (shovel and sweep).
Treatment and disposal		- Cleaning of intermediate sewer pipes once in 15 days - Ensuring the regular desludging of biogas digester as per the detention time - Desludging of anaerobic modules once in two to three years depending on the desludging period adopted for the designs - Cleaning of filter media in the planted gravel filter once in two to three years - Regular emptying of sludge drying beds (once in 10 days) and storing the dried compost for its use - If planted drain provided then cleaning of filter media once in two to three years - Ensure biosolids are stabilized before land application
B. Socioeconomic Characteristics		
Workers health and safety	Workers need to be mindful of the occupational hazards. Potential impacts are negative and long-term but reversible by mitigation measures.	- Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - 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. - Always wash hands after contact with biosolids. - Avoid touching face, mouth, eyes, nose, or genitalia before washing hands. - Eat in designated areas away from biosolids handling activities. - Do not smoke or chew tobacco or gum while working in direct contact with biosolids - Use gloves, when applicable. - Keep wounds covered with clean, dry bandages. - Change into clean work clothing on a daily basis. - If contact occurs, wash contact area thoroughly with soap and water. Use antiseptic solutions on wounds, and bandage with a clean, dry dressing. For contact with eyes, flush thoroughly but gently. - Consult a doctor regarding direct exposure to an open wound or mouth.
Hazard potentials	Accumulated methane and hydrogen sulfide in enclosed containers that can cause fire (methane) and foul odor (hydrogen sulfide)	- Extinguish flames/fires caused by methane accumulation with dry chemical, water spray or foam. - Avoid use of open flames in confined areas and around sealed transport containers. - Vent confined areas and transport containers if biosolids

Field	Impacts	Mitigation Measures
		have been stored for any significant length of time.
Community health and safety	Non-acceptance of the sanitation facilities and pilot projects by the community ; complaints from community	- Operator staff should politely receive citizen questions or complaints, collect the individual's name and phone number, conduct a prompt investigation, undertake control measures, if necessary, follow-up with the person who filed the complaint, and document the event and actions.

F. Cumulative Impact Assessment

59. The cumulative impact assessment examined the interaction between the subproject's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing, and reasonably foreseeable future projects or activities. The interaction of residual effects associated with multiple projects and/or activities can result in cumulative impacts, both positive and negative. The project'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.

60. The project has identified the valued components as 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 cyclone shelters. The temporal boundary can be considered as the whole Galachipa pourashava.

61. **Acoustic environment.** Noise levels during construction 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.

62. **Socioeconomic and socio-community.** Concerns on existing provisions for pedestrians and other forms of transport will occur spatially during construction activities. Traffic movement along the access roads 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 Galachipa pourashava. This can be considered a long-term cumulative benefit of the subproject.

63. 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 vulnerable⁹ groups.

⁹Vulnerable 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

64. Upon completion of the project, the socio-community will be the major beneficiaries of this subproject. The citizens of Galachipa will be the major beneficiaries of this subproject. The benefits of improved sanitation translate into improved health, an increase in productivity, fewer days absent from school for children, and improved quality of life. In addition to improved environmental conditions, the subproject will reduce exposure to climate extremes. On-site/decentralized systems of waste management will improve community health and hygiene, particularly in socially deprived groups, and reduce financial burden of Galachipa pourashava. 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. 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.

65. **Community and workers health and safety.** No adverse residual effects to human health will occur as a result of construction. While exposure to elevated noise levels, fugitive dust and common air pollutants will occur in proximity to work sites during construction, due to their short-term and localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health. The sanitation facilities will improve hygiene behavior practices thereby reducing transmission of diseases and cleaner environment for the community.

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

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Public Consultation Conducted

67. 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 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.

68. Public consultations and focus group discussions (FGDs) were conducted by PPTA on 20-21 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 6. The environmental concerns and suggestions made by the participants were listed, and discussed, and suggestions

with incomes that are below the poverty line.

accordingly incorporated in the EMP.

B. Future Consultation and Disclosure

69. 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 through a nongovernment organization (NGO), to ensure stakeholders participate fully in project execution, as well as to implement comprehensive information, education, and communication plan.

70. The public consultation and disclosure program with all interested and affected parties 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.

71. 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

72. 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.

73. **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.

74. 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.

75. 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.

76. **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.¹⁰ 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.

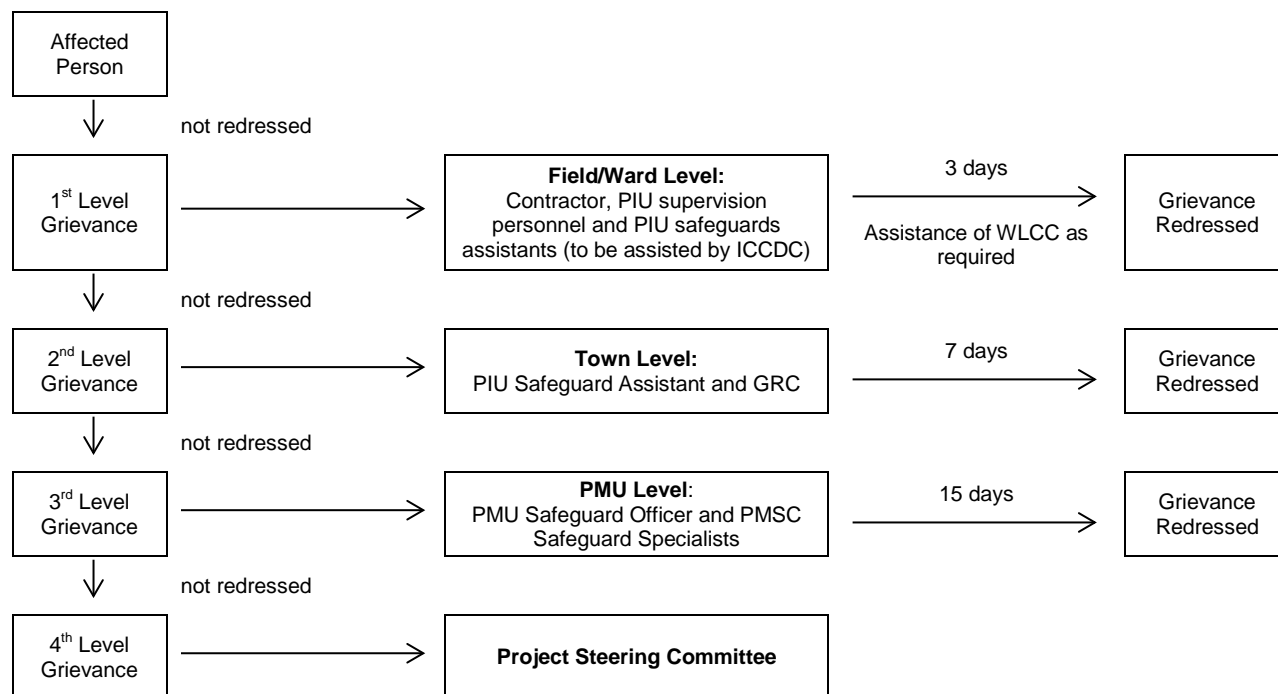
¹⁰ Grievance redress committees (GRC) have already been formed at town-level. For example in Pirojpur pourashava, the GRC comprises: Panel Mayor as Chairperson, and 1 councilor, the pourashava Executive Engineer, Secretary pourashava and pourashava administrative officer, as members. All town-level GRCs 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.

- (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)¹¹. 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.

77. 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.

78. 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.

¹¹ 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.

Figure 7: 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

79. **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.

80. **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.

81. **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.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

82. 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.

83. 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.

84. 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

85. **Executing Agency.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. LGED will be the lead executing agency (EA) for the project, and DPHE will be the co-executing agency (for water supply and sanitation components). A PMU will be established in LGED.

86. **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.

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

88. **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.

89. **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.

90. 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;¹²

91. 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.

¹² Reduce, reuse and recycle (3R) and water, sanitation, and hygiene program (WASH)

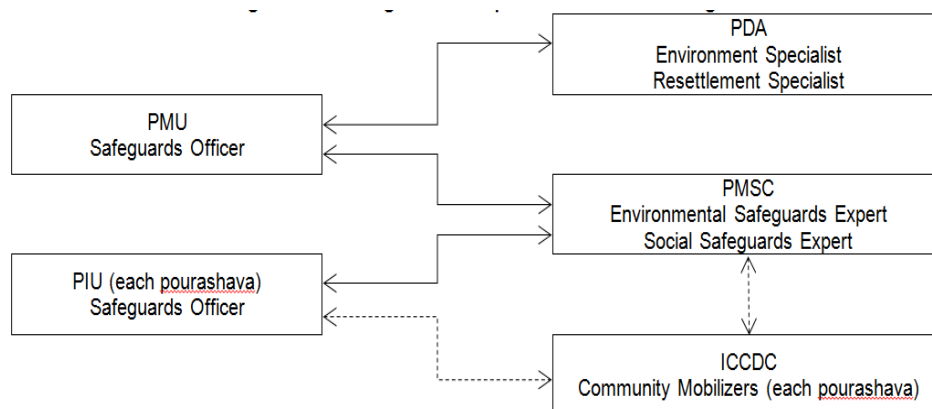
Figure 8: Safeguards Implementation Arrangement

Table 8: Program of Actions – Prior, During, and Post Construction Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	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	<ul style="list-style-type: none"> - Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. - Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. - Include in detailed design drawings and documents all conditions and provisions if necessary 	Project management unit (PMU), project implementing unit (PIU), project design advance (PDA) detailed design consultants, and project management and supervision consultants (PMSC)	Incorporated in final design and communicated to contractors.	Prior to award of contract	<p>No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PMU and PIU.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
Existing utilities	Disruption of services.	<ul style="list-style-type: none"> - Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction activities - Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. - Require contractors to prepare spoils management plan (Appendix 4) and traffic management plan (Appendix 5) 	PMU, PIU, PDA and PMSC	<ul style="list-style-type: none"> - List of affected utilities and operators; - 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 4), and traffic management plan (Appendix 5) - Number of deeptube wells to be shifted 	During detailed design phase	<p>No cost required.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p> <p>Cost of shifting deep tube to be included in the detailed design documents</p>
Construction work camps, hot mix plants, stockpile areas, storage areas,	Disruption to traffic flow and sensitive receptors	<ul style="list-style-type: none"> - Determine locations prior to award of construction contracts. 	PMU, PIU, PDA and PMSC	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas,	During detailed design phase	<p>No cost required.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU,</p>

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
and disposal areas.				and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land		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; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	During detailed design phase	No cost required. 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 with assistance of PIU and PMSC Environmental Safeguards Specialist	- Proof of completion (Safeguards Compliance Orientation) (ii) Posting of proof of completion at worksites (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. Other costs responsibility of contractor.
2. During Construction Activities						
A. Physical Characteristics						
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may	- Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and	Construction Contractor	- Records of sources of materials	Monthly by PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	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.	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	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.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Galachipa local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to 	Construction Contractor	<ul style="list-style-type: none"> - Areas for stockpiles, storage of fuels and lubricants and waste materials; - Number of silt traps installed along trenches leading to water bodies; - Records of surface water quality inspection; - Effectiveness of water management measures; - No visible degradation to nearby drainages, <i>khals</i> or water bodies due to construction activities 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>minimize the wastage of water in the construction activities.</p> <ul style="list-style-type: none"> - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when 	Construction Contractor	<ul style="list-style-type: none"> - Location of stockpiles; - Number of complaints from sensitive receptors; - Heavy equipment and machinery with air pollution control devices; 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	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.	transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.		- Certification that vehicles are compliant with air quality standards.	and final location of subproject components	
Acoustic environment	Construction activities will be on settlements, in 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	- Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Galachipa local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during	Construction Contractor	- Number of complaints from sensitive receptors; - Use of silencers in noise-producing equipment and sound barriers; - Equivalent day and night time noise levels	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	<p>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.</p>	<p>night time.</p> <ul style="list-style-type: none"> - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly. 				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
Aesthetics	The construction activities do not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Prepare the Debris Disposal Plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with Galachipa local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas Avoid stockpiling of any excess spoils - Suitably dispose of collected materials from drainages, unutilized materials and debris either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site 	Construction Contractor	<ul style="list-style-type: none"> - Number of complaints from sensitive receptors; - Worksite clear of hazardous wastes such as oil/fuel - Worksite clear of any wastes, collected materials from drainages, unutilized materials and debris - Transport route and worksite cleared of any dust/mud 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.</p> <ul style="list-style-type: none"> - The site must be kept clean to minimize the visual impact of the site. <p>Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;</p>				
B. Biological Characteristics						
Biodiversity	<p>Activities being located in the built-up area of Galachipa pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design there are no trees at the site that need to be removed (to be reassessed during detailed design stage).</p>	<ul style="list-style-type: none"> - 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. - If during detailed design cutting of trees will be required, compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to tree plantation as specified in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract. - All efforts shall be made to preserve trees by evaluation of minor 	Construction Contractor	<ul style="list-style-type: none"> - PMU and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be determined during detailed design stage) - Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc. 	<ul style="list-style-type: none"> - Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		design adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood.				
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. 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 5) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags	Construction Contractor	- Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 5); - Number of complaints from sensitive receptors; - Number of signages placed at project location - Number of walkways, signages, and metal sheets placed at project location	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - 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 Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>and flagmen informing diversions and alternative routes when required.</p> <ul style="list-style-type: none"> - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions. 				
Socio-economic status	There is no requirement for land acquisition	- Employ at least 50% of labor force from communities in the	Construction Contractor	<ul style="list-style-type: none"> - Employment records; - Records of sources 	- Inspection by PIU and supervision consultants on	Cost for implementation of mitigation measures

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	or any resettlements. 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.	vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market.		of materials - Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards	monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	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 Galachipa 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; - Integrate construction of the various infrastructure subprojects to be conducted in Galachipa (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. - Consult with local community to inform them of the nature,	Construction Contractor	- Utilities Contingency Plan - Number of complaints from sensitive receptors	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - 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 Indicators	Frequency of Monitoring	Cost and Source of Funds
	general. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but	- Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being	Construction Contractor	- Number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 5); - Number of complaints from	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	short-term, site-specific within a relatively small area and reversible by mitigation measures.	<p>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.</p> <ul style="list-style-type: none"> - Consult with Galachipa local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.¹³ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well- 		<p>sensitive receptors;</p> <ul style="list-style-type: none"> - Number of walkways, signages, and metal sheets placed at project location - Agreement between landowner and contractors in case of using private lands as work camps, storage areas, etc. 	finalized during detailed design stage and final location of subproject components	

¹³ 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 Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>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.</p> <p>- 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)</p>				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>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.</p> <p>- 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.</p>				
Workers health and safety	<p>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</p>	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement 	Construction Contractor	<ul style="list-style-type: none"> - Site-specific H&S Plan - Equipped first-aid stations - Medical insurance coverage for workers - Number of accidents - Records of supply of uncontaminated water - Condition of eating areas of workers - Record of H&S orientation trainings - Use of personal protective equipment - % of moving equipment outfitted with audible back-up 	<ul style="list-style-type: none"> - Daily inspection by contractors supervisor - Inspection by PIU and supervision consultants on monthly basis, or as the need arises. - 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 Indicators	Frequency of Monitoring	Cost and Source of Funds
	reversible by mitigation measures.	<p>a site 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) training¹⁴ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.</p> <p>- Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances</p> <p>- Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps.</p> <p>Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are</p>		<p>alarms</p> <p>- Permanent sign boards for hazardous areas</p> <p>- Signages for storage and disposal areas</p> <p>- Condition of sanitation facilities for workers</p>		

¹⁴ 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 Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times.</p> <ul style="list-style-type: none"> - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage 				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.				
D. Historical, Cultural, and Archaeological Characteristics						
Physical and cultural heritage	Construction works will be in built-up areas of Galachipa thus risk for chance finds is low.	<ul style="list-style-type: none"> - All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected. 	Construction Contractor	- Records of chance finds	- Inspection by PIU and supervision consultants on monthly basis	Cost for implementation of mitigation measures responsibility of contractor.
E. Others						
Submission of EMP	Unsatisfactory compliance to	(i) Appointment of supervisor to ensure EMP	Construction contractor	- Availability and competency of	- Monthly monitoring report to be	Cost for implementation of

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
implementation report	EMP	implementation (ii) Timely submission of monitoring reports including pictures		appointed supervisor - Monthly report	submitted by PIU to PMU - PMU to submit semi-annual monitoring report to ADB	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 (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (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. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services.	Construction Contractor	PMU/CSS 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 is satisfactory.	- 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 Indicators	Frequency of Monitoring	Cost and Source of Funds
		(viii) Request PMU/CSS to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.				

Table 9: Program of Actions – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
Sludge from twin pit latrines	Ground water contamination risk	<ul style="list-style-type: none"> - Re-use sludge from twin pits - Use adequate water for flushing to prevent clogging - Further treatment of sludge if sludge is not fully digested - Temporary stockpiles of biosolids to be covered with lime mud (high pH) that acts as an odor control measure until material is reused 	Galachipa pourashava	Regulations must be followed regarding specific requirements for monitoring sites receiving sludge.	To be determined during detailed design and ICCDC implementation	Included in O&M cost
Septage from septic tanks	Water contamination	<ul style="list-style-type: none"> - Secondary treatment for sludge required - Temporary stockpiles of biosolids to be covered with lime mud (high pH) that acts as an odor control measure until material is reused - Construct roofed facilities to prevent water or precipitation from contacting biosolids, and provide additional water management as needed. 	Galachipa pourashava	Regulations must be followed regarding specific requirements for monitoring sites receiving septage.	To be determined during detailed design and ICCDC implementation	Included in O&M cost
Odor	Nuisance to	- Ensure that only	Galachipa	Regulations must be	To be determined	Included in O&M

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	community	<p>properly treated biosolids. Unless biosolids will be stored for limited periods (60 days) and/or during cool weather months, vector attraction reduction should be met prior to storage. Reduce the potential for unacceptable off-site odors by minimizing storage time.</p> <ul style="list-style-type: none"> - Develop written odor control and response plans. - Operator training can increase sensitivity of personnel to odor concerns and ensure proper implementation of the odor control plan. - Regular inspections and odor monitoring, coupled with appropriate corrective action and recordkeeping, will help site and facility managers maintain good neighbor status and public acceptance of the project. - Conduct loading/unloading and spreading operations as quickly and efficiently as possible to minimize the time that odors may be emitted - Observe good housekeeping practices during facility loading and unloading. Clean trucks 	pourashava	followed regarding specific requirements for monitoring sites receiving septage.	during detailed design and ICCDC implementation	cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		and equipment regularly to prevent biosolids build-up that may give rise to odors. If biosolids spills occur, clean up promptly. - If significant odor should develop during handling operations, the following remedial measures can be taken: (i) immediately correct any poor housekeeping problems (such as dirty equipment); (ii) immediately treat any accumulated water that has turned septic with lime, chlorine, potassium permanganate or other odor control product; remove the water as quickly as possible to a suitable land application site; or (iii) cover biosolids with compost or sawdust.				
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 Galachipa 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. - 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	Galachipa pourashava	Regulations must be followed regarding specific requirements for monitoring sites receiving septage.	Galachipa pourashava	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		quickly.				
Collection and conveyance		<ul style="list-style-type: none"> - Regular check of desludging pump and attending the wear and tear - Regular check of desludging equipment and attending the wear and tear - Regular chemical coating of the collection tank - Prevent biosolids from being tracked onto public roadways - Desludging equipment should be inspected for cleanliness before leaving the site - Use mud flaps on the back of desludgers to preclude biosolids getting on tires or undercarriage during unloading operations - Public roadways accessing the site should be inspected each day during operational periods, and cleaned promptly (shovel and sweep). 	Galachipa pourashava	Regulations must be followed regarding specific requirements for monitoring sites receiving septage.	Galachipa pourashava	Included in O&M cost
Treatment and disposal		<ul style="list-style-type: none"> - Cleaning of intermediate sewer pipes once in 15 days - Ensuring the regular desludging of biogas digester as per the detention time - Desludging of anaerobic modules once in two to three years 	Galachipa pourashava	Monitoring may include sampling and analysis of septage, soil, groundwater, and plant tissue. National and local regulations must be followed regarding specific	Monitoring requirements for land application programs may vary widely with respect to sampling points, sampling frequency, and analytical parameters. To be determined during	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		depending on the desludging period adopted for the designs - Cleaning of filter media in the planted gravel filter once in two to three years - Regular emptying of sludge drying beds (once in 10 days) and storing the dried compost for its use - If planted drain provided then cleaning of filter media once in two to three years - Ensure biosolids are stabilized before land application		requirements for monitoring sites receiving septage.	detailed design stage	
B. Socioeconomic Characteristics						
Workers health and safety	Workers need to be mindful of the occupational hazards. Potential impacts are negative and long-term but reversible by mitigation measures.	- Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - 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. - Always wash hands after contact with biosolids.	Galachipa pourashava	- No complaints from sensitive receptors - No complaints from workers related to O&M activities - Zero accident	At least monthly for health conditions and one annual physical and health check-up	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		<ul style="list-style-type: none"> - Avoid touching face, mouth, eyes, nose, or genitalia before washing hands. - Eat in designated areas away from biosolids handling activities. - Do not smoke or chew tobacco or gum while working in direct contact with biosolids - Use gloves, when applicable. - Keep wounds covered with clean, dry bandages. - Change into clean work clothing on a daily basis. - If contact occurs, wash contact area thoroughly with soap and water. Use antiseptic solutions on wounds, and bandage with a clean, dry dressing. For contact with eyes, flush thoroughly but gently. - Consult a doctor regarding direct exposure to an open wound or mouth. 				
Hazard potentials	Accumulated methane and hydrogen sulfide in enclosed containers that can cause fire (methane) and foul odor (hydrogen sulfide)	<ul style="list-style-type: none"> - Extinguish flames/fires caused by methane accumulation with dry chemical, water spray or foam. - Avoid use of open flames in confined areas and around sealed transport containers. - Vent confined areas and transport containers if biosolids have been stored for any significant 	Galachipa pourashava	Monitoring may include sampling and analysis gases. National and local regulations must be followed regarding specific requirements for monitoring.	Monitoring requirements may vary widely with respect to sampling points, sampling frequency, and analytical parameters. To be determined during detailed design stage	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		length of time.				
Community health and safety	Non-acceptance of the sanitation facilities and pilot projects by the community ; complaints from community	- Operator staff should politely receive citizen questions or complaints, collect the individual's name and phone number, conduct a prompt investigation, undertake control measures, if necessary, follow-up with the person who filed the complaint, and document the event and actions.	Galachipa pourashava	- No complaints from sensitive receptors	As the need arises	Included in O&M cost

B. Institutional Capacity Development Program

92. 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 10.

Table 10: Training Program for Environmental Management

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation workshop	Module 1 – Orientation - ADB Safeguards Policy Statement - Government of Bangladesh Environmental Laws and Regulations Module 2 – Environmental Assessment Process - ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements - Review of environmental assessment report to comply with ADB requirements - Incorporation of EMP into the project design and contracts	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 - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day	PMU PIUs Contractors
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed	1 day on a regular period to be determined by PMU, PIUs, and PMSC	PMU PIUs Contractors

C. Staffing Requirement and Budget

93. 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.

94. LGED and DPHE will aim to produce a single document that is acceptable to both ADB and DoE to avoid duplication of effort, and the documents produced by the PPTA will be used as a guide. For budgeting purposes it is assumed this IEE report will also be deemed satisfactory by DoE.

95. 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.

96. 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.

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

98. The indicative costs of EMP implementation are shown in Table 11.

Table 8: 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.	Noise levels monitoring	- Pre-construction - Construction	Per location	14 locations (refer to table 3)	10,000	28,000	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 environmental assessment process; (ii) induction course for contractors, preparing	Module 1 – immediately upon engagement of the PMSC environmental safeguards specialist Module 2 – prior to award of civil works contracts (twice a year for 4 years)	lump sum		Module 1 – 30,000 Module 2 – 30,000 Module 3 – 30,000	90,000	Covered under PMSC and ICCDC contracts

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
	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	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	Lump sum		100,000	100,000	LGED DPD cost for municipal infrastructures
		Obtaining right of way clearances with related national agencies.					
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 and ICCDC contracts
2.	GRM implementation	Costs involved in resolving complaints (meetings,		Lump sum		As per PMU budget	PMU cost

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
		consultations, communication, and reporting/information dissemination)					
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

99. 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.

100. 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 9. 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.

101. 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).

102. 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

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

104. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the project design or location were not significant.

105. 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.

106. 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.

107. 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.

108. The EMP will assist the PMU, PMSC, 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.

109. The citizens of Galachipa will be the major beneficiaries of this subproject. The benefits of improved sanitation translate into improved health, an increase in productivity, fewer days absent from school for children, and improved quality of life. In addition to improved environmental conditions, the subproject will reduce exposure to climate extremes. On-site/decentralised systems of waste management will improve community health and hygiene, particularly in socially deprived groups, and reduce financial burden of Galachipa pourashava. 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 and health benefits to citizens of Galachipa 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.

110. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Galachipa 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. 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).

111. Per Government of Bangladesh Environment Conservation Act, 1995 (ECA, 1995) and Environment Conservation Rules (ECR, 1997), the subproject is categorized as “Red” and LCC and ECC must be obtained from the DoE prior to award of civil works contracts.

Appendix 1: Rapid Environmental Assessment Checklist

Screening questions	Yes	No	Remarks
A. Project siting Is the project area adjacent to or within any of the following environmentally sensitive areas?	✓		Galachipa pourashava is predominantly residential. There are no protected areas in or around subproject sites, and no known areas of ecological interest in Galachipa.
Cultural heritage site		✓	
Protected area		✓	
Wetland		✓	
Mangrove		✓	
Estuarine		✓	
Buffer zone of protected area		✓	
Special area for protecting biodiversity		✓	
B. Potential environmental impacts Will the project cause...		✓	
▪ impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.		✓	Not anticipated.
▪ deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		✓	Not anticipated.
▪ degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	Not anticipated.
▪ dislocation or involuntary resettlement of people?		✓	Not anticipated.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable group?		✓	Not anticipated.
▪ degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	Not anticipated.
▪ occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		✓	Not anticipated.
▪ water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters)?		✓	Not anticipated.
▪ air pollution due to urban emissions?	✓		Increase in concentration of vehicle-related pollutants during construction phase. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical and biological hazards during project construction and operation?		✓	Not anticipated.
▪ road blocking and temporary flooding due to land excavation during rainy season?	✓		Road closure not anticipated. Excavations may result to temporary ponding of water during construction phase. of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
▪ noise and dust from construction activities?	✓		Anticipated during construction phase. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.

Screening questions	Yes	No	Remarks
▪ traffic disturbances due to construction material transport and wastes?	✓		Anticipated during construction phase. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
▪ temporary silt runoff due to construction?	✓		Excavations 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.
▪ hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	Not anticipated.
▪ water depletion and/or degradation?		✓	Not anticipated.
▪ overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		✓	Not anticipated.
▪ contamination of surface and ground waters due to improper waste disposal?		✓	Not anticipated.
▪ pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Not anticipated.
▪ social conflicts if workers from other regions or countries are hired?		✓	Not anticipated.
▪ 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 anticipated.
▪ 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?		✓	Not anticipated.

<u>Climate Change and Disaster Risk Questions</u> 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 Galachipa 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.
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)?			
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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

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.

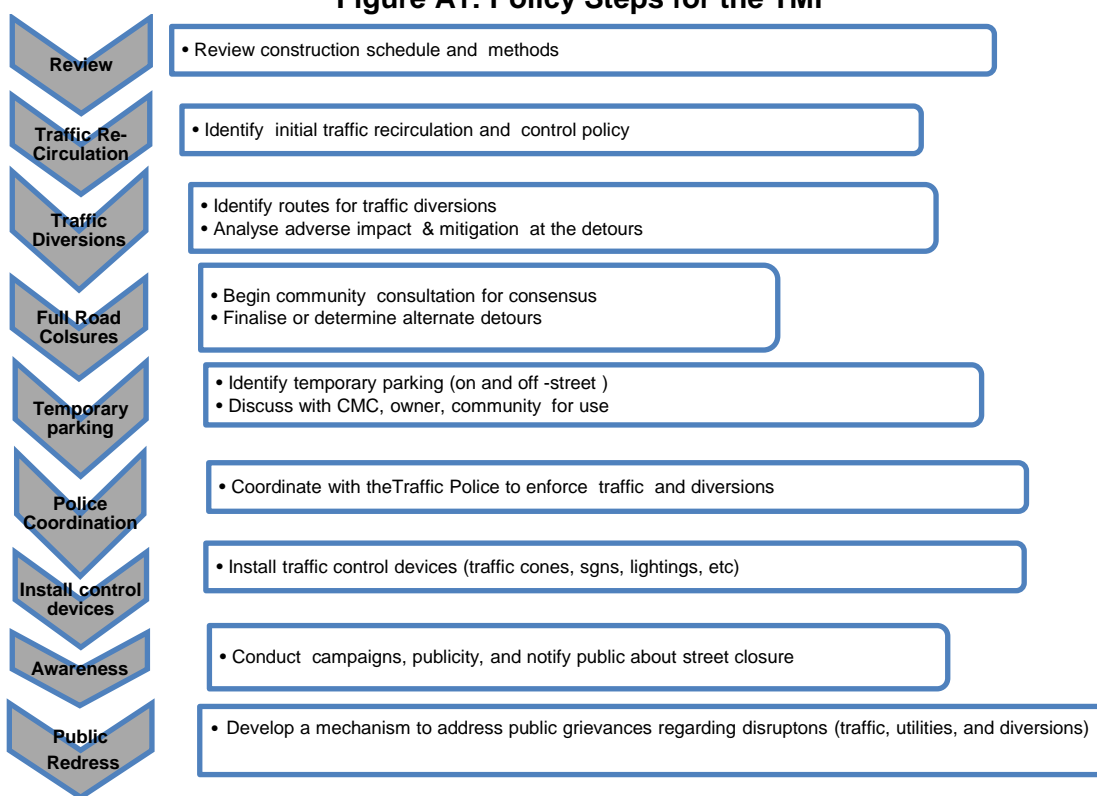
C. Analyze the impact due to street closure

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

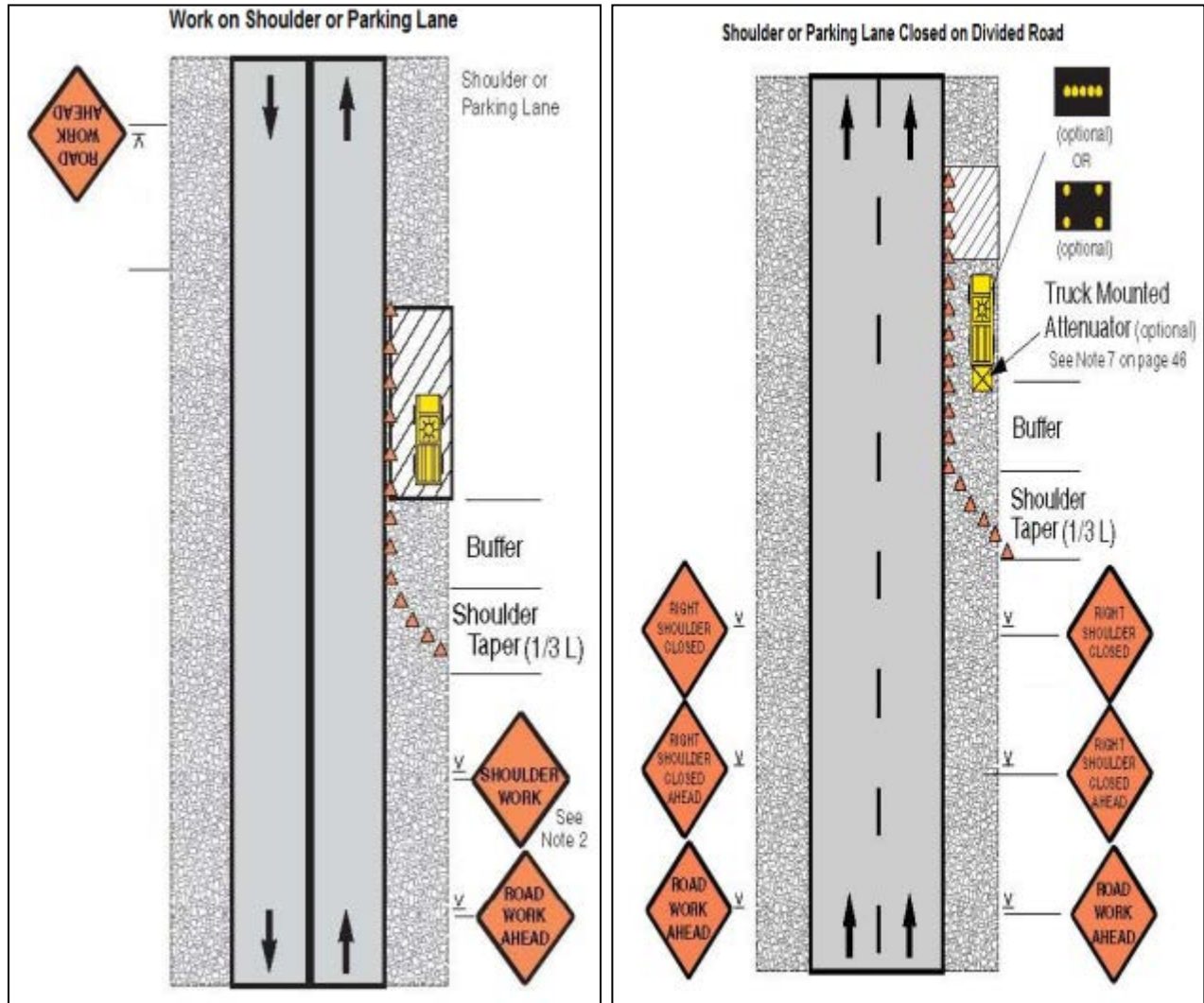


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

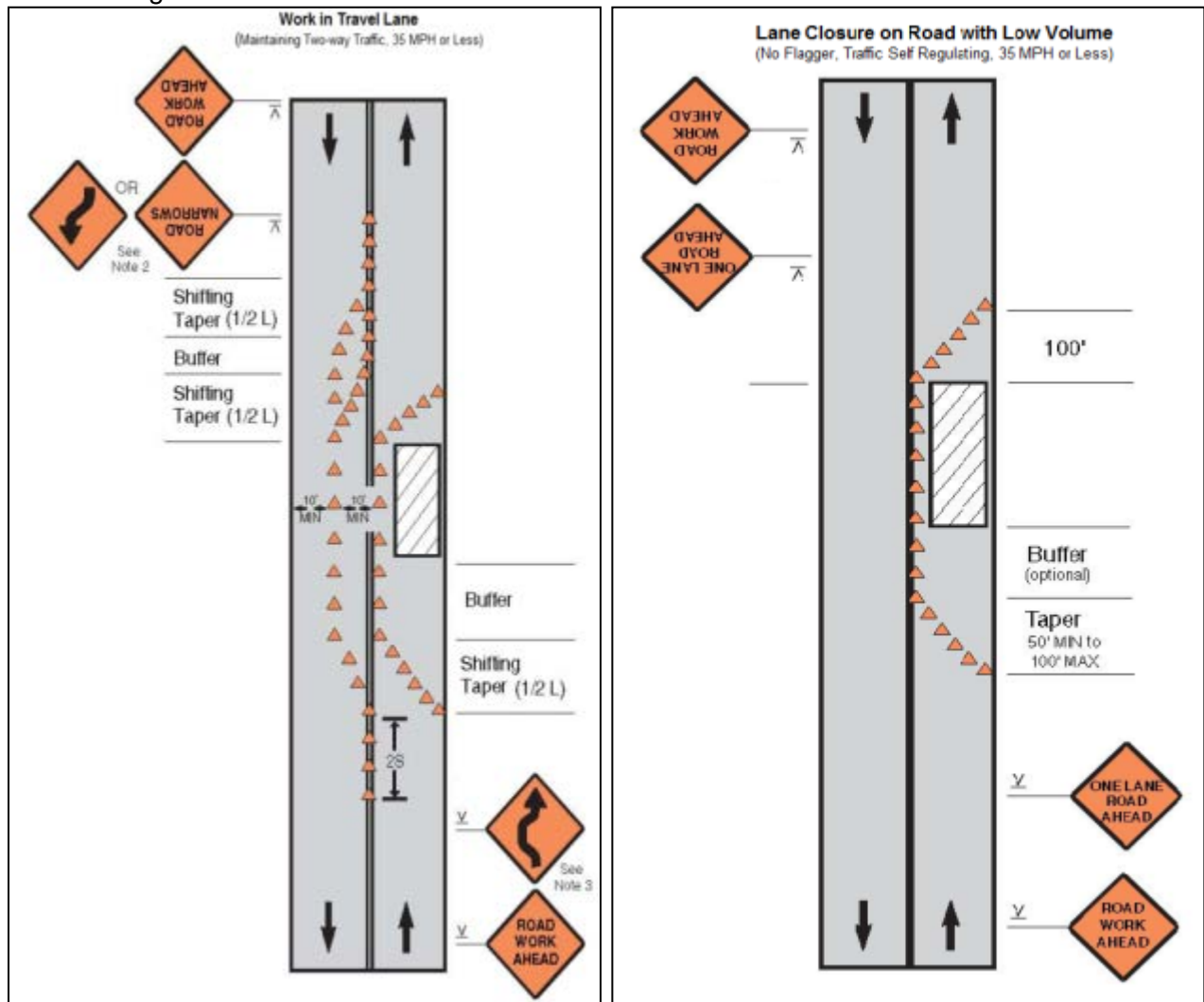


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)

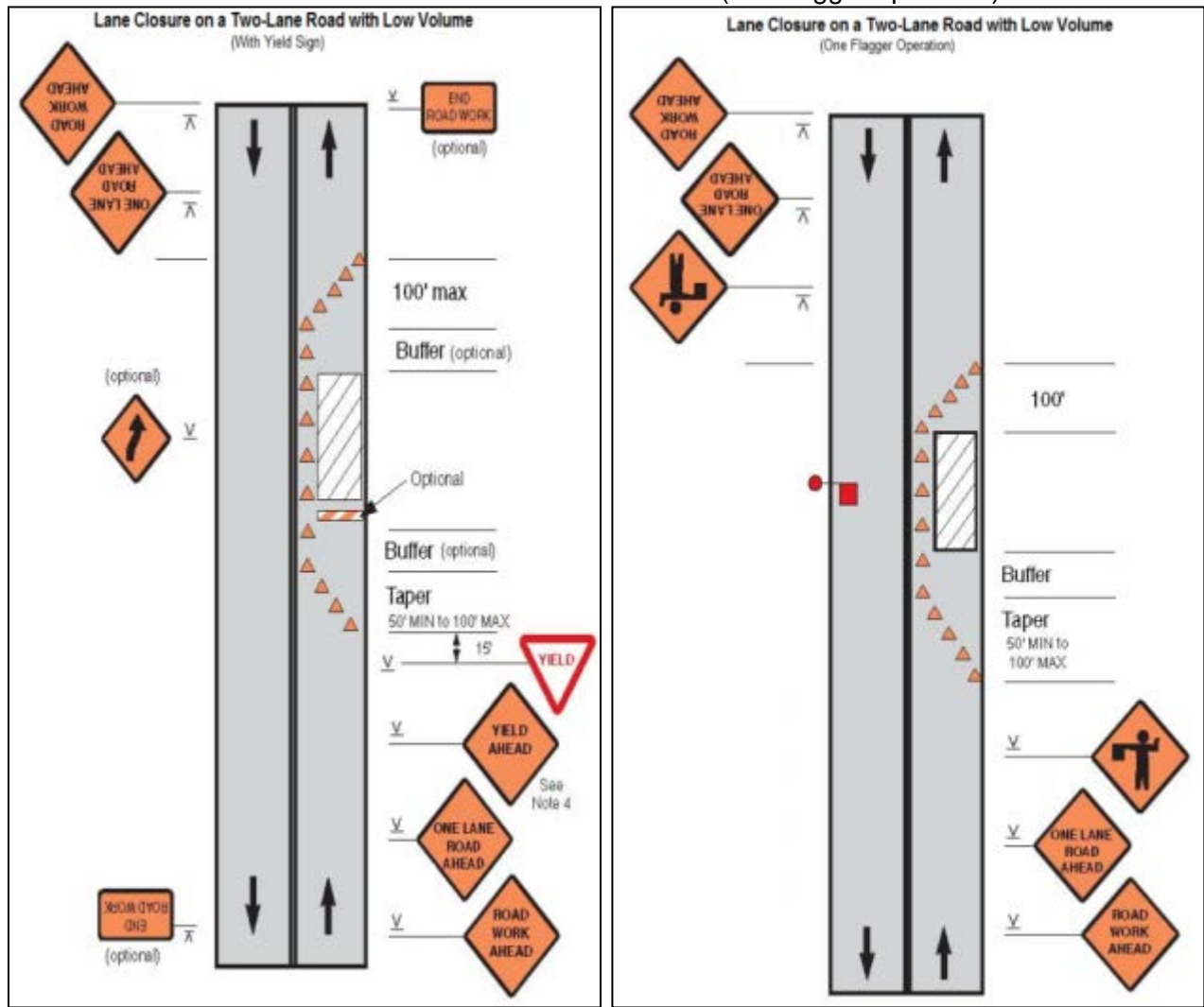


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

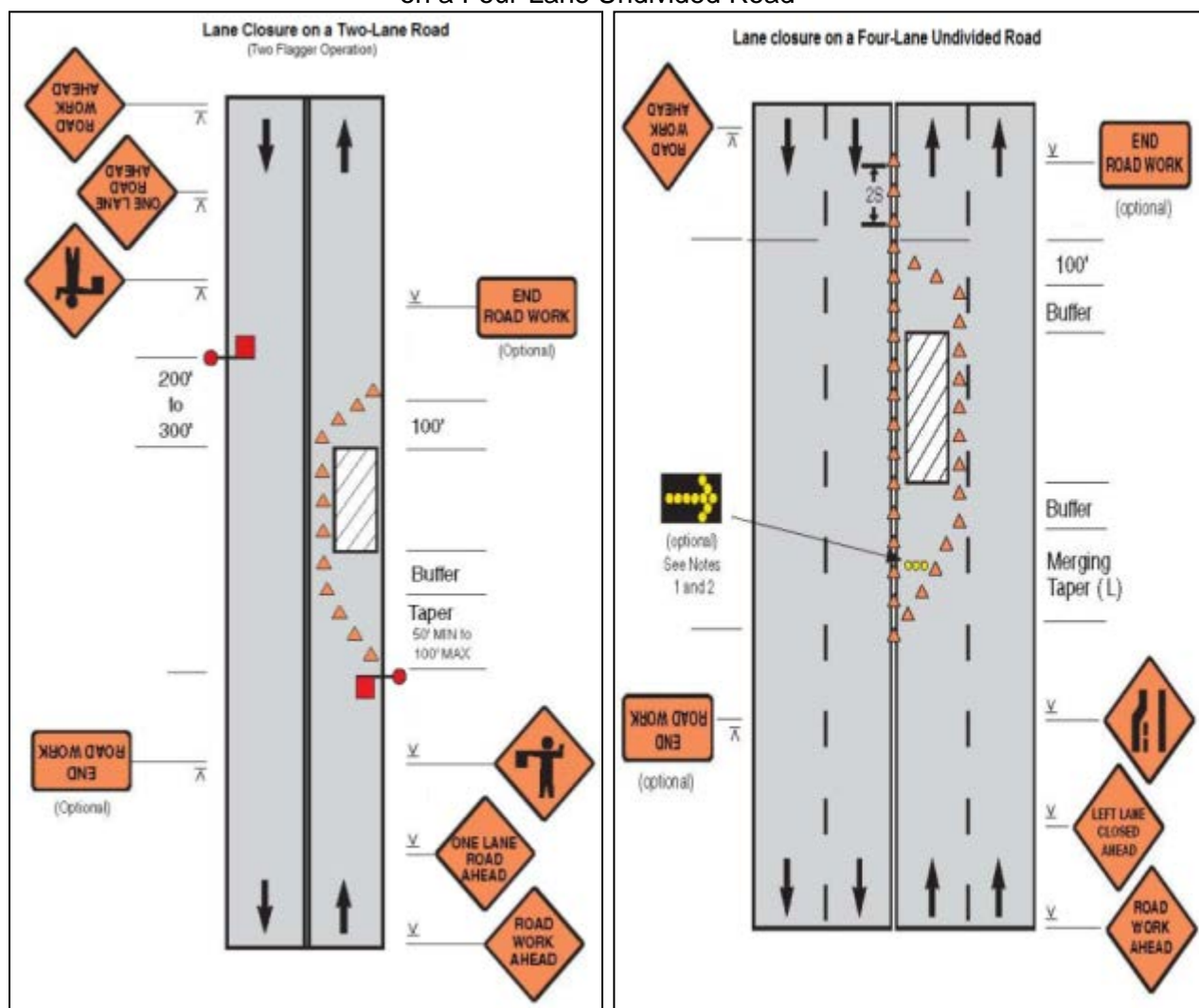


Figure A10 & A11: Lane Closure and Divided Roadway & Half Road Closure On Multi-Lane Roadway

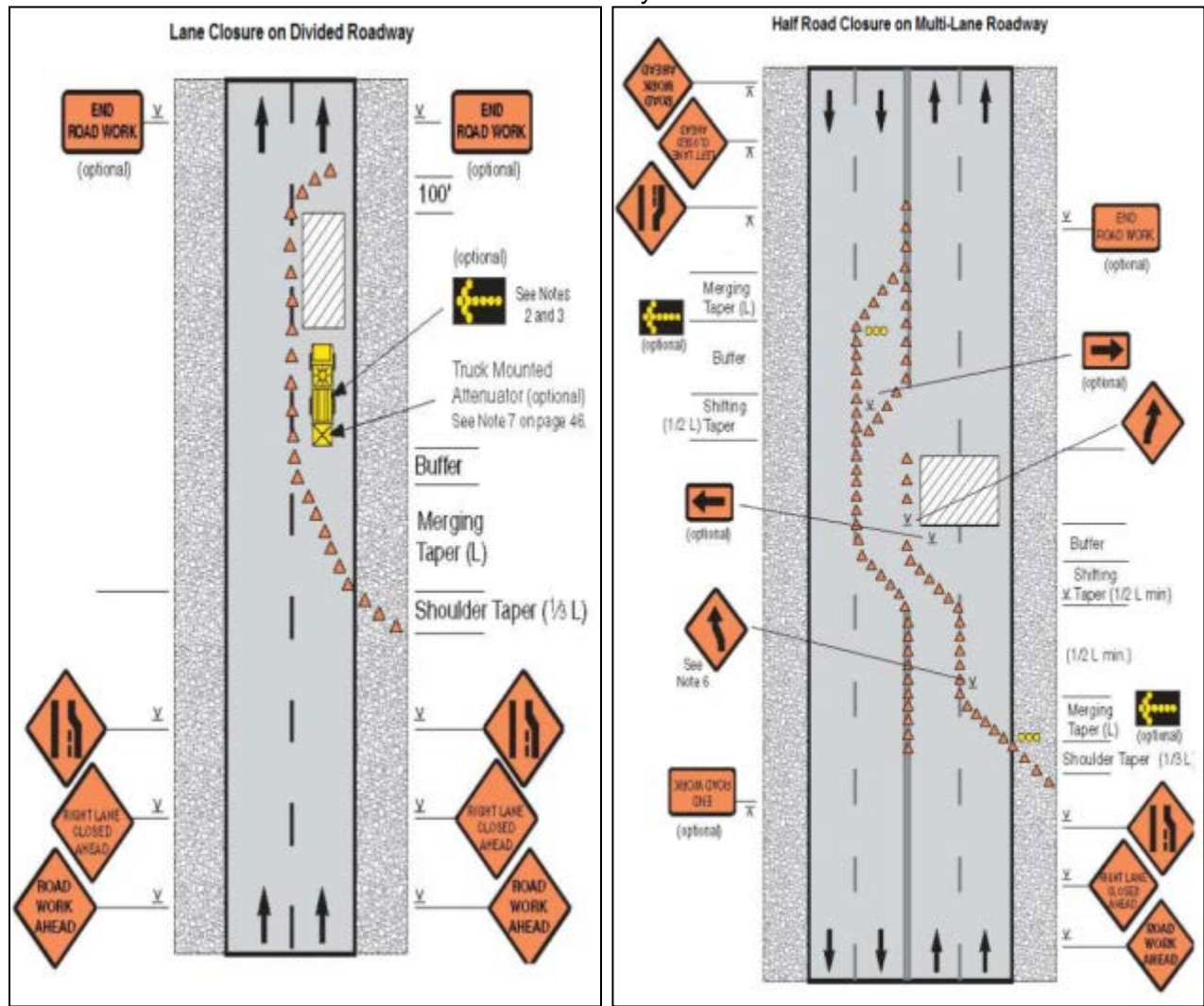
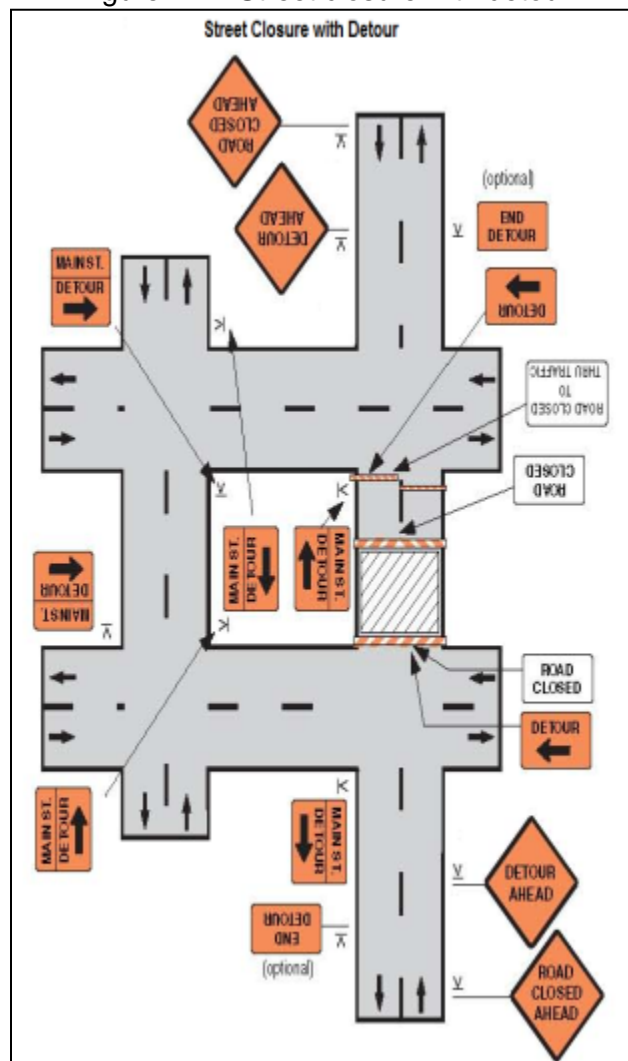


Figure A12: Street closure with detour



Appendix 5: Records of Public Consultations and FGDs

	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	Community Toilet	21-06-13	Shantibag, Galachipa	M=11 F=7 T=18	<ul style="list-style-type: none"> Govt. free land; No resettlement or safeguard issue; 	<ul style="list-style-type: none"> Local people would like to cooperate in constructing the Community Toilet as they badly need for such facilities; According to them, proposed Community Toilet should be maintained by Pourashava; 	<ul style="list-style-type: none"> Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured; 	<ul style="list-style-type: none"> The participants will cooperate in all respect during construction
2	Public Toilet	20-06-13	Baily bridge, near Galachipa Degree College		<ul style="list-style-type: none"> Govt. free land (along the side of road and bridge); No resettlement or safeguard issue; 	<ul style="list-style-type: none"> According to them, proposed Community Toilet should be maintained by Pourashava; 	<ul style="list-style-type: none"> Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured; 	<ul style="list-style-type: none"> The participants will cooperate in all respect during construction
3	Public Toilet	21-06-13	Al Aksa Jame Mosque near Poshu Hospital, Galachipa		<ul style="list-style-type: none"> Govt. free land in front of the mosque, at the side of road ; (Mosque is also built socially on a Govt. free land; No resettlement or safeguard issue; 	<ul style="list-style-type: none"> This project should be maintained by Mosque committee; 	<ul style="list-style-type: none"> Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured; Separate Oju khana for male and females should be ensured; Separate entry and exit for male and females should be ensured; 	<ul style="list-style-type: none"> The participants will cooperate in all respect during construction
4	Public Toilet	21-06-13	Lipi Tokij Cinema Hall, Galachipa		<ul style="list-style-type: none"> Proposed site's land is private land. Proprietor of Lipi Tokij Cinema Hal is the owner of that land. Value of the proposed 	<ul style="list-style-type: none"> Hall owner might not give the land for setting public toilet there; Interviewers had expressed that the Public Toilet should be constructed inside Upazilla Parishad Complex, which would be 	<ul style="list-style-type: none"> Water supply/tube well, lighting/solar, male, female separate; 	<ul style="list-style-type: none"> The participants will cooperate in all respect during construction

	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
					land is high due to its location (very busy place);	adjacent to this proposed place. That place is a free Govt. Land as well; <ul style="list-style-type: none"> Based on public opinion, that place will be better and people, in fact, are in badly need of such facility there; The Public Toilet should be maintained by Pourashava; 		
5	Public Toilet	21-06-13	Majher Stand, Galachipa		<ul style="list-style-type: none"> Govt. land at the side of road and bridge; Back side of a tin shed temporary restaurant built on that Govt. land falls in the project site; 	<ul style="list-style-type: none"> The shopkeeper is ready to shift the shed for the project by his own cost; The Public Toilet should be maintained by Pourashava; 	<ul style="list-style-type: none"> Water supply/tube well, lighting/solar, male, female separate; 	<ul style="list-style-type: none"> The participants will cooperate in all respect during construction
6	Public Toilet	21-06-13	Registry Office, Galachipa		<ul style="list-style-type: none"> Govt. Land. Few trees would be required to remove to get the place for setting the proposed Public Toilet ; 	<ul style="list-style-type: none"> They had expressed their views that they would easily plant trees again at the side of the public toilet; However, the Public Toilet should be maintained by Pourashava; 	<ul style="list-style-type: none"> Water supply/tube well should be ensured; 	<ul style="list-style-type: none"> The participants will cooperate in all respect during construction
7	Public Toilet	21-06-13	Chourasta, Galachipa		<ul style="list-style-type: none"> Govt. free land; No resettlement or safeguard issue; 	<ul style="list-style-type: none"> This Public Toilet should be maintained by Pourashava; 	<ul style="list-style-type: none"> Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured; 	<ul style="list-style-type: none"> The participants will cooperate in all respect during construction
8	Public Toilet	21-06-13	Kheya Ghat, Galachipa		<ul style="list-style-type: none"> Vacant Govt. land. Being Kheya Ghat, there are temporary restaurants on that Govt. Land; No resettlement or safeguard issue; 	<ul style="list-style-type: none"> Temporary restaurants owners suggested for setting Public Toilet at the side nearby workshop; This Public Toilet should be maintained by Kheya Ghat Committee/Pourashava; 	<ul style="list-style-type: none"> Water Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured; 	<ul style="list-style-type: none"> The participants will cooperate in all respect during construction
9	Public Toilet	21-06-13	Launch		<ul style="list-style-type: none"> Govt. free land; 	<ul style="list-style-type: none"> This project should be maintained 	<ul style="list-style-type: none"> Water 	<ul style="list-style-type: none"> The

	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
			Ghat, Galachipa		<ul style="list-style-type: none"> No resettlement or safeguard issue; 	by Pourashava;	Supply/tube well, lighting/solar, Separate arrangements for male and female should be ensured;	participants will cooperate in all respect during construction
10	College Toilet	20-06-13	Galachipa Degree College		<ul style="list-style-type: none"> Free land owned by College, No resettlement issues; 	<ul style="list-style-type: none"> Proposed toilet should be maintained by the college authority; 	<ul style="list-style-type: none"> Separate arrangements should be made for male/ female; 	<ul style="list-style-type: none"> The participants will cooperate in all respect during construction

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

Photograph



Santibag



Chourasta



College Para



Kheya Ghat



Launch Ghat



Lipi-Takies



Majer Stand



Register Office



Degree College Samalibagh



PARTICIPANTS LIST**Focus Group Discussion-CTEIP****Galachipa Town****Component: Water-Overhead Tank, Pump, Cyclone Shelter and School Toilet****Location: Galachipa Degree College, Ward No-9****Meeting Place: Galachipa Degree College Hall Room****Date: 20-06-13****Time: 11.45 am**

	Name	Designation
1	Md. Forkan Kabir	Principal-Galachipa Degree College
2	Md. Khalid Hossain Milton	Member-Government Committee-Galachipa Degree College
3	Md. Shorab Ali	Teaching
4	Md. Shafiul Islam	Teaching
5	Md. Mohsin	Teaching
6	Gazi Mohammad Babul Akhter	Teaching
7	Goalm Moula	Teaching
8	Md. Mosharraf Hossain	Teaching
9	ASM Khalilur Rahman	Teaching
10	Md. Riaduzzaman	Teaching
11	Md. Shah Alam	Teaching
12	Tapash Kumar Karmaker	Teaching
13	Md. Liakat Hossain Ghosh	Teaching
14	Md. Mizanur Rahman	Teaching
15	Md. Delwar	Teaching

Focus Group Discussion-CTEIP**Galachipa Town****Component: Public Toilet****Location: Baily Bridge near Galachipa Degree College, Ward No-9****Meeting Place: Baily Bridge near Galachipa Degree College****Date: 20-06-13****Time: 12.45 pm**

	Name	Designation
1	Md. Shah Alam	Labor
2	Khandaker Shorab Howlader	Business
3	Abdul Aziz	Business
4	Md. Rubel	Business
5	Abdul Jabbar	Business
6	Md. Zakir	Business
7	Md. Shamim	Business
8	Md. Miraz	Business
9	Md. Arif	Business
10	Md. Nazrul Islam	Business
11	Md. Ismail	Business
12	Md. Chand Mia	Business
13	Uttam Kumar	Business
14	Md. Delwar Hossain	Business
15	Monika Rakkhait	Business
16	Sujana Khatun	Student
17	Jannatul Firdous	Student
18	Md. Khalilur Rahman	Business
19	Abdur Rob	Worker
20	Md. Mosharraf Hossain	Worker

	Name	Designation
21	Md. Mizanur Rahman	Business
22	Md. Jamal	Business

Focus Group Discussion-CTEIP**Galachipa Town****Component: Public Toilet****Location: Al Aksa Jame Mosque, Shamoli Bag (near Poshu Hospital), Ward No-2****Meeting Place: Al Aksa Jame Mosque, Shamoli Bag (near Poshu Hospital)****Date: 21-06-13****Time: 11.30am**

	Name	Designation
1	Md. Hamedul Khan	Labor
2	Md. Mizanur Rahman	Labor
3	Md. Halim Howlader	Business
4	Firoza Begom	Housewife
5	Md. Nurul Islam	Teaching
6	Md. Shah Alam	Service
7	Md. Hazrat Ali	Service
8	Md. Faruk Ahmed	Business
9	Md. Moshir Rahman Shahin	Business
10	Md. Mahmudul Hasan	Service-Deed Register
11	Md. Harunur Rashid	Stamp Vander
12	Md. Abbas Molla	Business
13	Md. Moniruzzaman	Service
14	Md. Sumon	Student
15	Md. Mamun	Student

Focus Group Discussion-CTEIP**Galachipa Town****Component: Community Toilet****Location: Shantibag, Ward No-3****Meeting Place: Shantibag Sluice Gate****Date: 21-06-13****Time: 12.30am**

Sl.No	Name	Designation
1	Md. Eskander Bapery	Fisherman
2	Md. Saiful Islam Sujon	Business
3	Mir Ali Sarder	Fisherman
4	Md. Majibur Howlader	Fisherman
5	Md. Bachhu Mia	Fisherman
6	Firaja Begom	Housewife
7	Md. Mizan	Business
8	Md. Nazrul Islam	Fisherman
9	Moslem Howlader	Business
10	Md. Shahjahan	Labor
11	Nasima	Housewife
12	Renu Begom	Housewife
13	Md. Jamal Uddin	Business
14	Laili Begom	Business
15	Munni Begom	Student
16	Abu Saleh	Business
17	Reshma Begom	Housewife
18	Nurjahan	Housewife

Focus Group Discussion-CTEIP**Galachipa Town****Component: Public Toilet****Location: Lipi Tokij, Ward No-5****Meeting Place: Lipi Tokij (near Upa Zila Complex)****Date: 21-06-13****Time: 1.30pm**

	Name	Designation
1	Md. Zahir	Shopkeeper
2	Md. Harun	Service
3	Md. Hiron	Business
4	Amir Hossain	Fisherman
5	Md. Nnur Islam Hawlader	Fisherman
6	Md. Prince	Business
7	Md. Sohel Rana	Service
8	Md. Arifur Rahman Himel	Student

Focus Group Discussion-CTEIP**Galachipa Town****Component: Public Toilet****Location: Majher Stand, Ward No-7****Meeting Place: Majher Stand****Date: 21-06-13****Time: 2.45pm**

	Name	Designation
1	Jugal Sheel	Saloon worker
2	Md. Alamin	Labor
3	Md. Badal Akand	Service
4	Md. Habib	Business
5	Md. Jahid	Business
6	Md. Zafar	Business
7	Sanjib Kumar Mitra	Business

Focus Group Discussion-CTEIP**Galachipa Town****Component: Public Toilet****Location: Land Registry Office Premise, Ward No-7****Meeting Place: Land Registry Office Premise****Date: 21-06-13****Time: 3.40pm**

Sl.No	Name	Designation
1	Md. Rubel	Driving
2	Md. Milon	Driving
3	Md. Liton	Business
4	Md. Bazlu	Driver
5	Md. Shakil	Labor
6	Md. Mahabub	Driving
7	Jadab Das	Business
8	Md. Sirajul Islam Talukdar	Business
9	Md. Nasiruddin Talukdar	Business

Focus Group Discussion-CTEIP**Galachipa Town****Component: Public Toilet****Location: Chowrasta, Ward No-8****Meeting Place: Chowrasta****Date: 21-06-13****Time: 4.50pm**

	Name	Designation
1	Md. Mamun Howlader	Business
2	Md. Shakil	Driving
3	Md. Sujan Mia	Driving
4	Md. Rashel Sarder	Business
5	Md. Shamim	Driving
6	Md. Shahin	Driving
7	Md. Azizul Hoque	Service
8	Md. Nannu	Business
9	Md. Jewel Sikder	Business

Focus Group Discussion-CTEIP**Galachipa Town****Component: Public Toilet****Location: Kheya Ghat, Ward No-4****Meeting Place: Kheya Ghat****Date: 21-06-13****Time: 5.45pm**

	Name	Designation
1	Md. Dulal	Labor
2	Md. Rasel	Labor
3	Abdul Halim Sarder	Labor
4	Md. Salam	Labor
5	Md. Jahid	Labor
6	Md. Ohidur Rahman	Labor
7	Md. Mokbul	Sweeper
8	Md. Harun	Sweeper
9	Hazi Ismail Dewan	Business
10	Md. Nazrul Islam	Business
11	Md. Shohag Howlader	Labor
12	Md. Shahidul Islam	Boatman
13	Taslima Begom	Business
14	Md. Fazlul Hoque	Business
15	Md. Alamgir Howlader	Business

Focus Group Discussion-CTEIP**Galachipa Town****Component: Public Toilet****Location: Launch Ghat, Ward No-1****Meeting Place: Launch Ghat****Date: 21-06-13****Time: 6.30pm**

	Name	Designation
1	Daku Sarder	Fisherman
2	Md. Zakir Hossain	Business
3	Md. Salim	Labor

	Name	Designation
4	Anawara	Business
5	Nasima Begom	Business
6	Md. Nuruzzaman Howlader	Labor
7	Md. Roni	Student
8	Md. Zabbar Gazi	Business
9	Md. Aziz Mia	Business
10	Abdus Salam	Business
11		

Minutes of Discussion Meeting held in DOE Office regarding EARF of CTEIP at 10:30AM on 09-09-2013

Vanue: 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, Asstt. 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), CTEIP, Cell:+88-0171-1665408; +88-0173-1062331, email: yasin_afroza@yahoo.com

Agenda of Discussion:

Following item are discussed:

1. Classification of CTEIP subproject components as per 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 Environmental Infrastructure Project (CTEIP) 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.
- CTEIP, 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 ecological sensitive areas or within the reserved locations.
- Finally, the DG assures providing every cooperation relating to environmental clearance.

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	<input type="checkbox"/> * Male <input type="checkbox"/> * Female	Age	
Home Address					
Place					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where, and how) of your grievance below:					
If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of Official Registering Grievance)	
Mode of Communication:	
<input type="checkbox"/> Note/Letter <input type="checkbox"/> E-mail <input type="checkbox"/> Verbal/Telephonic	
Reviewed by: (Names/Positions of Officials Reviewing Grievance)	
Action Taken:	
Whether Action Taken Disclosed:	<input type="checkbox"/> Yes <input type="checkbox"/> 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		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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

Draft Initial Environmental Examination

October 2013

BAN: Coastal Towns Environmental Infrastructure Project – Mathbaria 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
CTEIP	–	Coastal Towns Environmental Infrastructure Project
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

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

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

CONTENTS

I.	INTRODUCTION	1
II.	POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK	1
	A. ADB Policy	1
	B. National Laws	2
	C. Government of Bangladesh Environmental Assessment Procedures	4
III.	DESCRIPTION OF THE PROJECT	5
	A. The Study Area	5
	B. Existing Condition and Need for the Project	5
	C. Proposed Components	6
	D. Implementation Schedule	9
IV.	DESCRIPTION OF THE ENVIRONMENT	14
	A. Methodology Used for the Baseline Study	14
	B. Physical Characteristics	14
	C. Biological Characteristics	15
	D. Socioeconomic Characteristics	16
	E. Historical, Cultural and Archaeological Characteristics	19
V.	ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS	20
	A. Methodology	20
	B. Screening Out Areas of No Significant Impact	20
	C. Anticipated Impacts and Mitigation Measures – Planning and Design Phase	21
	D. Anticipated Impacts and Mitigation Measures – Construction Phase	24
	E. Anticipated Impacts and Mitigation Measures – Operations and Maintenance Phase	30
	F. Cumulative Impact Assessment	33
VI.	INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION	35
	A. Public Consultation Conducted	35
	B. Future Consultation and Disclosure	35
VII.	GRIEVANCE REDRESS MECHANISM	36
VIII.	ENVIRONMENTAL MANAGEMENT PLAN	38
	A. Safeguard Implementation Arrangement	39
	B. Environmental Monitoring Program	63
	C. Institutional Capacity Development Program	64
	D. Staffing Requirement and Budget	65
IX.	MONITORING AND REPORTING	68
X.	CONCLUSION AND RECOMMENDATIONS	69

LIST OF TABLES:

Table 1: Applicable Government of Bangladesh Environmental Legislations	2
Table 2: Likely Government of Bangladesh Classification of Mathbaria Water Supply Subproject	4
Table 3: Components of Proposed Mathbaria Water Supply Subproject	7
Table 4: Mathbaria Pourashava Population Data	16
Table 5: Existing Road Situations in Mathbaria	16
Table 6: Existing Solid Waste Management and Generation Estimates	18
Table 7: Fields in Which the Subproject Is Not Expected to have Significant Impacts	20
Table 8: Possible Actions to Mitigate against Projected Effects of Climate Change on Water Supply Infrastructure and Improve Climate Resilience	22
Table 9: Anticipated Impacts and Mitigation Measures – Construction Phase	25
Table 10: Anticipated Impacts and Mitigation Measures – O&M Phase	31
Table 11: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase	42
Table 12: Environmental Management and Monitoring Plan – O&M Phase	58
Table 13: Environmental Monitoring Program	63
Table 14: Training Program for Environmental Management	65
Table 15: Indicative Cost of EMP Implementation	66

LIST OF FIGURES:

Figure 1: Location Map	10
Figure 2: Map of Proposed Mathbaria Water Supply System	11
Figure 3: Mathbaria Surface Water Treatment Plant – Site Plan	12
Figure 4: Mathbaria Overhead Tank – Site Plan	13
Figure 5: Grievance Redress Process	38
Figure 6: Safeguards Implementation Arrangement	39

LIST OF APPENDICES:

Appendix 1: Rapid Environmental Assessment Checklist	71
Appendix 2: Environmental Standards and Application Fees	75
Appendix 3: Outline Flow Charts for Desilted Materials Disposal and Reuse	77
Appendix 4: Sample Outline Spoils Management Plan	79
Appendix 5: Sample Outline Traffic Management Plan	80
Appendix 6: Records of Public Consultations and FGDs	90
Appendix 7: Sample Grievance Registration Form	94
Appendix 8: Sample Monthly Reporting Format	95

EXECUTIVE SUMMARY

1. The Coastal Towns Environmental Infrastructure 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 change 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. Mathbaria water supply subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical as currently there is no piped water supply in Mathbaria pourashava and water supply from shallow hand tube wells is not fit for drinking due to extreme salinity. 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. Mathbaria 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 construction of (i) 5.5 MLD surface water treatment plant (SWTP); (ii) river intake and resectioning of *khals*; (iii) 1 overhead tank and 1 ground reservoir; (iv) embankment; (v) 10 exploratory wells; (vi) 3.5 km of transmission mains and 49 km of distribution network; and provision of (i) 3,200 service connections; (ii) mini-water testing equipment; and (iii) generator set for electricity back-up.

7. **Implementation Arrangements.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. The Local Government Engineering Department (LGED) is the lead executing agency (EA), and the Department of Public Health Engineering (DPHE) is the co-executing agency (for water supply and sanitation components). ¹LGED 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 teams² 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 Mathbaria 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 Mathbaria. The proposed locations for the SWTP and intake agricultural lands. The transmission mains for raw and treated water are routed along existing roads within the road reserves. The proposed abstraction for the 5.5 MLD intake accounts for 3 to 4% of the lean flow, and would have negligible impacts on ecological flow and downstream uses.

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 Mathbaria water supply subproject are: (i) demand for new piped water supply; (ii) surface water source where groundwater source is saline; (iii) surface water should be treatable to meet Bangladesh drinking water standards; (iv) water source should not be polluted by upstream users; (v) avoidance of water-use conflicts; (vi) locating pipelines within right of way (ROW) to reduce acquisition of land; (vii) locating pipelines at least 10 meters from latrines, septic tanks and any main drains to avoid contamination; and (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.

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 (PMS), institutional strengthening and awareness building consultants (ISABC), and non-government organization.

11. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Mathbaria water supply subproject, including: (i) increased salinity in location of abstraction points; (ii) structural protection of facilities from future floods; (iii) location of SWTP where there is no risk of flooding or other hazards; (iv) additional storage for supplying during any disaster/crisis; (v) standalone power backup for the SWTP and pumping stations; and (vi) 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.

12. Key construction phase impacts identified and addressed in the IEE include: (i) loss of productive agricultural lands and conservation of topsoil; (ii) 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; (iii) air, noise, and vibration impacts due to construction vehicles, equipment, and machinery in the vicinity of construction site and inhabited sections; (iv) management of spoils due to excavation for the distribution and transmission mains; (v) safety measures during construction; (vi) traffic diversions; (vii) 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 (viii) 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. Water source protection will involve good inter-agency coordination led by Department of Environment (DoE). To provide inputs for effective inter-agency coordination, a water quality monitoring program at locations upstream of the intake is proposed during the implementation, along with semi-annual joint site visits by Mathbaria pourashava, DPHE and DoE to the upstream locations. The findings of the water quality monitoring and site visit recommendations shall be taken up with the steering committee for any coordination or measures required by agencies. Institutionalizing this process during the operation phase of the project will ensure sustained source protection.

14. 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.

15. **Consultation, Disclosure and Grievance Redress.** The stakeholders were involved in developing the IEE through discussions on-site and public consultation. Their views 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 Mathbaria 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 Mathbaria 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 Environmental Infrastructure 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 change 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. Mathbaria water supply subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical as currently there is no piped water supply in Mathbaria pourashava and water supply from shallow hand tube wells is not fit for drinking due to extreme salinity. 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

4. 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.

5. **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.

6. **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.

7. **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

8. 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).

9. 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	<ul style="list-style-type: none"> - initiated in the ecologically critical areas - Regulation on vehicles emitting smoke harmful to the environment - Remedial measures for injuries to ecosystems - Standards for quality of air, water, noise and soil for different areas for various purposes and limits for discharging and emitting waste - Environmental guidelines 	operation and maintenance (O&M) phases.
2.	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	<ul style="list-style-type: none"> - Environmental clearances - Compliance to environmental quality standards 	The subproject is categorized as red and requires locational clearance certificate (LCC) and environmental clearance certificate (ECC). All requisite clearances (LCC and ECC) from DoE shall be obtained prior to commencement of civil works.
3.	Forest Act of 1927 and amendments (2000)	<ul style="list-style-type: none"> - Clearance for any felling, extraction, and transport of forest produce 	Considered in subproject preparation.
4.	Bangladesh Climate Change Strategy and Action Plan of 2009	<ul style="list-style-type: none"> - 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. - 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	<ul style="list-style-type: none"> - EIA for water development projects and increase surface water flow - Pre-screening of IEEs/EIAs for water sector projects by WARPO, in advance of submission to DOE for final clearance. - Augmentation for dry season water flow - Awareness-raising in consumptive use of surface and groundwater for irrigation - Structural and non-structural mitigation (early warning and flood proofing) 	Considered in subproject preparation. The subproject proposes new surface water system for Mathbaria residents.
6.	National Policy for Arsenic Mitigation of 2004	<ul style="list-style-type: none"> - Guideline for mitigating the effect of arsenic on people and environment in a holistic and sustainable way. - Supplement the National Water Policy 1998 and National Policy for Safe Water Supply and Sanitation 1998 - 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 <i>upazila</i> are identified.	
7.	National Safe Drinking Water Supply and Sanitation Policy of 1998	<ul style="list-style-type: none"> - 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. - Sanitation systems shall be self-sufficient and self-sustaining. - Pourasavhas shall be responsible for solid waste collection, disposal and their management. DOE shall be consulted on solid waste management. - Where WASAs exist, 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	<ul style="list-style-type: none"> - Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement - Prohibition of employment of children and adolescent 	The 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

10. 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).

11. 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 Mathbaria 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 Per preliminary quantity and cost estimate, Mathbaria water supply subproject is 3,635.13 Lac Taka (US\$4.66 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		

Subproject	Component	Equivalent in Schedule I of ECR 1997	DoE Classification
	secondary drains)		
	Tertiary network (includes main drains and drainage outfalls)		

12. 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 plus layout plan showing location of effluent treatment plant, process flow diagram, design and time schedule of the effluent treatment plant;
- (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).

13. 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

14. Mathbaria pourashava was established on 1 June 1993 and is divided into 9 wards consisting of 16 *mouzas/mahallas*. It is located between 22°09' and 22°24' north latitude and between 89°52' and 90°03' east latitude; bounded by Dhanisafa union to the north, Bara *mouza* union to the west, Tushkhali to the north and Tikikata union to the south-east. Mathbaria pourashava is located in the southern part of Bengal Basin and occupies a land area of 6.55 km². The topography is mostly flat with elevations range between 0.2 to 4.5 meters (m).

15. Subproject components are located in Mathbaria 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. About 10 acres of agricultural land at Surjomoni near Boddhabhumi under Tikikata union will be acquired for construction of the surface water treatment plant (SWTP), pre-settling and sedimentation basin, raw water intake, pump house, water storage, storage for chemical, office cum residence, etc. 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 Mathbaria. The location map is shown as Figure 1.

B. Existing Condition and Need for the Project

16. Mathbaria does not have a piped water supply system at present. The population there is suffering from the lack of a good water supply, and has to obtain its water from ponds (through pond sand filters), saline shallow groundwater (for non-drinking purposes), rainwater, and rivers and *khals*.

17. Shallow hand tube well water is the main source of water supply for majority of the

Pourashava population for domestic use only and not for drinking as the water has extreme salinity. In Mathbaria pourashava, there are 225 hand tube wells which have been installed by the pourashava and DPHE; most of which (about 115) are reportedly dysfunctional at the moment due the presence of extreme salinity in the groundwater. About 150 hand tube wells are installed by the individual owners sunk at their homestead. Groundwater quality data of the tube wells (depths 61.0m, 152.4m and 280.5m) in Mathbaria have been collected from Bangladesh Water Development Board (BWDB) Groundwater Circle; which indicate that the salinity level in the groundwater is extremely higher than the Bangladesh Drinking Water Standard.

18. Surface water sources include four canals (Tushkhali, Boyratala, Mirukhali and Machua/Ramna *khangals*) flowing inside the pourashava area; tidal water is available round the year in these *khangals*. The people of the area use the water for domestic use, and drinking after filtration and sometimes after boiling. Rain water harvesting facilities are hardly found in practice in the pourashava.

19. There are 65 pond sand filters (PSF) in the pourashava area; out of which about 40 are in a functional condition. The PSF consists of (i) raw water pump; (ii) raw water chamber; (iii) filter bed of sand and charcoal; and (iv) clear water chamber with clear water outlets. The raw water from ponds is pumped to the filter bed and the filtered water flows through the outlet of the PSF. The capacity of the each PSF is 1,500 to 2,000 liters per day.

20. PROSHIKA, a nongovernment organization (NGO), is operating a mini WTP in Mathbaria. The plant was established in 2003 in the *upazila* office compound. The pond water in the compound is being used as a water source. Water from the pond is pumped to the chamber where alum and chlorine is added and the water is allowed to a filter of stone chips, carbon and sand layers. The treatment capacity of the plant is 5,000 liter per day. The cost of 20 liters water is 2 taka only.

C. Proposed Components

21. The interventions to introduce water supply system in Mathbaria pourashava have been proposed based on the results of the field investigations and consultation with the mayor, councilors and people of the pourashava. The projected water demand for the year 2040 and climate change impacts for the year 2050 have also been taken into account.

22. Investments under this subproject include construction of (i) 5.5 MLD surface water treatment plant (SWTP); (ii) river intake and resectioning of *khangals*; (iii) 1 overhead tank and 1 ground reservoir; (iv) embankment; (v) 10 exploratory wells; (vi) 3.5 km of transmission mains and 49 km of distribution network; and provision of (i) 3,200 service connections; (ii) mini-water testing equipment; and (iii) generator set for electricity back-up.

23. The concepts considered in design of Mathbaria water supply subproject are: (i) demand for new piped water supply; (ii) surface water source where groundwater source is saline; (iii) surface water should be treatable to meet Bangladesh drinking water standards; (iv) water source should not be polluted by upstream users; (v) avoidance of water-use conflicts; (vi) locating pipelines within ROWs 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.

24. Preliminary designs integrate a number of measures, both structural and non-structural,

to mainstream climate resilience into the Mathbaria water supply subproject, including: (i) increased salinity in location of abstraction points; (ii) structural protection of facilities from future floods; (iii) location of SWTP where there is no risk of flooding or other hazards; (iv) additional storage for supplying during any disaster/crisis; (v) standalone power backup for the SWTP and pumping stations; and (vi) promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures.

25. The inventory and proposed interventions are listed in Table 3. The outline of the proposed system is shown on Figure 2. The preliminary site plans for the SWTP and OHT are shown in Figures 3 and 4, respectively.

26. There will also be a storage tank and pumping facilities for backwash water before recycling. Backwash water will be pumped through the process after temporary storage for flow equalization. Sludge from the sedimentation, after preliminary thickening in the sedimentation tanks themselves, will be pumped to sludge-drying beds for final disposal.

Table 3: Components of Proposed Mathbaria Water Supply Subproject

	Items	Unit	Qty	Remarks
1.0	Land Acquisition	Acre	10	Land at Surjomoni near Boddhabhumi under Tikikata union; about 3.5 km east from Mathbaria pourashava to be acquired for construction of SWTP, pre-settling and sedimentation basin, raw water intake, pump house, water storage, storage for chemical, office cum residence etc.
2.0	Construction of SWTP			
2.1	Surface water treatment plant (300 m ³ per hour or 5.5 MLD)	No.	1	To meet the estimated water demand of around 5,000 m ³ /day Electrical conductivity and salinity data of BWDB surface water sampling stations have been collected from BWDB Groundwater Circle. The Baleswar River is above the permissible limit of drinking water standards, whereas the Bishkhali River is within the permissible limit around the year. Bishkhali River is a better source of water supply for Mathbaria rather than the Baleswar River. The raw water source will be Mathbaria – Kholpatua <i>khal</i> connecting the Bishkhali River about 12 km east and the Baleswar about 11 km west from the proposed SWTP site. Both Bishkhali and Baleswar river are fully influenced by tide and ebb thus water quantity is sufficient and additional abstraction from the river will not have significant impact. The Mathbaria – Kholpatua <i>khal</i> also has perennial tidal flow of sufficient quantity to satisfy the daily raw water demand of SWTP. There is a sluice gate (Surjomoni Sluice) located at the junction of Mathbaria – Kholpatua <i>khal</i> and Surjomoni <i>khal</i> . The sluice is operated to raise water level inside the polder during summer and kept open to allow water discharge during monsoon. The intake will
2.2	Sedimentation Pond (100 m x 120 m)	No.	1	
2.3	River Intake	No.	1	
2.4	Pond Intake	No.	1	

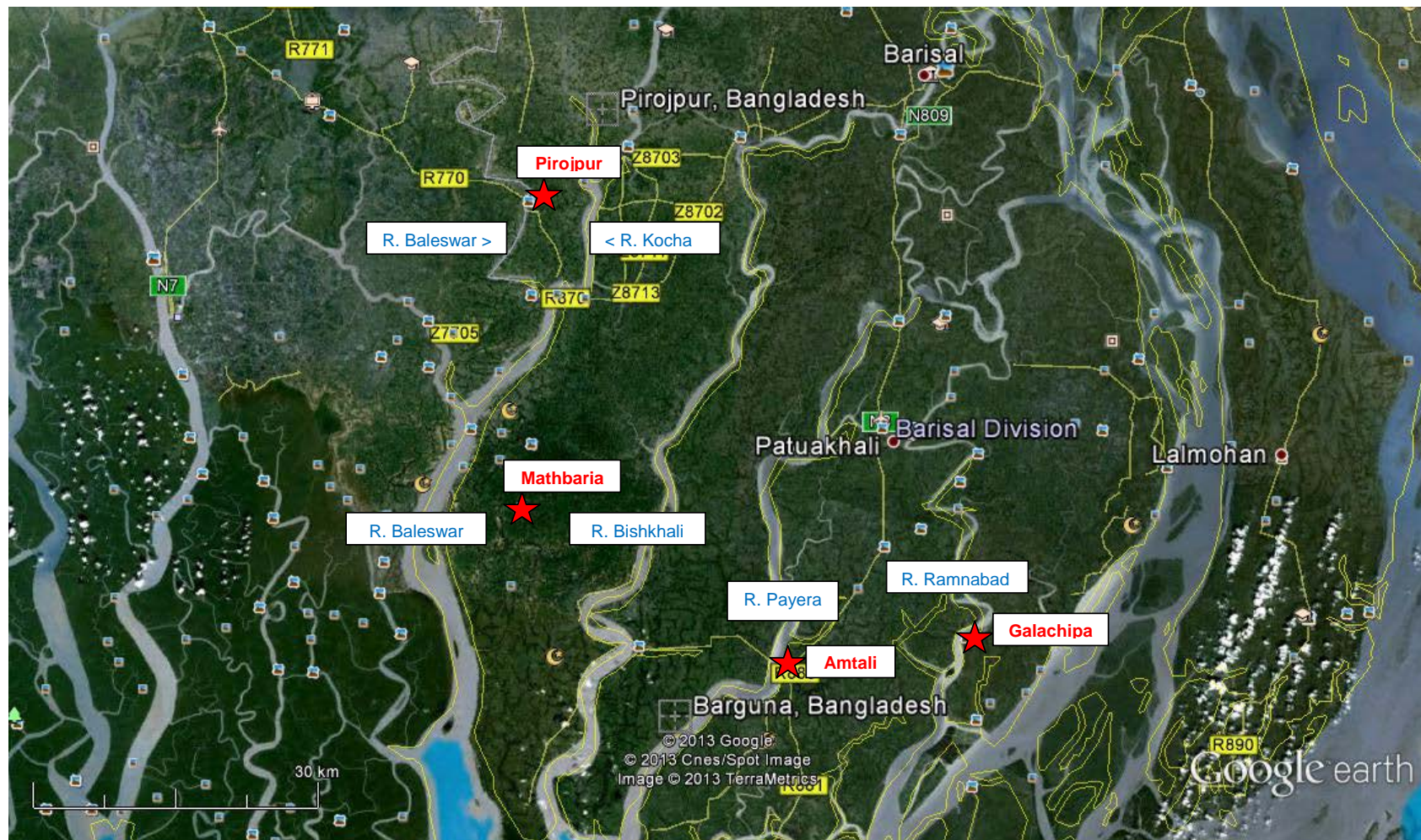
	Items	Unit	Qty	Remarks
				have provision of gravity flow in the pre-sedimentation basin of the proposed SWTP from Surjomoni <i>khal</i> . This arrangement will save huge amount of power consumption from operation of pump in the intake. The proposed abstraction for the 5.5 MLD intake accounts for 3 to 4% of the lean flow, and would have negligible impacts on ecological flow and downstream uses.
3.0	Construction of Water Storage Facilities			
3.1	Overhead tank (OHT) of capacity 680 m ³	No.	1	To be constructed near Tikikata union compound. The OHT capacity is about 15% of total production capacity. The cyclonic strong wind will be taken into account during detail design of the structure to make it strong enough to withstand the cyclones and climate resilient.
3.2	Ground reservoir of capacity 2000 m ³ for Emergency Water Storage Provision	No.	1	To be constructed at the WTP site. River and pond water gets saline during cyclone and storm surge. The ground reservoir is proposed for provision of water storage for emergency use.
4.0	Installation of Water Transmission and Distribution			
4.1	100 mm dia	km	32	A tentative plan of distribution pipelines has been prepared with the objective to water coverage almost 100% of the pourashava area. About 3.5 km transmission pipeline will be laid from SWTP to OHT. About 49 km of pipes will be laid for the distribution network.
4.2	150 mm dia	km	7	
4.3	200 mm dia	km	5.5	
4.4	250 mm dia	km	4.5	
5.0	Laying of Service Connection			
5.1	13 mm connection	Nos.	3,000	Projected population of 21,916 by 2020 has been considered for estimating number of service connections. The total predicted number of service connections at 1.5 households per service connection) will be about 3,200.
5.2	20 mm connection	Nos.	175	
5.3	25 mm connection	Nos.	25	
6.0	Procurement and Installation of Water Meters in Service Connections			
6.1	13 mm connection	Nos.	3,000	All future connections will be metered.
6.2	20 mm connection	Nos.	450	
6.3	25 mm connection	Nos.	50	
7.0	Construction of Protection Embankment surrounding the SWTP Compound	M	800	Earthen embankment of height 4.0m above mean sea level with concrete cement block pitching will be constructed along the boundary of the compound to protect the SWTP from cyclones and storm surges. The width of the embankment crest will be 3 m, outside slope and inside slope will be 1:2 and 1:1 respectively.
8.0	Re-sectioning of <i>khals</i>	km	3.0	Mathbaria – Kholpatua <i>khal</i> and Surjomoni <i>khal</i> will be re-sectioned by removing silts from the bottom to make it wider and deeper so that it can provide sufficient raw water flow for the SWTP round the year.
9.0	Exploratory drilling	Nos.	10	Exploratory drilling to deep aquifer will be conducted to ascertain potable groundwater potentiality in Mathbaria. Water supply source for the pourashava will be chosen based on the result of the investigation.
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)

	Items	Unit	Qty	Remarks
				and fecal coliform and <i>E. coli</i> .
11.0	Pourashava water supply office cum residence	No.	1	To be constructed in the SWTP compound in order to facilitate smooth operation and maintenance of the plant.
12.0	Logistics			To be provided for smooth operation of the water supply system.
12.1	Pick-up	No.	1	
12.2	Motorcycle	No.	2	
12.3	Computers, software etc.	lump sum	1	
12.4	Generator for proposed System	lump sum	1	To be provided as standalone power backup for the SWTP and pumping stations.

D. Implementation Schedule

27. 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 Proposed Mathbaria Water Supply System

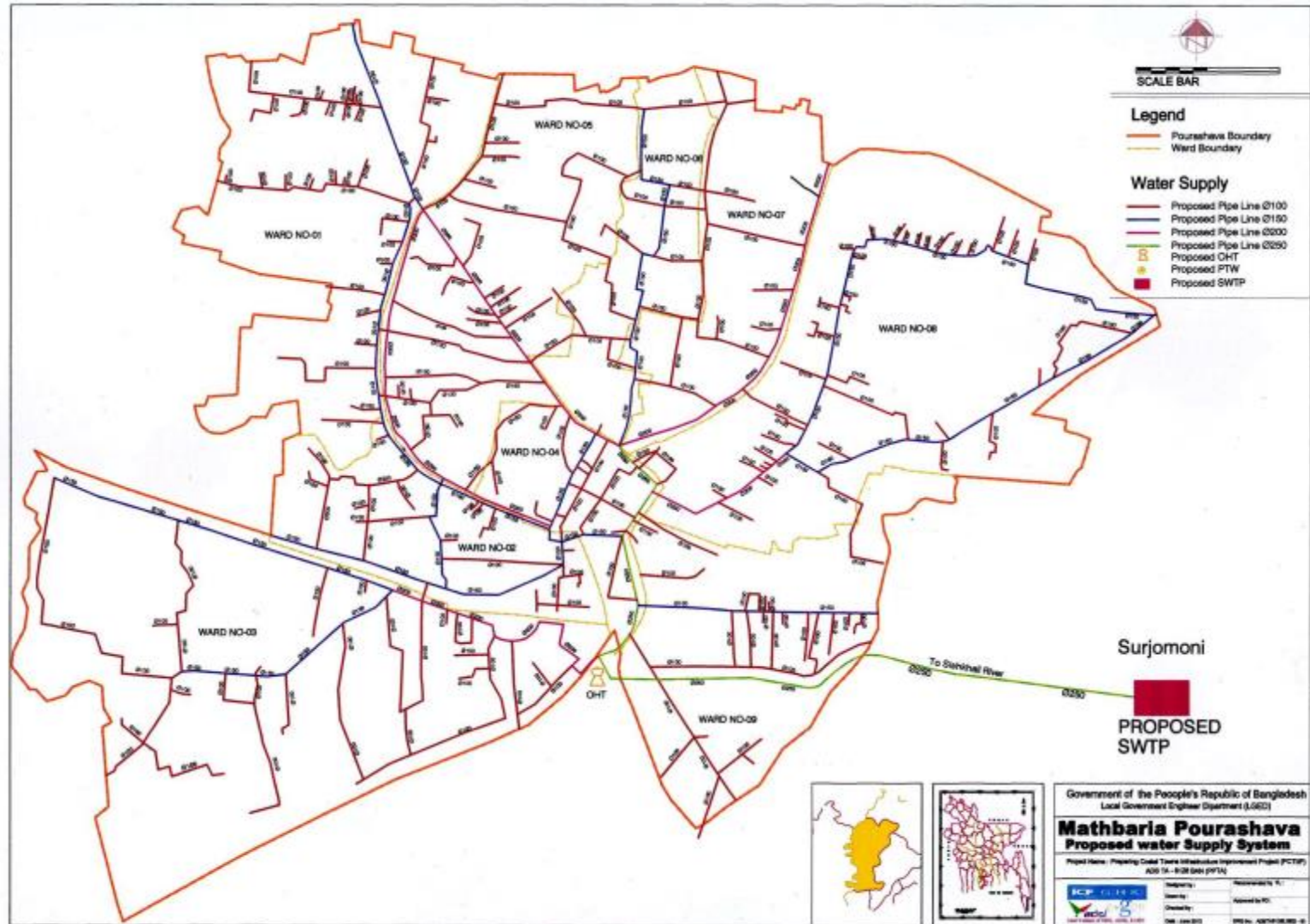


Figure 3: Mathbaria Surface Water Treatment Plant – Site Plan

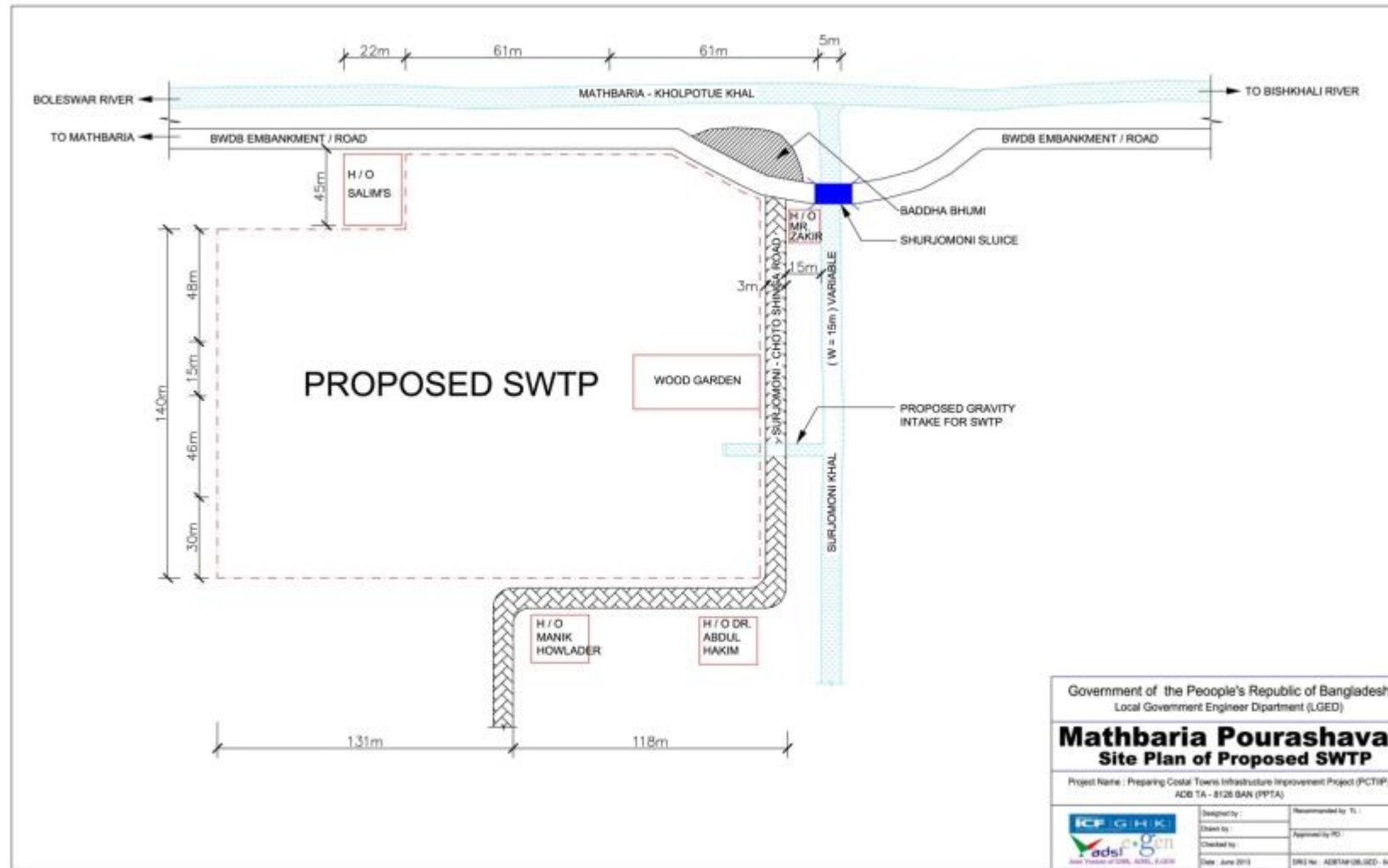
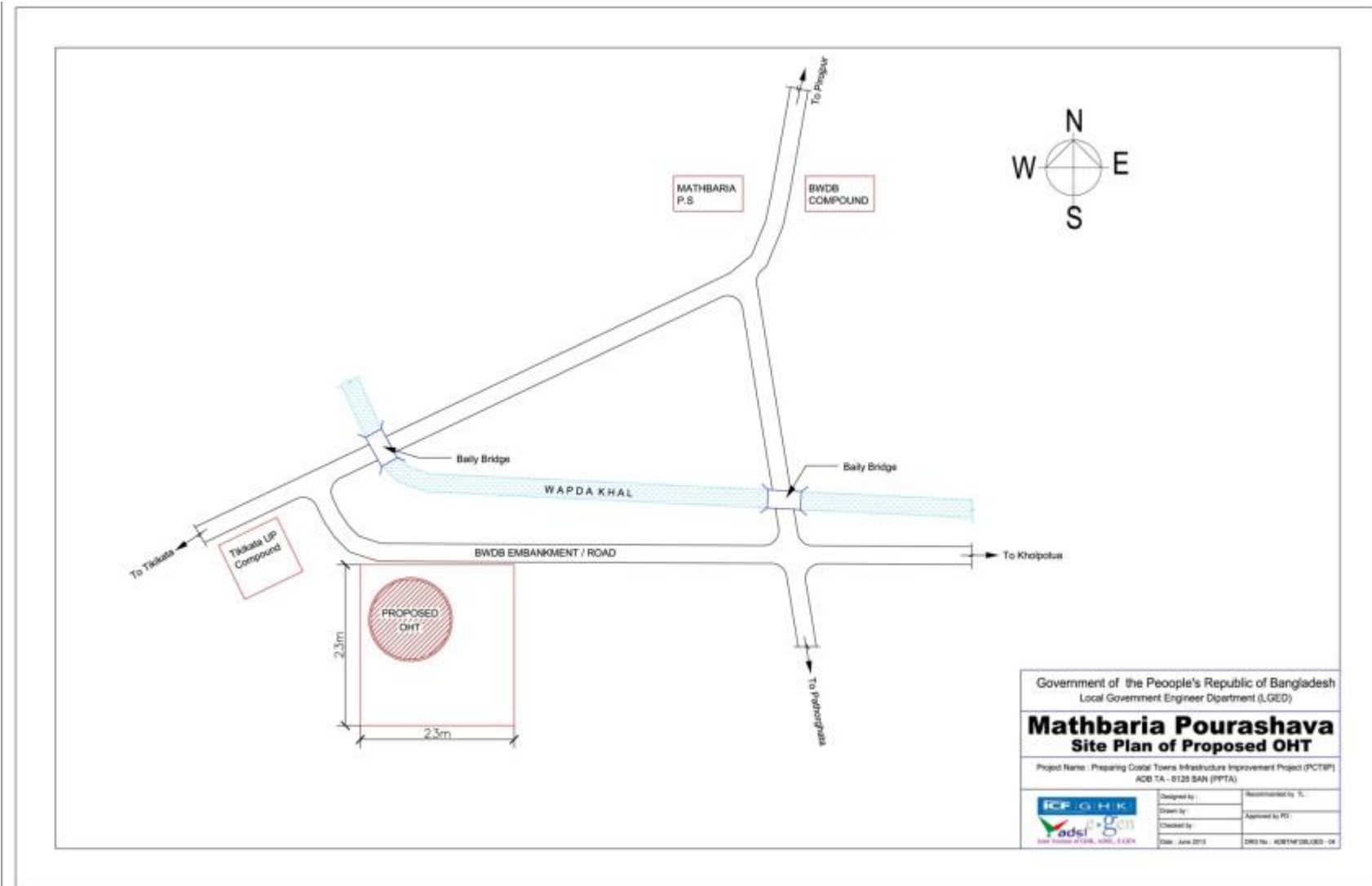


Figure 4: Mathbaria Overhead Tank – Site Plan



IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for the Baseline Study

28. **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 Mathbaria pourashava;
- (ii) relevant acts and extraordinary gazettes, and guidelines issued by Government of Bangladesh agencies; and
- (iii) literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and environmental planning documents collected from Government of Bangladesh agencies and websites.

29. 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.

30. **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

31. **Topography, landforms, geology and soils.** Mathbaria pourashava occupies an area of 6.55 km². The topography is mostly flat with elevation ranges mostly between 0.2 m to 4.5 m. Mostly of the pourashava area is below 2.3 m as measured by Public Works Department (PWD) only the patches of land along *khal* banks and built up town area have elevation more than 2.5 m PWD. However, there are some small patches of land having elevation as high as 4.5 m PWD. The pourashava area is located on the southern part of Bengal basin; sedimentary layers are mostly horizontal to sub-horizontal and are free from major tectonic deformation in the fore deep area covering the central part of the basin and this is expressed as river to delta plain topography of the land.

32. **Climatic conditions.** Mathbaria has a tropical monsoon-type climate. January is the coolest month with temperatures averaging near 26 °C (78 °F) and April the warmest with temperatures from 33 to 36 °C (91 to 96 °F). 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). Mathbaria 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.

33. **Hydrology.** The Baleswar River flowing 8 km west and the Bishkahali River 12 km east of Mathbaria influences the surface water hydrological condition of Mathbaria. Both the rivers are tidal river which shows semidiurnal tidal fluctuation. Mathbaria - Machua *khal* from Baleswar river and Mathbaria - Dowatola *khal* from Bishkhali river are meeting in Mathbaria pourashava

and connecting both the rivers. A number of *khal*s which are drainage arteries of the pourashava run through the pourashava.

34. There are about 300 ponds within the pourashava. The water is available round the year in 67% of the ponds. The remaining ponds hold water for 6-7 months. About 30% ponds are being used for culture fishery (Source: Baseline Survey Final Report, Ground Water Management and Feasibility Study for 148 Pourashavas, DPHE).

35. **Surface water quality.** A good number of *khal*s run through the pourashava and the ponds make the surface water resource of the pourashava. All canals are tidal and get the flow of water from the Baleswar or Bishkhali River. In the wet season the *khal*s remain full but some of them get water during spring tide in the dry season only. The *khal* water is somewhat turbid and contains algae. Water hyacinth is found to float on it. The water of canals coming from Baleswar River is saline except in the monsoon months.

36. **Groundwater availability and quality.** The water table in the Mathbaria varies generally from 1.5 m to 3.0 m and does not go beyond suction limit. Shallow hand tube wells are used by the general population to abstract water from the ground. But most of the water from hand tube wells is iron and saline contaminated, and in some cases arsenic contaminated.⁴ Consequently, most of the tube well water is not used for drinking, but used for other domestic purposes.

37. The water in the deep aquifer in Mathbaria is also severely saline contaminated. The deep aquifer salinity data, collected from BWDB Groundwater Circle, show that the salinity level in the groundwater is much higher than the Bangladesh Standard. Available data on the water quality of the deep aquifer indicate that the deep groundwater is highly saline and unsuitable as a source for municipal water supply.

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

39. **Acoustic environment.** Subproject components are in the built-up part of Mathbaria, 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

40. **Flora and fauna.** Subproject components are located in Mathbaria 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.

⁴ Groundwater used for drinking in many areas of Bangladesh has been reported to have contamination by arsenic above the Bangladesh National Standard of 50 parts per billion (ppb). The percentage of contaminated tube wells in villages varies from more than ninety percent to less than five percent. Geographically, the tube wells in the delta and the flood plains regions, which comprise 72% of the land area, are more or less affected by arsenic contamination. Arsenic contaminated aquifers have no regular pattern, varies both horizontally and vertically within short distances.

41. **Protected areas.** There are no forest areas, wetlands, mangroves, or estuaries in or near the subproject sites.

D. Socioeconomic Characteristics

42. **Population.** Mathbaria is the largest *upazila* of Pirojpur District in respect of both area and population. Information about the total number of households with average size and density per ward is Table 4.

Table 4: Mathbaria Pourashava Population Data

Administrative Unit	Area (km ²)	Households (nos.)	Population			Average Household Size	Density (per km ²)
			Total	Male	Female		
Mathbaria Pourashava	6.55	4,330	18,375	9,124	9,251	4.24	2,805
Ward No - 01	0.73	334	1,565	838	727	4.68	2,143
Ward No - 02	0.24	587	2,281	1,115	1,166	3.88	9,504
Ward No - 03	1.21	695	2,844	1,355	1,489	4.09	2,350
Ward No - 04	0.20	277	1,047	582	465	3.78	5,235
Ward No - 05	1.13	600	2,507	1,275	1,232	4.18	2,218
Ward No - 06	0.71	401	1,711	786	925	4.26	2,409
Ward No - 07	0.71	523	2,268	1,142	1,126	4.33	3,194
Ward No - 08	0.77	606	2,207	1,065	1,142	3.64	2,866
Ward No - 09	0.85	407	1,945	966	979	4.77	2,288

Source: BBS Community Report, Zilla: Pirojpur, 2011.

43. **Land use.** Total cultivable land is 2,421.89 hectares and fallow land is 219.34 hectares. Land being used for single crop is 56.73%, double crop is 41.15% and treble crop land is 2.12%.

44. **Type of community spread.** Mathbaria is composed of Muslim 87.52%, Hindu 12.37% and others 0.11%.

45. **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. Many of the roads in Mathbaria, particularly roads on the periphery of the pourashava, are narrow and only single lane and, in some areas, many households only have footpath access, often over substantial distances. Table 5 summarizes existing condition of roads in Mathbaria.

Table 5: Existing Road Situations in Mathbaria

Town	Length of Road (km)			
	Earthen	BT & CC	HBB	Total
Mathbaria	31.50	41.50	13.00	86.00

Source: PPTA Consultant.

46. **Socio-economic status.** The economy of Mathbaria is agriculture dependent. The principal crops are paddy, wheat, sugarcane, chili and pulses. Cottage industries include

weaving, bamboo work, goldsmith, blacksmith, potteries, tailoring, wood work, and welding. Main occupations are agriculture (42.95%), agricultural laborer (21.14%), wage laborer (4.12%), commerce (10.85%), service (5.28%), fishing (2.62%), construction (1.11%), transport (1.41%), and others (10.52%).

47. **Other existing amenities for community welfare.** Mathbaria has 1 upazila health complex, 7 family planning centers, 49 palli health services, and 2 satellite clinics. Average literacy is 68.2% which is above the national average of 44%; there are 7 colleges, 246 primary and secondary schools and 121 *madrashas* (any type of religious school or college for the study of the Islamic religion, though this may not be the only subject studied).

48. **Cyclone shelter situation.** There are existing cyclone shelters in Mathbaria, but most of them were constructed over 30 years ago and are in a poor condition. Research commissioned by the various development partners in Bangladesh,⁵ 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. Key issues⁶ 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 PPTA of existing shelters in Mathbaria confirmed these findings.

49. **Solid waste management situation.** Compared to many urban areas of South Asia, and Bangladesh, solid waste is not such a noticeable issue in the Mathbaria 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 Mathbaria'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

⁵ Coastal Climate Resilient Infrastructure Project, TA 7902 – BAN, Annex N, Cyclone Shelters, kfW, ADB, IFAD, Sept 2012.

⁶ 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.

are not currently active. As there has been no detailed analysis of solid waste generation rates in the PPTA study towns, information from Khulna⁷ has been used to estimate solid waste generation rates. A study by Alamgir and Ahsan in 2007⁸ in Khulna estimated that waste generation from 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 Mathbaria is outlined in Table 6. 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 6: 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)
Mathbaria	No record	2 x 3-ton truck	01 (dumpsite)	Truck -1 Rickshaw - Van -2	3.8	1.9	4.0

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

50. Apart from medical waste, there is not much waste that is hazardous, such as used fluorescent tubes and batteries. Mathbaria 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. Mathbaria 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 Mathbaria. 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 Mathbaria.⁹

51. **Slum situation.** Mathbaria has 10 slums (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 3,040 or 16% of the total population of Mathbaria 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.

⁷ Cities Development Initiative for Asia (CDIA), Support to Khulna City Corporation (KCC), Sector Report 4. Solid Waste Management, June 2009

⁸ 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.

⁹ 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 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.

52. **Drainage and flood control.** Mathbaria Pourashava drains out its storm water to Baleswar River on the west and Bishkhali River on the east through a network of *khals*. The primary drains comprise the natural *khals* and channels, and are almost entirely unlined earth, while the tertiary drains are *pucca* brick and concrete drains. The secondary drains comprise both natural earth and *pucca* channels. These canals have polders constructed by BWDB on both banks to protect the pourashava from floods. Besides, flood walls are also constructed along the canal banks in densely populated areas in the pourashava due to the scarcity of land to construct polders. A large portion of the flood walls are damaged and sluice gates in the polder are also in very poor condition. All these flood walls and sluice gates need repair and rehabilitation/ reconstruction. The drainage canal network is silted up, filled with garbage and encroached by settlements. There are inadequate numbers and lengths of street drains in the pourashava. For proper drainage flow into the secondary drains, many new street drains are required.

53. **Water supply situation.** Mathbaria does not have a piped water supply system at present. The population there is suffering from the lack of a good water supply, and has to obtain its water from ponds (through pond sand filters), saline shallow groundwater (for non-drinking purposes), rainwater, and rivers and *khals*.

54. **Sanitation situation.** There is high coverage of household toilets/latrines (94-98% in Mathbaria). Most toilets are pit latrines, which are generally located in relatively low areas in the household. The latrines consist of 4/5 numbers of rings placed to the depth of around 3 – 4 ft (0.9 to 1.2 m) in the ground; a platform is simply positioned on the uppermost ring of the pit which is almost at the ground level. Consequently the latrines are easily inundated due to rain water accumulation in the monsoon season, resulting in a loss of accessibility to the latrine and pollution caused by discharge of the contents. It was observed in some places during the field visit that holes have been made on the surface of ring of the latrine pit to allow the flow of sludge over the ground to a nearby ditch, *khal* or canal, which is really environmentally and health hazardous. Most of the schools (primary schools, high schools and *madrashas*) have inadequate sanitation facilities. The condition of existing latrines in the schools is bad as the pits/septic tanks and superstructures are mostly damaged, there are no arrangements for electricity and water supply, and there is lack of separate provision for girls. Socio-economic and willingness-to-pay survey findings indicate that there is hardly any usage of the 5 existing public toilets. Public toilets are viewed as being poorly maintained and equipped (e.g. no water line or electricity). Mathbaria does not have de-sludging equipment for cleaning latrine 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

55. There are 4 historical places in Mathbaria: Sonakhali Jamider Bari, Burir Char Momin Mosque, Sapleza Khuti Bari, and Surjomonno Bidhya Bhumi. The subproject components are not located in or near and excavation works will not be conducted in the vicinities of these sites.

56. 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 small graveyard at the location of the 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

57. 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

58. From the preliminary design and results of the rapid environmental assessment, it is clear that implementation of Mathbaria 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 7) thus can be screened out of the assessment at this stage but will be assessed again during detailed design stage and before implementation.

Table 7: 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 SWTP sites and along public ROWs.
Climatic conditions	Short-term production of dust is the only effect on atmosphere. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Acoustic environment	Construction activities will be on settlements, along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will be on vacant agricultural land and will follow existing ROW alignment and impact is short-term, site-specific and

Field	Rationale
	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 Mathbaria pourashava will not cause direct impact on biodiversity values. Based on preliminary design 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. SWTP construction and operation will be limited to 10 acres and will not affect the surrounding agricultural lands. OHT construction and operation will be on government-land. Laying of pipelines will be limited to ROWs.
Type of community spread	No alteration on type of community spread.
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site can cause traffic problems. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Socio-economic status	The resettlement impacts are discussed in details in the subproject's resettlement plan. Impacts are limited to economic displacement in the form of loss of land, assets, income sources, and means of livelihoods as a result of involuntary resettlement. Manpower will be required during the 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 Mathbaria 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 4 historical sites.

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

59. 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. Except for the location of the SWTP the subproject will be in properties held by the pourashava. Access to the subproject sites is thru public ROW and existing roads.

60. The concepts considered in design of Mathbaria water supply subproject are: (i) demand for new piped water supply; (ii) surface water source where groundwater source is saline; (iii) surface water should be treatable to meet Bangladesh drinking water standards; (iv) water source should not be polluted by upstream users; (v) avoidance of water-use conflicts; (vi) locating pipelines within right of way (ROW) to reduce acquisition of land; (vii) locating pipelines at least 10 meters from latrines, septic tanks and any main drains to avoid contamination; and (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.

61. Possible actions to mitigate against the main projected effects of climate change on water supply infrastructure and service are described in Table 8. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Mathbaria water supply subproject, including: (i) increased salinity in location of abstraction points; (ii) structural protection of facilities from future floods; (iii) location of SWTP where there is no risk of flooding or other hazards; (iv) additional storage for supplying during any disaster/crisis; (v) standalone power backup for the SWTP and pumping stations; and (vi) 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 8: 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	- 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 °C by 2050) in addition to that due to increase of population and future demand.
Sea level rise (SLR)	- protect water supply infrastructure such as production tube well, 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.
Increased frequency of severe cyclones	- superstructures to be strong to cope with cyclone	It is recommended to take into account cyclonic strong wind during detailed design of the structures.
Rising temperatures	- protect SWTP from cyclone /storm surge	An earthen embankment of height 4.0m above mean sea level with CC block pitching, will be constructed along the boundary of the compound. The width of the embankment crest will be 3 m, and the outside slope and inside slope will be 1:2 and 1:1 respectively.
Flooding	- provide water storage for emergency use	A ground reservoir of capacity 2,000 m ³ is included in the subproject for emergency use after big cyclone /storm surges.
	- 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.

62. **Land acquisition and resettlement.** The proposed SWTP on land at Surjomoni near Boddhabhumi under Tikikata union is on private agricultural lands which needs to be acquired for the subproject. The crops cultivated are rice, other grains, and vegetables. There are no residential/commercial structures within the identified land. A resettlement plan in line with SPS has been prepared based on census and socioeconomic surveys of the affected persons to address impacts due to land acquisition and resettlement. Cutting of trees, if required based on detailed design, in private lands 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.

63. **Impacts on fisheries/river ecology.** Impact on inland water bodies, including *khaals* and

fishponds, will be addressed in the detailed designs through appropriate measures to provide for cross-drainage to minimize severance impacts. Intake screens are to be designed according to the swimming characteristics of *hilsa* (the key species in the *khals*), to ensure that the impacts on *hilsa* as well as the smaller fish, including the *jatka* (*hilsa* fry), are minimized. Consulting a fisheries expert as part of the detailed design is proposed, to provide inputs on the design of the intake screen to minimize impacts on fish. Efforts to minimize such impacts will be integrated into the detailed designs by the fisheries expert.

64. **Impacts on downstream uses.** The proposed abstraction accounts for only 3 to 4% of the lean flow. This minor level of abstraction is considered not to adversely impact downstream uses or ecological flows of the Mathbaria – Kholpatua and Surjomoni *khals*. Further, these levels of abstraction are not envisaged to result in any flow modifications, which can potentially lead to salinity intrusion or impacts on downstream water uses.

65. **Upstream pollution impacts and protection of source.** The water quality monitoring program carried out as part of the PPTA confirmed that the key water quality parameters at the intake location are within permissible limits for inland surface waters designated for use for water supply after conventional treatment. The current low levels of pollution can be attributed to the absence of any major pollution sources upstream of Mathbaria–Kholpatua and Surjomoni *khals*, coupled with dilution factors in the river system.

66. Protection of the source through regular desilting of Mathbaria–Kholpatua and Surjomoni *khals* and regulation of upstream developments, especially discharge of effluents (either untreated or partially treated), has been identified as a key policy level intervention requiring inter-departmental coordination. While consultations with Department of Industries and BWDB, do not indicate future large-scale industrial development upstream of the intake, enforcement of discharge standards, treatment of wastes and regular desilting shall be critical to ensure the long-term protection of the water quality at the intake.

67. The mandate of water quality protection and ensuring compliance to discharge standards rests with the DoE. Accordingly, DoE has established water quality monitoring stations at various locations along major rivers, however has not including Mathbaria – Kholpatua and Surjomoni *khals*. Given the need for additional measures to ensure sustained protection of water quality at the intake source, seasonal water quality monitoring upstream of the intake is proposed. In addition, a semi-annual field visit by the PMU environmental officer, along with the PIU, consultant team environmental management specialist, and representative of the district office of the DoE, to various locations within 5 km upstream of the intake shall be carried out. These visits shall enable identification and reporting to the PMU on any potential issues with respect to change in land uses, pollution sources, etc. The findings of the water quality analysis and the field visits, along with recommendations towards source protection, shall be summarized and presented as part of the semi-annual environmental monitoring reports. Issues pertaining to source protection shall be taken up in the steering committee meetings and provide a forum for addressing inter-agency issues towards protection of the water quality at the intake. Given that DoE is a member of the steering committee, the DoE representative shall follow up on the recommendations from the committee and monitor actions taken to address water pollution risks. In addition, it is recommended that PMU and PIU initiate the preparation of a water safety plan as an adjunct to the EMP, at least as it would pertain to intake protection and monitoring measures.

68. **Impacts of transmission mains and distribution network.** A 0.5 m-wide, 3.5 km-long corridor is proposed to accommodate the transmission mains from SWTP in Surjamoni to the

OHT in Tikikata union compound. The alignment passes through agriculture fields and low-lying areas. A 0.5 m-wide, 49 km corridor on public ROWs is proposed to accommodate the distribution network. 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.

69. **Impacts of re-sectioning of *khals*.** A 3.0 km stretch of Mathbaria–Kholpatua and Surjomoni khals will be re-sectioned and desilted to ensure smooth flow and availability of water for treatment. Dispersion of desilted material (thick layer of fine silt material) in nearby fields and adjoining areas will be prevented by disposal to identified disposal sites or determination during detailed design if the materials can be reused for strengthening of banks, formation of embankments, or application in farmlands. Appendix 4 provides step-by-step process for disposal or reuse of desilted materials. If desilted materials will be reused in farmlands, working in collaborative mode and consultation with farmers are necessary to minimize potential environmental and social challenges faced by the proposed activity.

D. Anticipated Impacts and Mitigation Measures – Construction Phase

70. 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.

71. **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 or 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.

72. 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.

73. 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 Mathbaria 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, Mathbaria 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 9).

Table 9: 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.	<ul style="list-style-type: none"> - Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply to 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.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of desilted materials, excess spoils and materials in construction activities. If spoils will be disposed, consult with Mathbaria local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to minimize the wastage of water in the construction activities. - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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.	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.
Acoustic environment	Construction activities will be on settlements, along and near	<ul style="list-style-type: none"> - 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.	<p>scheduled to avoid sensitive times.</p> <ul style="list-style-type: none"> - Plan activities in consultation with Mathbaria local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during night time. - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
Aesthetics	Based on preliminary design construction activities do not anticipate any cutting of trees (to be reassessed during detailed design stage) but will produce desilted materials, 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.	<ul style="list-style-type: none"> - Prepare a debris and desilted materials disposal plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with Mathbaria local authority for beneficial uses of desilted materials and excess excavated soils or immediately dispose to designated areas. Avoid stockpiling of any desilted materials and/or excess spoils. - All vehicles delivering fine materials to the site and carrying desilted materials/debris for disposal shall be covered to avoid spillage. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. - The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas.
B. Biological Characteristics		
Biodiversity	Activities being located in the built-up area of Mathbaria 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.	<ul style="list-style-type: none"> - Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and

Field	Impacts	Mitigation Measures
		damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood. - Implement compensatory plantation for trees lost at a rate of 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) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Socio-economic status	Manpower will be required during the 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.	- Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market.
Other existing amenities for 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 Mathbaria 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	- Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in Mathbaria (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. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local

Field	Impacts	Mitigation Measures
	impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<p>authority for use of water for construction. Use of water for construction works shall not disturb local water users.</p> <ul style="list-style-type: none"> - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Mathbaria local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.¹⁰ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. - The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.
Workers health and safety	There is invariably a safety risk when construction works such as excavation and earthmoving	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S.

¹⁰ 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
	are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	<ul style="list-style-type: none"> - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement a site 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) training¹¹ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to noise level greater than 85 dBA for 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	<ul style="list-style-type: none"> - Stop work immediately to allow further investigation if any finds are suspected.

¹¹ 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
	listed by local and/or national authority and/or internationally (UNESCO) within or adjacent to subproject sites. The subproject components are not located in or near and excavation works will not be conducted in the vicinities of the 4 historical sites. Thus risk for chance finds is low.	

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

74. 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 Mathbaria local authority, which will be given training by this project.

75. 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.

76. **Sludge generation.** Sludge primarily consists of settled suspended solids from source water and chemicals added in the treatment process. Composition of the sludge depends on the treatment process and the characteristics of the source water, and may include arsenic and other metals, lime, polymers and other organic compounds, microorganisms, etc. Sludge from the SWTP need to be collected and disposed at a designated site such as the landfill or dispose of by land application if allowed.¹²

77. **Wastewater generation.** Wastewater from SWTP include filter backwash and reject streams which may contain suspended solids and organics from the raw water, high levels of dissolved solids, high or low pH, heavy metals, etc. Recommended measures to manage wastewater effluents include: (i) land application of wastes with high dissolved solids concentrations is generally preferred over discharge to surface water subject to an evaluation of potential impact on soil, groundwater, and surface water resulting from such application; (ii) recycle filter backwash into the process if possible; and (iii) treat and dispose of reject streams, consistent with Government of Bangladesh requirements.

78. **Increased sewage generation.** The subproject will result in increased sewage generation. A number of public toilets, community latrines, school latrines and de-sludging equipment are proposed in Mathbaria pourashava which will address additional wastewater to be generated and improve the overall condition of domestic wastewater pollution.

79. **Hazardous chemicals use and storage.** Water treatment may involve the use of chemicals for coagulation, 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 SWTP include (i) store sodium hypochlorite in

¹² Potential impact on soil, groundwater, and surface water, in the context of protection, conservation and long term sustainability of water and land resources, should be assessed when land is used as part of any waste or wastewater treatment system.

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) isolate ammonia storage and feed areas from chlorine and hypochlorite storage and feed areas; (iv) Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruptions in supply; (v) develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures; and (vi) develop and implement a plan for responding to accidental releases.

80. **Air emissions.** Air emissions from SWTP operations may include gaseous or volatile chemicals used for disinfection processes (e.g., chlorine and ammonia). Measures related to hazardous chemicals discussed above will mitigate risks of chlorine and ammonia releases.

81. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 10).

Table 10: Anticipated Impacts and Mitigation Measures – O&M Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Water quality (intake)	Pollution of source due to upstream developments, especially discharge of effluents (either untreated or partially treated)	<ul style="list-style-type: none"> - Enforcement of discharge standards and treatment of wastes - Seasonal water quality monitoring upstream of the intake - Semi-annual field visit by the PMU environmental officer, along with the PIU, consultant team environmental management specialist, and representative of the district office of the DoE, to various locations within 5 km upstream of the intake - Identification and reporting to the PMU on any potential issues with respect to change in land uses, pollution sources, etc. - Issues pertaining to source protection shall be taken up in the steering committee meetings and provide a forum for addressing inter-agency issues towards protection of the water quality at the intake - Preparation of a water safety plan as an adjunct to the EMP (pertain to intake protection and monitoring measures)
Water quality (receiving body of water)	Wastewater from SWTP include filter backwash and reject streams which may contain suspended solids and organics from the raw water, high levels of dissolved solids, high or low pH, heavy metals, etc. Sludge from the SWTP need to be collected and disposed.	<ul style="list-style-type: none"> - Land application of sludge and wastes with high dissolved solids concentrations is generally preferred over discharge to surface water subject to an evaluation of potential impact on soil, groundwater, and surface water resulting from such application. - Recycle filter backwash into the process if possible. - Treat and dispose of reject streams, consistent with Government of Bangladesh requirements. - Conduct regular water quality monitoring.
Air quality	Air emissions from SWTP operations may include gaseous or volatile chemicals used for disinfection processes (e.g., chlorine and ammonia).	<ul style="list-style-type: none"> - Store sodium hypochlorite in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials. - Store calcium hypochlorite away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year. - Isolate ammonia storage and feed areas from chlorine and hypochlorite storage and feed areas. - Minimize the amount of chlorination chemicals stored on site

Field	Impacts	Mitigation Measures
		<p>while maintaining a sufficient inventory to cover intermittent disruptions in supply.</p> <ul style="list-style-type: none"> - Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures. - Develop and implement a plan for responding to accidental releases.
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Plan activities in consultation with Mathbaria 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 Mathbaria pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	<ul style="list-style-type: none"> - No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal).
C. Socioeconomic Characteristics		
Workers health and safety	Workers need to be mindful of the occupational hazards working with chemicals at SWTP. Potential impacts are negative and long-term but reversible by mitigation measures.	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Produce and implement a O&M health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training¹³ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. - Disallow worker exposure to noise level greater than 85 dBA

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.

Field	Impacts	Mitigation Measures
		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

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

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

83. 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 Mathbaria pourashava.

84. **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.

85. **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.

86. **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.

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

88. 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 vulnerable¹⁴ groups.

89. 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.

90. **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.

91. Therefore the project will benefit the general public by contributing to the long-term

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.

improvement of municipal services and community livability in Mathbaria pourashava.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Public Consultation Conducted

92. 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 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.

93. Public consultations and focus group discussions (FGDs) were conducted by PPTA on 2 July 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

94. 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.

95. The public consultation and disclosure program with all interested and affected parties 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.

96. 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

97. 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.

98. **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.

99. 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.

100. 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.

101. **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.

102. 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.

103. 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.

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.

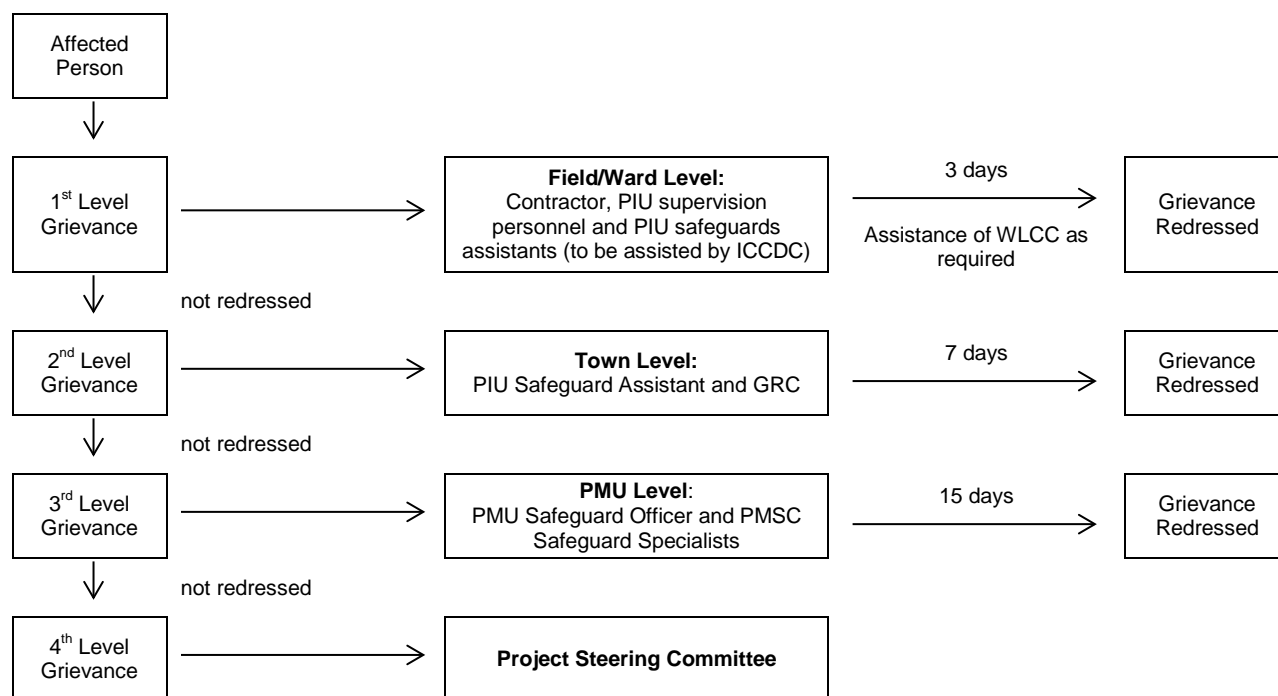
¹⁶ The project steering committee (PSC) responsible for grievance redress will have the following as members: Secretary, Local Government Department, as chair; Chief Engineer, LGED; Chief Engineer, DPHE; Project Director, member secretary; General Economic Division, Planning Commission; Physical Planning, 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.

104. **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.

105. **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.

106. **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

107. 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.

108. 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.

109. 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

110. **Executing Agency.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. LGED will be the lead executing agency (EA) for the project, and DPHE will be the co-executing agency (for water supply and sanitation components). A PMU will be established in LGED.

111. **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.

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

113. **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.

114. 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

115. **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.

116. 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.

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

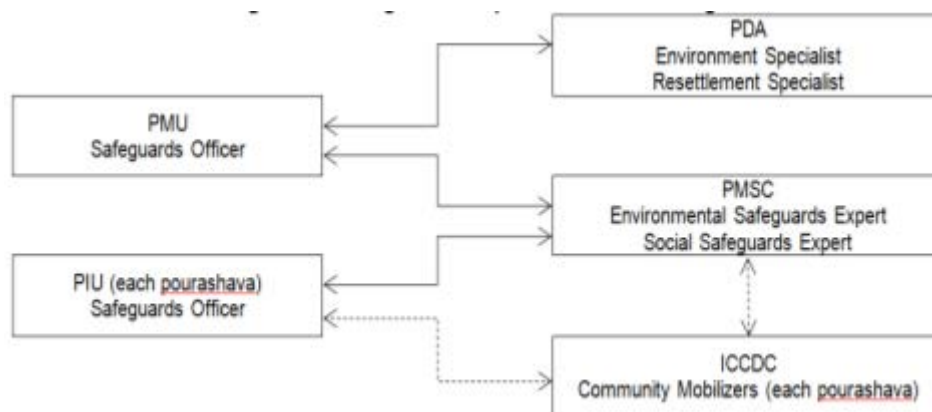
Figure 6: Safeguards Implementation Arrangement

Table 11: 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						
Fisheries/river ecology	Impacts on <i>hilsa</i> (key species in the <i>khals</i>), as well as the smaller fish, including <i>jatka</i> (<i>hilsa</i> fry)	<ul style="list-style-type: none"> - Include intake screens in the design - Consult a fisheries expert as part of the detailed design 	Project management unit (PMU), project implementing unit (PIU), project design advance (PDA) detailed design consultants, and project management and supervision consultants (PMSC)	Incorporated in final design of water intake	<ul style="list-style-type: none"> - Prior to finalization of water intake design - Prior to commissioning of the SWTP 	<p>No cost required.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
Desilted materials	Dispersion of desilted material to nearby farmlands and adjoining areas	<ul style="list-style-type: none"> - Determine during detailed design if desilted materials will be disposed or reused for strengthening of banks, formation of embankments, or application in farmlands. - Appendix 4 provides step-by-step process for disposal or reuse of desilted materials. - If desilted materials will be reused in farmlands, consult and collaborate with farm owners 	PMU, PIU, PDA detailed design consultants, and PMSC	<ul style="list-style-type: none"> - Incorporated in final design and communicated to contractors. - Preparation of desilted materials management plan (Appendix 4) 	<ul style="list-style-type: none"> - Prior to finalization of bid documents; conditions - Prior to award of contract - Prior to desilting activities - Review of desilted materials management plan - twice (once after first draft and once before final approval) 	<p>No cost required.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
Consents, permits, clearances, no objection certificate (NOC), etc.	Failure to obtain necessary consents, permits, NOCs, etc can result to design revisions and/or	<ul style="list-style-type: none"> - Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. - Acknowledge in writing and provide report on compliance all obtained consents, permits, 	PMU, PIU, PDA detailed design consultants, and PMSC	Incorporated in final design and communicated to contractors.	Prior to award of contract	<p>No cost required.</p> <p>Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start</p>

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	stoppage of works	clearance, NOCs, etc. - Include in detailed design drawings and documents all conditions and provisions if necessary				of civil works responsibility of PMU and PIU. 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 - Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. - Require contractors to prepare spoils management plan (Appendix 3) and traffic management plan (Appendix 4)	PMU, PIU, PDA and PMSC	- List of affected utilities and operators; - 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 - Review of spoils management plan: Twice (once after first draft and once before final approval)	No cost required. Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	- Determine locations prior to award of construction contracts.	PMU, PIU, PDA and PMSC	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for	During detailed design phase	No cost required. Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
				reuse of excess spoils to agricultural land		
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	- Prepare list of approved quarry sites and sources of materials	PMU, PIU, PDA and PMSC	(i) List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	During detailed design phase, as necessary with discussion with detailed design engineers and PIUs	No cost required. Mitigation measures are included as part of TOR of PMU, PIU, 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) (ii) Posting of proof of completion at worksites (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. Other costs responsibility of contractor.
2. During Construction Activities						
A. Physical Characteristics						
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may cause localized changes in	- Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply to environmental requirements, as applicable. No	Construction Contractor	- Records of sources of materials	Monthly by PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	topography and landforms. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	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.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of desilted materials, excess spoils and materials in construction activities. If spoils will be disposed, consult with Mathbaria local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to minimize the wastage of water in the construction activities. - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. 	Construction Contractor	<ul style="list-style-type: none"> - Areas for stockpiles, storage of fuels and lubricants and waste materials; - Number of silt traps installed along trenches leading to water bodies; - Records of surface water quality inspection; - Effectiveness of water management measures; - No visible degradation to nearby drainages, <i>khals</i> or water bodies due to construction activities 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<ul style="list-style-type: none"> - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality. 	Construction Contractor	<ul style="list-style-type: none"> - Location of stockpiles; - Number of complaints from sensitive receptors; - Heavy equipment and machinery with air pollution control devices; - Certification that vehicles are compliant with air quality standards. 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	reversible by mitigation measures.					
Acoustic environment	Construction activities will be on settlements, along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Mathbaria local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during night time. - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted 	Construction Contractor	<ul style="list-style-type: none"> - Number of complaints from sensitive receptors; - Use of silencers in noise-producing equipment and sound barriers; - Equivalent day and night time noise levels 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.				
Aesthetics	Based on preliminary design construction activities do not anticipate any cutting of trees (to be reassessed during detailed design stage) but will produce desilted materials, 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	<ul style="list-style-type: none"> - Prepare a debris and desilted materials disposal plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with Mathbaria local authority for beneficial uses of desilted materials and excess excavated soils or immediately dispose to designated areas. Avoid stockpiling of any desilted materials and/or excess spoils. - All vehicles delivering fine materials to the site and carrying desilted materials/debris for disposal shall be covered to avoid spillage. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. - The site must be kept clean to minimize the visual impact of the site. Manage solid waste according 	Construction Contractor	<ul style="list-style-type: none"> - Number of complaints from sensitive receptors; - Worksite clear of hazardous wastes such as oil/fuel - Worksite clear of any wastes, collected materials from drainages, unutilized materials and debris - Transport route and worksite cleared of any dust/mud 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	measures.	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 Mathbaria 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.	<ul style="list-style-type: none"> - Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood. - Implement compensatory plantation for trees lost at a rate of 10 trees for every tree cut. Maintain the saplings for the duration of contract. 	Construction Contractor	<ul style="list-style-type: none"> - PMU and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be determined during detailed design stage) - Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc. 	<ul style="list-style-type: none"> - Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - Frequency and sampling at intake during construction works to be finalized during detailed design stage and final location of intake 	Cost for implementation of mitigation measures responsibility of contractor.
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Hauling of construction materials and	<ul style="list-style-type: none"> - Prepare and implement a traffic management plan (Appendix 4) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate 	Construction Contractor	- Traffic route during construction works including number of	- Inspection by PIU and supervision consultants on monthly basis, or	Cost for implementation of mitigation measures responsibility of

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	<p>vicinity of delivery sites.</p> <ul style="list-style-type: none"> - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions. 		<p>permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 4);</p> <ul style="list-style-type: none"> - Number of complaints from sensitive receptors; - Number of signages placed at project location - Number of walkways, signages, and metal sheets placed at project location 	<p>more frequently as the need arises.</p> <ul style="list-style-type: none"> - Frequency and sampling sites to be finalized during detailed design stage and final location of project components (SWTP, intake, OHT, and pipe alignments) 	contractor.
Socio-economic status	Manpower will be required during	- Employ at least 50% of labor force from communities in the vicinity of	Construction Contractor	- Employment records;	- Inspection by PIU and	Cost for implementation of

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market.		- Records of sources of materials - Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards	supervision consultants on monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components (SWTP, intake, OHT, and pipe alignments)	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 Mathbaria 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; - Integrate construction of the various infrastructure subprojects to be conducted in Mathbaria (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. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity	Construction Contractor	- Utilities Contingency Plan - Number of complaints from sensitive receptors	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be finalized during detailed design stage and final location of project components (SWTP, intake, OHT, and pipe alignments)	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. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Mathbaria local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators	Construction Contractor	- Number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 4); - Number of complaints from sensitive receptors; - Number of walkways, signages, and metal sheets placed at project location - Agreement between	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be finalized during detailed design stage and final location of project components (SWTP, intake, OHT, and pipe alignments)	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
		<p>to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.¹⁸</p> <ul style="list-style-type: none"> - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book 		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
		<p>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.</p> <p>- 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.</p>				
Workers health and safety	<p>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</p>	<p>- Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S.</p> <p>- 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.</p> <p>- Produce and implement a site 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)</p>	Construction Contractor	<p>- Site-specific H&S Plan</p> <p>- Equipped first-aid stations</p> <p>- Medical insurance coverage for workers</p> <p>- Number of accidents</p> <p>- Records of supply of uncontaminated water</p> <p>- Condition of eating areas of workers</p> <p>- Record of H&S orientation trainings</p> <p>- Use of personal</p>	<p>- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises.</p> <p>- Frequency and sampling sites to be finalized during detailed design stage and final location of project components (SWTP, intake, OHT, and pipe alignments)</p>	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.	<p>providing (H&S) training¹⁹ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.</p> <ul style="list-style-type: none"> - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas 		<p>protective equipment</p> <ul style="list-style-type: none"> - % of moving equipment outfitted with audible back-up alarms - Permanent sign boards for hazardous areas - Signages for storage and disposal areas - Condition of sanitation facilities for workers 		

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
		unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to 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	- Stop work immediately to allow further investigation if any finds are suspected.	Construction Contractor	- Records of chance finds	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises. - Frequency and sampling sites to be finalized during detailed design stage and	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
	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.				final location of project components (SWTP, intake, OHT, and pipe alignments)	
E. Others						
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports including pictures	Construction contractor	- Availability and competency of appointed supervisor - Monthly report	- Monthly monitoring report to be submitted by PIU to PMU - PMU to submit semi-annual monitoring report to ADB	Cost for implementation of mitigation measures responsibility of contractor.
3. Post-construction Activities						
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (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. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials	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 is satisfactory.	- 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
		removed, and the area shall be topsoiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services. (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.				

Table 12: Environmental Management and Monitoring Plan – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
Water quality intake	Pollution of source due to upstream developments, especially discharge of effluents (either untreated or partially treated)	<ul style="list-style-type: none"> - Enforcement of discharge standards and treatment of wastes - Seasonal water quality monitoring upstream of the intake - Semi-annual field visit by the PMU environmental officer, along with the PIU, consultant team environmental management specialist, and representative of the district office of the DoE, to various locations within 5 km upstream of the intake - Identification and reporting to the PMU on any potential issues with respect to change in land uses, pollution sources, etc. - Issues pertaining to source protection shall be taken up in the steering committee meetings and provide a forum for addressing inter-agency issues towards protection of the water quality at the intake 	Mathbaria pourashava in coordination with DoE	<ul style="list-style-type: none"> - No visible degradation of water intake - Change in land uses, pollution sources upstream of intake - Protection measures at intake - Water safety plan 	<ul style="list-style-type: none"> - Daily inspection by SWTP operator at intake point - Monitoring of on-site parameter (pH, turbidity, etc) to be determined during detailed design - Environmental monitoring of intake water quality to be determined 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
		- Preparation of a water safety plan as an adjunct to the EMP (pertain to intake protection and monitoring measures)				
Water quality (receiving body of water)	Wastewater from SWTP include filter backwash and reject streams which may contain suspended solids and organics from the raw water, high levels of dissolved solids, high or low pH, heavy metals, etc. Sludge from the SWTP need to be collected and disposed.	<ul style="list-style-type: none"> - Land application of sludge and wastes with high dissolved solids concentrations is generally preferred over discharge to surface water subject to an evaluation of potential impact on soil, groundwater, and surface water resulting from such application. - Recycle filter backwash into the process if possible. - Treat and dispose of reject streams, consistent with Government of Bangladesh requirements. - Conduct regular sludge and water quality monitoring. 	Mathbaria pourashava	<ul style="list-style-type: none"> - No complaints from sensitive receptors - Records of sludge generation and disposal - Environmental quality monitoring of sludge and discharges 	<ul style="list-style-type: none"> - Daily inspection by SWTP operator at outfall/discharge point - Quarterly (environmental monitoring of water quality of receiving body of water to be finalized in accordance to the LCC and ECC by DoE) 	Included in O&M cost
Air quality	Air emissions from SWTP operations may include gaseous or volatile chemicals used for disinfection processes (e.g., chlorine and ammonia).	<ul style="list-style-type: none"> - Store sodium hypochlorite in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials. - Store calcium hypochlorite away from any organic materials and protect from moisture; fully empty or re-seal shipping containers to exclude moisture. Calcium hypochlorite can be stored for up to one year. - Isolate ammonia storage and feed areas from chlorine and hypochlorite storage and feed areas. - Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent 	Mathbaria pourashava	<ul style="list-style-type: none"> - No complaints from sensitive receptors - Inventory of chemicals - Air emission monitoring - Record of chemical-related accidents 	<ul style="list-style-type: none"> - Daily inspection by SWTP operator at storage areas of chemicals - Quarterly (environmental monitoring of air quality to be finalize in accordance to the LCC and ECC by DoE) 	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>disruptions in supply.</p> <ul style="list-style-type: none"> - Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures. - Develop and implement a plan for responding to accidental releases. 				
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Plan activities in consultation with Mathbaria 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. 	Mathbaria pourashava	- No complaints from sensitive receptors	Duration of repair work	Included in O&M cost
Biodiversity	Activities in the built-up area of Mathbaria pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	<ul style="list-style-type: none"> - No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal). 	Mathbaria 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.	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Produce and implement a O&M 	Mathbaria pourashava	<ul style="list-style-type: none"> - No complaints from sensitive receptors - No complaints from workers related to O&M activities 	<ul style="list-style-type: none"> - Duration of repair work - Daily inspection of workers at SWTP 	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.	<p>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) training²⁰ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.</p> <ul style="list-style-type: none"> - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general 		- Zero accident	- Semi-annual check-up workers involved in desilting activities and sludge management (frequency to be finalized during detailed design stage)	

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. - 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

117. 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.

118. 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 13: Environmental Monitoring Program

	Field	Stage	Parameters	Location	Frequency	Standards	Responsibility
1.	Air quality	- Prior to construction to establish baseline - Construction phase	SPM PM2.5 PM10 SO2 NOx CO	-Intake/ SWTP location - OHT location - Along water transmission main 1-km interval from intake/SWTP - construction campsite locations	24-hour monitoring once in a season (except monsoons) for the construction period	Bangladesh Standards for Ambient Air Quality Schedule-2; Rule 12, Environment Conservation Rules of 1997	Contractor
2.	Noise and vibration levels	- Prior to construction to establish baseline - Construction phase	Equivalent day and night time noise levels	- Intake/ SWTP location - OHT location - Along water transmission main 1-km interval from intake/SWTP - 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.	Fish diversity	- Prior to construction to establish baseline - Construction phase	Yield and impacts on fish species	- Intake location - Along <i>khals</i> cut across by the transmission mains (to be identified by PDA and PMSC)	Once in a year during construction	Interviews and consultations, including with fisheries department	PMU, with support from PMSC
4.	Water quality	- Prior to construction to establish baseline	TDS, TSS, pH, hardness, BOD, fecal coliform, total	- Intake location - Along <i>khals</i> adjacent to	Twice a year (pre-monsoon and post-	Bangladesh Standards for Industrial and Project	Contractor

	Field	Stage	Parameters	Location	Frequency	Standards	Responsibility
		- Construction phase	nitrogen, total phosphorus, heavy metals, temperature, DO, hydrocarbons, mineral oils, phenols, cyanide, temperature	construction sites (to be identified by the PDA and PMSC)	monsoon) for the entire period of construction	Effluent, Schedule 10; Rule 13, Environment Conservation Rules, 1997	
5.	Water quality (source related)	- Prior to construction to establish baseline - Construction phase - O&M phase	TDS, TSS, pH, hardness, BOD, fecal coliform, total nitrogen, total phosphorus, heavy metals, temperature, DO, hydrocarbons, mineral oils, phenols, cyanide, temperature	Upstream of intake (to be identified by the PDA and PMSC in consultation with DoE)	Monitoring of water quality (once in 3 months) for the construction period, to be followed up during the operation stage by DWASA	Bangladesh Standards for Industrial and Project Effluent, Schedule 10; Rule 13, Environment Conservation Rules, 1997	PMU and PIU/Mathbaria pourashava with support from DoE
6.	Surface water quality	O&M phase	23 parameters defined in the National Standards for Drinking Water Quality	SWTP	Daily, during the operation of the facilities	National Standard for Drinking Water	Mathbaria pourashava
7.	Leachate monitoring	O&M phase	Leachate quality, TDS, TSS, pH, hardness, BOD, fecal coliform	At the location of the sludge-drying bed at the SWTP	Twice a year, before, during and after the monsoons	-	Mathbaria pourashava
8.	Survival rate of landscaping, tree plantation	O&M phase	Survival rate	In the areas where replantation/ landscaping proposed	Twice a year for 2 years	-	Mathbaria pourashava
9.	Socioeconomic monitoring	O&M phase	Income levels, livelihood options	DPs impacted due to the project components	Once a year for 5 years from the completion of the project	Primary surveys and consultations	Mathbaria pourashava

C. Institutional Capacity Development Program

119. 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 14.

Table 14: Training Program for Environmental Management

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation workshop	Module 1 – Orientation - ADB Safeguards Policy Statement - Government of Bangladesh Environmental Laws and Regulations Module 2 – Environmental Assessment Process - ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements - Review of environmental assessment report to comply with ADB requirements - Incorporation of EMP into the project design and contracts	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 - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day	PMU PIUs Contractors
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed	1 day on a regular period to be determined by PMU, PIUs, and PMSC	PMU PIUs Contractors

D. Staffing Requirement and Budget

120. 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 Clearance; and
- (iii) Implementation of EMP, environmental monitoring program and long-term surveys.

121. 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.

122. 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.

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

124. The indicative costs of EMP implementation are shown in Table 15.

Table 15: 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 - Construction	Per location	20	30,000	60,000	Civil works contract
2.	Noise levels monitoring	- Pre-construction - Construction	Per location	20	10,000	200,000	Civil works contract
3.	Fish diversity monitoring	- Pre-construction - Construction	Per sample	2	250,000	500,000	Civil works contract
4.	Water quality – discharge to surface waters	- Pre-construction - Construction	Per sample	10	25,000	250,000	Civil works contract
5.	Water quality – source protection related	- Pre-construction - Construction	Per sample	10	25,000	250,000	Civil works contract
6.	Site visits to upstream locations of source	- Construction	Per trip	6	50,000	300,000	PMU and PMSC cost
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 environmental assessment process; (ii) induction course contractors, preparing them on EMP implementation and environmental monitoring	Module 1 – immediately upon engagement of the PMSC environmental safeguards specialist Module 2 – prior to award of civil works contracts (twice a year for 4 years) Module 3 – prior to start of Phase 2 and upon	lump sum		Module 1 – 30,000 Module 2 – 30,000 Module 3 – 30,000	90,000	Covered under PMSC

	Particulars	Stages	Unit	Total Number	Rate (taka)	Cost (Taka)	Cost covered by
	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	completion of the project					
D.	Consultants Costs						
	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						
	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 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 and ICCDC contracts
2.	GRM implementation	Costs involved in resolving complaints (meetings, consultations, communication, and reporting/inform		Lump sum		As per PMU budget	PMU cost

	Particulars	Stages	Unit	Total Number	Rate (taka)	Cost (Taka)	Cost covered by
		ation dissemination)					
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

125. 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.

126. 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.

127. 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).

128. 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

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

130. 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.

131. 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.

132. 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.

133. 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.

134. 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.

135. 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.

136. The citizens of Mathbaria 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.

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

138. 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.

139. 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 Is the project area...			
• Densely populated?	✓		Mathbaria pourashava covers an area of 6.55 km ² with population density of 2,805 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 Will the project cause...			
• Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		✓	The main water supply source is Bishkhali River through Mathbaria – Kholpatua and Surjomoni <i>khals</i> (canals). The water quality monitoring program carried out as part of the PPTA confirmed that the key water quality parameters at the intake location are within permissible limits for inland surface waters designated for use for water supply after conventional treatment. The current low levels of pollution can be attributed to the absence of any major pollution sources upstream of Mathbaria–Kholpatua and Surjomoni <i>khals</i> , coupled with dilution factors in the river system. Consultations with Department of Industries and Bangladesh Water Development Board, do not indicate future large-scale industrial development upstream of the intake.
• Impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	
• Hazard of land subsidence caused by excessive ground water pumping?		✓	Not applicable.
• Social conflicts arising from displacement of communities?		✓	The proposed surface water treatment plant (SWTP) will require acquisition of 10 acre private agricultural land. There are no residential/commercial structures within the identified land. A resettlement plan in line with SPS has been prepared based on census and socioeconomic surveys of the affected persons to address impacts due to land acquisition and resettlement
• Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		✓	Not anticipated. The main source will be Mathbaria – Kholpatua <i>khal</i> connecting the Bishkhali and Baleswar rivers. Both rivers fully influenced by tide and ebb; Mathbaria–Kholpatua <i>khal</i> also has perennial tidal flow of sufficient quantity to satisfy the daily raw water demand of SWTP. Thus water

Screening Questions	Yes	No	Remarks
			quantity is sufficient and additional abstraction from the river will not have significant impact to downstream users. Groundwater will not be used as source.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Delivery of unsafe water to distribution system? 		✓	The subproject will provide treated water through new distribution network to prevent leakages and contamination.
<ul style="list-style-type: none"> Inadequate protection of intake works or wells, leading to pollution of water supply? 		✓	The intake will be secured and accessible only to authorized persons. Upstream of intake will be monitored for potential sources of pollution.
<ul style="list-style-type: none"> Over pumping of ground water, leading to salinization and ground subsidence? 		✓	Not applicable.
<ul style="list-style-type: none"> Excessive algal growth in storage reservoir? 		✓	Not anticipated. The storage reservoirs (overhead and ground level) will be fully enclosed. Treated water will only be stored in a short period of time.
<ul style="list-style-type: none"> Increase in production of sewage beyond capabilities of community facilities? 		✓	Mathbaria will undertake sanitation improvement subproject.
<ul style="list-style-type: none"> Inadequate disposal of sludge from water treatment plants? 		✓	Dried sludge will be collected regularly and disposed or applied to lands/farms subject to approval of Department of Environment (DoE).
<ul style="list-style-type: none"> Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities? 		✓	Designs of the subproject components include provision of buffer zones.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals. 		✓	Chlorine dosing will be done through chlorinators. Separate storage areas for the chemicals have been included in the engineering design of the SWTP.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Dislocation or involuntary resettlement of people? 		✓	No displacement of communities is required in this subproject. A resettlement plan in line with SPS has been prepared based on census and socioeconomic surveys of the affected persons to address impacts due to land acquisition and resettlement.
<ul style="list-style-type: none"> Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups? 		✓	Not applicable.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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

Screening Questions	Yes	No	Remarks
			contractors will be required to coordinate with local traffic police.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> 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 Mathbaria pourashava through the mini water testing laboratory to be procured under the subproject. .
<ul style="list-style-type: none"> Accidental leakage of chlorine gas? 		✓	Not anticipated. Chlorine gas will not be used. Sodium or calcium hypochlorite will be used in the chlorination process.
<ul style="list-style-type: none"> Excessive abstraction of water affecting downstream water users? 		✓	Not anticipated. Water quantity is sufficient and additional abstraction from the river will not have significant impact.
<ul style="list-style-type: none"> Competing uses of water? 		✓	Not anticipated. Adequate water for downstream uses is available post-project.
<ul style="list-style-type: none"> Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant 	✓		Mathbaria will undertake sanitation improvement subproject. Dried sludge will be collected regularly and disposed or applied to lands/farms subject to approval of Department of Environment (DoE).
<ul style="list-style-type: none"> Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		✓	Improved water supply management systems through capacity building and institutional development will ensure reduced burden on services and infrastructure.
<ul style="list-style-type: none"> Social conflicts if workers from other regions or countries are hired? 		✓	Priority in employment will be given to local residents.
<ul style="list-style-type: none"> 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 SWTP site only.
<ul style="list-style-type: none"> 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 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	✓		Low lying areas of Mathbaria are subject to flooding during heavy rainfall in monsoon. Preliminary designs integrate a number of

and climate changes (see Appendix I)?			
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)?	✓		measures, both structural and non-structural, to mainstream climate resilience into the Mathbaria water supply subproject, including: (i) increased salinity in location of abstraction points; (ii) structural protection of facilities from future floods; (iii) location of SWTP where there is no risk of flooding or other hazards; (iv) additional storage for supplying during any disaster/crisis; (v) standalone power backup for the SWTP and pumping stations; and (vi) promote more efficient use of water by reducing losses and wastage to counter increased demands due to higher temperatures.
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 10,00,00,000	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.

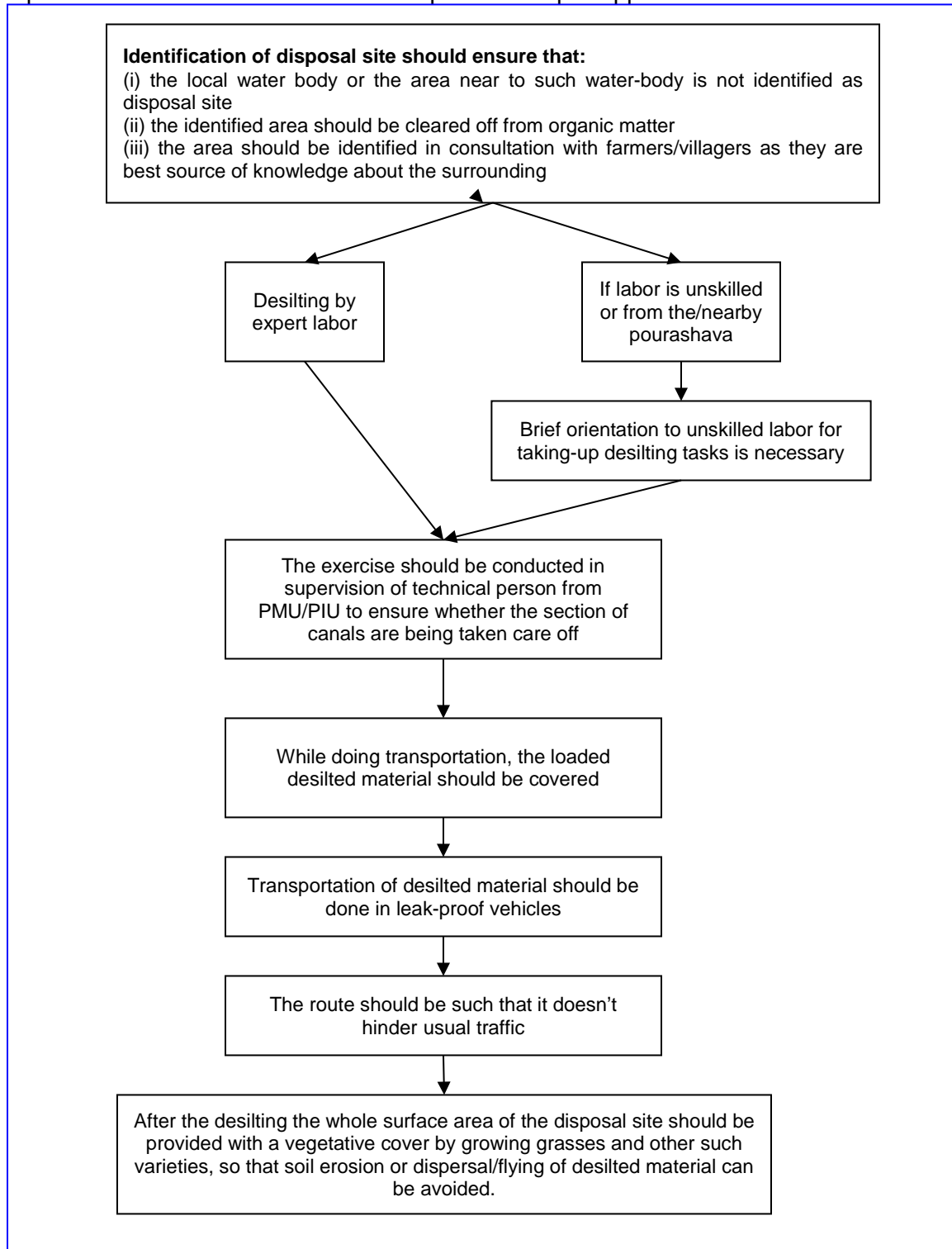
crifek ArBb msKjb

224

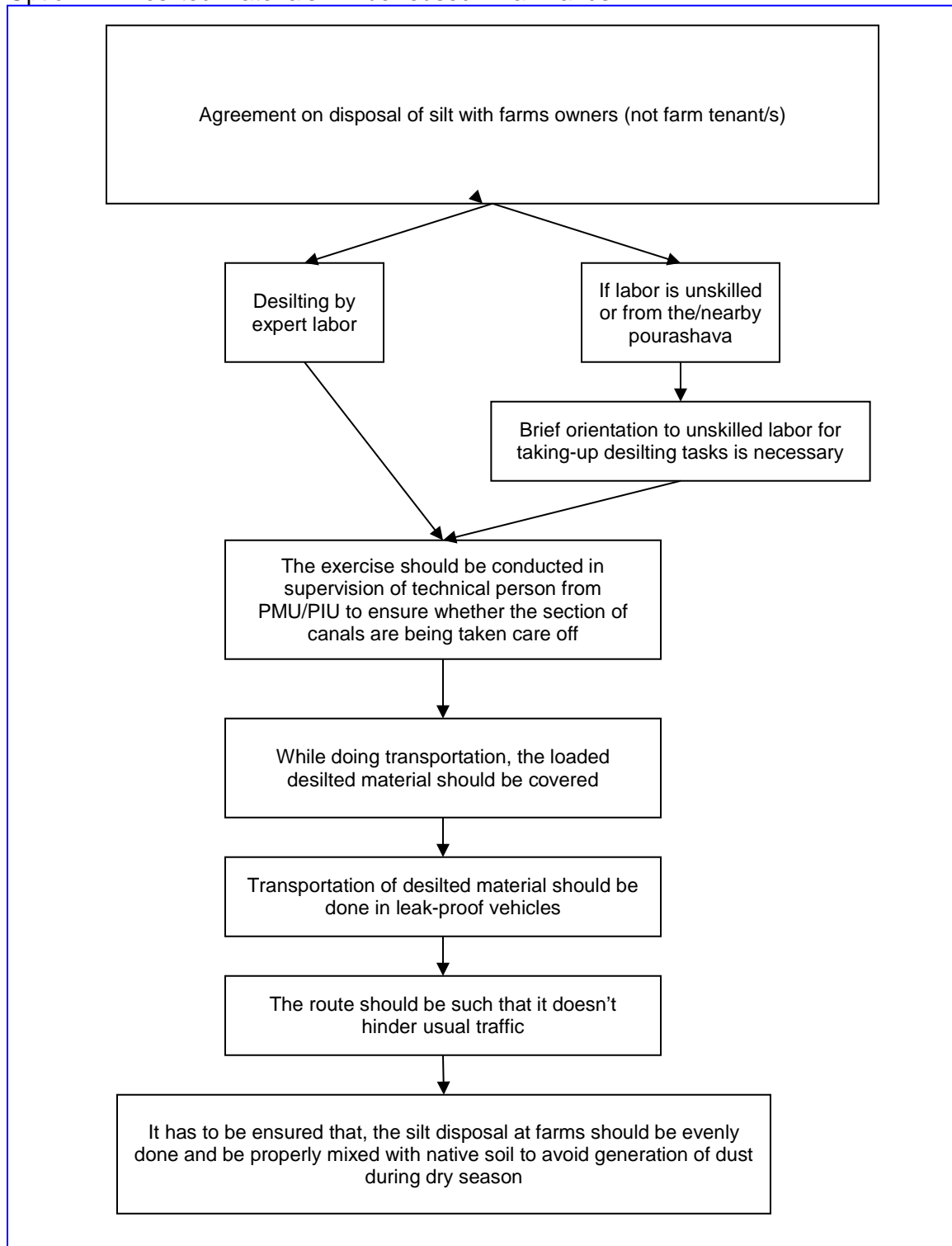
(1)	(2)	(3)
(e) Between Tk. 10,00,000 and 2,00,00,000	Tk. 25,000	One-fourth of the fees in Column (2).
(f) Between Tk. 2,00,00,000 and 5,00,00,000	Tk. 50,000	-Do-
(g) Above Tk. 5,00,00,000	Tk. 1,00,000	-Do-

Appendix 3: Outline Flow Charts for Desilted Materials Disposal and Reuse

Option 1 – Desilted materials will be disposed of at pre-approved site



Option 2 – Desilted materials will be reused in farmlands



Appendix 4: 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 5: 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.

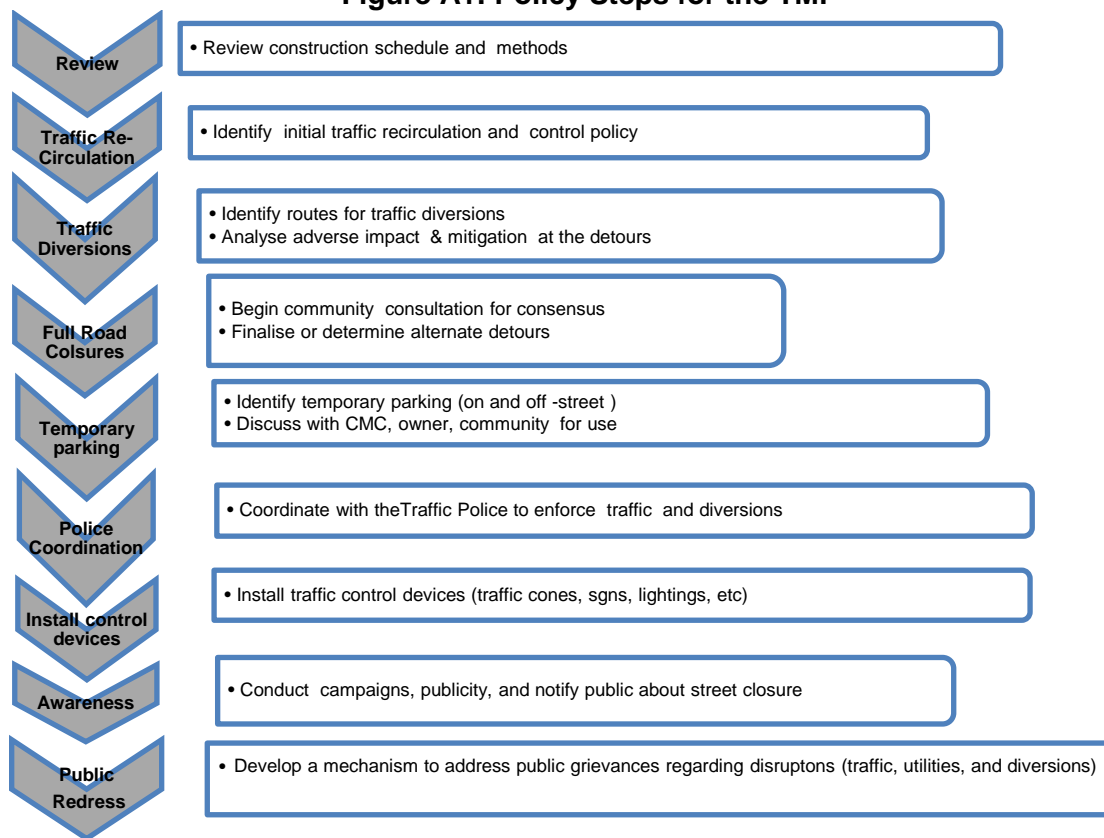
C. Analyze the impact due to street closure

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

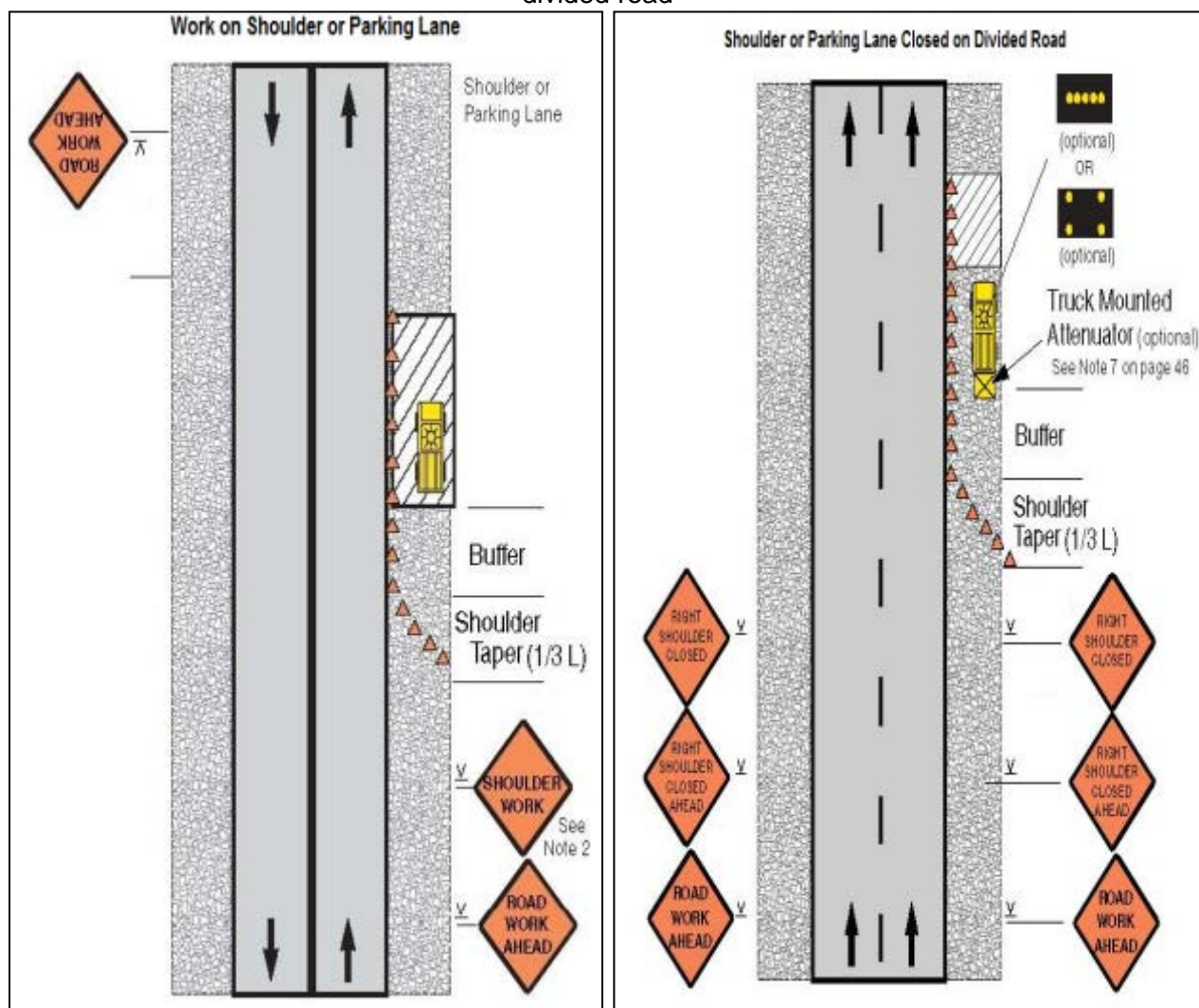


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

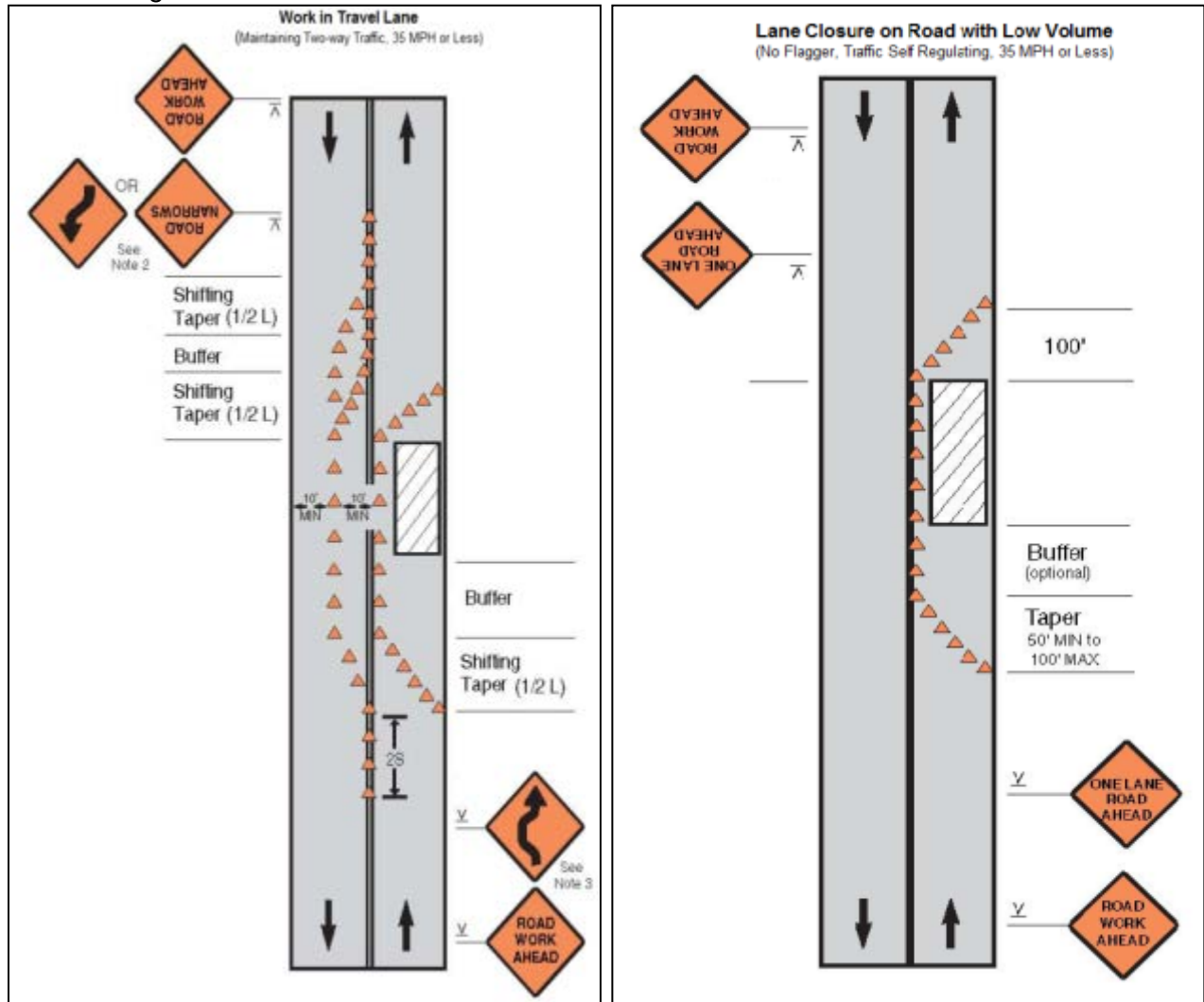


Figure A6 & A7: Lane closure on a two-lane road with low volume (with yield sign) & Lane closure on a two-lane road with low volume (one flagger operation)

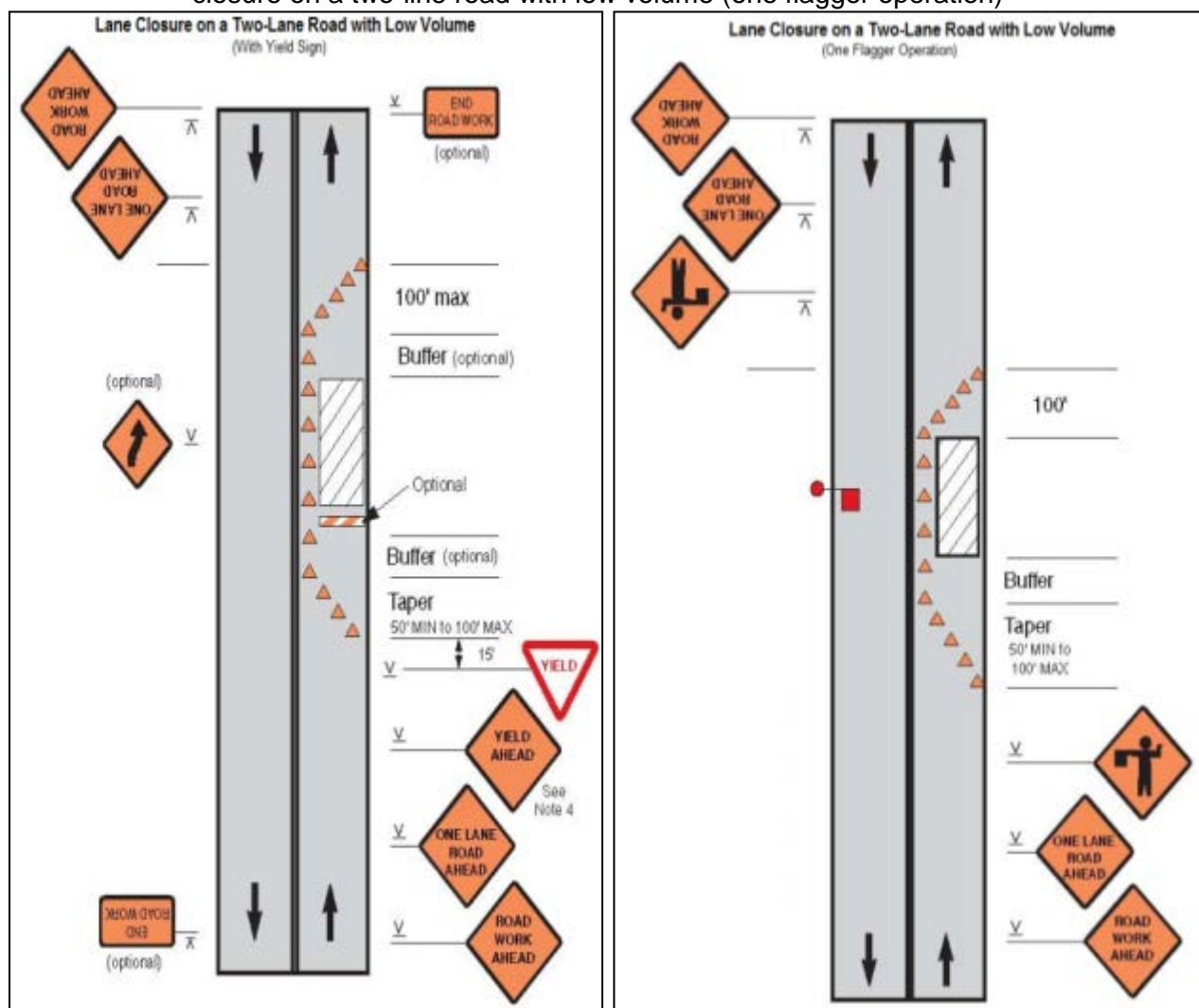


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

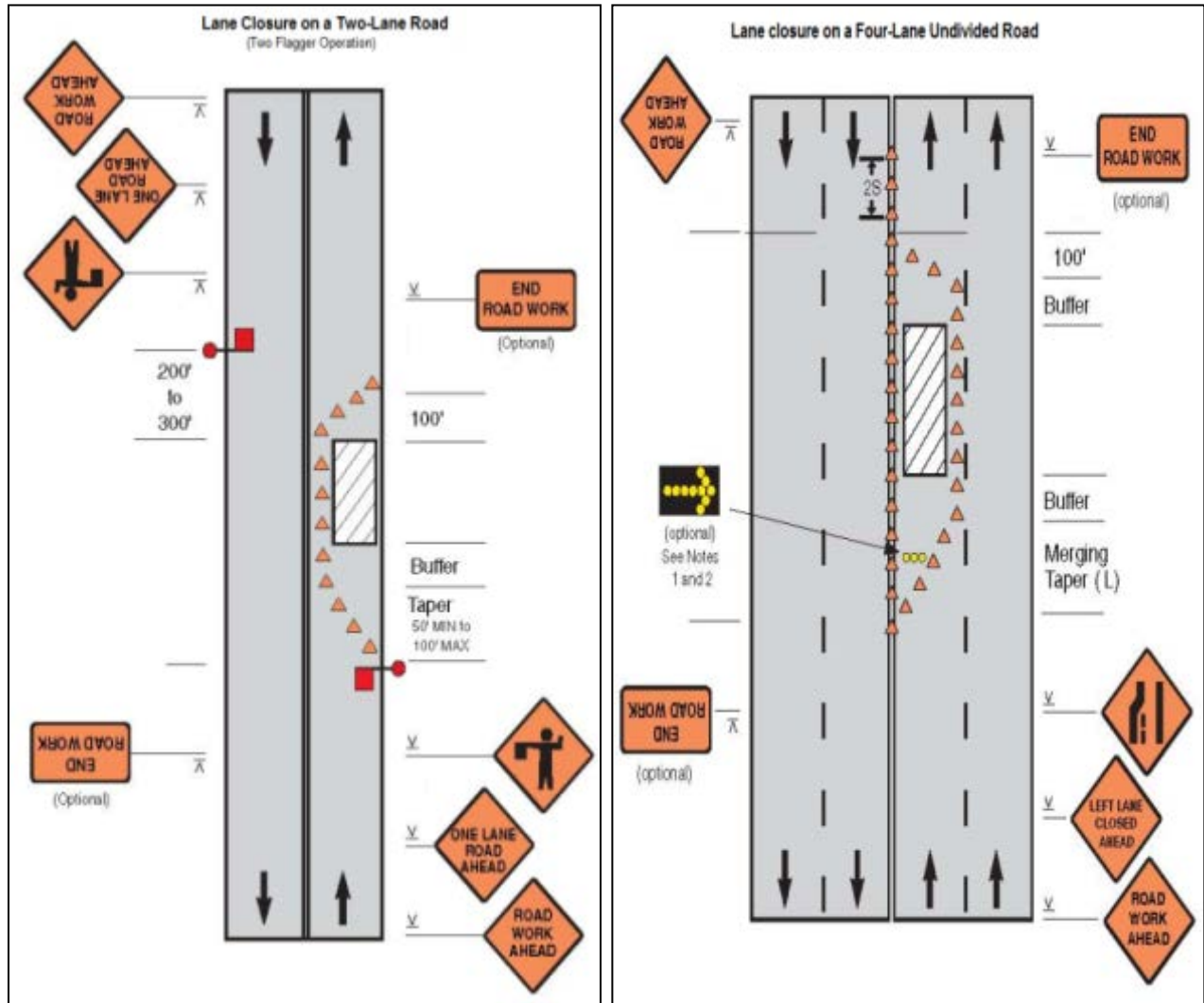


Figure A10 & A11: Lane Closure in Divided Roadway & Half Road Closure On Multi-Lane Roadway

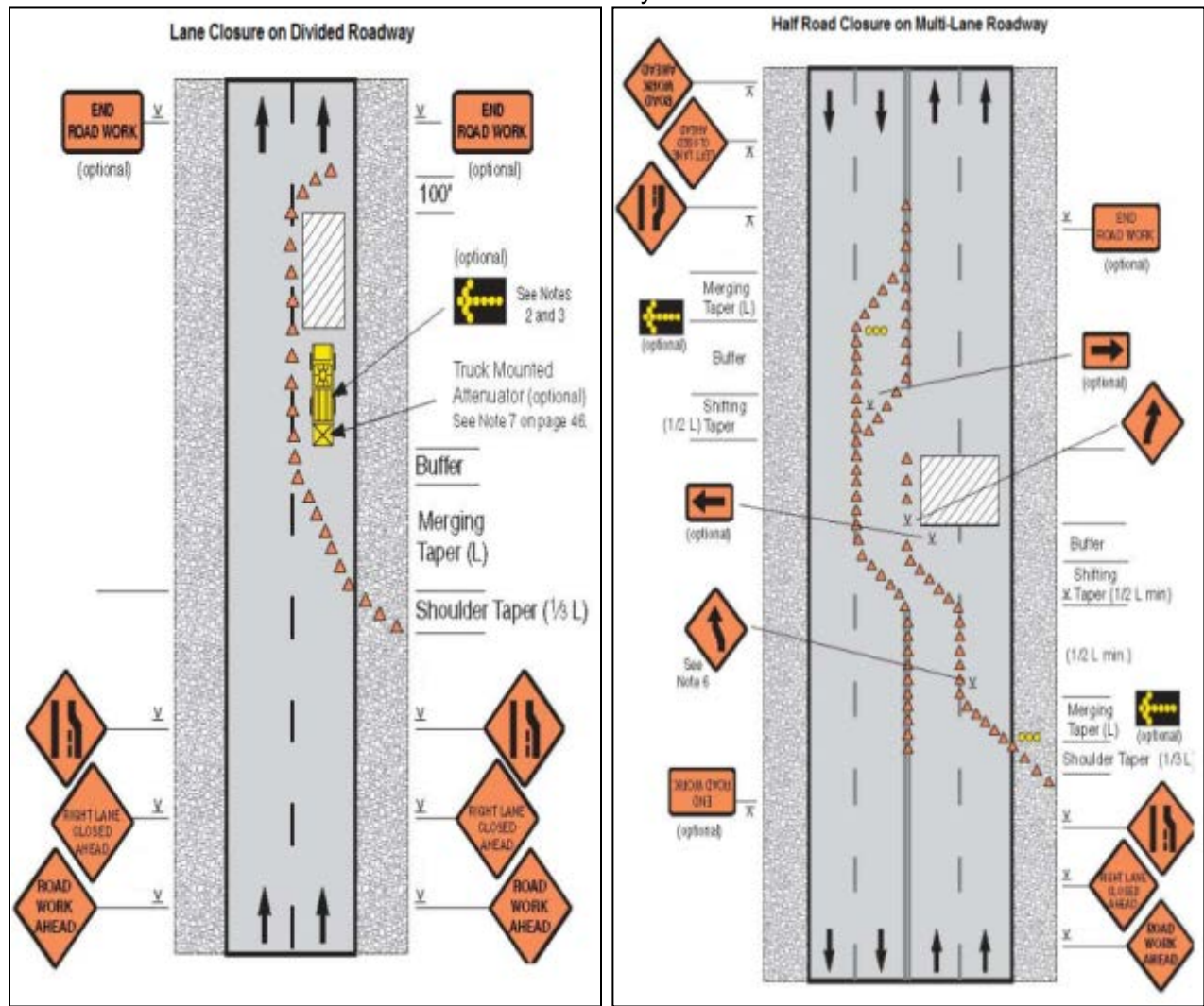
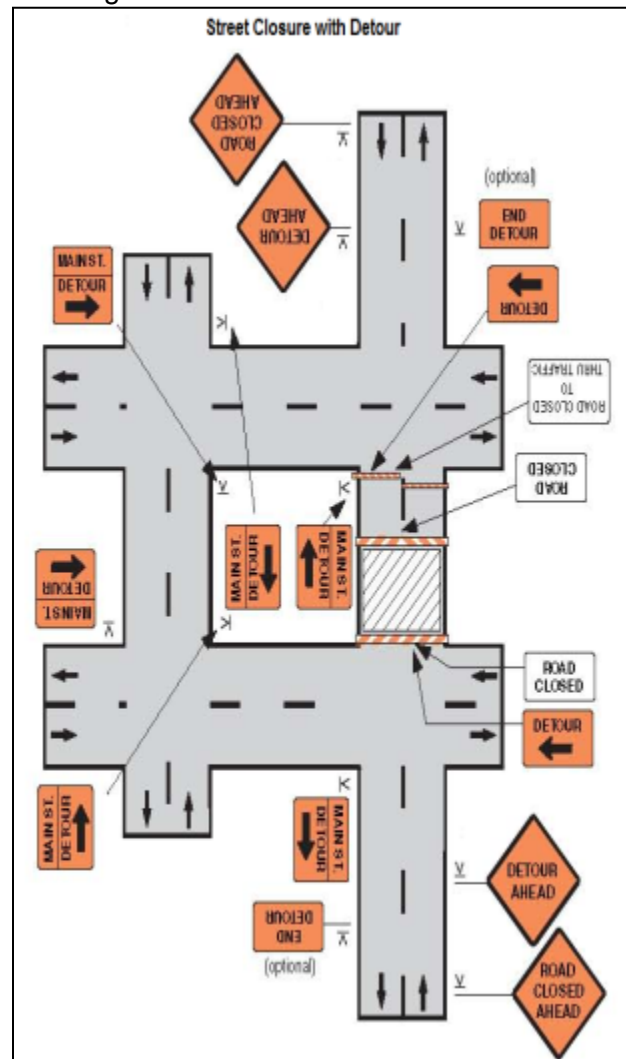


Figure A12: Street closure with detour



Appendix 6: Records of Public Consultations and FGDs

Minutes of Discussion Meeting held in DOE Office regarding EARF of CTEIP at 10:30AM on 09-09-2013

Venue: Chamblee 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), CTEIP, Cell:+88-0171-1665408; +88-0173-1062331, email: yasin_afroza@yahoo.com

Agenda of Discussion:

Following item are discussed:

1. Classification of CTEIP subprojects components as per 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 Environmental Infrastructure Project (CTEIP) 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.
- CTEIP, 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 ecological sensitive areas or within reserved locations.
- Finally, the DG assures providing every cooperation relating to environmental clearance.

FGD Summaries-Water Supply Mathbaria Pourashava

SL No	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	Water-Overhead Tank	02-07-13	Near Tikikata Union Parishad office, Ward No-9- Mathbaria Pourashava	M=14 F=0 T=14	<ul style="list-style-type: none"> o WAPDA Land (Govt. land) o Baranda of a wood house (12x20 ft) o 	<ul style="list-style-type: none"> o maintain by Pourashava 	<ul style="list-style-type: none"> o They have no objection to build it in the proposed land. 	<ul style="list-style-type: none"> o Assist and cooperate the construction work.
2	Water Treatment Plant	02-07-13	Surjamoni Tikikata Union, Ward No-3- outside of Mathbaria Pourashava boundary	M=9 F=6 T=15	<ul style="list-style-type: none"> o Nos. of Trees 350 o Land 10 acre, agriculture land, single cropped paddy land o Problem of down-stream user if water abstracted for Pourashava 	<ul style="list-style-type: none"> o maintain by Pourashava o Down-stream people have no objection if water abstracted for water supply of Pourashava 	<ul style="list-style-type: none"> o Avoid existing residential area for demarcation of land for acquisition. o Properly compensate for the land o Engaged people during construction and operation that lose the land. 	<ul style="list-style-type: none"> o Assist and cooperate the construction work subject to properly compensate for the land.

SL No	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
							<ul style="list-style-type: none"> Water should be distributed among the local people 	

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

Photograph



FGD- Tikikata Union Parishad



FGD- Surjamoni

PARTICIPANTS LIST

Focus Group Discussion-CTEIP

List of Participants

Town: Mathbaria Pourashava

Component: Water-Overhead Tank- **Near Tikikata Union Parishad Office**

Location: Near Tikikata Union Parishad Office, Ward No: 9

Meeting Place: Pathar Ghata Bus stand, Mathbaria

Date: 02-07-2013

Time: 10.00 am

Sl.No	Name	Occupation
1	Md. Sakendar	Service
2	Abdul Majid Howlader	Service
3	Abu Sultan	Business
4	Md. Mahtabuddin	Business
5	Sttaya Ranjan Misri	Business
6	Abdul Majid	Business

Sl.No	Name	Occupation
7	Md. Saidur Rahman	Business
8	Md. Faruk Hossain	Business
9	Golam Mostafa	Business
10	Md. Monir	Business
11	Md. Zakir Hossain	Business
12	Md. Khalil	Business
13	Md. Shamim Khan	Business
14	Md. Kalam	Business

Focus Group Discussion-CTEIP

List of Participants

Town: Mathbaria Pourashava

Component: Water Treatment Plant

Location: Surjamoni, Tikikata Union, Ward No: 3

Meeting Place: Surjamoni, Tikikata Union

Date: 02-07-2013

Time: 4.30 pm

Sl.No	Name	Occupation
1	Md. Mostafa	Business
2	Md. Shah Alam	Agriculture
3	Haji Ratan Howlader	Agriculture
4	Saliza Sharif	Agriculture
5	Haider Gazi	Agriculture
6	Md. Afzal Hossain	Agriculture
7	Md. Zakir Hossain	Agriculture
8	Md. Kabir Howlader	Agriculture
9	Khadiza Begom	Housewife
10	Khadiza Akhter	Housewife
11	Rehena Begom	Housewife
12	Yousuf Howlader	Agriculture
13	Khadiza	Housewife
14	Nasima	Housewife
15	Md. Salim	Housewife

Appendix 7: Sample Grievance Registration Form

(To be available in Bangla and English)

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

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

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

FOR OFFICIAL USE ONLY

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

Appendix 8: Sample Monthly 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		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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:

- What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
- If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
- 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;
- Are there designated areas for concrete works, and refueling;
- Are there spill kits on site and if there are site procedures for handling emergencies;
- 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

Draft Initial Environmental Examination

October 2013

BAN: Coastal Towns Environmental Infrastructure Project – Pirojpur Drainage

Prepared by the Local Government Engineering Department, 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

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	affected person
CTEIP	–	Coastal Towns Environmental Infrastructure Project
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

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

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

CONTENTS

I.	INTRODUCTION	1
II.	POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK	1
	A. ADB Policy	1
	B. National Laws	2
	C. Government of Bangladesh Environmental Assessment Procedures	3
III.	DESCRIPTION OF THE PROJECT	4
	A. The Study Area	4
	B. Existing Condition and Need for the Project	5
	C. Proposed Components	5
	D. Implementation Schedule	9
IV.	DESCRIPTION OF THE ENVIRONMENT	11
	A. Methodology Used for the Baseline Study	11
	B. Physical Characteristics	11
	C. Biological Characteristics	12
	D. Socioeconomic Characteristics	12
	E. Historical, Cultural and Archaeological Characteristics	13
V.	ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS	13
	A. Methodology	13
	B. Screening Out Areas of No Significant Impact	13
	C. Anticipated Impacts and Mitigation Measures – Planning and Design Phase	15
	D. Anticipated Impacts and Mitigation Measures – Construction Phase	16
	E. Anticipated Impacts and Mitigation Measures – Operations and Maintenance Phase	22
	F. Cumulative Impact Assessment	24
VI.	INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION	27
	A. Public Consultation Conducted	27
	B. Future Consultation and Disclosure	27
VII.	GRIEVANCE REDRESS MECHANISM	28
VIII.	ENVIRONMENTAL MANAGEMENT PLAN	30
	A. Safeguard Implementation Arrangement	31
	B. Institutional Capacity Development Program	59
	C. Staffing Requirement and Budget	59
IX.	MONITORING AND REPORTING	62
X.	CONCLUSION AND RECOMMENDATIONS	63

LIST OF TABLES:

Table 1: Applicable Government of Bangladesh Environmental Legislations	3
Table 2: Likely Government of Bangladesh Classification of Pirojpur Drainage Subproject.....	4
Table 3: Components of Proposed Pirojpur Drainage Subproject	6
Table 4: Population of Pirojpur Pourashava	12
Table 5: Fields in Which the Subproject Is Not Expected to have Significant Impacts	14
Table 6: Possible Actions to Mitigate against Projected Effects of Climate Change on Drainage and Flood Control Infrastructure and Improve Climate Resilience	15
Table 7: Possible Actions to Mitigate against Other Factors that may affect Drainage/Flood Control Infrastructure and Climate Resilience.....	16
Table 8: Anticipated Impacts and Mitigation Measures – Construction Phase	17
Table 9: Anticipated Impacts and Mitigation Measures – O&M Phase.....	23
Table 10: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase	34
Table 11: Environmental Management and Monitoring Plan – O&M Phase	53
Table 12: Training Program for Environmental Management	59
Table 13: Indicative Cost of EMP Implementation	60

LIST OF FIGURES:

Figure 1: Location Map	10
Figure 2: Grievance Redress Process	30
Figure 3: Safeguards Implementation Arrangement	33

LIST OF APPENDICES:

Appendix 1: Rapid Environmental Assessment Checklist	65
Appendix 2: Environmental Standards and Application Fees	68
Appendix 3: Sample Outline Spoils Management Plan	70
Appendix 4: Sample Outline Traffic Management Plan	71
Appendix 5: Records of Public Consultations and FGDs	81
Appendix 6: Sample Grievance Registration Form	86
Appendix 7: Sample Semi-Annual Reporting Format	87

EXECUTIVE SUMMARY

1. The Coastal Towns Environmental Infrastructure 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 change 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. Pirojpur drainage subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical for drainage and flood control. 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 drainage and flood control (Appendix 1) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Pirojpur drainage 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 "Orange-B" 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 rehabilitation and construction of 25.3 kilometers (km) of drainage and flood control structures such as (i) 16.92 km earthen channel; (ii) 1.53 km concrete cement block lined channel; (iii) 3.4 km reinforced concrete cement (RCC) covered drain; and (iv) 3.45 km RCC open drain.

7. **Implementation Arrangements.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department

(LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. The Local Government Engineering Department (LGED) is the lead executing agency (EA), and the Department of Public Health Engineering (DPHE) is the co-executing agency (for water supply and sanitation components).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 teams² 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 Pirojpur 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. 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. There are no forest areas within or near Pirojpur.

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 the Pirojpur drainage and flood control subproject are: (i) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (ii) prioritizing rehabilitation over new construction, using vacant government land and right of way (ROW), and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts; (iii) avoiding where possible locations that will result in destruction/disturbance to historical and cultural places/values; (iv) avoiding tree-cutting where possible; (v) 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. 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.

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), institutional strengthening and awareness building consultants (ISABC), and non-government organization.

11. During the construction phase, impacts mainly arise from (i) disturbance of residents, businesses, and traffic; (ii) need to manage excess construction materials and spoils; (iii) community and workers health and safety. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Measures such as conducting work in lean season and minimizing inconvenience by best construction methods will be employed. Traffic management will be necessary during excavation works on busy roads. 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.

12. 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.

13. **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.

14. **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.

15. **Conclusions and Recommendations.** The citizens of Pirojpur will be the major beneficiaries of this subproject. With the improved drainage and flood control structures, 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. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Pirojpur 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.

16. 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 Environmental Infrastructure 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 change 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. Pirojpur drainage subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical for drainage and flood control. 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 Drainage 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

4. 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.

5. **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.

6. **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.

7. **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

8. 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).

9. 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. Appendix 2 provides salient features and applicability of the legislations and Table 1 presents specific requirements for the project. Appendix 3 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
1.	Environmental Conservation Act of 1995 and amendments in 2000, 2002 and 2010 ¹	<ul style="list-style-type: none"> - Restriction on operation and process, which can be continued or cannot be initiated in the ecologically critical areas - Regulation on vehicles emitting smoke harmful to the environment - Remedial measures for injuries to ecosystems - Standards for quality of air, water, noise and soil for different areas for various purposes and limits for discharging and emitting waste - Environmental guidelines
2.	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	<ul style="list-style-type: none"> - Environmental clearances - Compliance to environmental quality standards
3.	Forest Act of 1927 and amendments (2000)	<ul style="list-style-type: none"> - Clearance for any felling, extraction, and transport of forest produce
4.	Bangladesh Climate Change Strategy and Action Plan of 2009	<ul style="list-style-type: none"> - 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. - enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change
5.	National Water Policy of 1999	<ul style="list-style-type: none"> - EIA for water development projects and increase surface water flow - Pre-screening of IEEs/EIAs for water sector projects by WARPO, in advance of submission to DOE for final clearance. - Augmentation for dry season water flow - Awareness-raising in consumptive use of surface and groundwater for irrigation - Structural and non-structural mitigation (early warning and flood proofing)
6.	National Safe Drinking Water Supply and Sanitation Policy of 1998	<ul style="list-style-type: none"> - 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. - Sanitation systems shall be self- sufficient and self- sustaining. - Pourasavhas shall be responsible for solid waste collection, disposal and their management. DOE shall be consulted on solid waste management. - Where WASAs exists, they shall be responsible for sewerage and storm water drainage systems.
7.	Bangladesh Labor Law of 2006	<ul style="list-style-type: none"> - Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement - Prohibition of employment of children and adolescent

C. Government of Bangladesh Environmental Assessment Procedures

10. 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).

¹ *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.

11. 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 Pirojpur Drainage Subproject

	Subproject	Component	Equivalent in Schedule I of ECR 1997	DoE Classification
1.	Drainage and flood control	Primary network (includes domestic connections or primary drains)	Engineering works (up to 10 hundred thousand Taka capital)	Red
		Secondary network (includes secondary drains)		Per preliminary quantity and cost estimate, Pirojpur drainage and flood control structures 297.69 million Taka
		Tertiary network (includes main drains and drainage outfalls)		

12. 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).

13. 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

14. Pirojpur pourashava consists of 9 wards, 30 *mahallas* and 23 *mouzas*. It is located between 22°23' and 22°42' north and between 89°52' and 90°03' east. It has an area of 29.46 km² within the center of Pirojpur upazila (district) which occupies an area of 166.81 km². The town is about 72 km from the sea; and bordered on the west side by Baleshwar River and to the east and south by Kocha River.

15. The ground elevation in Pirojpur pourashava varies from 0.4 to 4.4 meters (m) above mean sea level. Subproject components are located in Pirojpur 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. 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. There are no forest areas within or near Pirojpur. The location map is shown as Figure 1.

B. Existing Condition and Need for the Project

16. Damudar *khal* (canal), the major drainage backbone of Pirojpur connecting Baleshwar and Kocha rivers, runs almost along the center of the town. All other drainage network including small and big canals joins the Damudar khal, some of which are Chila, Varani, Shasan Ghat, Madhyama Mashimpur, Dhup Pasha, and Ranipur *khals*. Almost 90% of these drains are of the primary category. The secondary and tertiary drains are about 4% and 6%, respectively. The primary canals, specifically Damudar and Varani *khals*, are silted up and encroached thus have lost their original capacities.

17. The urban drainage model (UDM) developed in TA 7890-BAN: Strengthening the Resilience of the Urban Water Supply, Drainage, and Sanitation to Climate Change in Coastal Towns² has been applied to simulate design and climate change scenarios. A summary of the major conclusions of the study shows (i) drainage systems in Pirojpur are as yet unplanned and under developed. Mostly the drainage network consists of set of natural *khals* that were part of the extensive coastal river system around which habitation developed; and (ii) various sections of these natural canals in Pirojpur are overtopped for design storm conditions due to extensive encroachment, restricted outflows, blockage due to dumping of solid waste and progressive siltation over many years mainly due to embankments that interrupt natural tidal flows.

18. Focus group discussion (FGDs) conducted in May 2012 under TA 7890-BAN identified climatic vulnerabilities and impacts of poor drainage and flood control structures on local stakeholders and residents. Due to lack of embankment, people in Pirojpur are vulnerable to flood during heavy rainfall and frequent tidal surges. Ward No. 3 and 9 are fully affected by flooding from the Kocha River and Ward 6 is fully affected by Baleshwar River. In Wards 3 and 9 the depth of water ranges from 0.4 to 0.6 m for about 2 to 3 hours after heavy rains. 80% of Ward 5 and 30% of Ward 4 is affected by flooding from the Baleshwar River. 50% of Ward 7 is vulnerable to Damodar and Varani khals, which has silted up. The stagnant wastewater in the drains and ditches provides an ideal habitat for mosquitoes and create unhygienic conditions due to stagnation. People have lost agricultural production, homesteads, immovable and movable assets due to cyclones, floods, tidal surges and river erosion. There is frequent displacement of households, damage to sanitation infrastructure, increase in poverty level, financial crisis and increase in food prices. These impacts lead to forced migration particularly the male earners of households, increased incidence of water borne diseases and fishing community losses of their fishing equipment.

C. Proposed Components

19. The drainage system needs to be improved to meet the needs of adequate reduction of

² A Strategic Program for Climate Resilience (SPCR) prepared by Bangladesh was approved under the Pilot Programme for Climate Resilience (PPCR) in November 2010. The Coastal Towns Environmental Infrastructure Project (CTEIP) identified by the SPCR and mentioned in the ADB's 2011-2013 country operations business plan for Bangladesh has great relevance. TA 7890-BAN: Strengthening the Resilience of the Urban Water Supply, Drainage, and Sanitation to Climate Change in Coastal Towns taken up within the CTEIP initiative is an ADB Capacity Development Technical Assistance (CDTA) project for strengthening capacity to develop climate-resilient urban water supply, drainage, and sanitation projects in coastal towns. Scope of TA 7890-BAN included assessment of climate change scenarios in selected coastal towns; assessment of impacts on the water, drainage and sanitation sector caused by climate change; identification of structural and other options to strengthen climate resilience; and strengthen the capacity and awareness of key stakeholders regarding climate change. Its results were used to guide the linked project preparatory technical assistance (PPTA) to prepare a feasibility study incorporating preliminary engineering designs that would further help the Project Design Advance (PDA) team to make detailed designs for implementation of urban infrastructure projects.

flooding and inundation; and changes in climatic conditions, such as increasing rain intensities and more extreme weather events, such as thunderstorms, which will most likely aggravate these problems. The priority of the canals and drains was determined through participatory approaches during the workshop held on April 12, 2013 in the presence of Pirojpur mayor, councilors, engineers, PPTA consultants and other officials of relevant government agencies.

20. Preliminary designs have been made considering climate change resilience and adaptation. The proposed interventions include items like raising up of canal banks and re-excavation to protect flooding and to improve capacities of drains. Investments under this subproject include rehabilitation and construction of 25.3 kilometers (km) of drainage and flood control structures such as (i) 16.92 km earthen channel; (ii) 1.53 km concrete cement block lined channel; (iii) 3.4 km reinforced concrete cement (RCC) covered drain; and (iv) 3.45 km RCC open drain. The inventory and proposed interventions on drainage and flood control structures are listed in Table 3.

Table 3: Components of Proposed Pirojpur Drainage Subproject

	Drain/ Structure ID No.	Ward No.	Existing Condition			Proposed Intervention			
			Location and Length	Section and Structure Type	Existing Condition	Section	Proposed Structure Type	Length	Scope of works / Remarks
1.	PD 01	W4,5,7, 2,3,8,9	Damudar <i>khal</i> , from Baleshwar river, (up to Borokhalish akhali Bridge) L = 4,000 m	T - 17.71 m B - 6.5 m D - 1.7 m Earthen Canal	Bed silted up: settlement of bank	T - 20.00m B - 7.50m D - 3.5 m	Earthen Canal	3,800 m	Re- excavation of canal
							Concrete cement (CC) block lined channel	200 m	
2.	SD 02	W5,6,7, 8	2(a) Pirojpur parerhat varani <i>khal</i> , from Damuder <i>khal</i> to parerhat <i>khal</i> near Barapul, L = 2,600 m	T - 7.00 m B - 2.00 m C - 1.25 m Earthen Canal	Bed silted up: settlement of bank	T - 8.00 m B - 3.50 m D - 1.75 m	Earthen Canal	2,470 m	Re- excavation of canal
							CC block lined channel	130 m	
			2(b) Malaria pule to primary school (Mashid bari)	T - 5.00 m B - 2.00 m D - 1.25 m	Bed silted up: settlement of bank	T - 5.00 m B - 2.00 m	Earthen Canal	450 m	Re- excavation of canal
							CC block lined channel	50 m	
3.	SD 03	W4	Pal para <i>khal</i> , from Damuder <i>khal</i> to Mr. Kabil house, L = 1,500 m	T - 4.25 m B - 1.50 m D - 1.00 m Earthen Canal	Bed silted up: settlement of bank	T - 1.25 m D - 1.50 m	Reinforced cement concrete (RCC) covered U- channel	1,500 m	Adjacent road to be widened
4.	PD 02	W5	Chan Mari <i>khal</i> , from Baleshwar	T - 4.55 m B - 2.00 m D - 1.30 m	Bed silted up: settlement	04	Earthen Canal	1,422 m	Adjacent road to be widened
							CC block	158 m	

	Drain/ Structure ID No.	Ward No.	Existing Condition			Proposed Intervention			
			Location and Length	Section and Structure Type	Existing Condition	Section	Proposed Structure Type	Length	Scope of works / Remarks
			River to Sarder bari field, L = 1,580 m	Earthen Canal	of bank		lined channel		
5.	SD 04	W7	Gazi bari khal from Damuder khal (near barring gate) to S.K. Jalil mia's house, L = 1,736 m	T - 4.80 m B - 2.00 m D - 1.20 m Earthen Canal	Bed silted up: settlement of bank	B - 4.00 m D - 1.50 m	RCC covered U- channel	1,736 m	Re- excavation of canal
6.	SD 06	W5	Modda Rasta Katcha drain from Chan mari khal to Maddo rasta via Mr. Farruk sarder house, L = m	B - 2.00 m D - 1.50 m	Bed silted up: settlement of bank	B - 2.00 m D - 1.5 m	RCC open channel	500 m	Re- excavation of canal
7.	SD 07	W5	Primary Education Office Drain from existing RCC drain to Mr. Delower house, L = m	B - 1.50 m D - 1.25 m	Bed silted up: settlement of bank	B - 1.5 m D - 1.25 m	RCC open channel	250 m	Re- excavation of canal
8.	SD 08	W4	West Sikarpur katcha drain from Chilla khal to cfitala near Mr. Abu mia house, via babu Dulal Ghoos,	B - 2.00 m D - 1.50 m	Bed silted up: settlement of bank	B - 2.00 m D - 1.50 m	RCC open channel	600 m	Re- excavation of canal
9.	SD 09	W7	Damuder khal to Mr. Haque Mias house, side of S.P house,	B - 2.00 m D - 1.50 m	Bed silted up: settlement of bank	B - 2.00 m D - 1.50 m	RCC open channel	500 m	Re- excavation of canal
10.	SD 10	W7	Pirojpur – Paraerhat Varani khal to Maddo Mushid house north	B - 1.50 m D - 2.50 m	Bed silted up: settlement of bank	T - 6.00 m B - 1.75 m D - 1.50 m	RCC open channel	1,736 m	Re- excavation of canal

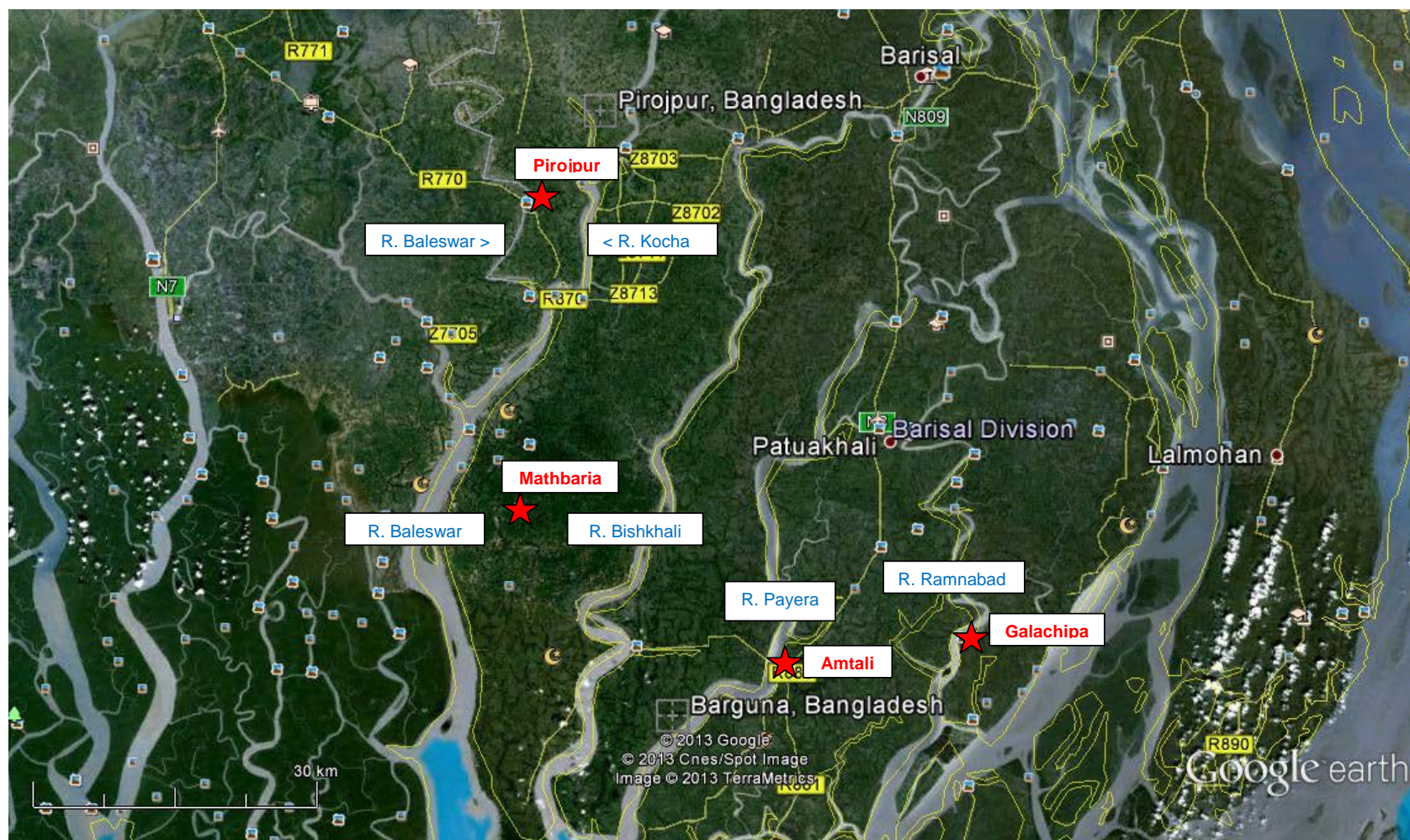
	Drain/ Structure ID No.	Ward No.	Existing Condition			Proposed Intervention			
			Location and Length	Section and Structure Type	Existing Condition	Section	Proposed Structure Type	Length	Scope of works / Remarks
			side of bypass						
11.	SD 11	W5	Adorshapar a drain from Baleshwar river to east side of sultan mia's house,	New	Bed silted up: settlement of bank	B - 2.00 m D - 1.5 m	RCC open channel	500 m	Re- excavation of canal
12.	PD 12	W7	Murshid bari khal from Pirojpur – parerhat varani khal to Mr. Alom house,	New	Bed silted up: settlement of bank	B - 1.50 m D - 2.00 m	RCC open channel	500 m	Re- excavation of canal
13.	SD 13		Khumuria Asrom bari road side drain to Baleshwar river,	New	Bed silted up: settlement of bank	B - 2.00 m D - 1.50 m	RCC open channel	600 m	Re- excavation of canal
14.	SD 04	W4	14(a) Sikarpur khal from Damuder khal to water supply compound , L = 1,000 m	T - 5.68 m B - 2.00 m D - 1.25 m Earthen Canal	Bed silted up: settlement of bank	T - 6.50 m B - 3.00 m	Earthen Canal CC block lined channel	900 m 100 m	Re- excavation of canal
		W4	14(b)Sikder bari to Sheikh bari , L = 2,500 m	T - 5.00 m B - 2.00 m D - 1.25 m	Bed silted up: settlement of bank	T - 5.00 m B - 2.00 m D - 1.25 m	Earthen Canal CC block lined channel	440 m 60 m	
		W4	14(c) Sikder bari Culvert to Huque driver house	T - 5.00 m B - 2.00 m D - 1.25 m	Bed silted up: settlement of bank	T - 6.50 m B - 3.00 m	Earthen Canal RCC open channel	450 m 600 m	
15.	SD 05	W8	Fire service khal(Mache mpur Kisnagur) from Damuder khal to Stadium compound, L = 1,522 m	B - 2.00 m D - 1.50 m Earthen Canal	Bed silted up: settlement of bank	T - 5.00 m B - 2.00 m D - 1.25 m	Earthen Canal	1,369.8 m	Re- excavation of canal
							CC block lined channel	152.2 m	
16.	SD 06	W2,4	Side of Primary Teacher's	T - 10.10 m B - 3.00 m D - 1.30 m	Bed silted up: settlement	T - 6.00 m B - 1.75 m	Earthen Canal	1,350 m	Re- excavation of canal
							CC block	150 m	

	Drain/ Structure ID No.	Ward No.	Existing Condition			Proposed Intervention			
			Location and Length	Section and Structure Type	Existing Condition	Section	Proposed Structure Type	Length	Scope of works / Remarks
			Training Institute khal, from Damuder khal to Police line, L = 1,736 m	Earthen Canal	of bank		lined channel		
17.	SD 07	W8,9	Dhup pasa khal, from Da muder khal to Krisna Nagur Field, L = 1,275 m	T - 9.23 m B - 3.5 m D - 1.5 m Earthen Canal	Bed silted up: settlement of bank	D - 1.50 m T - 9.23 m	Earthen Canal CC block lined channel	2,700 m 300 m	Re- excavation of canal
18.	SD 08	W4	HBN Bricks to East side of Mr. Muklasur Rahman house, via Madu Mia's Mill khal, L = 3,000 m	T - 4.80 m B - 2.00 m D - 1.20 m Earthen Canal	Bed silted up: settlement of bank		Earthen Canal CC block lined channel	1,562.4 m 173.6 m	Re- excavation of canal

D. Implementation Schedule

21. 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

IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for the Baseline Study

22. **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 Pirojpur 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.

23. Several visits to the subproject sites were made during the CDTA and PPTA stages 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.

24. **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

25. **Topography, landforms, geology and soils.** Pirojpur pourashava, with an area of 29.46 km². A topographic and physical feature survey of the pourashava was undertaken by Sheltech consultants in 2010 to 2011. According to that survey, the lowest spot height is 0.4 m and the highest is 4.00 m with an average ground level of 1.86 m. The physical feature survey showed that there are about 16.3 hectares of roads. There are 189 bridges, 181 box culverts and 20 pipe culverts. Approximately 11% of the Pourashava area is ponds, ditches and *khals*.

26. **Climatic conditions.** Pirojpur has a tropical monsoon-type climate. January is the coolest month with temperatures averaging near 26 °C (78 °F) and April the warmest with temperatures from 33 to 36 °C (91 to 96 °F). 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). Pirojpur 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.

27. **Water quality.** The town is bordered on the west side by the Baleshwar River and to the east and south by the Kocha River.

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

29. **Acoustic environment.** Subproject components are in the built-up part of Pirojpur, 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

30. **Flora and fauna.** Subproject components are located in Pirojpur 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.

31. **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

32. **Area and population.** lies within the centre of Pirojpur Upazila which occupies an area of 166.81 km². Information about the total number of households, with average size, and population of Pirojpur pourashava is presented in Table 4.

Table 4: Population of Pirojpur Pourashava

	Area (km ²)	Households (nos.)	Population			Average Household Size	Density (per km ²)
			Total	Male	Female		
Pirojpur	29.46	13,646	60,056	30,048	30,008	4.40	2,038
Ward No - 01	4.5	1,311	5,707	2,802	2,905	4.35	1,268
Ward No - 02	2.62	1,369	6,455	3,157	3,302	4.72	2,463
Ward No - 03	4.70	1,023	4,717	2,358	2,359	4.61	1,003
Ward No - 04	1.81	2,548	10,421	5,199	5,222	4.08	5,757
Ward No - 05	2.31	1,687	7,528	3,979	3,549	4.46	3,258
Ward No - 06	3.60	1,330	6,143	3,170	2,973	4.61	1,706
Ward No - 07	1.01	1,665	7,112	3,376	3,736	4.27	7,041
Ward No - 08	2.85	1,490	6,474	3,214	3,260	4.34	2,271
Ward No - 09	6.06	1,223	5,495	2,793	2,702	4.49	906

Source: Bangladesh Bureau of Statistics Community Report, Zilla: Pirojpur, 2011.

33. **Land use.** A land use survey was undertaken by Sheltech Consultants in 2009. The results show that there is predominance of agricultural land use (42%) followed by residential land use (30%) and the rest as commercial, industrial, administrative, educational, places of worship, health, recreational, restricted, transportation, miscellaneous, mixed uses, graveyard, open spaces, and water bodies. The survey clearly shows that the land use pattern reveals significant urbanized land uses. Approximately 11% of the pourashava area is ponds, ditches and khals.

34. **Type of community spread.** Pirojpur is composed of 79.01% Muslim, 20.91% Hindu and 0.08% others. Average literacy is 55.8%.

35. **Existing provisions for pedestrians and other forms of transport.** Pirojpur roads generally fall into two categories: *katcha* (earthen) construction and *pukka* (formed) roads. Formed roads are mainly BT asphalt roads with CC roads in a few places for main roads, while minor roads may also be brick-on-edge soling, known locally as 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. There are about 16.3 ha of roads, 189 bridges, 181 box culverts and 20 pipe culverts in Pirojpur. Management survey results reveal that there is no public or private bus service available for internal movement of passengers at Pirojpur. At present, there is no designated authority for the management of traffic at Pirojpur pourashava, the owners of the transport agencies decide about their routes and manage their traffic.

36. **Socio-economic status.** Main occupations are agriculture (35.3%), agricultural laborer (17.05%), wage laborer (5.71%), commerce (16.2%), service (7.25%), fishing (2.68%), transport (1.64%), construction (1.28%), and others (12.89%). Main crops are paddy, wheat, sugarcane, and betel leaf.

37. **Other existing amenities for community welfare.** Educational institutions in the pourashava include 4 government colleges, 18 non-government colleges, 5 government high schools, 185 non-government high schools, 12 junior schools, 485 government primary schools, 282 non-government primary schools, 188 *madrashas* (any type of religious school or college for the study of the Islamic religion, though this may not be the only subject studied), 4 kindergarten schools, 1 poly technique institute and 7 satellite schools. Health facilities include 2 hospitals, 6 *upazila* health complexes, 42 union health and family planning centre, 1 maternity and child welfare centre, 12 satellite clinics and 53 palli health services clinic.

E. Historical, Cultural and Archaeological Characteristics

38. **Physical and cultural heritage.** There historical places in Pirojpur are the marks of war of liberation, 2 mass killing sites, 1 mass grave and 1 memorial. The archaeological heritage and relics sites are Kumarkhali Kali Mandir, Rayerkati Zamindarbari and Shiva Mandir, two domed mosque (Nesarabad), remnants of Kaurikhara Zamindarbari. Kumarkhali Kali Mandir, Rayerkati Zamindarbari and Shiva Mandir, two domed mosque (Nesarabad), remnants of Kaurikhara Zamindarbari. The subproject components are not located in or near and excavation works will not be conducted in the vicinities of these sites.

V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS

A. Methodology

39. 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 Drainage and Flood Control (Appendix 1) and ADB SPS 2009.

B. Screening Out Areas of No Significant Impact

40. From the preliminary design and results of the rapid environmental assessment, it is clear that implementation of Pirojpur drainage and flood control subproject will not have major negative impacts because activities will be localized/site-specific and short in duration, corridors of impact 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 5) thus can be screened out of the assessment at this stage but will be assessed again during detailed design stage and before implementation.

Table 5: 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 sites along public ROWs.
Climatic conditions	Short-term production of dust is the only effect on atmosphere. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Acoustic environment	Construction activities will be on settlements, along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will 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 Pirojpur pourashava will not cause direct impact on biodiversity values. Based on preliminary design 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. Rehabilitation of existing drainage and flood control structures is prioritized over new construction, using vacant government land and right of way (ROW).
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	Subproject components will be located in government land and existing ROWs thus there is no requirement for land acquisition or any resettlements. 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.
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 Pirojpur 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	

Field	Rationale
Physical and cultural heritage	There are no scheduled or unscheduled historical, 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.

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

41. 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. The subproject will be in properties held by the pourashava and access to the subproject sites is thru public ROW and existing roads hence, land acquisition and encroachment on private property will not occur.

42. The concepts considered in design of the Pirojpur drainage and flood control subproject are: (i) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (ii) prioritizing rehabilitation over new construction, using vacant government land and right of way (ROW), and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts; (iii) avoiding where possible locations that will result in destruction/disturbance to historical and cultural places/values; (iv) avoiding tree-cutting where possible; (v) 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.

43. Possible actions to mitigate against the main projected effects of climate change on drainage and flood control infrastructure and service are described in Table 6. Possible actions to mitigate against other factors that will affect drainage and flood control infrastructure and climate resilience are described in Table 7. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Pirojpur drainage subproject, including: (i) existing drains rehabilitated and capacities enhanced to 2050 projections - dredging, re-profiling, lining, etc., as appropriate; (ii) new drains constructed to same capacity, including reinstating and enhancing natural drainage channels, etc., wherever feasible; (iii) runoff detention capacity introduced wherever feasible; and (iv) materials selected and construction quality monitored for increased durability, because of longer inundation periods, wastewater risks, etc. 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 6: Possible Actions to Mitigate against Projected Effects of Climate Change on Drainage and Flood Control Infrastructure and Improve Climate Resilience

	Climate Change Effect	Mitigation Measures
1.	Increased rainfall quantity and runoff	<ul style="list-style-type: none"> - Increase infrastructure capacity, e.g. channels, bridges, culverts, regulating structures, outfall vents, etc. (levels to take account of sea level rise) - Create capacity to detain runoff as necessary, e.g. ponds, open spaces, channels, khals, etc. - Isolate/protect vulnerable catchments and sub-catchments, to reduce flooding from adjacent catchments, especially if large in area and volume and impacts are less serious, e.g. agricultural land - Actively managing runoff and discharges, according to needs, adverse impacts, etc. - Improve O&M, organizational capacity, resource allocation, etc. - Work with relevant stakeholders to manage water use and flood discharges more effectively

	Climate Change Effect	Mitigation Measures
		<ul style="list-style-type: none"> - Improve collection and disposal of solid waste - Control encroachments - Improve public behavior through active and prolonged information, education and communication campaigns to reduce uncontrolled solid waste disposal, encroachments, damage to infrastructure, unregulated development in key areas, etc., supported by enforcement.
2.	Sea level rise (SLR)	<ul style="list-style-type: none"> - Raise existing flood defenses to requisite levels and building new flood defenses on unprotected tidal channels and <i>kha/s</i> - Improve drainage infrastructure and detention capacity as required (see (1)) - Improve O&M, organizational capacity, resource allocation, etc. - Work with relevant stakeholders, e.g. BWDB, landowners, water user groups, farmers associations, etc., to ensure their actions contribute as required.
3.	Increased frequency of severe cyclones	<ul style="list-style-type: none"> - Enhance flood defense levels and strengthen to the requisite levels according to location, etc., e.g. urban areas should have higher and stronger levels of protection than rural areas - Improve infrastructure and detention capacity and protecting/isolating catchments as appropriate (see (1)) - Improve O&M of defenses and drainage, organizational capacity, resource allocation, etc., - Work with relevant stakeholders, e.g. BWDB, etc., to ensure their actions contribute as best possible.

Source: PPTA Consultant.

Table 7: Possible Actions to Mitigate against Other Factors that may affect Drainage/Flood Control Infrastructure and Climate Resilience

	Impact Factor	Mitigating action
1.	Construction materials' quality	<ul style="list-style-type: none"> - Choose most durable materials possible, even if higher cost, e.g. concrete, high quality bricks. - Monitor and control construction quality
2.	Flat topography	<ul style="list-style-type: none"> - Shorten drainage routes - Avoid downstream constrictions, etc. - Retain and upgrade existing natural drainage routes and channels. - Maximize runoff and water-level regulation, and detention capacity; regulate land development as required. - Consider short to medium-term pumping, using mobile/emergency pumps wherever appropriate.
3.	Rising temperatures	<ul style="list-style-type: none"> - Execute works during most favorable times of year and day. - Monitor and control preparing, placing and curing concrete and mortar, to ensure placement, etc., during most favorable times. - Use plain high-quality un-rendered brickwork and high quality cement mortar in preference to rendered low-grade bricks - Use sulphate resisting cement in vulnerable locations (higher heat gain during curing) or cement containing fly-ash (less heat gain, so preferred).
4.	Runoff	<ul style="list-style-type: none"> - Require separate arrangements for disposal of fecal-contaminated wastewater. - Use trapezoidal section drains with small low-flow section (cunette) for low flows - Line drains to achieve higher discharge velocities without increasing risk of scour, etc.
5.	Flooding	<ul style="list-style-type: none"> - Choose durable materials, preferably concrete or high quality bricks - Ensure high quality construction - Consider short to medium-term pumping (mobile/emergency pumps) - Check and design against possible floating in various operating scenarios (hydrostatic pressure).

Source: PPTA Consultant.

D. Anticipated Impacts and Mitigation Measures – Construction Phase

44. 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 pourashavas, will not cause direct impact on biodiversity values.

45. **Construction method.** Trenches will be dug by backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed nearby, and the materials (brought to site on trucks and stored on unused land nearby) will be placed in the trench by crane or using a small rig. The infrastructures will be constructed manually according to design specifications. Any excavated road will be reinstated.

46. 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.

47. 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 Pirojpur 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, Pirojpur drainage 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 8).

Table 8: 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.	<ul style="list-style-type: none"> - Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply to 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.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Pirojpur local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to minimize the wastage of water in the construction activities.

Field	Impacts	Mitigation Measures
		<ul style="list-style-type: none"> - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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.	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.
Acoustic environment	Construction activities will be on settlements, along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will follow existing ROW alignment and impact is short-term, site-specific and within a relatively small area. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Pirojpur local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during night time. - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
Aesthetics	Based on preliminary design construction activities do not anticipate any cutting of trees (to be reassessed during detailed design) but will produce excess	<ul style="list-style-type: none"> - Prepare the Debris Disposal Plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with Pirojpur local authority for beneficial uses of excess excavated soils or immediately dispose to designated

Field	Impacts	Mitigation Measures
	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.	<p>areas Avoid stockpiling of any excess spoils</p> <ul style="list-style-type: none"> - Suitably dispose of collected materials from drainages, unutilized materials and debris either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. - The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
B. Biological Characteristics		
Biodiversity	Activities being located in the built-up area of Pirojpur pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design there are no trees at the site that need to be removed (to be reassessed during detailed design stage).	<ul style="list-style-type: none"> - Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood.
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.	<ul style="list-style-type: none"> - Prepare and implement a Traffic Management Plan (Appendix 5) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions

Field	Impacts	Mitigation Measures
		during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Socio-economic status	Subproject components will be located in government land and existing ROWs thus there is no requirement for land acquisition or any resettlements. 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. - 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 Pirojpur 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 measures.	- Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in Pirojpur (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. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Pirojpur local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals. ⁵ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility.

⁵ 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
		<ul style="list-style-type: none"> - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. - The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.
Workers health and safety	<p>There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.</p>	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement a site 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) training⁶ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. - Ensure (i) uncontaminated water for drinking, cooking and

⁶ 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
		<p>washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times.</p> <ul style="list-style-type: none"> - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to 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	Pirojpur pourashava was established in 1885. However, construction works will be on existing drainages and built-up areas of Pirojpur thus risk for chance finds is low.	<ul style="list-style-type: none"> - All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected.

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

48. In the operations and maintenance (O&M) phase, the drainages and flood control structures 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 Pirojpur local authority, which will be given training by this project.

49. Routine repairs and unblocking of drains will be very small in scale, to be conducted manually by small teams of men with simple equipment (shovels, wheelbarrows, etc.) and works will be very short in duration thus will not cause significant physical impacts. Traffic may be interrupted temporarily but this work will be very small in scale, infrequent, and short in duration, so there will be no economic or other implications. To maintain the safety of workers and road-users, such work should be coordinated with the local police department so that adequate warning signs and traffic diversions can be set up when necessary. Debris/sediments from drainages need to be collected and disposed at a designated site such as the landfill. It is important that the designated disposal site's base is of a non-permeable membrane in order to

prevent leachate that can contaminate the soil and groundwater. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 9).

Table 9: Anticipated Impacts and Mitigation Measures – O&M Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Water quality	Run-off from stockpiled debris/sediments from drainages which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Take all precautions to prevent entering of run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Remove all debris/sediments immediately. - Dispose debris/sediments at a designated site such as landfill. It is important that the designated disposal site's base is of a non-permeable membrane in order to prevent leachate that can contaminate the soil and groundwater.
Air quality	Moving debris/sediments from drainages may create dusts during dry season. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Use tarpaulins to cover soils, sand and other loose material.
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.	<ul style="list-style-type: none"> - Plan activities in consultation with Pirojpur 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. - 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.
B. Biological Characteristics		
Biodiversity	Activities in the built-up area of Pirojpur pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	<ul style="list-style-type: none"> - No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal).
C. Socioeconomic Characteristics		
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Traffic may be interrupted temporarily. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Maintain safe passage for vehicles and pedestrians during maintenance activities. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of maintenance activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Workers health and safety	Workers need to be mindful of the occupational hazards working in confined spaces such	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S.

Field	Impacts	Mitigation Measures
	as closed drains. Potential impacts are negative and long-term but reversible by mitigation measures.	<ul style="list-style-type: none"> - Ensure that all site personnel have a basic level of H&S training. - Produce and implement a O&M health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training⁷ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. - Disallow worker exposure to noise level greater than 85 dBA for 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	Pirojpur pourashava was established in 1885. However, construction works will be on existing drainages and built-up areas of Pirojpur thus risk for chance finds is low.	<ul style="list-style-type: none"> - All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected.

F. Cumulative Impact Assessment

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

⁷ 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.

- (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.

51. 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 Pirojpur pourashava.

52. **Water quality.** PPTA findings show that intensity of tropical cyclones will increase with the rise of sea surface temperature. As a result the probability of higher category cyclones would increase in year 2040-2050. Increased and more intensive rainfall will cause more floods inundating roads and yards, market places and other important areas. Larger, steeper or lined drains will be required to discharge excess storm water. However Pirojpur topography and land availability do not lend itself to steeper drainage with complex pumping or water management arrangements. It is recommended that the infrastructures be (i) designed to the current best practice standard and in line with the current LGED guidelines⁸ for a 25-year design period; (ii) designed as (i) but taking into account of the projected climate change impacts up to 2050;⁹ (iii) built that the floods do not damage them; and (iv) drains are to be kept free from wastes and siltation. Short-term negative impacts 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.

53. **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.

54. **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

⁸ Urban Drainage Manual, May 1998

⁹ PPTA projected rainfall intensity for a 1:10 year design storm by 2050 is only about 1% greater than the intensity for the same storm in 2030. It is therefore considered more cost-effective to plan and develop infrastructure for 2050 immediately that develop it in two stages.

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.

55. **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 drainage alignment and flood control structures will be improved once the activities are completed. Since the subproject will be improvement of existing infrastructures, it 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 Pirojpur pourashava. This can be considered a long-term cumulative benefit of the subproject.

56. 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 vulnerable¹⁰ groups.

57. Upon completion of the project, the socio-community will be the major beneficiaries of this subproject. With the improved drainage and flood control structures, 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.

58. **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.

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

¹⁰Vulnerable 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.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Public Consultation Conducted

60. 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 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.

61. Public consultations and focus group discussions (FGDs) were conducted by PPTA on 05 and 09-10 July 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 6. 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

62. 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.

63. The public consultation and disclosure program with all interested and affected parties 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.

64. 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

65. 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.

66. **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.

67. 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.

68. 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.

69. **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.¹¹ 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)¹². 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.

70. 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.

71. 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.

72. **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

¹¹ 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.

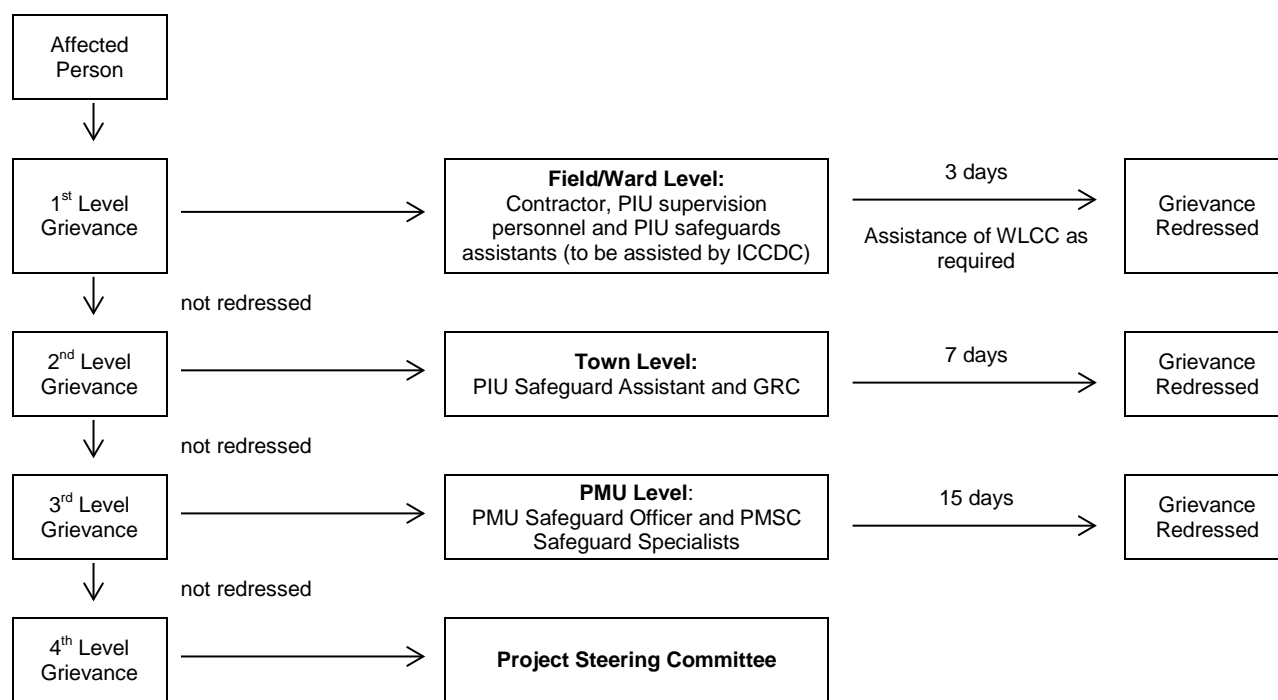
¹² The project steering committee (PSC) responsible for grievance redress will have the following as members: Secretary, Local Government Department, as chair; Chief Engineer, LGED; Chief Engineer, DPHE; Project Director, member secretary; General Economic Division, Planning Commission; Physical Planning, 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.

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.

73. **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.

74. **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 2: 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

75. 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.

76. 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.

77. 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

78. **Executing Agency.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. LGED will be the lead executing agency (EA) for the project, and DPHE will be the co-executing agency (for water supply and sanitation components). A PMU will be established in LGED.

79. **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.

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

81. **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.

82. 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;¹³

83. **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.

84. 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.

¹³ Reduce, reuse and recycle (3R) and water, sanitation, and hygiene program (WASH)

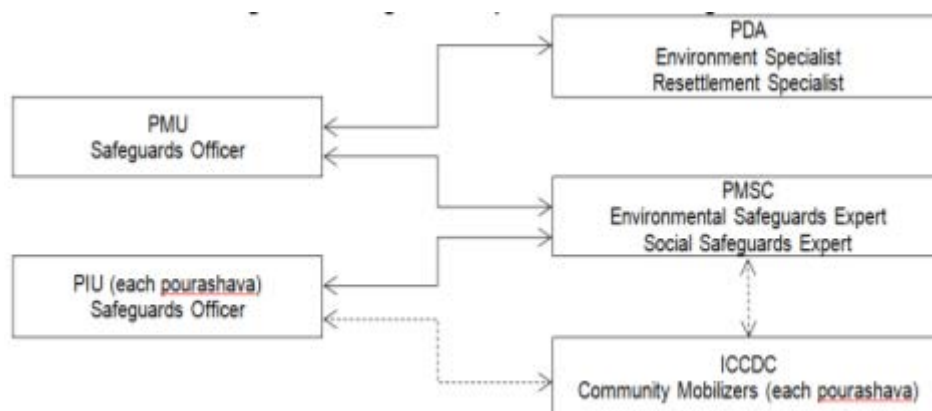
Figure 3: Safeguards Implementation Arrangement

Table 10: 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	<ul style="list-style-type: none"> - Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. - Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. - Include in detailed design drawings and documents all conditions and provisions if necessary 	Project management unit (PMU), project implementing unit (PIU), project design advance (PDA) detailed design consultants, and project management and supervision consultants (PMSC)	Incorporated in final design and communicated to contractors.	Prior to award of contract	<p>No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PMU and PIU.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
Existing utilities	Disruption of services.	<ul style="list-style-type: none"> - Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction activities - Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. - Require contractors to prepare spoils management plan (Appendix 4) and traffic management plan (Appendix 5) 	PMU, PIU, PDA and PMSC	<ul style="list-style-type: none"> - List of affected utilities and operators; - 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 4), and traffic management plan (Appendix 5) 	<p>During detailed design phase</p> <p>- Review of spoils management plan: Twice (once after first draft and once before final approval)</p>	<p>No cost required.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
Construction work camps, hot mix plants, stockpile areas, storage areas,	Disruption to traffic flow and sensitive receptors	- Determine locations prior to award of construction contracts.	PMU, PIU, PDA and PMSC	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas,	During detailed design phase	<p>No cost required.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU,</p>

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
and disposal areas.				and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land		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; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	During detailed design phase, as necessary with discussion with detailed design engineers and PIUs	No cost required. Mitigation measures are included as part of TOR of PMU, PIU, 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) (ii) Posting of proof of completion at worksites (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. Other costs responsibility of contractor.
2. During Construction Activities						
A. Physical Characteristics						
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may	- Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and	Construction Contractor	- Records of sources of materials	Monthly by PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	quarries (If these are being opened up exclusively for the subproject) must comply to 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.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Pirojpur local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to 	Construction Contractor	<ul style="list-style-type: none"> - Areas for stockpiles, storage of fuels and lubricants and waste materials; - Number of silt traps installed along trenches leading to water bodies; - Records of surface water quality inspection; - Effectiveness of water management measures; - No visible degradation to nearby drainages, <i>khals</i> or water bodies due to construction activities 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>minimize the wastage of water in the construction activities.</p> <ul style="list-style-type: none"> - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when 	Construction Contractor	<ul style="list-style-type: none"> - Location of stockpiles; - Number of complaints from sensitive receptors; - Heavy equipment and machinery with air pollution control devices; 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.		- Certification that vehicles are compliant with air quality standards.	and final location of subproject components	
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	- Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Pirojpur local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during night time.	Construction Contractor	- Number of complaints from sensitive receptors; - Use of silencers in noise-producing equipment and sound barriers; - Equivalent day and night time noise levels	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	<ul style="list-style-type: none"> - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly. 				
Aesthetics	Based on	- Prepare the Debris	Construction	- Number of	- Visual inspection by	Cost for

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	<p>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.</p>	<p>Disposal Plan</p> <ul style="list-style-type: none"> - Remove all construction and demolition wastes on a daily basis. - Coordinate with Pirojpur local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas Avoid stockpiling of any excess spoils - Suitably dispose of collected materials from drainages, unutilized materials and debris either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. 	Contractor	<p>complaints from sensitive receptors;</p> <ul style="list-style-type: none"> - Worksite clear of hazardous wastes such as oil/fuel - Worksite clear of any wastes, collected materials from drainages, unutilized materials and debris - Transport route and worksite cleared of any dust/mud 	<p>PIU and supervision consultants on monthly basis</p> <ul style="list-style-type: none"> - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	<p>implementation of mitigation measures responsibility of contractor.</p>

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.</p> <ul style="list-style-type: none"> - The site must be kept clean to minimize the visual impact of the site. <p>Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;</p>				
B. Biological Characteristics						
Biodiversity	<p>Activities being located in the built-up area of Pirojpur pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design there are no trees at the site that need to be removed (to be reassessed during detailed design stage).</p>	<ul style="list-style-type: none"> - Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and 	Construction Contractor	<ul style="list-style-type: none"> - PMU and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be determined during detailed design stage) - Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc. 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood.				
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.	<ul style="list-style-type: none"> - Prepare and implement a Traffic Management Plan (Appendix 5) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where 	Construction Contractor	<ul style="list-style-type: none"> - Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 5); - Number of complaints from sensitive receptors; - Number of signages placed at project location - Number of walkways, signages, and metal sheets placed at project location 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>required to maintain access across for people and vehicles.</p> <ul style="list-style-type: none"> - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions. 				
Socio-economic status	Subproject components will be located in government land and existing ROWs thus there is no requirement for land acquisition or any resettlements. Manpower will be required during the XXX-months construction stage. This can	<ul style="list-style-type: none"> - Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local 	Construction Contractor	<ul style="list-style-type: none"> - Employment records; - Records of sources of materials - Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.	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 Pirojpur 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)	<ul style="list-style-type: none"> - Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in Pirojpur (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. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, 	Construction Contractor	<ul style="list-style-type: none"> - Utilities Contingency Plan - Number of complaints from sensitive receptors 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	located alongside the roads. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Pirojpur local authority on the	Construction Contractor	- Number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 5); - Number of complaints from sensitive receptors; - Number of walkways, signages, and metal sheets placed at project location - Agreement between landowner	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>designated areas for stockpiling of, soils, gravel, and other construction materials.</p> <ul style="list-style-type: none"> - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.¹⁴ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) 		and contractors in case of using private lands as work camps, storage areas, etc.		

¹⁴ 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
		<p>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.</p> <p>- 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</p>				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>as per environment management specialist's instruction.</p> <ul style="list-style-type: none"> - 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	<p>There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.</p>	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement a site 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 	Construction Contractor	<ul style="list-style-type: none"> - Site-specific H&S Plan - Equipped first-aid stations - Medical insurance coverage for workers - Number of accidents - Records of supply of uncontaminated water - Condition of eating areas of workers - Record of H&S orientation trainings - Use of personal protective equipment - % of moving equipment outfitted with audible back-up alarms - Permanent sign boards for hazardous areas - Signages for storage and disposal areas 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>personal protective equipment (reflectORIZED vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training¹⁵ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.</p> <ul style="list-style-type: none"> - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. <p>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.</p> <ul style="list-style-type: none"> - Provide medical insurance coverage for 		- Condition of sanitation facilities for workers		

¹⁵ 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
		<p>workers;</p> <ul style="list-style-type: none"> - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by 				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	<p>(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and</p> <p>(ii) All excavated roads shall be reinstated to original condition.</p> <p>(iii) All disrupted utilities restored</p> <p>(iv) All affected structures rehabilitated/compensated</p> <p>(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.</p> <p>(vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document.</p> <p>(vii) The contractor must arrange the cancellation of all temporary services.</p> <p>(viii) Request PMU/CSS to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.</p>	Construction Contractor	PMU/CSS 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 is satisfactory.	- Prior to turn-over of completed works to pourashava	Cost for implementation of mitigation measures responsibility of contractor.

Table 41: Environmental Management and Monitoring Plan – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
Water quality	Run-off from stockpiled debris/sediments from drainages which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Take all precautions to prevent entering of run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Remove all debris/sediments immediately. - Dispose debris/sediments at a designated site such as landfill. It is important that the designated disposal site's base is of a non-permeable membrane in order to prevent leachate that can contaminate the soil and groundwater. 	Pirojpur pourashava	- No visible degradation to nearby drainages, <i>khals</i> or water bodies due to construction activities	Duration of repair works	Included in O&M cost
Air quality	Moving debris/sediments from drainages may create dusts during dry season. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Use tarpaulins to cover soils, sand and other loose material. 	Pirojpur pourashava	- No complaints from sensitive receptors	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
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.	<ul style="list-style-type: none"> - Plan activities in consultation with Pirojpur 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. - 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. 	Pirojpur pourashava	- No complaints from sensitive receptors	Duration of repair works	Included in O&M cost
B. Biological Characteristics						
Biodiversity	Activities in the built-up area of Pirojpur pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	<ul style="list-style-type: none"> - No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal). 	Pirojpur pourashava	- No complaints from sensitive receptors	Duration of repair works	Included in O&M cost
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Traffic may be interrupted temporarily. The impacts are negative but short-term, site-specific within a relatively small	<ul style="list-style-type: none"> - Maintain safe passage for vehicles and pedestrians during maintenance activities. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. 	Pirojpur pourashava	- No complaints from sensitive receptors	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Notify affected sensitive receptors by providing sign boards informing nature and duration of maintenance activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions. 				
Workers health and safety	Workers need to be mindful of the occupational hazards working in confined spaces such as closed drains. Potential impacts are negative and long-term but reversible by mitigation	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Produce and implement a O&M health and safety 	Pirojpur pourashava	<ul style="list-style-type: none"> - No complaints from sensitive receptors - No complaints from workers related to O&M activities - Zero accident 	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	measures.	<p>(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) training¹⁶ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.</p> <ul style="list-style-type: none"> - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Ensure the visibility of workers through their use 				

¹⁶ 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
		<p>of high visibility vests when working in or walking through heavy equipment operating areas;</p> <ul style="list-style-type: none"> - Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. - Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. 				
D. Historical, Cultural, and Archaeological Characteristics						
Physical and cultural heritage	Pirojpur pourashava was established in 1885. However, construction works will be on existing drainages and built-up areas of Pirojpur thus risk for chance finds is low.	<ul style="list-style-type: none"> - All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately to allow further 	Pirojpur pourashava	- Records of chance finds	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		investigation if any finds are suspected.				

B. Institutional Capacity Development Program

85. 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 12.

Table 5: Training Program for Environmental Management

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation workshop	Module 1 – Orientation - ADB Safeguards Policy Statement - Government of Bangladesh Environmental Laws and Regulations Module 2 – Environmental Assessment Process - ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements - Review of environmental assessment report to comply with ADB requirements - Incorporation of EMP into the project design and contracts	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 - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day	PMU PIUs Contractors
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed	1 day on a regular period to be determined by PMU, PIUs, and PMSC	PMU PIUs Contractors

C. Staffing Requirement and Budget

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

- (i) Conducting environmental assessments of new subprojects, preparing and submitting reports and public consultation and disclosure;
- (ii) Application for Environmental Clearance; and

(iii) Implementation of EMP and long-term surveys.

87. 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.

88. 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.

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

90. The indicative costs of EMP implementation are shown in Table 13.

Table 6: 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 - Construction	Per location	20	30,000	60,000	Civil works contract
2.	Noise levels monitoring	- Pre-construction - 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 environmental assessment process; (ii) induction course contractors, preparing them on EMP implementation and environmental monitoring requirements related to	Module 1 – immediately upon engagement of the PMSC environmental safeguards specialist Module 2 – prior to award of civil works contracts (twice a year for 4 years) Module 3 – prior to start of Phase 2 and upon completion of	lump sum		Module 1 – 30,000 Module 2 – 30,000 Module 3 – 30,000	90,000	Covered under Institutional Strengthening and Awareness Building contract

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
	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	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 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 and ICCDC contracts
2.	GRM implementation	Costs involved in resolving complaints (meetings, consultations, communication, and reporting/information)		Lump sum		As per PMU budget	PMU cost

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
		dissemination)					
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

91. 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.

92. 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 9. 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.

93. 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).

94. 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

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

96. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the project design or location were not significant.

97. 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. 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.

98. 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.

99. 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.

100. 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.

101. The citizens of Pirojpur will be the major beneficiaries of this subproject. With the improved drainage and flood control structures, 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.

102. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Pirojpur 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. 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). However 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 Department of Environment (DoE).

Appendix 1: Rapid Environmental Assessment Checklist

Screening questions	Yes	No	Remarks
A. Project siting Is the project area adjacent to or within any of the following environmentally sensitive areas?	✓		Pirojpur pourashava covers an area of 29.46 km ² with population density of 2,038 per km ² . The area is predominantly residential.
Cultural heritage site		✓	
Protected area		✓	
Wetland		✓	
Mangrove		✓	
Estuarine		✓	
Buffer zone of protected area		✓	
Special area for protecting biodiversity		✓	
B. Potential environmental impacts Will the project cause...		✓	
Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		✓	Not applicable. Construction works will be on existing roads and bridges in built-up areas of Pirojpur.
Encroachment on precious ecology (e.g. sensitive or protected areas)?		✓	Not applicable. There are no protected areas in or around subproject sites, and no known areas of ecological interest in Pirojpur.
Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	✓		Excavations 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.
Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	✓		Due to excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	✓		Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?		✓	Not applicable. Construction will not involve use explosives and chemicals. Excavation will be done manually. Construction contractors will be required to implement health and safety (H&S) plan.
Noise and vibration due to blasting and other civil works?	✓		Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
Dislocation or involuntary resettlement of people?		✓	Not applicable. Land acquisition and resettlement are not required for the subproject.
Dislocation and compulsory resettlement of people living in right-of-way?		✓	Not applicable. There are no encroachers or residential/commercial structures in the ROWs

Screening questions	Yes	No	Remarks
Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?		✓	Not applicable.
Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		✓	Not applicable.
Hazardous driving conditions where construction interferes with pre-existing roads?		✓	Road closures are not required. Construction contractors will be required to implement traffic management plan and coordinate with Pirojpur local authority.
Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI and HIV/AIDS) from workers to local populations?		✓	Construction contractors will be required to provide sanitation facilities and ensure proper waste management at all times. Contracts will include provisions on STI and HIV/AIDS.
Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		✓	Construction contractors will be required to ensure cleanliness at all times to prevent breeding of mosquitoes and rodents.
Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?		✓	Not applicable.
Increased noise and air pollution resulting from traffic volume?		✓	Not anticipated.
Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		✓	Not anticipated.
Social conflicts if workers from other regions or countries are hired?		✓	Priority in employment will be given to local residents.
Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Improved management systems through capacity building and institutional development will ensure reduced burden on services and infrastructure.
Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	Not applicable. Construction will not involve use of explosives and chemicals.
Community safety risks due to both accidental and natural causes, 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.

<u>Climate Change and Disaster Risk Questions</u>	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
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 Pirojpur 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, including: (i) road level rise as required; (ii) increase of bitumen carpeting thickness; (iii) proper compaction; (iv) prefer cement concrete (CC) pavement where there are threats of inundation; (v) temperature reinforcement in CC pavement where there are threats of inundation; (vi) cross-drains as required; (vii) for CC roads, guide wall to protect erosion and sliding; and (viii) turf and tree plantation along the roads.
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		✓	Proposed project will not impact any

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)?			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 10,00,00,000	Tk. 10,000	-Do-

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

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224

(1)	(2)	(3)
(e) Between Tk. 10,00,000 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.

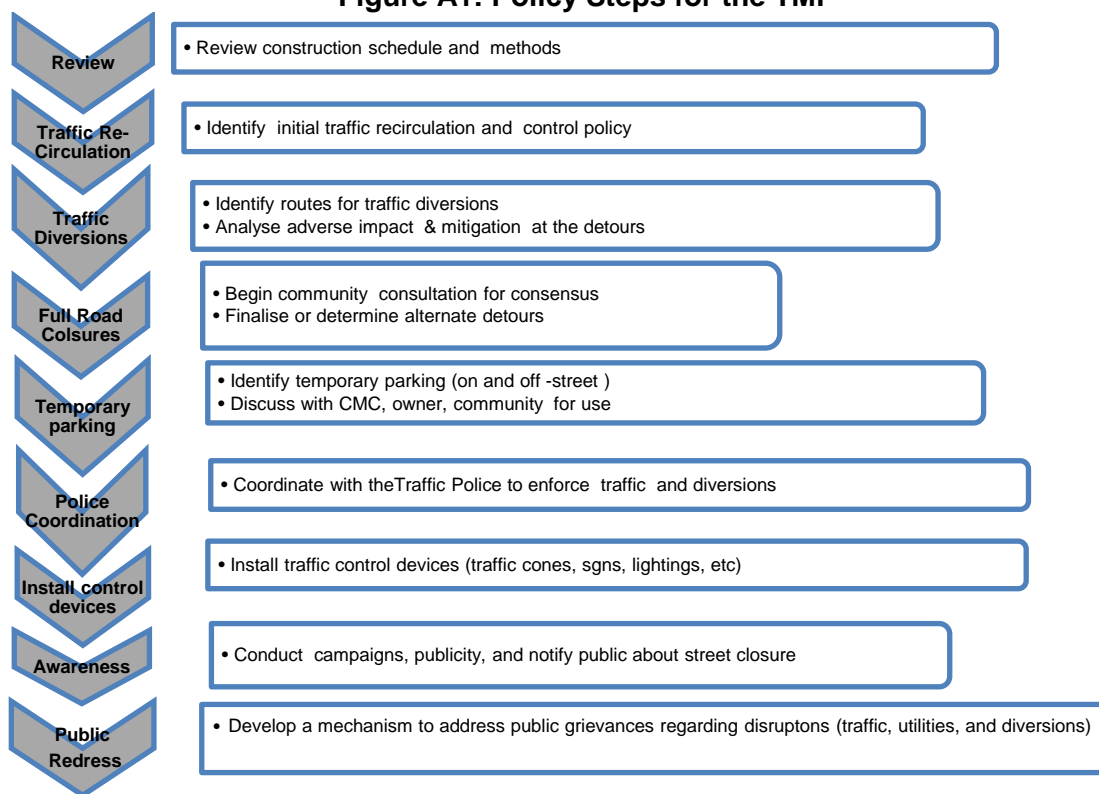
C. Analyze the impact due to street closure

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

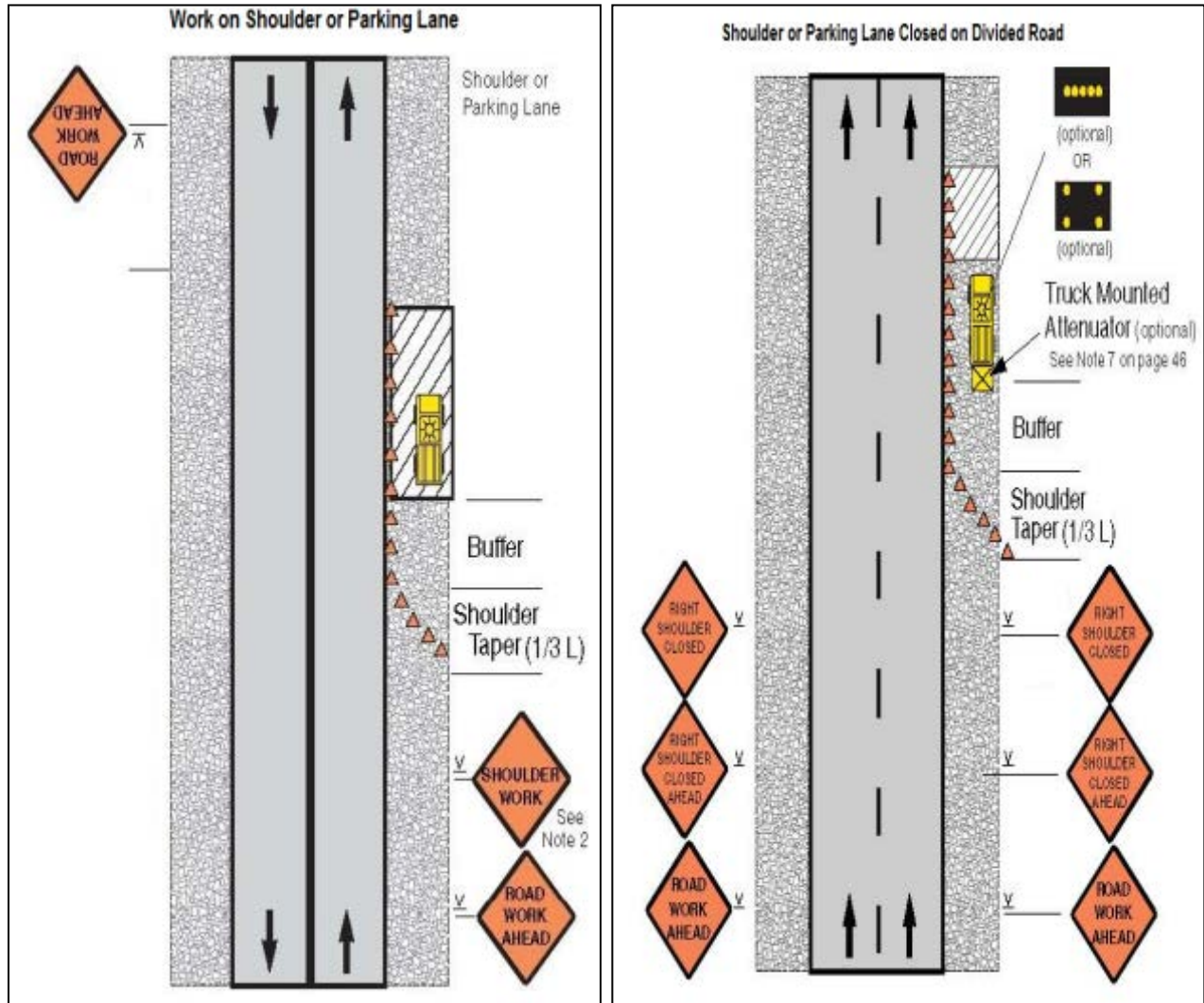


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

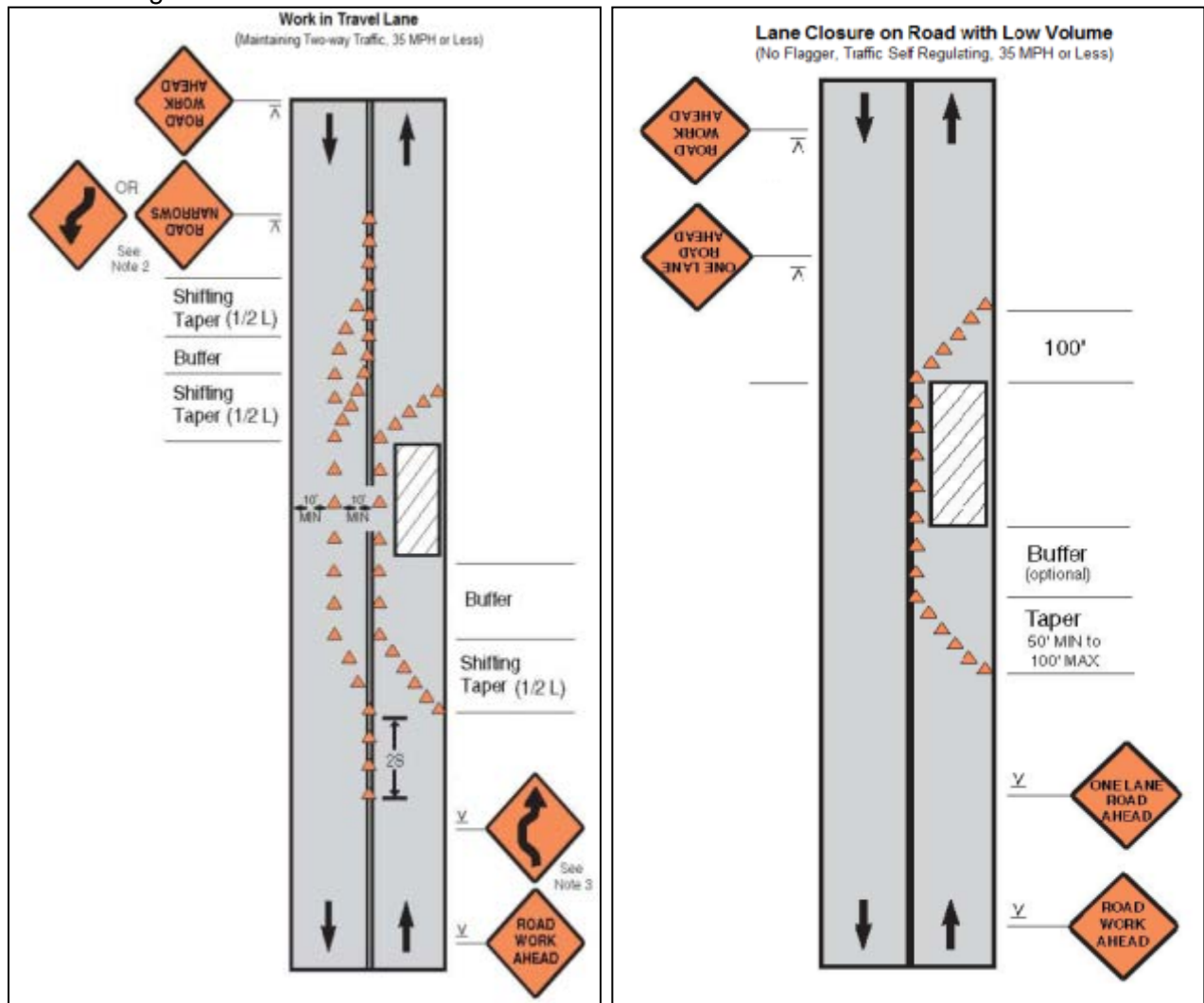


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

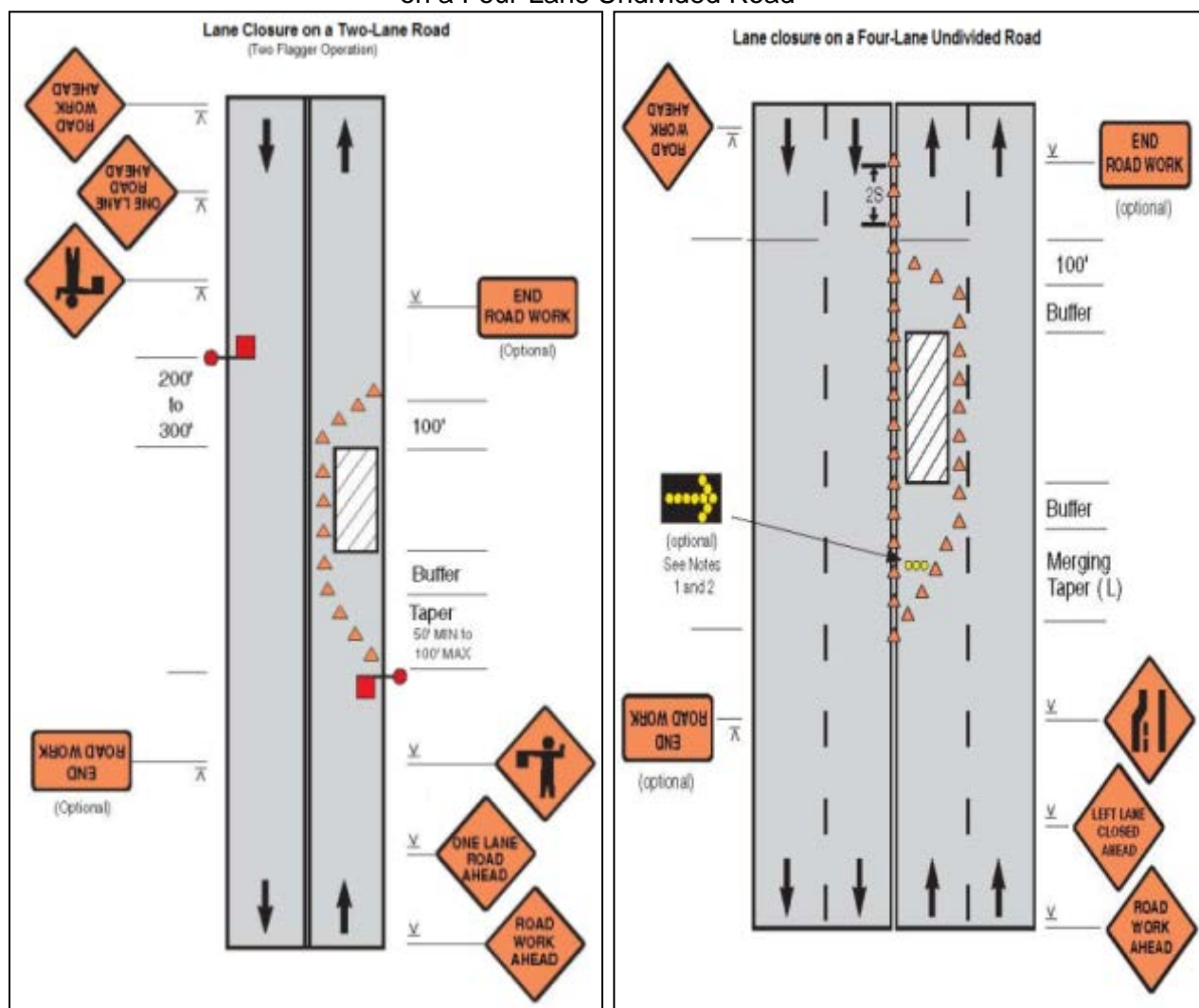


Figure A10 & A11: Lane Closure in Divided Roadway & Half Road Closure On Multi-Lane Roadway

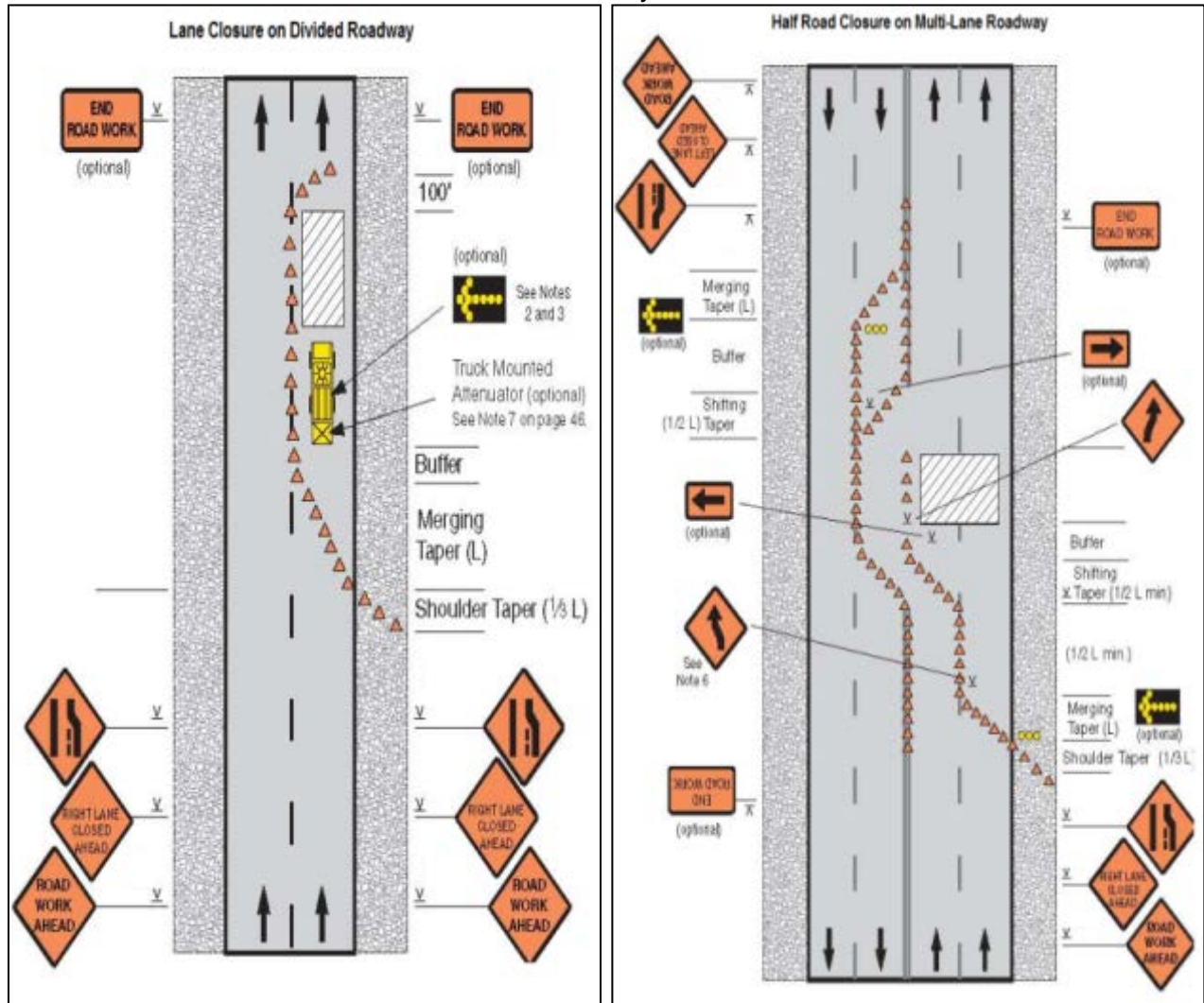
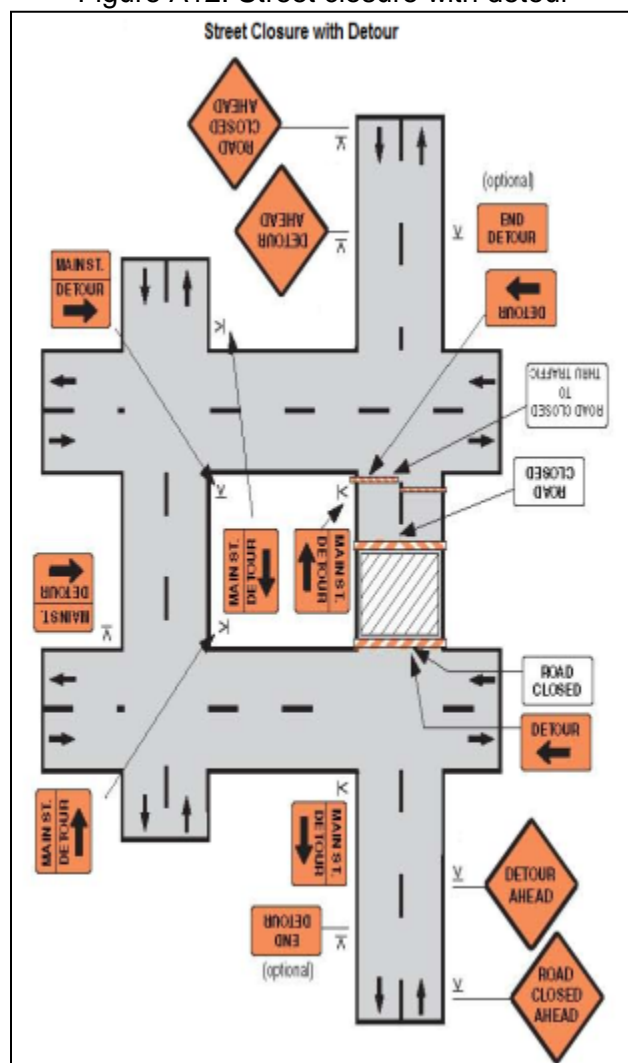


Figure A12: Street closure with detour



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 subproject components as per 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 Environmental Infrastructure Project (CTEIP) 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 ecological sensitive areas or within reserved locations.
- Finally, the DG assures providing every cooperation relating to environmental clearance.

FGD Summaries-Bridge Pirojpur Pourashava

SL No.	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	Bridge/ Roads/ Drainages	05-July 2013	Near Firoj Howlader House, Ward No-6- Pirojpur Pourashava	M=11 F=4 T=15	No resettlement issues there	Site selection is perfect maintain by Pourashava	Provide RCC Box culvert Provide railing both side of the bridge with electric post for lighting at night.	They will cooperate to built this bridge
2	Bridge/ Roads/ Drainages	09-July 2013	Near Shakil Khan's House, Ward No-8- Pirojpur Pourashava	M=16 F=0 T=16	No resettlement issues there	maintain by Pourashava	Provide railing both side of the bridge with electric post for lighting at night..	They will cooperate to built this bridge
3	Bridge/ Roads/ Drainages	09-July 2013	Near Shahjahan Khan's House, Ward No-8- Pirojpur Pourashava	M=12 F=3 T=15	No resettlement issues there	maintain by Pourashava	Provide railing both side of the bridge with electric post for lighting at night..	They will cooperate to built this bridge
4	Bridge/ Roads/ Drainages	10 July 2013	Over Varani Khal, connection between ward no 6 and 8,	M=15 F=0 T=15	No resettlement issue during construction period a	maintain by Pourashava/local committee	Provide railing both side of the bridge with electric post for lighting at	They will cooperate to built this bridge

SL No.	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
			Ward No-6- Pirojpur Pourashava		temporary bamboo bridge to be provided		night..	

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

Photograph



FGD Near Piroj Halder House



FGD Near Shakil Khan House



FGD Near Shajahan Khan House

**FGD Varani Khal****PARTICIPANTS LIST****Focus Group Discussion-CTIIP****List of Participants**

Town: Pirojpur Pourashava

Location: Near Firoj Howlader's House, Ward No: 6

Meeting Place: Firoj Howlader's House

Date: 05-07-2013

Time: 11.00 am

Sl.No	Name	Occupation
1	Md. Firoj Howlader	Business
2	Md. Nasir Akand	Service
3	Md. Mohashin Howlader	Business
4	Md. Razzak Howlader	Service
5	Md. Zakir Howlader	Service
6	Md. Yunus Sheikh	Agriculture
7	Md. Tofazzal Sharif	Service
8	Md. Siraj Khan	Service
9	Md. Saidul Sheikh	Service
10	Md. Nizam Howlader	Service
11	Most. Fatema Begom	Housewife
12	Most. Shiopi Begom	Housewife
13	Most. Dali Akhter	Housewife
14	Most. Madhuri	Housewife
15	Md. Badsha Sheikh	Agriculture

Focus Group Discussion-CTIIP**List of Participants**

Town: Pirojpur Pourashava

Location: Near Shakil Khan's House, Ward No: 8

Meeting Place: House of Aminul Islam

Date: 09-07-2013

Time: 4.00 pm

Sl.No	Name	Occupation
1	Md. Aminul Islam	Business
2	Abdul Khaleque Sheikh	Business
3	Md. Jahangir Hossain	Rickshaw Puller
4	Md. Pervej Khan	Business
5	Shahjahan Sheikh	Business
6	Md. Zakir Hossain	Business
7	Md. Shajahan Howlader	Social worker
8	Md. Abdullah Al Wadud	Service
9	Md. Ruhul Amin	Business
10	Md. Mostaq Ahmed	Service
11	Md. Touhidul Islam	Student

Sl.No	Name	Occupation
12	Md. Sirajul Islam	Student
13	Md. Faizullah	Student
14	Md. Musa	Student
15	Md. Ilias Ahmed	Business
16	Md. Touhidul Islam	Business

Focus Group Discussion-CTIIP

List of Participants

Town: Pirojpur Pourashava

Location: Near Shahjahan Khan House, Ward No: 8

Meeting Place: Shahjahan Khan House

Date: 09-07-2013

Time: 11.30 am

Sl.No	Name	Occupation
1	Md. Saiful Islam	Business
2	Md. Mezbah	Daily labor
3	Kazal Begom	Housewife
4	Rina Begom	Housewife
5	Md. Mobarok	Daily labor
6	Md. Faruk	Service
7	Abdur Razzak	Daily labor
8	Md. Touhidul Islam	Business
9	Md. Monjurul Kader	Service
10	Rekha Begom	Housewife
11	Md. Al Amin	Service
12	Md. Zihad	Business
13	Md. Hasan	Business
14	Md. Baizid	Business
15	Md. Shovan	Business

Focus Group Discussion-CTIIP

List of Participants

Town: Pirojpur Pourashava

Location: **Over Varani Khal connection between ward no 6 and 8**, Ward No: 6

Meeting Place: Vijora Rickshaw stand

Date: 10-07-2013

Time: 4.00 pm

Sl.No	Name	Occupation
1	Md. Chand Mia	Daily Labor
2	Md. Nizam	Daily Labor
3	Md. Badal Shen	Business
4	Md. Jalil Sheikh	Business
5	Md. Imus	Daily Labor
6	Md. Hemayet Ali Sheikh	Service
7	Abdul Mannan Kazi	Business
8	Md. Dulal Howlader	Business
9	Md. Anwarul Kabir	Social worker
10	Md. Alamgir Hossain	Service
11	Md. Harun Sheikh	Business
12	Md. Emdadul Sikder	Business
13	Md. Haidul Howlader	Agriculture
14	Md. Monir Mollik	Daily Labor
15	Md. Kalam Sikder	Service

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	<input type="checkbox"/> * Male <input type="checkbox"/> * Female	Age	
Home Address					
Place					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where, and how) of your grievance below:					
If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of Official Registering Grievance)	
Mode of Communication: <input type="checkbox"/> Note/Letter <input type="checkbox"/> E-mail <input type="checkbox"/> Verbal/Telephonic	
Reviewed by: (Names/Positions of Officials Reviewing Grievance)	
Action Taken:	
Whether Action Taken Disclosed:	<input type="checkbox"/> Yes <input type="checkbox"/> 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		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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:

- What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
- If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
- 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;
- Are there designated areas for concrete works, and refueling;
- Are there spill kits on site and if there are site procedure for handling emergencies;
- 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

Draft Initial Environmental Examination

October 2013

BAN: Coastal Towns Environmental Infrastructure
Project – Pirojpur Roads and Bridges

Prepared by the Local Government Engineering Department, 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

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	affected person
CTEIP	–	Coastal Towns Environmental Infrastructure Project
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

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

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

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CONTENTS

I.	INTRODUCTION	1
II.	POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK	1
	A. ADB Policy	1
	B. National Laws	2
	C. Government of Bangladesh Environmental Assessment Procedures	3
III.	DESCRIPTION OF THE PROJECT	4
	A. The Study Area	4
	B. Existing Condition and Need for the Project	5
	C. Proposed Components	5
	D. Implementation Schedule	7
IV.	DESCRIPTION OF THE ENVIRONMENT	14
	A. Methodology Used for the Baseline Study	14
	B. Physical Characteristics	14
	C. Biological Characteristics	15
	D. Socioeconomic Characteristics	15
	E. Historical, Cultural and Archaeological Characteristics	16
V.	ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS	16
	A. Methodology	16
	B. Screening Out Areas of No Significant Impact	16
	C. Anticipated Impacts and Mitigation Measures – Planning and Design Phase	18
	D. Anticipated Impacts and Mitigation Measures – Construction Phase	19
	E. Anticipated Impacts and Mitigation Measures – Operations and Maintenance Phase	25
	F. Cumulative Impact Assessment	27
VI.	INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION	29
	A. Public Consultation Conducted	29
	B. Future Consultation and Disclosure	29
VII.	GRIEVANCE REDRESS MECHANISM	30
VIII.	ENVIRONMENTAL MANAGEMENT PLAN	33
	A. Safeguard Implementation Arrangement	33
	B. Institutional Capacity Development Program	61
	C. Staffing Requirement and Budget	61
IX.	MONITORING AND REPORTING	64
X.	CONCLUSION AND RECOMMENDATIONS	65

LIST OF TABLES:

Table 1: Applicable Government of Bangladesh Environmental Legislations	2
Table 2: Likely Government of Bangladesh Classification of Pirojpur Roads and bridges subproject	4
Table 3: Existing Road Conditions in Pirojpur	5
Table 4: Basic Data on Proposed Roads in Pirojpur	6
Table 5: Basic Data on Proposed Bridges in Pirojpur	7
Table 6: Details of Proposed Roads in Pirojpur	9
Table 7: Population of Pirojpur Pourashava	15
Table 8: Fields in Which the Subproject Is Not Expected to have Significant Impacts	17
Table 9: Possible Actions to Mitigate against Projected Effects of Climate Change and Improve Climate Resilience for Roads and Bridges	18
Table 10: Anticipated Impacts and Mitigation Measures – Construction Phase	19
Table 11: Anticipated Impacts and Mitigation Measures – O&M Phase	25
Table 12: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase	36
Table 13: Environmental Management and Monitoring Plan – O&M Phase	55
Table 14: Training Program for Environmental Management	61
Table 15: Indicative Cost of EMP Implementation	62

LIST OF FIGURES:

Figure 1: Location Map.....	8
Figure 2: Proposed Works in Pirojpur Pourashava	11
Figure 3: Typical Section of Bitumous Carperiting (BC) Road	12
Figure 4: Typical Section of Reinforced Concrete Cement (RCC) Road	13
Figure 5: Grievance Redress Process	32
Figure 6: Safeguards Implementation Arrangement	35

LIST OF APPENDICES:

Appendix 1: Rapid Environmental Assessment Checklist	67
Appendix 2: Environmental Standards and Application Fees.....	70
Appendix 3: Levels of Service for Proposed Interventions – Roads and Bridges	72
Appendix 4: Sample Outline Spoils Management Plan	73
Appendix 5: Sample Outline Traffic Management Plan.....	74
Appendix 6: Records of Public Consultations and FGDs	84
Appendix 7: Sample Grievance Registration Form	89
Appendix 8: Sample Semi-Annual Reporting Format.....	90

EXECUTIVE SUMMARY

1. The Coastal Towns Environmental Infrastructure 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 change 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. Pirojpur roads and bridges subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical for drainage and flood control. 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 roads (Appendix 1) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Pirojpur roads and bridges 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 "Orange-B" 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) rehabilitation of 17 existing roads totalling 17 kilometers (km) (ii) 16.92 km earthen channel; and (ii) rehabilitation of 4 bridges totalling 38 meters (m).

7. **Implementation Arrangements.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing

Agencies of the project. The Local Government Engineering Department (LGED) is the lead executing agency (EA), and the Department of Public Health Engineering (DPHE) is the co-executing agency (for water supply and sanitation components).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 teams² 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 Pirojpur 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. 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. There are no forest areas within or near Pirojpur.

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 the Pirojpur roads and bridges subproject are: (i) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (ii) prioritizing rehabilitation over new construction, using vacant government land and right of way (ROW), and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts; (iii) avoiding where possible locations that will result in destruction/disturbance to historical and cultural places/values; (iv) avoiding tree-cutting where possible; (v) 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 Pirojpur roads and bridges subproject, including: (i) road level rise as required; (ii) increase of bitumen carpeting thickness; (iii) proper compaction; (iv) prefer cement concrete (CC) pavement where there are threats of inundation; (v)

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).

temperature reinforcement in CC pavement where there are threats of inundation; (vi) cross-drains as required; (vii) for CC roads, guide wall to protect erosion and sliding; and (vii) turf and tree plantation along the roads. 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. During the construction phase, impacts mainly arise from (i) disturbance of residents, businesses, and traffic; (ii) need to manage excess construction materials and spoils; (iii) community and workers health and safety. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Measures such as conducting work in lean season and minimizing inconvenience by best construction methods will be employed. Traffic management will be necessary during excavation works on busy roads. 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.

13. 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.

14. **Consultation, Disclosure and Grievance Redress.** The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB, 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.

15. **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.

16. **Conclusions and Recommendations.** The citizens of Pirojpur will be the major beneficiaries of this subproject. With the improved roads and bridges, 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. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Pirojpur 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.

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 Environmental Infrastructure 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 change 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. Pirojpur roads and bridges subproject is one of the subprojects proposed under Performance Criteria Stage I which is considered critical for drainage and flood control. 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

4. 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.

5. **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.

6. **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.

7. **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

8. 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).

9. 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 presents specific requirements for the subproject. 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 and amendments in 2000, 2002 and 2010 ¹	- Restriction on operation and process, which can be continued or cannot be initiated in the ecologically	The provisions of the act apply to the entire subproject in the construction and operation and maintenance

¹ ECA Amendment 2000 focuses on ascertaining responsibility for compensation in cases of damage to ecosystems,

	Legislation	Requirements for the Project	Relevance
		critical areas - Regulation on vehicles emitting smoke harmful to the environment - Remedial measures for injuries to ecosystems - Standards for quality of air, water, noise and soil for different areas for various purposes and limits for discharging and emitting waste - Environmental guidelines	(O&M) phases.
2.	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	- Environmental clearances - Compliance to environmental quality standards	The subproject is categorized as Orange-B and requires LCC and 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. - enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change	Considered in subproject preparation.
5.	Bangladesh Labor Law of 2006	- Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement - Prohibition of employment of children and adolescent	The provisions of the act apply to the entire subproject in the construction and O&M phases. Provides for safety of workforce during construction phase.

C. Government of Bangladesh Environmental Assessment Procedures

10. 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).

11. 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.

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.

Table 1: Likely Government of Bangladesh Classification of Pirojpur Roads and bridges subproject

	Subproject	Component	Equivalent in Schedule I of ECR	DoE Classification
1.	Roads, bridges and culverts	Road provisions (include new road, road resurfacing, roadside footpath, roadside drains, road signs, road/pavement markings, intersection improvement, or high mast lighting)	Construction, re-construction and extension of road (feeder road, local road)	Orange – B
		Bridges	Construction, re-construction and extension of bridge (length below 100 meters)	Orange – B
			Construction, re-construction and extension of bridge (length above 100 meters)	Red
		Culverts	No similar facility	Orange – B (because impacts likely to be similar to roads and bridges less than 100 m)

12. Rule 7 of the ECR indicates that the application for ECC must be made to the relevant DoE Divisional Officer, and the application for Orange-B 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;
- (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).

13. Under the ECR DoE has 30 days to respond to receipt of the ECC application for an Orange-B category project.

III. DESCRIPTION OF THE PROJECT

A. The Study Area

14. Pirojpur pourashava consists of 9 wards, 30 *mahallas* and 23 *mouzas*. It is located between 22°23' and 22°42' north and between 89°52' and 90°03' east. It has an area of 29.46 km² within the center of Pirojpur upazila (district) which occupies an area of 166.81 km². The town is about 72 km from the sea; and bordered on the west side by Baleshwar River and to the east and south by Kocha River.

15. The ground elevation in Pirojpur pourashava varies from 0.4 to 4.4 meters (m) above mean sea level. Subproject components are located in Pirojpur 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. The subproject sites are located in existing right of way (RoWs) and government-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Pirojpur. The location map

is shown as Figure 1.

B. Existing Condition and Need for the Project

16. Roads in Pirojpur 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.

17. Typically, most new roads start as earthen roads and are upgraded (raised, widened and surfaced) as funds become available. However, the decisions as to which roads should be upgraded do not seem to be based upon proposed traffic levels as there is little traffic data. In the district center of Pirojpur, road widths are generally adequate for current traffic flows. Existing road conditions in Pirojpur are given in Table 3.

Table 2: Existing Road Conditions in Pirojpur

Town	Length of Road (km)			
	Earthen	BT & CC	HBB	Total
Pirojpur	11.50	72.75	79.25	163.50

Source: PPTA Consultant.

Note: BT = black-topped; CC = cement concrete; HBB = herring bone bond

18. There exists a big canal network in Pirojpur Pourashava and there are many locally built bridges over the canals. These are mainly foot-bridges such as iron-sleeper bridges, wooden bridges (*pul*) and bamboo bridges (*sako*). Vehicles cannot move over these bridges.

C. Proposed Components

17. Investments under this subproject include (i) rehabilitation of 17 existing roads totalling 17 kilometers (km) (ii) 16.92 km earthen channel; and (ii) rehabilitation of 4 bridges totalling 38 meters (m).

1. Roads

19. Roads to be rehabilitated under the subproject are considered using the following factors: (i) leading to existing and planned cyclone shelters, or any other establishment used as a shelter during disasters; (ii) used for key public safety and health care facilities for post-disaster response; (iii) critical for emergency evacuation during disasters; (iv) access for emergency services, and provision of post-disaster recovery and reconstruction goods (relief workers, food, medical supplies, etc.); (v) contributing to flood defenses and vulnerable areas; (vi) frequently inundated due to floods; and (vii) serving slum areas. The identified roads were finalized through the workshop organized in the pourashava in the presence of the mayor, councilors, engineers, PPTA team and invited officials from relevant organizations.

20. To accommodate climate change related inundation and storm surges, each road was assessed against whether: (i) existing crest level is 600 millimeters (mm) above existing normal flood level; (ii) embankments are protected against surges; and (iii) drainage is adequate to accommodate storm flows. Appendix 3 outlines proposed standards and additional climate

change measures for level of service for proposed roads and bridges.

21. The major considerations adopted for preliminary design were as follows: (i) LGED's road design manual and standards followed. The road design type 6 for bituminous carpeting (BC) pavement was considered, with some modifications; (ii) guidelines on climate change resilience and adaptation measures (Appendix 3) were studied and accommodated as necessary; and (iii) existing bitumen finished surface (BFS)/HBB roads were considered for improvement with reinforced cement concrete (RCC) pavement in most cases as suitable, with modified design standard. The thickness of BC was taken as 40 mm instead of 25 mm as generally practiced. Other climate change resilience and adaptation measures were considered as required/applicable for roads (BC/RCC) like (i) turf, grass/shrub, tree plantation, side protection works, rise of road level, shoulder/footpath, cross-drain, etc., and (ii) brick masonry guide wall on the edge of RCC pavement. Basic data on the proposed roads and related works in Pirojpur pourashava are shown on Table 4. Details are given in Table 6.

Table 3: Basic Data on Proposed Roads in Pirojpur

	Item	Unit	Qty
1.0	Roads		
1.1	Number of road	No.	17
1.2	Length of road	Km	34.20
1.3	BC pavement, length	Km	11.60
1.4	RCC pavement, length	Km	22.60
1.5	Width ranges	m	3.0 to 3.7
1.6	Total pavement area	m ²	110,300
1.7	BC pavement area	m ²	40,050
1.8	RCC pavement area	m ²	70,250
2.0	Related works		
2.1	Road side drain	Km	4.60
2.2	Cross-drain /Culvert	No.	39
2.3	Side protection works	m	4.30
2.4	Tree plantation	No.	4,300
2.5	Rise of road (average)	m	0.30

Source: PPTA Consultant.

Note: BC = bituminous carpeting; RCC = reinforced concrete cement

2. Bridges

22. Bridges to be repaired, reconstructed, upgraded or relocated are considered using the following factors: (i) bridges that are part of roads which are selected for Stage 1 investment, and are critical for emergency evacuation during disasters; (ii) physical condition and type of existing bridge; (iii) number of population that will be served; (iv) type and quantity of vehicles that will be served by the proposed bridge; and (v) economic growth will be enhanced by the bridge.

23. The key proposed climate resilience measures associated with bridges interventions are: (i) maintain rise of deck slab of bridge and pile length needed to be increased; (ii) ensure proper compaction and hard shoulder in approaches; and (iii) guide wall at tow of approaches to protect erosion of approaches. Approach roads of bridges will be protected by providing proper compaction, hard shoulder and guide-wall at tow of approaches. Inundation of bridges will be avoided by considering future sea levels appropriately. Bridge piles will be increased at the top and will be designed as required.

24. A few sites of existing risky foot-bridges were identified with the assistance of

pourashava engineers and councilors. Four small bridges on the proposed roads were finally selected adopting the selection criteria. Details of the proposed bridges in Pirojpur pourashava are shown in Table 5.

Table 4: Basic Data on Proposed Bridges in Pirojpur

	Name, Location,	Present Condition	Required Length (m)	Required width
1.	Bridge on proposed road near Kuddus Mia's house. Road: Vijora road, from R&H road (near Vijora Govt. primary School) to Mathkhola. Ward # 6.	Iron sleeper bridge. Damaged and risky.	10	5.5
2.	Bridge on proposed road near Feroj Howladar's house. Road: Vijora road, from R&H road (near Vijora Govt. primary School) to Mathkhola. Ward # 6.	Iron sleeper bridge. Damaged and risky.	10	5.5
3.	Bridge on P/road near Shakil Khan's house. Road : Masimpur main road from R&H road Sargicare (in front) towards Yasin Khal Pul towards west side Jubo Unnayan to bypass road. Ward #8.	Iron sleeper bridge. Damaged and risky.	8	5.5
4.	Bridge on P/road near X-Councilor Shajahan Sk's house. Road : Masimpur Varani khal road from Baro Pul to Molla Bari Pul at east side. Ward #8.	Iron sleeper bridge. Damaged and risky.	10	5.5
	Total		38	

D. Implementation Schedule

25. 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

Table 5: Details of Proposed Roads in Pirojpur

	Name of Road with Ward No.	Existing Feature	Length (m)	W (m)	S/FP (m)	Rise (m)	SD (m)	SP (m)	Culvert No.	TP No.	Type
1	Masimpur main road from R&H road Sargicare (in front) towards Yasin Khal Pul towards west side Jubo Unnayan to bypass road. Ward No. 8.	Type = BC W = 2.50 to 3.00m Poor condition.	2,100	3.00	0	0.45	0	600	3	500	BC road
2	Balaka Club to Sargicare hospital via Modho Pirojpur Govt. P /School (Masid bari road). Ward No. 7	Type = BC W = 3.00 to 3.50m Poor condition.	1,500	3.70	0	0.3	300	200	1	0	BC road.
3	South Sikarpur Muslimpara road. Ward No. 4.	Type = CC/BFS W = 2.00 to 2.44m.	1,500	3.70	0	0.30	1,000	0	2	0	RCC road.
4	Narkahli road from, Baro Khalisha khali road to Jalil Sk house via Narkhali Govt. Primary School. Ward No. 3.	Type = BFS Earthen W=2.44 to 3.00m	3,000	3.00	0	0.30	0	200	3	100	RCC road.
5	Sadhona Bridge to Shaik Bari Mosque via Basontopol. Ward No.5.	Type = BC W = 3.00 to 3.50m.	1,000	3.70	0	0.45	600	0	0		BC road.
6	Vijora road, from R&H road (near Vijora Govt. Primary School) to Mathkhola via Modho Namajpur Govt. P/School. Ward No. 6.	Type = BFS W = 2.44 to 3.00m Poor condition.	4,000	3.00	0	0.30	0	400	4	800	RCC road.
7	Masimpur Varani khal road from Baro Pul to Molla Bari Pul at east side. Ward No. 8.	Type = BC W = 3.00 to 3.50m.	2,000	3.00	0	0.3	0	400	0	400	BC road.
8	Baneshwar pur - Kumirmara road, from Baneshwarpur Govt. P/School to RHD road via Kumirmara Govt. P/School. Ward No. 9.	Type = BFS W = 2.50 to 3.00m Poor condition.	1,800	3.00	0	0.3	0	400	4	400	RCC road.
9	Apar circular Branch road, Moddo road from Shahid Bidhan road to bypass road. Ward No.5	Type = BC W = 3.00 to 3.50m Poor condition.	1,100	3.70	0	0.30	1,500	0	0	0	BC road.
10	Muktarkati road from Pirojpur -Nazirpur road to Nima bridge via water supply road. Ward Nos. 1 and 4	Type = BFS W = 3.00 to 3.50m.	4,200	3.00	0	0.30	0	400	3	800	RCC road.
11	Jhatokati road Sahebpara road to Sunil Dakua's house. (Left side canal). Ward No. 2.	Type = BC W = 3.00 to 3.50m	1,200	3.70	0	0.30	0	300	2	0	BC road.
12	Pirojpur -Nazirpur R&H road to Police line via Kanak Thakur's house. Ward No. 2.	Type = BFS W = 2.44 to 3.00m.	2,000	3.70	0	0.60	0	300	3	400	RCC road.
13	Narkahli Mallik bari to Molla bari and Kalam Sk house. Ward No. 3.	Type = BFS Earthen W = 2.5 to 3m	2,000	3.00	0	0.30	0	300	4	100	RCC road.
14	West Sikarpur road from Palpara –Razarhat road near Amjed Bekari to Jaydebi tala with Maddo Sikarpur road in front of Uttarpara Govt. Primary School. Ward No. 4.	Type = BC W = 3.00 to 3.7m Poor condition.	2,700	3.70	0	0.00	1,200	200	4	0	BC road.
15	Ranipur Branch road from Ranipur BC Road Pourashava last to Bekutia-RHD road via	Type = BFS W = 2.50 to 3.00m	900	3.00	0	0.3	0	200	3	200	RCC road.

	Name of Road with Ward No.	Existing Feature	Length (m)	W (m)	S/FP (m)	Rise (m)	SD (m)	SP (m)	Culvert No.	TP No.	Type
	Sorab Hossain master's house. Ward No. 9.	Poor condition.									
16	Brammonkati road, from Pirojpur –Nazirpur BC road to Mozahar Mia's house via Misu Councilor's house. Ward No. 1.	Type = BFS W = 3.00 to 3.50m Poor condition.	700	3.00	0	0.30	0	0	0	200	RCC road.
17	Vijora road, from R&H road (near Boropul) to Vijora Krinhnachura via Skdar bari. Ward No. 6.	Type = BFS W = 2.44 to 3.00m	2,500	3.00	0	0.30	0	400	3	400	RCC road.
	Total		34,200				4,600	4,300	39	4,300	

Source: PPTA Consultants

Note: L = length; W = width; S /FP = shoulder/footpath; SD = side drain; SP = side protection; TP = tree plantation; BC = bituminous carpeting; BFS = bitumen finished surface; CC = concrete cement; RCC = reinforced cement concrete

Figure 2: Proposed Works in Pirojpur Pourashava

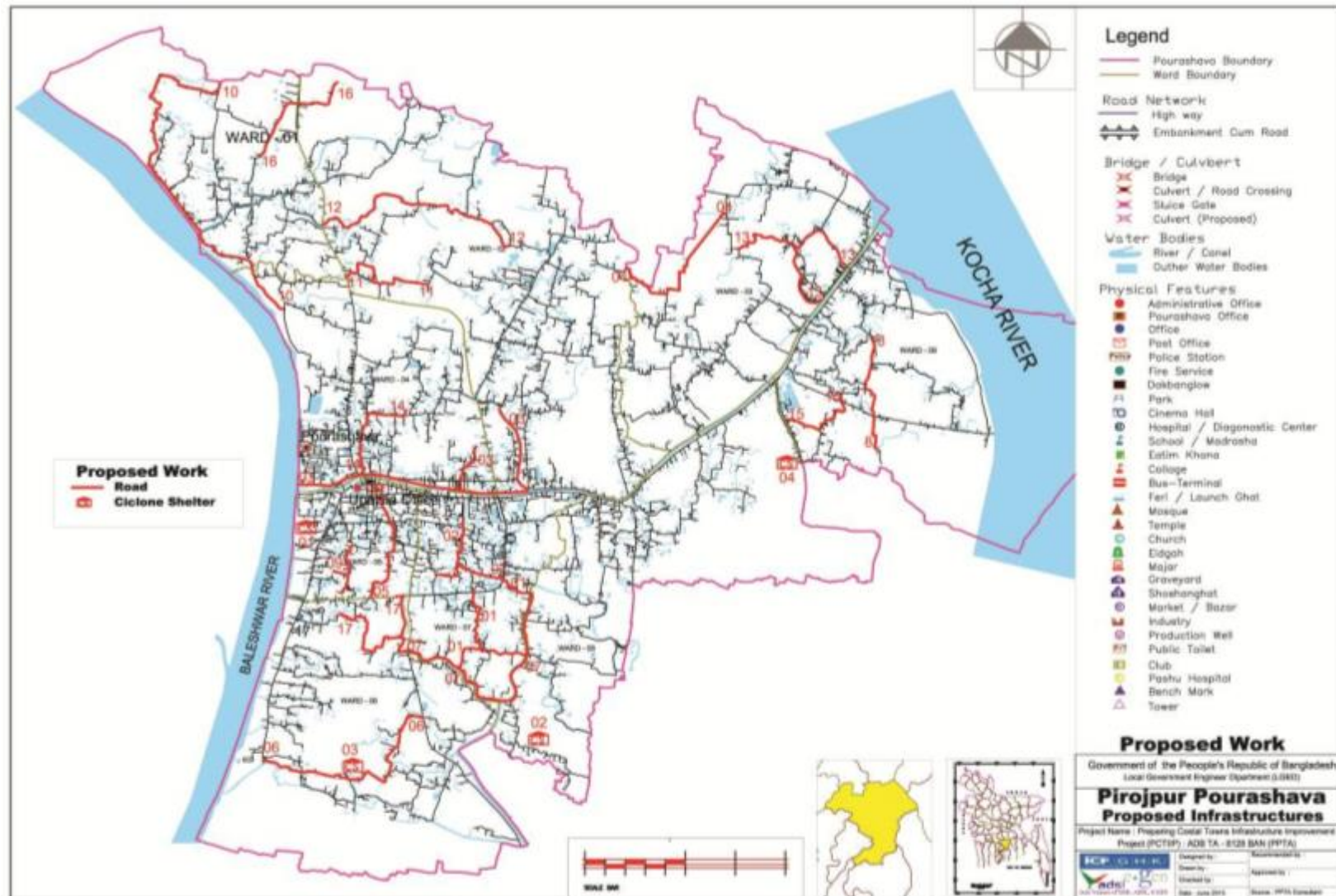


Figure 3: Typical Section of Bituminous Carpeting (BC) Road

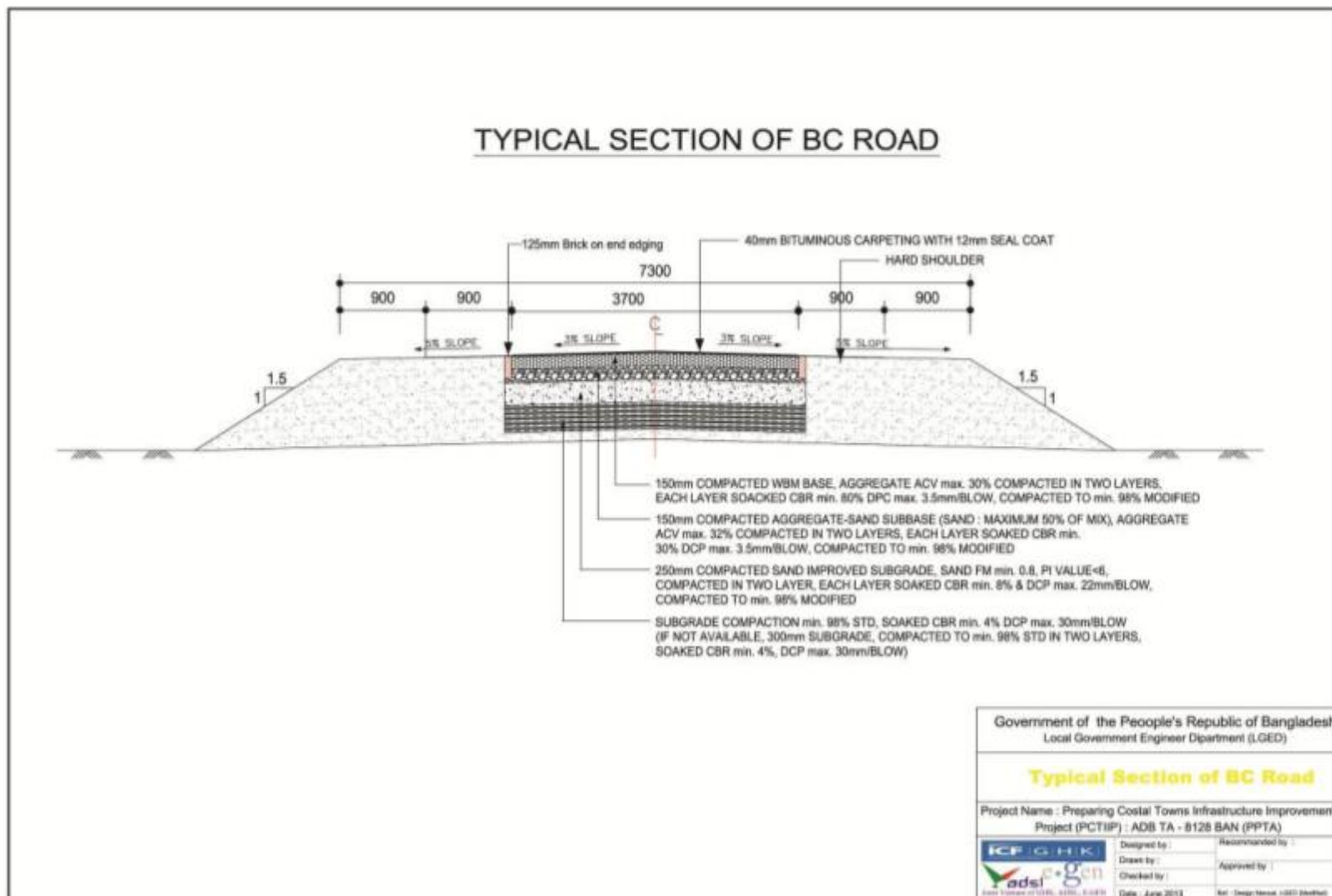
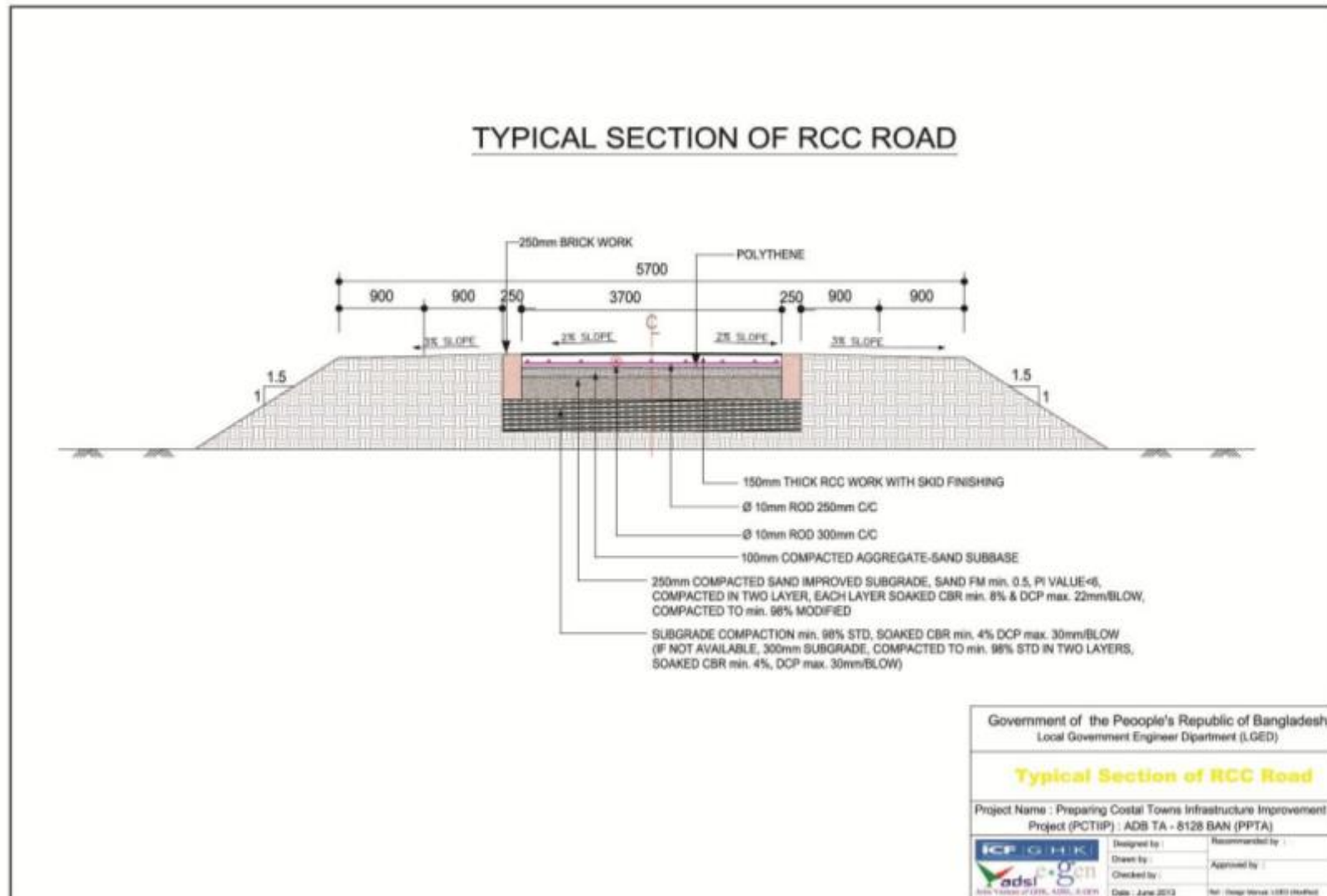


Figure 4: Typical Section of Reinforced Concrete Cement (RCC) Road



IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for the Baseline Study

26. **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 Pirojpur 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.

27. Several visits to the subproject sites were made during the CDTA and PPTA stages 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.

28. **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

29. **Topography, landforms, geology and soils.** Pirojpur pourashava, with an area of 29.46 km². A topographic and physical feature survey of the pourashava was undertaken by Sheltech consultants in 2010 to 2011. According to that survey, the lowest spot height is 0.4 m and the highest is 4.00 m with an average ground level of 1.86 m. The physical feature survey showed that there are about 16.3 hectares of roads. There are 189 bridges, 181 box culverts and 20 pipe culverts. Approximately 11% of the Pourashava area is ponds, ditches and *khals*.

30. **Climatic conditions.** Pirojpur has a tropical monsoon-type climate.. January is the coolest month with temperatures averaging near 26 °C (78 °F) and April the warmest with temperatures from 33 to 36 °C (91 to 96 °F). 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). Pirojpur 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.

31. **Water quality.** The town is bordered on the west side by the Baleshwar River and to the east and south by the Kocha River.

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

33. **Acoustic environment.** Subproject components are in the built-up part of Pirojpur, 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

34. **Flora and fauna.** Subproject components are located in Pirojpur 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.

35. **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

36. **Area and population.** lies within the centre of Pirojpur Upazila which occupies an area of 166.81 km². Information about the total number of households, with average size, and population of Pirojpur pourashava is presented in Table 7.

Table 6: Population of Pirojpur Pourashava

	Area (km ²)	Households (nos.)	Population			Average Household Size	Density (per km ²)
			Total	Male	Female		
Pirojpur	29.46	13,646	60,056	30,048	30,008	4.40	2,038
Ward No - 01	4.5	1,311	5,707	2,802	2,905	4.35	1,268
Ward No - 02	2.62	1,369	6,455	3,157	3,302	4.72	2,463
Ward No - 03	4.70	1,023	4,717	2,358	2,359	4.61	1,003
Ward No - 04	1.81	2,548	10,421	5,199	5,222	4.08	5,757
Ward No - 05	2.31	1,687	7,528	3,979	3,549	4.46	3,258
Ward No - 06	3.60	1,330	6,143	3,170	2,973	4.61	1,706
Ward No - 07	1.01	1,665	7,112	3,376	3,736	4.27	7,041
Ward No - 08	2.85	1,490	6,474	3,214	3,260	4.34	2,271
Ward No - 09	6.06	1,223	5,495	2,793	2,702	4.49	906

Source: Bangladesh Bureau of Statistics Community Report, Zilla: Pirojpur, 2011.

37. **Land use.** A land use survey was undertaken by Sheltech Consultants in 2009. The results show that there is predominance of agricultural land use (42%) followed by residential land use (30%) and the rest as commercial, industrial, administrative, educational, places of worship, health, recreational, restricted, transportation, miscellaneous, mixed uses, graveyard, open spaces, and water bodies. The survey clearly shows that the land use pattern reveals significant urbanized land uses. Approximately 11% of the pourashava area is ponds, ditches and khals.

38. **Type of community spread.** Pirojpur is composed of 79.01% Muslim, 20.91% Hindu and 0.08% others. Average literacy is 55.8%.

39. **Existing provisions for pedestrians and other forms of transport.** Pirojpur roads generally fall into two categories: *katcha* (earthen) construction and *pucca* (formed) roads. Formed roads are mainly BT asphalt roads with CC roads in a few places for main roads, while minor roads may also be brick-on-edge soling, known locally as 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. There are about 16.3 ha of roads, 189 bridges, 181 box culverts and 20 pipe culverts in Pirojpur. Management survey results reveal that there is no public or private bus service available for internal movement of passengers at Pirojpur. At present, there is no designated authority for the management of traffic at Pirojpur pourashava, the owners of the transport agencies decide about their routes and manage their traffic.

40. **Socio-economic status.** Main occupations are agriculture (35.3%), agricultural laborer (17.05%), wage laborer (5.71%), commerce (16.2%), service (7.25%), fishing (2.68%), transport (1.64%), construction (1.28%), and others (12.89%). Main crops are paddy, wheat, sugarcane, and betel leaf.

41. **Other existing amenities for community welfare.** Educational institutions in the pourashava include 4 government colleges, 18 non-government colleges, 5 government high schools, 185 non-government high schools, 12 junior schools, 485 government primary schools, 282 non-government primary schools, 188 *madrashas* (any type of religious school or college for the study of the Islamic religion, though this may not be the only subject studied), 4 kindergarten schools, 1 poly technique institute and 7 satellite schools. Health facilities include 2 hospitals, 6 *upazila* health complexes, 42 union health and family planning centre, 1 maternity and child welfare centre, 12 satellite clinics and 53 palli health services clinic.

E. Historical, Cultural and Archaeological Characteristics

42. **Physical and cultural heritage.** There historical places in Pirojpur are the marks of war of liberation, 2 mass killing sites, 1 mass grave and 1 memorial. The archaeological heritage and relics sites are Kumarkhali Kali Mandir, Rayerkati Zamindarbari and Shiva Mandir, two domed mosque (Nesarabad), remnants of Kaurikhara Zamindarbari. Kumarkhali Kali Mandir, Rayerkati Zamindarbari and Shiva Mandir, two domed mosque (Nesarabad), remnants of Kaurikhara Zamindarbari. The subproject components are not located in or near and excavation works will not be conducted in the vicinities of these sites.

V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS

A. Methodology

43. 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 Roads (Appendix 1) and ADB SPS 2009.

B. Screening Out Areas of No Significant Impact

44. From the preliminary design and results of the rapid environmental assessment, it is clear that implementation of Pirojpur drainage and flood control subproject will not have major negative impacts because activities will be localized/site-specific and short in duration, corridors of impact 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 4) thus can be screened out of the assessment

at this stage but will be assessed again during detailed design stage and before implementation.

Table 7: 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 sites along public ROWs.
Climatic conditions	Short-term production of dust is the only effect on atmosphere. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Air quality	Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants (such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. However, impact is short-term, site-specific and within a relatively small area. There are well developed methods for mitigation.
Acoustic environment	Construction activities will be on settlements, along and near schools, and areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. However, the proposed subproject will 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 Pirojpur pourashava will not cause direct impact on biodiversity values. Based on preliminary design 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. Rehabilitation of existing roads and bridges is prioritized over new construction, using vacant government land and right of way (ROW).
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	Subproject components will be located in government land and existing ROWs thus there is no requirement for land acquisition or any resettlements. 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 Pirojpur 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

Field	Rationale
	duration.
D. Historical, Cultural, and Archaeological Characteristics	
Physical and cultural heritage	The subproject components are not located in or near and excavation works will not be conducted in the vicinities of identified historical and sites.

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

45. **Land acquisition and resettlement.** The proposed roads and bridges will be located in public ROWs. There are no encroachers or residential/commercial structures in the ROWs. 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, in addition to the required tree plantation in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract.

46. 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. The subproject will be in properties held by the pourashava and access to the subproject sites is thru public ROW and existing roads hence, land acquisition and encroachment on private property will not occur.

47. The concepts considered in design of the Pirojpur roads and bridges subproject are: (i) locating facilities on government-owned land to avoid the need for land acquisition and relocation of people; (ii) prioritizing rehabilitation over new construction, using vacant government land and right of way (ROW), and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts; (iii) avoiding where possible locations that will result in destruction/disturbance to historical and cultural places/values; (iv) avoiding tree-cutting where possible; (v) 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.

18. Preliminary designs integrate a number of measures (Table 9), both structural and non-structural, to mainstream climate resilience into the Pirojpur roads and bridges subproject, including: (i) road level rise as required; (ii) increase of bitumen carpeting thickness; (iii) proper compaction; (iv) prefer cement concrete (CC) pavement where there are threats of inundation; (v) temperature reinforcement in CC pavement where there are threats of inundation; (vi) cross-drains as required; (vii) for CC roads, guide wall to protect erosion and sliding; and (viii) turf and tree plantation along the roads. 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 8: Possible Actions to Mitigate against Projected Effects of Climate Change and Improve Climate Resilience for Roads and Bridges

		Mitigation Measures
A.	Climate Change Effect	
1.	Increased rainfall quantity and runoff Sea level rise (SLR) Increased frequency of severe cyclones	<ul style="list-style-type: none"> - Improve O&M, organizational capacity, resource allocation, etc. - Work with relevant stakeholders to manage water use and flood discharges more effectively - Improve collection and disposal of solid waste - Control encroachments - Improve public behavior through active and prolonged information, education

		Mitigation Measures
		and communication campaigns to reduce uncontrolled solid waste disposal, encroachments, damage to infrastructure, unregulated development in key areas, etc., supported by enforcement. - Guide wall to protect erosion and sliding for CC roads
B.	Impact Factor	
1.	Construction materials' quality	- Choose most durable materials possible, even if higher cost, e.g. concrete, high quality bricks. - Monitor and control construction quality
2.	Rising temperatures	- Execute works during most favorable times of year and day. - Monitor and control preparing, placing and curing concrete and mortar, to ensure placement, etc., during most favorable times. - Use plain high-quality un-rendered brickwork and high quality cement mortar in preference to rendered low-grade bricks - Use sulphate resisting cement in vulnerable locations (higher heat gain during curing) or cement containing fly ash (less heat gain, so preferred).
3.	Runoff	- Use trapezoidal section side drains with small low-flow section (cunette) for low flows - Line side drains to achieve higher discharge velocities without increasing risk of scour, etc.

Source: PPTA Consultant.

D. Anticipated Impacts and Mitigation Measures – Construction Phase

48. 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.

49. **Construction method.** Trenches will be dug by backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed nearby, and the materials (brought to site on trucks and stored on unused land nearby) will be placed in the trench by crane or using a small rig. The infrastructures will be constructed manually according to design specifications. Any excavated road will be reinstated.

50. 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.

51. 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 Pirojpur 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, Pirojpur roads and bridges 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 10).

Table 9: Anticipated Impacts and Mitigation Measures – Construction Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		

Field	Impacts	Mitigation Measures
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.	<ul style="list-style-type: none"> - Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.
Water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Pirojpur local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to minimize the wastage of water in the construction activities. - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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.	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - 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	<ul style="list-style-type: none"> - Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Pirojpur 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.

Field	Impacts	Mitigation Measures
	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.	<ul style="list-style-type: none"> - Use of high noise generating equipment shall be stopped during night time. - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
Aesthetics	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.	<ul style="list-style-type: none"> - Prepare the Debris Disposal Plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with Pirojpur local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas. Avoid stockpiling of any excess spoils - Suitably dispose of collected materials from drainages, unutilized materials and debris either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. - The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
B. Biological Characteristics		
Biodiversity	Activities being located in the built-up area of Pirojpur pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design there are no trees at the site that need to be removed (to be reassessed during detailed design stage).	<ul style="list-style-type: none"> - 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. - If during detailed design cutting of trees will be required, compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to tree plantation as specified in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during

Field	Impacts	Mitigation Measures
		<p>implementation.</p> <ul style="list-style-type: none"> - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood.
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.	<ul style="list-style-type: none"> - Prepare and implement a Traffic Management Plan (Appendix 5) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Socio-economic status	Subproject components will be located in government land and existing ROWs thus there is no requirement for land acquisition or any resettlements. 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.	<ul style="list-style-type: none"> - Employ at least 50% of labor force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market.
Other existing amenities for 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 Pirojpur 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	<ul style="list-style-type: none"> - Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in Pirojpur (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. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction

Field	Impacts	Mitigation Measures
	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.	<p>starts at the subproject sites.</p> <ul style="list-style-type: none"> - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Pirojpur local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.⁴ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. - The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.
Workers	There is invariably a safety risk	- Comply with requirements of Government of Bangladesh

⁴ 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
health and safety	when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	<p>Labor Law of 2006 and all applicable laws and standards on workers health and safety (H&S).</p> <ul style="list-style-type: none"> - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing H&S training⁵ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to noise level greater than 85 dBA for 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	Pirojpur pourashava was established in 1885. However,	- All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site

⁵ 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
heritage	construction works will be on existing roads and bridges in built-up areas of Pirojpur thus risk for chance finds is low.	shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected.

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

52. In the operations and maintenance (O&M) phase, the roads and bridges will operate with routine maintenance, which should not affect the environment. Routine repairs and unblocking of side drains will be very small in scale, to be conducted manually by small teams of men with simple equipment (shovels, wheelbarrows, etc.) and works will be very short in duration thus will not cause significant physical impacts. Traffic may be interrupted temporarily but this work will be very small in scale, infrequent, and short in duration, so there will be no economic or other implications. 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 Pirojpur local authority, which will be given training by this project.

53. To maintain the safety of workers and road-users, such work should be coordinated with the local police department so that adequate warning signs and traffic diversions can be set up when necessary. Debris/sediments from drainages need to be collected and disposed at a designated site such as the landfill. It is important that the designated disposal site's base is of a non-permeable membrane in order to prevent leachate that can contaminate the soil and groundwater. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 11).

Table 10: Anticipated Impacts and Mitigation Measures – O&M Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Water quality	Run-off from stockpiled debris/sediments from drainages which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Take all precautions to prevent run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along drainage leading to the water bodies. - Remove all debris/sediments immediately. - Dispose debris/sediments at a designated site such as landfill.
Air quality	Moving debris/sediments may create dusts during dry season. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Use tarpaulins to cover soils, sand and other loose material.
Acoustic environment	Temporary increase in noise level and vibrations. The impacts are negative but short-term, site-specific within a relatively small area and	- Plan activities in consultation with Pirojpur 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. - Identify any buildings at risk from vibration damage and

Field	Impacts	Mitigation Measures
	reversible by mitigation measures.	avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
B. Biological Characteristics		
Biodiversity	Activities in the built-up area of Pirojpur pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	<ul style="list-style-type: none"> - No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal).
C. Socioeconomic Characteristics		
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Traffic may be interrupted temporarily. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Maintain safe passage for vehicles and pedestrians during maintenance activities. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of maintenance activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Workers health and safety	Workers need to be mindful of the occupational hazards working in confined spaces such as closed drains. Potential impacts are negative and long-term but reversible by mitigation measures.	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Produce and implement a O&M health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training⁶ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Mark and provide sign boards. Signage shall be in

⁶ 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
		<p>accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate.</p> <p>- 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.</p>
D. Historical, Cultural, and Archaeological Characteristics		
Physical and cultural heritage	Pirojpur pourashava was established in 1885. However, construction works will be on existing drainages and built-up areas of Pirojpur thus risk for chance finds is low.	<p>- All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government.</p> <p>- Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest.</p> <p>- Stop work immediately to allow further investigation if any finds are suspected.</p>

F. Cumulative Impact Assessment

54. The cumulative impact assessment examined the interaction between the subproject's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing, and reasonably foreseeable future projects or activities. The interaction of residual effects associated with multiple projects and/or activities can result in cumulative impacts, both positive and negative. The project'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.

55. 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 roads and bridges. The temporal boundary can be considered as the whole Pirojpur pourashava.

56. **Water quality.** It is recommended that infrastructures be (i) designed to the current best practice standard and taking into account of the projected climate change impacts up to 2050; (ii) built that the floods do not damage them; and (iii) side drains are to be kept free from wastes and siltation. Short-term negative impacts are the same with or without climate change measures except that with climate change measures there are increased demand for construction materials and more 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.

57. **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 roads and bridges. 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.

58. **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.

59. **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 drainage alignment and flood control structures will be improved once the activities are completed. Since the subproject will be improvement of existing infrastructures, it 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 Pirojpur pourashava. This can be considered a long-term cumulative benefit of the subproject.

60. 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 vulnerable⁷ groups.

61. Upon completion of the project, the socio-community will be the major beneficiaries of this subproject. With the improved roads and bridges, 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

⁷Vulnerable 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.

productive activities in the household, or school attendance. These are considered a long-term cumulative benefit.

62. **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.

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

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Public Consultation Conducted

64. 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 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.

65. Public consultations and focus group discussions (FGDs) were conducted by PPTA on 05 and 09-10 July 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 6. 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

66. 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.

67. The public consultation and disclosure program with all interested and affected parties 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.

68. 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

69. 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.

70. **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.

71. 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.

72. 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.

73. 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.⁸ 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)⁹. 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.

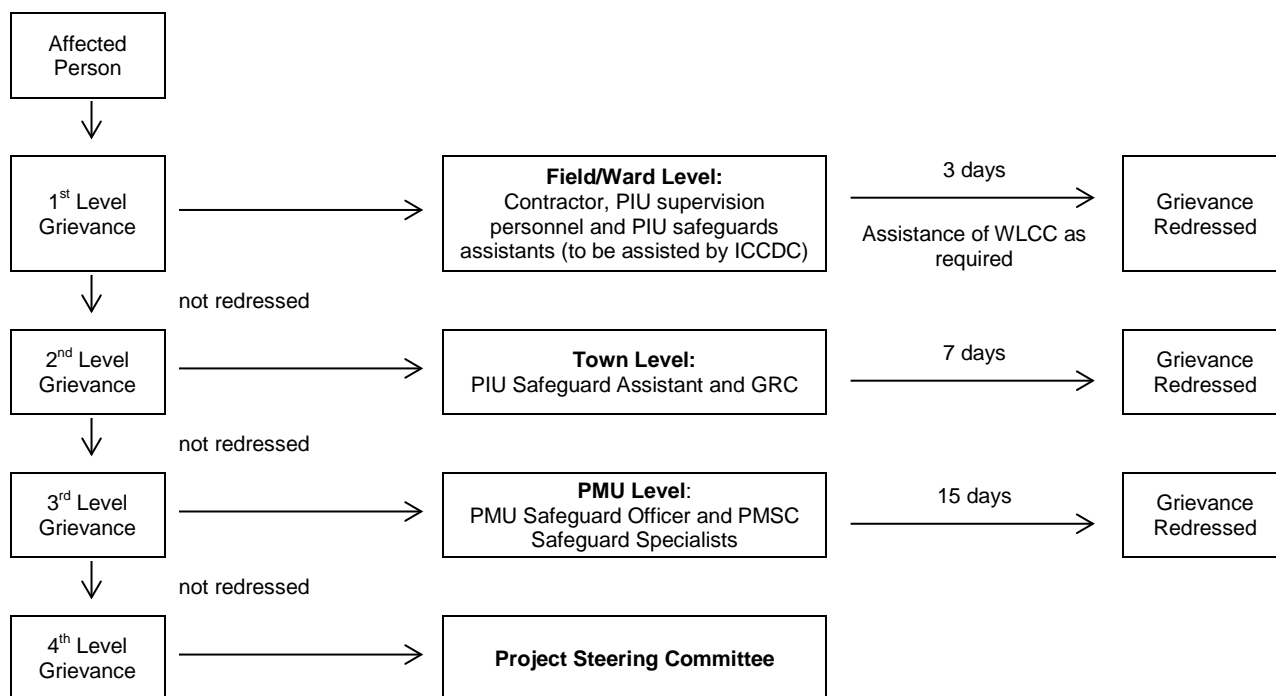
⁸ Grievance redress committees (GRC) have already been formed at town-level. For example in Pirojpur pourashava, the GRC comprises: Panel Mayor as Chairperson, and 1 councilor, the pourashava Executive Engineer, Secretary pourashava and pourashava administrative officer, as members. All town-level GRCs 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.

⁹ 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.

74. 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.

75. 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.

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

76. **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.

77. **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.

78. **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.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

79. 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.

80. 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.

81. 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

82. **Executing Agency.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. LGED will be the lead executing agency (EA) for the project, and DPHE will be the co-executing agency (for water supply and sanitation components). A PMU will be established in LGED.

83. **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.

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

85. **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.

86. 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;¹⁰

87. **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

¹⁰ Reduce, reuse and recycle (3R) and water, sanitation, and hygiene program (WASH)

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.

88. 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

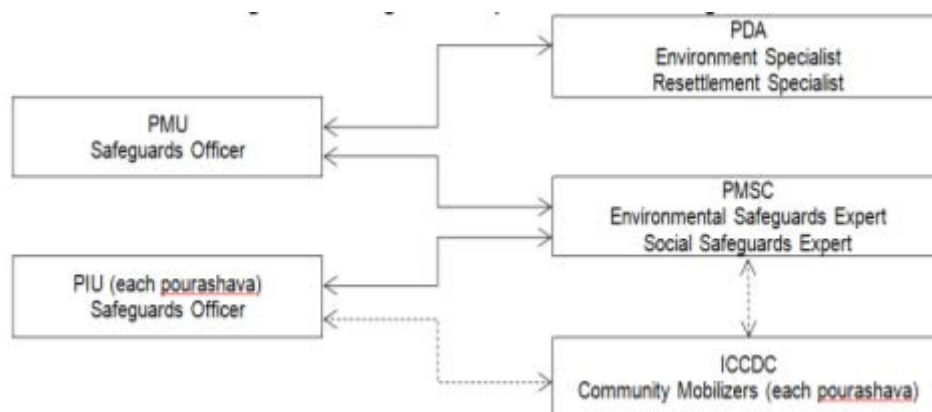


Table 11: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase

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	<ul style="list-style-type: none"> - Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. - Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. - Include in detailed design drawings and documents all conditions and provisions if necessary 	Project management unit (PMU), project implementing unit (PIU), project design advance (PDA) detailed design consultants, and project management and supervision consultants (PMSC)	Incorporated in final design and communicated to contractors.	Prior to award of contract	<p>No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PMU and PIU.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
Existing utilities	Disruption of services.	<ul style="list-style-type: none"> - Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction activities - Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. - Require contractors to prepare spoils management plan (Appendix 4) and traffic management plan (Appendix 5) 	PMU, PIU, PDA and PMSC	<ul style="list-style-type: none"> - List of affected utilities and operators; - 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 4), and traffic management plan (Appendix 5) 	<p>During detailed design phase</p> <p>- Review of spoils management plan: Twice (once after first draft and once before final approval)</p>	<p>No cost required.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
Construction work camps, hot mix plants, stockpile areas, storage areas,	Disruption to traffic flow and sensitive receptors	- Determine locations prior to award of construction contracts.	PMU, PIU, PDA and PMSC	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas,	During detailed design phase	<p>No cost required.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU,</p>

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
and disposal areas.				and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land		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; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	During detailed design phase, as necessary with discussion with detailed design engineers and PIUs	No cost required. Mitigation measures are included as part of TOR of PMU, PIU, 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) (ii) Posting of proof of completion at worksites (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. Other costs responsibility of contractor.
2. During Construction Activities						
A. Physical Characteristics						
Topography, landforms, geology and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may	- Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements. - Borrow areas and	Construction Contractor	- Records of sources of materials	Monthly by PIU	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	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.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Pirojpur local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to 	Construction Contractor	<ul style="list-style-type: none"> - Areas for stockpiles, storage of fuels and lubricants and waste materials; - Number of silt traps installed along trenches leading to water bodies; - Records of surface water quality inspection; - Effectiveness of water management measures; - No visible degradation to nearby drainages, <i>khals</i> or water bodies due to construction activities 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>minimize the wastage of water in the construction activities.</p> <ul style="list-style-type: none"> - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas. - While working across or close to any water body, 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. - 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	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather; - Use tarpaulins to cover soils, sand and other loose material when 	Construction Contractor	<ul style="list-style-type: none"> - Location of stockpiles; - Number of complaints from sensitive receptors; - Heavy equipment and machinery with air pollution control devices; 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.		- Certification that vehicles are compliant with air quality standards.	and final location of subproject components	
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	- Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Pirojpur local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during night time.	Construction Contractor	- Number of complaints from sensitive receptors; - Use of silencers in noise-producing equipment and sound barriers; - Equivalent day and night time noise levels	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	<ul style="list-style-type: none"> - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly. 				
Aesthetics	Based on	- Prepare the Debris	Construction	- Number of	- Visual inspection by	Cost for

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	<p>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.</p>	<p>Disposal Plan</p> <ul style="list-style-type: none"> - Remove all construction and demolition wastes on a daily basis. - Coordinate with Pirojpur local authority for beneficial uses of excess excavated soils or immediately dispose to designated areas Avoid stockpiling of any excess spoils - Suitably dispose of collected materials from drainages, unutilized materials and debris either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. 	Contractor	<p>complaints from sensitive receptors;</p> <ul style="list-style-type: none"> - Worksite clear of hazardous wastes such as oil/fuel - Worksite clear of any wastes, collected materials from drainages, unutilized materials and debris - Transport route and worksite cleared of any dust/mud 	<p>PIU and supervision consultants on monthly basis</p> <ul style="list-style-type: none"> - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	<p>implementation of mitigation measures responsibility of contractor.</p>

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.</p> <ul style="list-style-type: none"> - The site must be kept clean to minimize the visual impact of the site. <p>Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;</p>				
B. Biological Characteristics						
Biodiversity	<p>Activities being located in the built-up area of Pirojpur pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design there are no trees at the site that need to be removed (to be reassessed during detailed design stage).</p>	<ul style="list-style-type: none"> - 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. - If during detailed design cutting of trees will be required, compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to tree plantation as specified in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/ 	Construction Contractor	<ul style="list-style-type: none"> - PMU and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be determined during detailed design stage) - Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc. 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally-important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting of trees for firewood.				
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	- Prepare and implement a Traffic Management Plan (Appendix 5) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags and flagmen informing	Construction Contractor	- Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan (Appendix 5); - Number of complaints from sensitive receptors; - Number of signages placed at project location - Number of walkways, signages, and metal sheets placed at project location	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	mitigation measures.	<div>diversions and alternative routes when required.</div> <div>- Notify affected sensitive receptors by providing sign boards informing nature and duration of construction activities and contact numbers for concerns/complaints.</div> <div>- Leave spaces for access between mounds of soil.</div> <div>- Provide walkways and metal sheets where required to maintain access across for people and vehicles.</div> <div>- Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools.</div> <div>- 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.</div> <div>- Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.</div>				
Socio-economic status	Subproject components will be located in government land	- Employ at least 50% of labor force from communities in the vicinity of the site. This	Construction Contractor	<div>- Employment records;</div> <div>- Records of sources of materials</div>	- Visual inspection by PIU and supervision consultants on monthly basis	Cost for implementation of mitigation measures responsibility of

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	and existing ROWs thus there is no requirement for land acquisition or any resettlements. 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.	will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. - Secure construction materials from local market.		- Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards	- Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components	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 Pirojpur pourashava where there are a variety of human activities, will result to impacts to the sensitive	- Obtain details from pourashava nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible; - Integrate construction of the various infrastructure subprojects to be conducted in Pirojpur (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	Construction Contractor	- Utilities Contingency Plan - Number of complaints from sensitive receptors	- Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage 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
	receptors such as residents, businesses, and the community in general. Excavation may also damage existing infrastructure (such as water distribution pipes, electricity pylons, etc) located alongside the roads. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	area at different times for different purposes. - Consult with local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.				
Community health and safety	Construction works will impede the access of	- Contractor's activities and movement of staff will be restricted to designated construction	Construction Contractor	- Number of permanent signages, barricades and flagmen on worksite	- Visual inspection by PIU and supervision consultants on monthly basis	Cost for implementation of mitigation measures responsibility of

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	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.	<p>areas.</p> <ul style="list-style-type: none"> - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with Pirojpur local authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster trenching progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.¹¹ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the 		<p>as per Traffic Management Plan (Appendix 5);</p> <ul style="list-style-type: none"> - Number of complaints from sensitive receptors; - Number of walkways, signages, and metal sheets placed at project location - Agreement between landowner and contractors in case of using private lands as work camps, storage areas, etc. 	<ul style="list-style-type: none"> - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	contractor.

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	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>provision of separate waste receptacles for different types of waste shall be encouraged.</p> <p>- 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.</p> <p>- Interested and affected parties need to be made aware of the existence of the complaints book and the methods of</p>				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>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.</p> <p>- 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.</p>				
Workers health and safety	<p>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</p>	<p>- Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S.</p> <p>- Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist</p>	Construction Contractor	<p>- Site-specific H&S Plan</p> <p>- Equipped first-aid stations</p> <p>- Medical insurance coverage for workers</p> <p>- Number of accidents</p> <p>- Records of supply of uncontaminated water</p> <p>- Condition of eating areas of workers</p> <p>- Record of H&S</p>	<p>- Visual inspection by PIU and supervision consultants on monthly basis</p> <p>- Frequency and sampling sites to be finalized during detailed design stage and final location of) subproject components</p>	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
	working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement a site 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 ¹² for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances - Maintain necessary living accommodation and ancillary facilities in functional and hygienic		orientation trainings - Use of personal protective equipment - % of moving equipment outfitted with audible back-up alarms - Permanent sign boards for hazardous areas - Signages for storage and disposal areas - Condition of sanitation facilities for workers		

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	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<p>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.</p> <ul style="list-style-type: none"> - Provide medical insurance coverage for workers; - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Ensure moving equipment is outfitted with audible back-up alarms; 				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<ul style="list-style-type: none"> - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. 				
D. Historical, Cultural, and Archaeological Characteristics						
Physical and cultural heritage	Pirojpur pourashava was established in 1885. However, construction works will be on existing roads and bridges in built-up areas of Pirojpur thus risk for chance finds is low.	<ul style="list-style-type: none"> - All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately 	Construction Contractor	- Records of chance finds	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of subproject components 	Cost for implementation of mitigation measures responsibility of contractor.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		to allow further investigation if any finds are suspected.				
E. Others						
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports including pictures	Construction contractor	- Availability and competency of appointed supervisor - Monthly report	- Monthly monitoring report to be submitted by PIU to PMU - PMU to submit semi-annual monitoring report to ADB	Cost for implementation of mitigation measures responsibility of contractor.
3. Post-construction Activities						
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (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. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and regrassed using the guidelines set out in the	Construction Contractor	PMU/CSS 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 is satisfactory.	- 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
		revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services. (viii) Request PMU/CSS to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.				

Table 12: Environmental Management and Monitoring Plan – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
Water quality	Run-off from debris/sediments from repair and maintenance of road and bridge 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.	- Take all precautions to prevent run-off into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along drainage leading to the water bodies. - Remove all debris/sediments immediately. - Dispose debris/sediments at a designated site such as landfill.	Pirojpur pourashava	- No visible degradation to nearby drainages, <i>kha/s</i> or water bodies due to construction activities	Duration of repair works	Included in O&M cost
Air quality	Moving debris/sediments may create dusts	- Use tarpaulins to cover soils, sand and other loose material.	Pirojpur pourashava	- No complaints from sensitive receptors	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	during dry season. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.					
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.	<ul style="list-style-type: none"> - Plan activities in consultation with Pirojpur 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. - 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. 	Pirojpur pourashava	- No complaints from sensitive receptors	Duration of repair works	Included in O&M cost
B. Biological Characteristics						
Biodiversity	Activities in the built-up area of Pirojpur pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest.	<ul style="list-style-type: none"> - No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal). 	Pirojpur pourashava	- No complaints from sensitive receptors	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
C. Socioeconomic Characteristics						
Existing provisions for pedestrians and other forms of transport	Road closure is not anticipated. Traffic may be interrupted temporarily. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> - Maintain safe passage for vehicles and pedestrians during maintenance activities. - Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. - Notify affected sensitive receptors by providing sign boards informing nature and duration of maintenance activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factoring this in work schedules. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions. 	Pirojpur pourashava	- No complaints from sensitive receptors	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
Workers health and safety	Workers need to be mindful of the occupational hazards working in confined spaces such as closed drains. Potential impacts are negative and long-term but reversible by mitigation measures.	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Produce and implement a O&M 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 training¹³ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances 	Pirojpur pourashava	<ul style="list-style-type: none"> - No complaints from sensitive receptors - No complaints from workers related to O&M activities - Zero accident 	Duration of repair works	Included in O&M cost

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.

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
		<ul style="list-style-type: none"> - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; - Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. - Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. 				
D. Historical, Cultural, and Archaeological Characteristics						
Physical and cultural heritage	Pirojpur pourashava was established in 1885. However, construction works will be on existing roads	- All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of	Pirojpur pourashava	- Records of chance finds	Duration of repair works	Included in O&M cost

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds
	and bridges in built-up areas of Pirojpur thus risk for chance finds is low.	<p>the government.</p> <ul style="list-style-type: none"> - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected. 				

B. Institutional Capacity Development Program

89. 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 14.

Table 13: Training Program for Environmental Management

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation workshop	Module 1 – Orientation - ADB Safeguards Policy Statement - Government of Bangladesh Environmental Laws and Regulations Module 2 – Environmental Assessment Process - ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements - Review of environmental assessment report to comply with ADB requirements - Incorporation of EMP into the project design and contracts	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 - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day	PMU PIUs Contractors
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed	1 day on a regular period to be determined by PMU, PIUs, and PMSC	PMU PIUs Contractors

C. Staffing Requirement and Budget

90. 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.

91. 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.

92. 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.

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

94. The indicative costs of EMP implementation are shown in Table 15.

Table 14: 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 - Construction	Per location	20	30,000	60,000	Civil works contract
2.	Noise levels monitoring	- Pre-construction - 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 environmental assessment process; (ii) induction course contractors, preparing them on EMP implementation and environmental monitoring	Module 1 – immediately upon engagement of the PMSC environmental safeguards specialist Module 2 – prior to award of civil works contracts (twice a year for 4 years) Module 3 – prior to start of Phase 2 and upon	lump sum		Module 1 – 30,000 Module 2 – 30,000 Module 3 – 30,000	90,000	Covered under Institutional Strengthening and Awareness Building contract

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
	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	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 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 and ICCDC contracts
2.	GRM implementation	Costs involved in resolving complaints (meetings, consultations, communication, and reporting/inform		Lump sum		As per PMU budget	PMU cost

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost covered by
		ation dissemination)					
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

95. 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.

96. 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 9. 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.

97. 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).

98. 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

99. The process described in this document has assessed the environmental impacts of all elements of Pirojpur roads and bridges subproject. All potential impacts were identified in relation to design and location, construction, and operation phases.

100. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the project design or location were not significant.

101. 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. 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.

102. 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.

103. 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.

104. 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.

105. The citizens of Pirojpur will be the major beneficiaries of this subproject. With the improved roads and bridges, 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.

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

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

108. 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 Is the project area adjacent to or within any of the following environmentally sensitive areas?	✓		Pirojpur pourashava covers an area of 29.46 km ² with population density of 2,038 per km ² . The area is predominantly residential.
Cultural heritage site		✓	
Protected area		✓	
Wetland		✓	
Mangrove		✓	
Estuarine		✓	
Buffer zone of protected area		✓	
Special area for protecting biodiversity		✓	
B. Potential environmental impacts Will the project cause...		✓	
Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		✓	Not applicable. Construction works will be on existing roads and bridges in built-up areas of Pirojpur.
Encroachment on precious ecology (e.g. sensitive or protected areas)?		✓	Not applicable. There are no protected areas in or around subproject sites, and no known areas of ecological interest in Pirojpur.
Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	✓		Excavations 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.
Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	✓		Due to excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	✓		Conducting works at dry season and moving large quantity of materials may create dusts and increase in concentration of vehicle-related pollutants. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?		✓	Not applicable. Construction will not involve use explosives and chemicals. Excavation will be done manually. Construction contractors will be required to implement health and safety (H&S) plan.
Noise and vibration due to blasting and other civil works?	✓		Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.
Dislocation or involuntary resettlement of people?		✓	Not applicable. Land acquisition and resettlement are not required for the subproject.
Dislocation and compulsory resettlement of people living in right-of-way?		✓	Not applicable. There are no encroachers or residential/commercial structures in the ROWs

Screening questions	Yes	No	Remarks
Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?		✓	Not applicable.
Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		✓	Not applicable.
Hazardous driving conditions where construction interferes with pre-existing roads?		✓	Road closures are not required. Construction contractors will be required to implement traffic management plan and coordinate with Pirojpur local authority.
Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI and HIV/AIDS) from workers to local populations?		✓	Construction contractors will be required to provide sanitation facilities and ensure proper waste management at all times. Contracts will include provisions on STI and HIV/AIDS.
Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		✓	Construction contractors will be required to ensure cleanliness at all times to prevent breeding of mosquitoes and rodents.
Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?		✓	Not applicable.
Increased noise and air pollution resulting from traffic volume?		✓	Not anticipated.
Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		✓	Not anticipated.
Social conflicts if workers from other regions or countries are hired?		✓	Priority in employment will be given to local residents.
Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Improved management systems through capacity building and institutional development will ensure reduced burden on services and infrastructure.
Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	Not applicable. Construction will not involve use of explosives and chemicals.
Community safety risks due to both accidental and natural causes, 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.

<u>Climate Change and Disaster Risk Questions</u>	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
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 Pirojpur 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, including: (i) road level rise as required; (ii) increase of bitumen carpeting thickness; (iii) proper compaction; (iv) prefer cement concrete (CC) pavement where there are threats of inundation; (v) temperature reinforcement in CC pavement where there are threats of inundation; (vi) cross-drains as required; (vii) for CC roads, guide wall to protect erosion and sliding; and (viii) turf and tree plantation along the roads.
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		✓	Proposed project will not impact any

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)?			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 10,00,00,000	Tk. 10,000	-Do-

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

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224

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

Appendix 3: Levels of Service for Proposed Interventions – Roads and Bridges

Road Part	Existing Standard	Proposed Standard	Additional Climate Change for CTEIP
Design Life	20 years		20 years with consideration for 50 years sea level rise for rights of way (RoW)
Minimum width	Minor roads 1.0-3.0 m Town Roads 3.0-5.0 m	3.0 m for minor access roads with 1.0 shoulder only if RoW permits. 5.0 m with 2 x 1.15 meter shoulders where RoW exists	
Crest level	600 mm above normal flood level	600 mm above normal flood level	200 mm above A1B ¹⁴ scenario sea levels in 2034
Surface material	BT, CC or HBB depending on width		All CC with minimum thickness of 150 mm with adequate reinforcement and 150 mm plastic pipes to be placed at 50 meter intervals under roads for services
Pavements	Thickened sand cushion or sometimes sand aggregate. (7 to 11 meters wide)		All thickened sand aggregate. Sub-base to be 0.25 meters wider than overlying layer.
Earthworks	Compacted where necessary either by hand or machine.	Machine compacted in layers and tested.	
Embankments	Slope 1:1.5	Embankments strengthened with edge protection. Where possible, trees or bushes should be planted on earth embankments	Additional strengthening on roads in flood areas, either concrete brick work.
Run-off / drainage	Culverts provided as necessary	Ensure side drains are integrated into town's drainage system	Increase cross drainage structures as necessary. Full width drainage layer in sub-base Assess need for larger culverts
Bridges			Strengthen abutments and approaches

Source: PPTA Consultant.

¹⁴ A1B represents a mid-range emission scenario for the future global emission of Greenhouse gases. A1B makes assumptions about future growth and development of human activities during the next century. It was used for the IPCC climate change assessments in 2007.

Appendix 4: 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 5: 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.

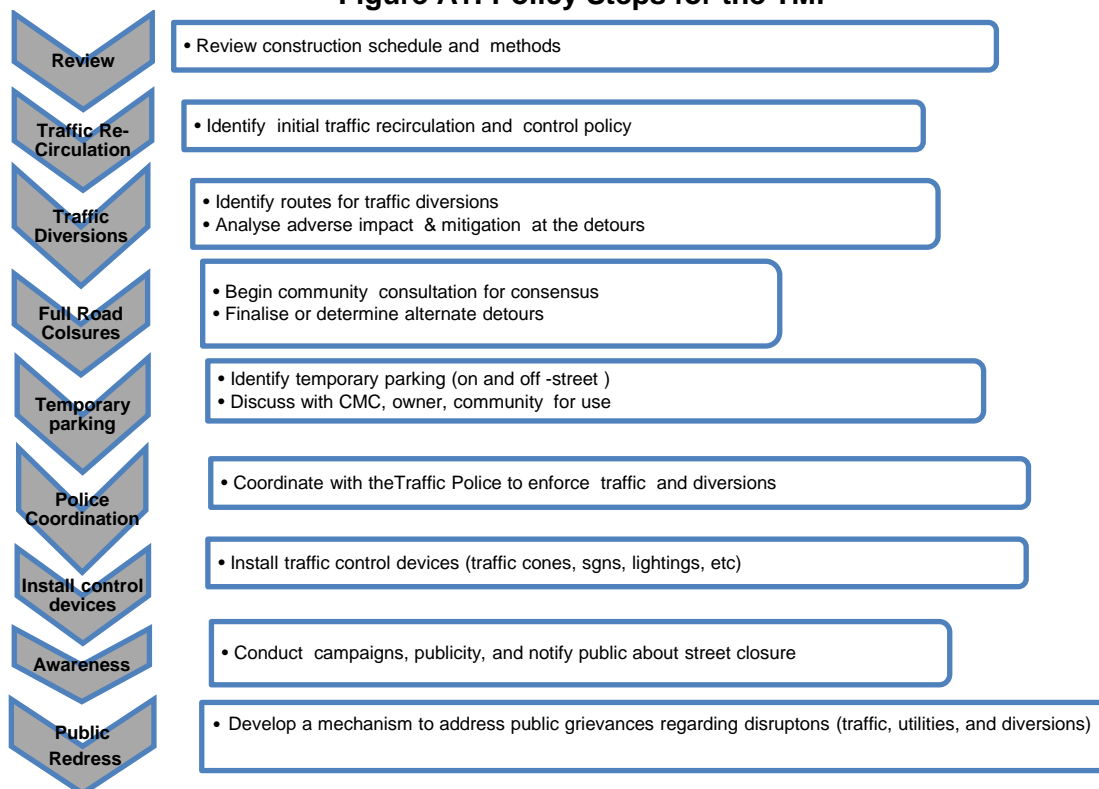
C. Analyze the impact due to street closure

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

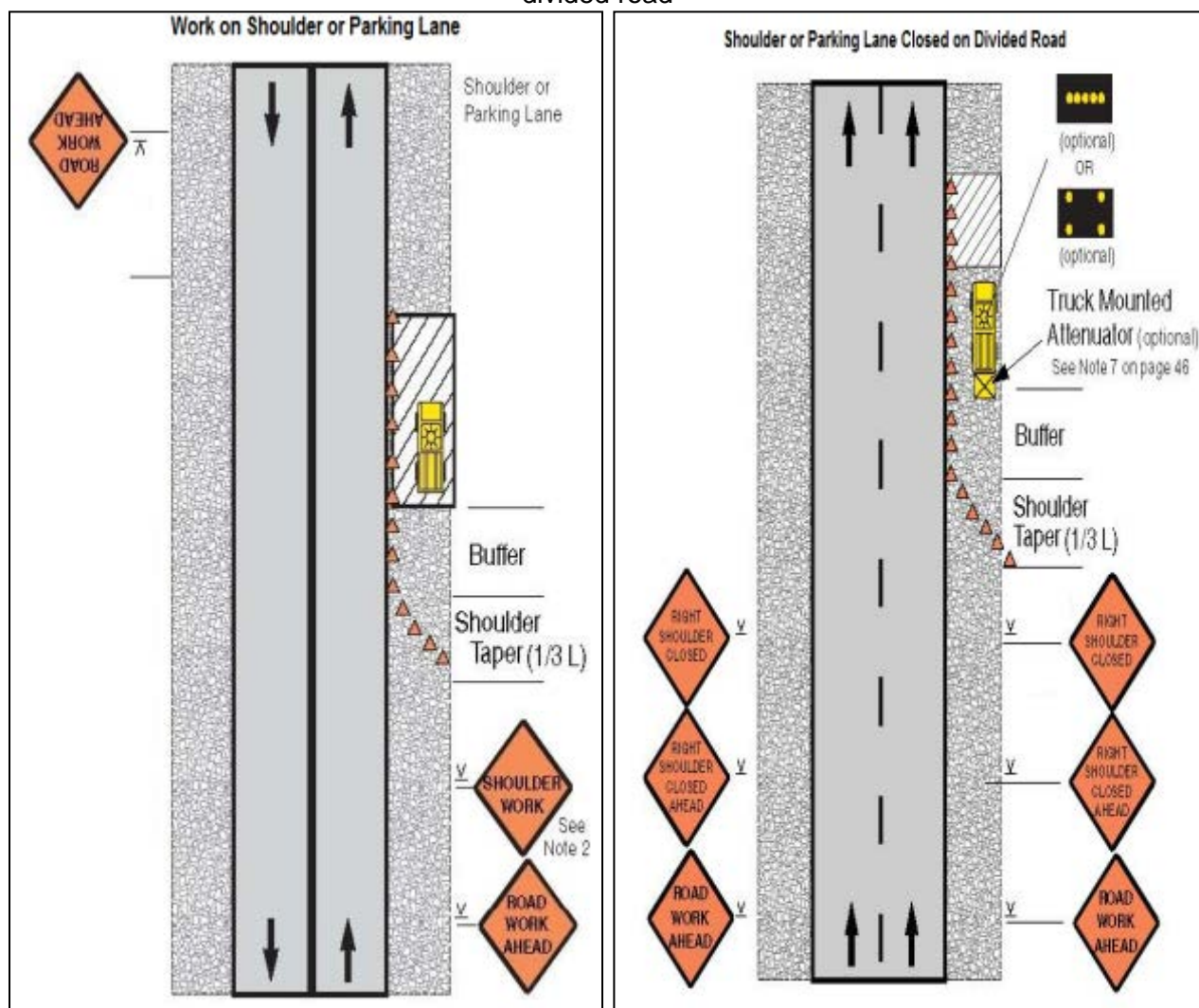


Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

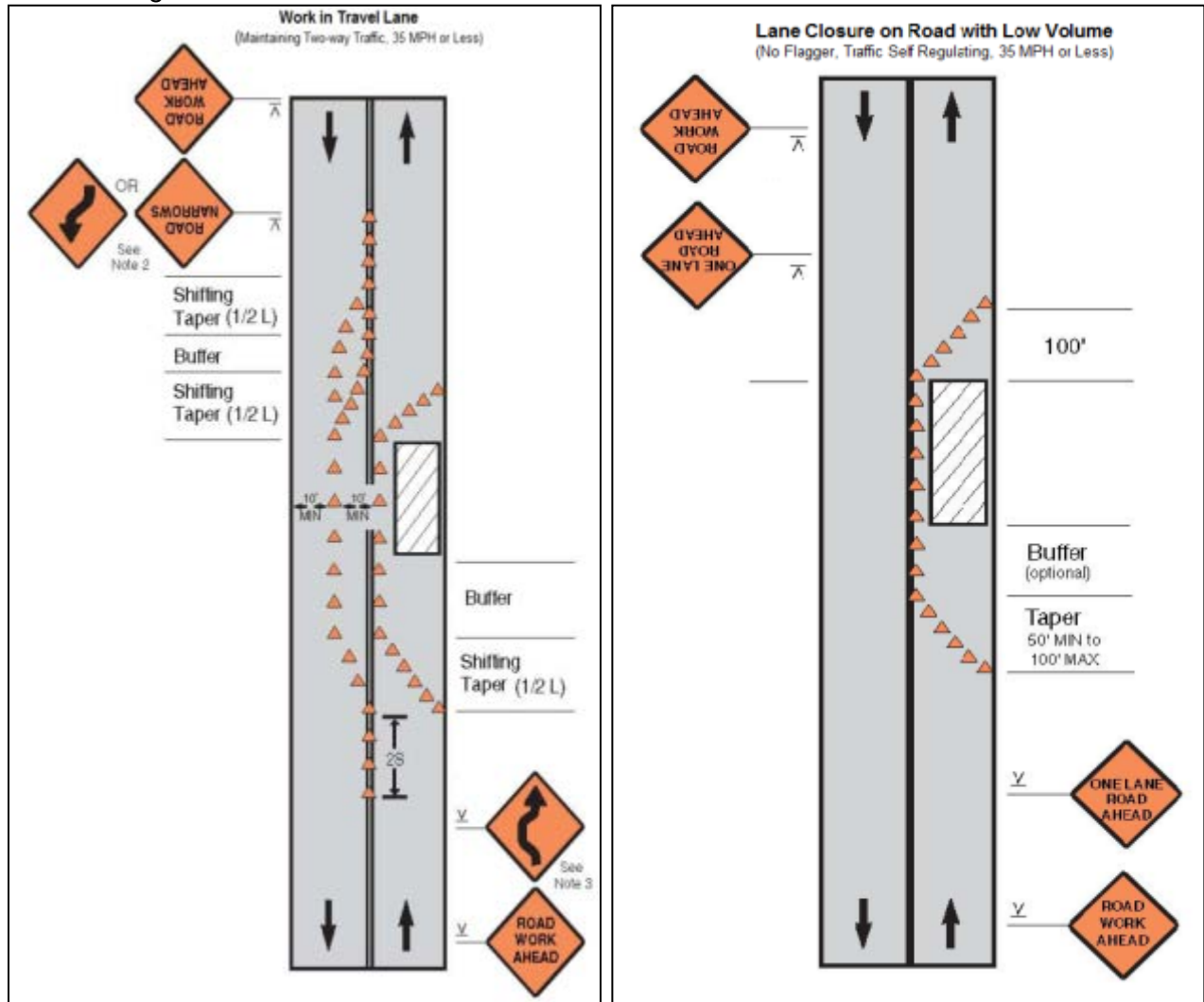


Figure A6 & A7: Lane closure on a two-line road with low volume (with yield sign) & Lane closure on a two-line road with low volume (one flagger operation)

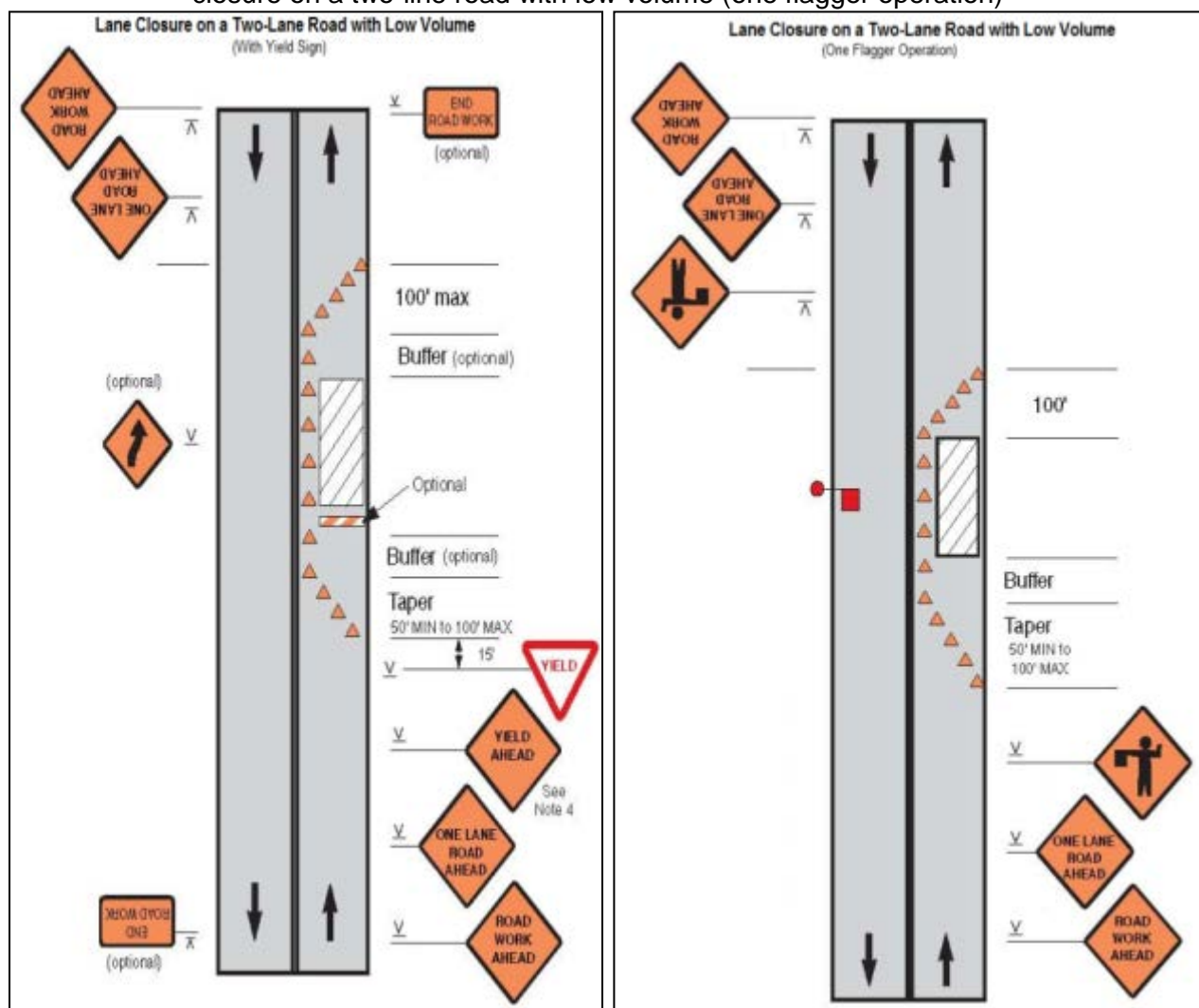


Figure A8 & A9: Lane Closure on a Two-Lane Road (Two Flagger Operation) & Lane Closure on a Four-Lane Undivided Road

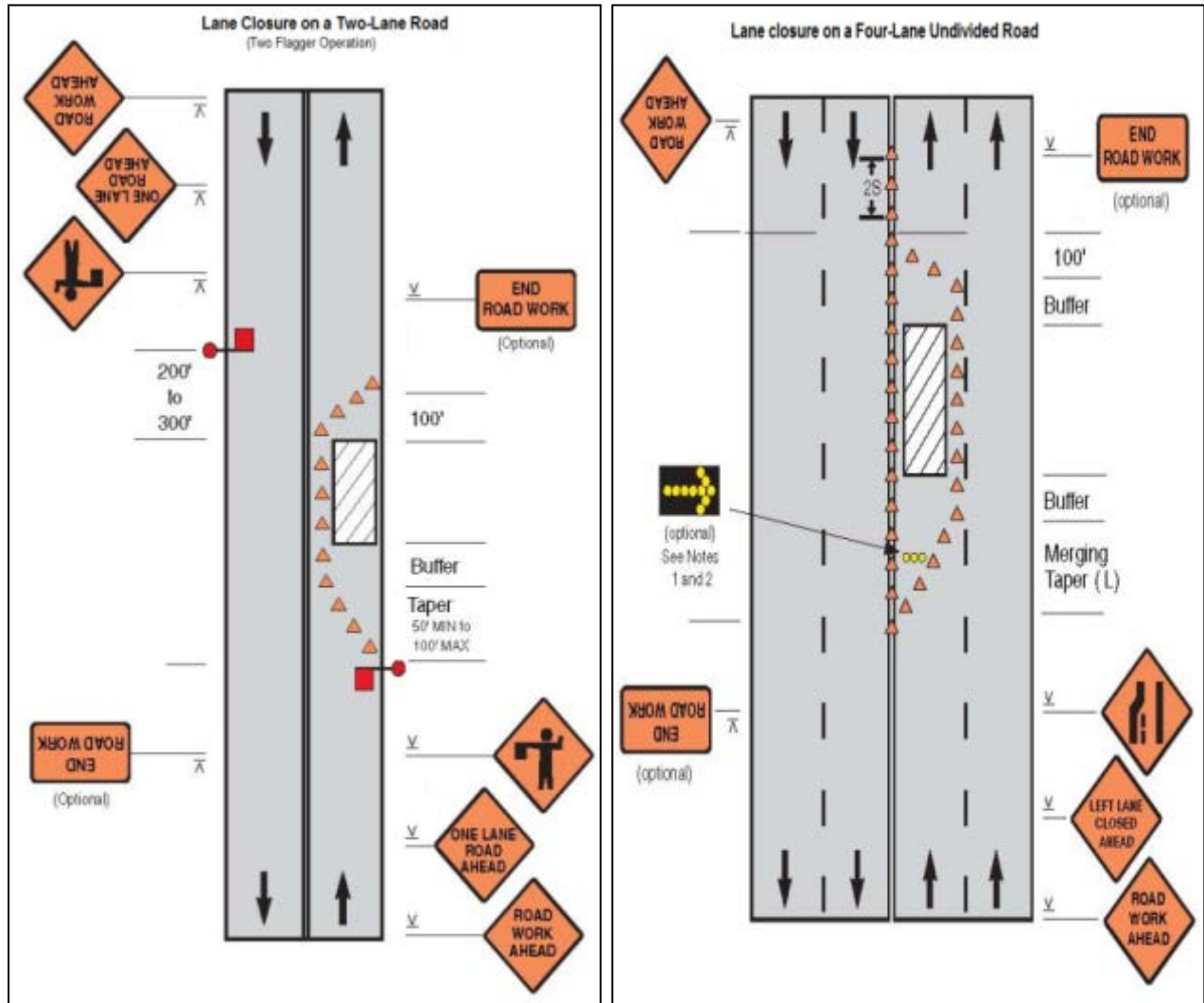


Figure A10 & A11: Lane Closure in Divided Roadway & Half Road Closure On Multi-Lane Roadway

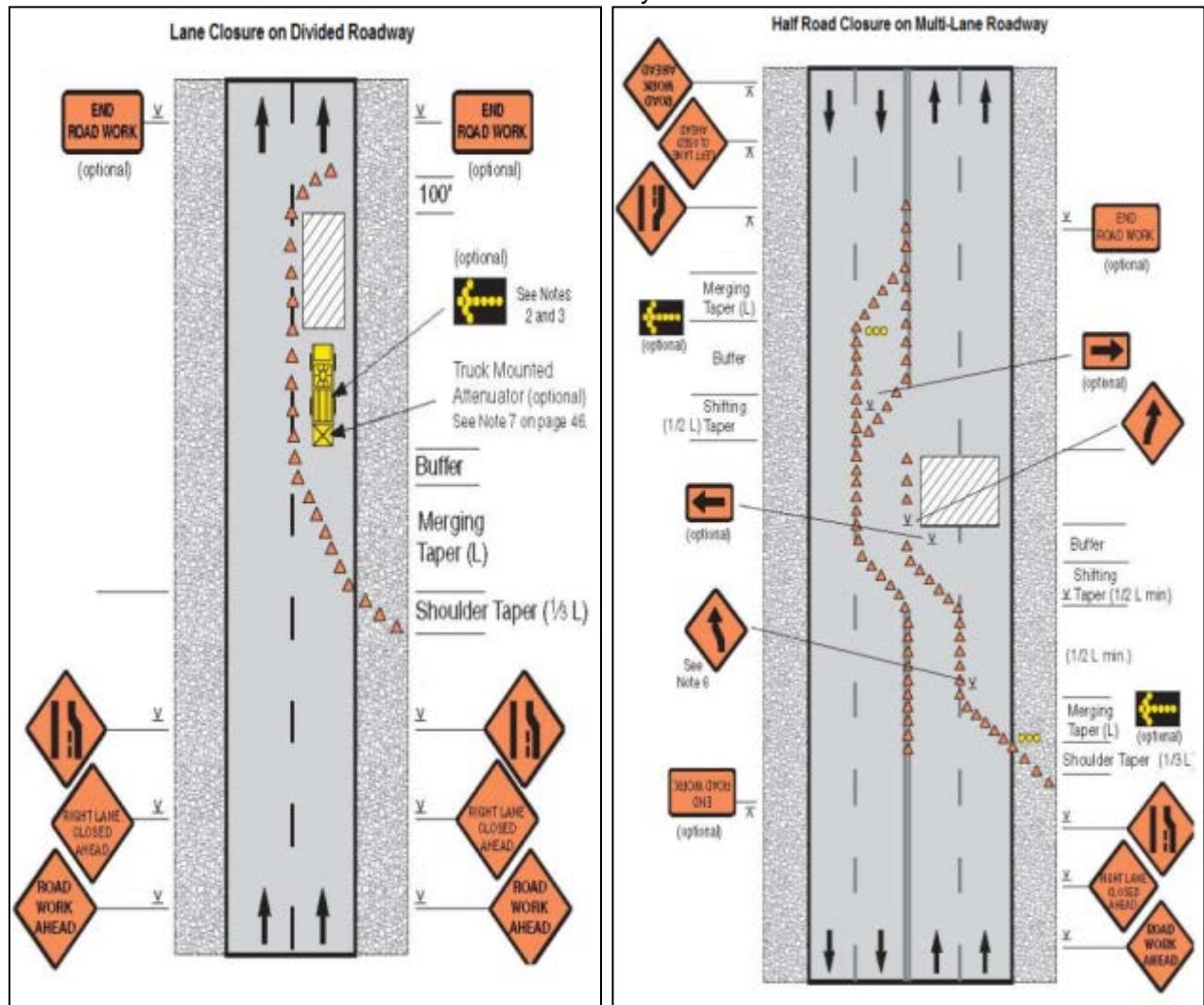
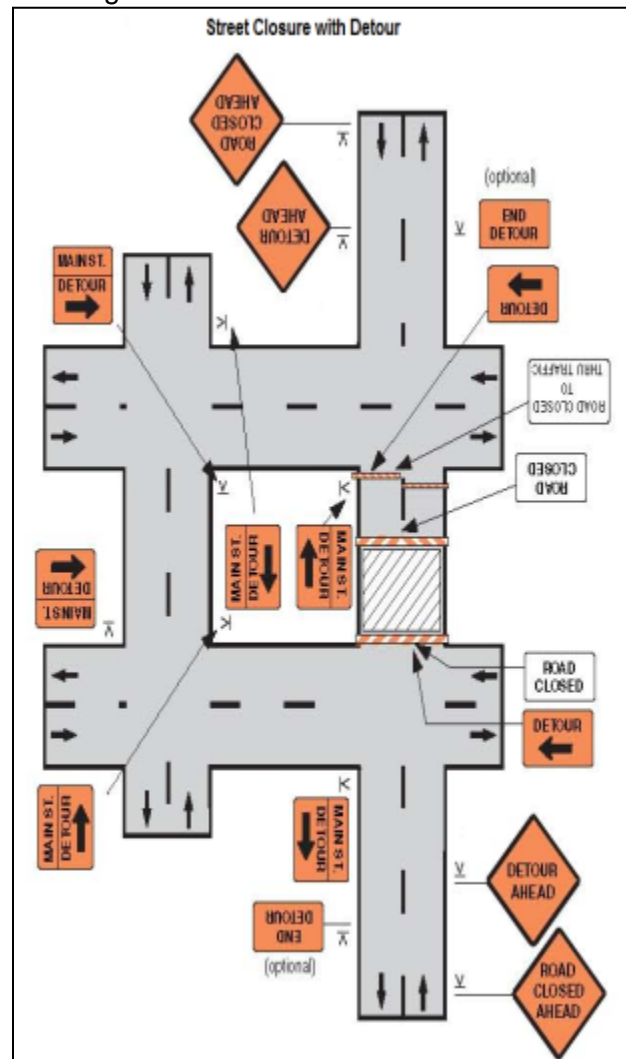


Figure A12: Street closure with detour



Appendix 6: Records of Public Consultations and FGDs

Minutes of Discussion Meeting held in DOE Office regarding EARF of CTEIP 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), CTEIP, Cell:+88-0171-1665408; +88-0173-1062331, email: yasin_afroza@yahoo.com

Agenda of Discussion:

Following item are discussed:

1. Classification of CTEIP subproject components as per 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 Environmental Infrastructure Project (CTEIP) 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.
- CTEIP, 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 ecological sensitive areas or within reserved locations.
- Finally, the DG assures providing every cooperation relating to environmental clearance.

FGD Summaries-Bridge Pirojpur Pourashava

SL No.	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	Bridge/ Roads/ Drainages	05- July 2013	Near Firoj Howlader House, Ward No-6- Pirojpur Pourashava	M=11 F=4 T=15	No resettlement issues there	Site selection is perfect maintain by Pourashava	Provide RCC Box culvert Provide railing both side of the bridge with electric post for lighting at night.	They will cooperate to built this bridge
2	Bridge/ Roads/ Drainages	09- July 2013	Near Shakil Khan's House, Ward No-8- Pirojpur Pourashava	M=16 F=0 T=16	No resettlement issues there	maintain by Pourashava	Provide railing both side of the bridge with electric post for lighting at night..	They will cooperate to built this bridge
3	Bridge/ Roads/ Drainages	09- July 2013	Near Shahjahan Khan's House, Ward No-8- Pirojpur Pourashava	M=12 F=3 T=15	No resettlement issues there	maintain by Pourashava	Provide railing both side of the bridge with electric post for lighting at night..	They will cooperate to built this bridge
4	Bridge/ Roads/ Drainages	10 July 2013	Over Varani Khal, connection between ward no 6 and 8,	M=15 F=0 T=15	No resettlement issue during construction period a	maintain by Pourashava/local committee	Provide railing both side of the bridge with electric post for lighting at	They will cooperate to built this bridge

SL No.	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
			Ward No-6- Pirojpur Pourashava		temporary bamboo bridge to be provided		night..	

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

Photograph



FGD near Piroj Halder House



FGD near Shakil Khan House



FGD near Shajahan Khan House



FGD Varani Khal

PARTICIPANTS LIST**Focus Group Discussion-CTEIP****List of Participants**

Town: Pirojpur Pourashava

Location: Near Firoj Howlader's House, Ward No: 6

Meeting Place: Firoj Howlader's House

Date: 05-07-2013

Time: 11.00 am

Sl.No	Name	Occupation
1	Md. Firoj Howlader	Business
2	Md. Nasir Akand	Service
3	Md. Mohashin Howlader	Business
4	Md. Razzak Howlader	Service
5	Md. Zakir Howlader	Service
6	Md. Younus Sheikh	Agriculture
7	Md. Tofazzal Sharif	Service
8	Md. Siraj Khan	Service
9	Md. Saidul Sheikh	Service
10	Md. Nizam Howlader	Service
11	Most. Fatema Begom	Housewife
12	Most. Shiopi Begom	Housewife
13	Most. Dali Akhter	Housewife
14	Most. Madhuri	Housewife
15	Md. Badsha Sheikh	Agriculture

Focus Group Discussion-CTEIP**List of Participants**

Town: Pirojpur Pourashava

Location: Near Shakil Khan's House, Ward No: 8

Meeting Place: House of Aminul Islam

Date: 09-07-2013

Time: 4.00 pm

Sl.No	Name	Occupation
1	Md. Aminul Islam	Business
2	Abdul Khaleque Sheikh	Business
3	Md. Jahangir Hossain	Rickshaw Puller
4	Md. Pervej Khan	Business
5	Shahjahan Sheikh	Business
6	Md. Zakir Hossain	Business
7	Md. Shajahan Howlader	Social worker
8	Md. Abdullah Al Wadud	Service
9	Md. Ruhul Amin	Business
10	Md. Mostaq Ahmed	Service
11	Md. Touhidul Islam	Student

SI.No	Name	Occupation
12	Md. Sirajul Islam	Student
13	Md. Faizullah	Student
14	Md. Musa	Student
15	Md. Ilias Ahmed	Business
16	Md. Touhidul Islam	Business

Focus Group Discussion-CTEIP

List of Participants

Town: Pirojpur Pourashava

Location: Near Shahjahan Khan House, Ward No: 8

Meeting Place: Shahjahan Khan House

Date: 09-07-2013

Time: 11.30 am

SI.No	Name	Occupation
1	Md. Saiful Islam	Business
2	Md. Mezbah	Daily labor
3	Kazal Begom	Housewife
4	Rina Begom	Housewife
5	Md. Mobarak	Daily labor
6	Md. Faruk	Service
7	Abdur Razzak	Daily labor
8	Md. Touhidul Islam	Business
9	Md. Monjurul Kader	Service
10	Rekha Begom	Housewife
11	Md. Al Amin	Service
12	Md. Zihad	Business
13	Md. Hasan	Business
14	Md. Baizid	Business
15	Md. Shovan	Business

Focus Group Discussion-CTEIP

List of Participants

Town: Pirojpur Pourashava

Location: **Over Varani Khal connection between ward no 6 and 8**, Ward No: 6

Meeting Place: Vijora Rickshaw stand

Date: 10-07-2013

Time: 4.00 pm

SI.No	Name	Occupation
1	Md. Chand Mia	Daily Labor
2	Md. Nizam	Daily Labor
3	Md. Badal Shen	Business
4	Md. Jalil Sheikh	Business
5	Md. Imus	Daily Labor
6	Md. Hemayet Ali Sheikh	Service
7	Abdul Mannan Kazi	Business
8	Md. Dulal Howlader	Business
9	Md. Anwarul Kabir	Social worker
10	Md. Alamgir Hossain	Service
11	Md. Harun Sheikh	Business
12	Md. Emdadul Sikder	Business
13	Md. Haidul Howlader	Agriculture
14	Md. Monir Mollik	Daily Labor
15	Md. Kalam Sikder	Service

Appendix 7: Sample Grievance Registration Form

(To be available in Bangla and English)

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

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

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

FOR OFFICIAL USE ONLY

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

Appendix 8: 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		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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 procedure 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

Draft Initial Environmental Examination

October 2013

BAN: Coastal Towns Environmental Infrastructure Project – Galachipa Cyclone Shelters

Prepared by the Local Government Engineering Department, 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

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

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, ADB does not intend to make any judgments as to the legal or other status of any territory or area.

CONTENTS

I.	INTRODUCTION	1
II.	POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK	1
	A. ADB Policy	1
	B. National Laws	2
	C. Government of Bangladesh Environmental Assessment Procedures	3
III.	DESCRIPTION OF THE PROJECT	4
	A. The Study Area	4
	B. Existing Condition and Need for the Project	4
	C. Proposed Components	5
	D. Implementation Schedule	5
IV.	DESCRIPTION OF THE ENVIRONMENT	9
	A. Methodology Used for the Baseline Study	9
	B. Physical Characteristics	9
	C. Biological Characteristics	10
	D. Socioeconomic Characteristics	10
	E. Historical, Cultural and Archaeological Characteristics	12
V.	ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS	12
	A. Methodology	12
	B. Screening Out Areas of No Significant Impact	12
	C. Anticipated Impacts and Mitigation Measures – Planning and Design Phase	13
	D. Anticipated Impacts and Mitigation Measures – Construction Phase	14
	E. Anticipated Impacts and Mitigation Measures – Operations and Maintenance Phase	20
	F. Cumulative Impact Assessment	20
VI.	INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION	22
	A. Public Consultation Conducted	22
	B. Future Consultation and Disclosure	22
VII.	GRIEVANCE REDRESS MECHANISM	23
VIII.	ENVIRONMENTAL MANAGEMENT PLAN	25
	A. Safeguard Implementation Arrangement	26
	B. Institutional Capacity Development Program	49
	C. Staffing Requirement and Budget	49
IX.	MONITORING AND REPORTING	52
X.	CONCLUSION AND RECOMMENDATIONS	53

LIST OF TABLES:

Table 1: Applicable Government of Bangladesh Environmental Legislations	2
Table 2: Likely Government of Bangladesh Classification of Galachipa cyclone shelters subproject	4
Table 3: Existing Condition of Cyclone Shelters in Galachipa	5
Table 4: Basic Data on Proposed Cyclone Shelters in Galachipa	5
Table 5: Population of Galachipa Pourashava	10
Table 6: Fields in Which the Subproject Is Not Expected to have Significant Impacts	12
Table 7: Anticipated Impacts and Mitigation Measures – Construction Phase	14
Table 8: Anticipated Impacts and Mitigation Measures – O&M Phase.....	20
Table 11: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase	29
Table 12: Environmental Management and Monitoring Plan – O&M Phase	47
Table 11: Training Program for Environmental Management	49
Table 12: Indicative Cost of EMP Implementation	50

LIST OF FIGURES:

Figure 1: Location Map	6
Figure 2: Ground Floor of Cyclone Shelter	7
Figure 6: Safeguards Implementation Arrangement	28

LIST OF APPENDICES:

Appendix 1: Rapid Environmental Assessment Checklist.....	55
Appendix 2: Environmental Standards and Application Fees	58
Appendix 3: Sample Outline Spoils Management Plan.....	59
Appendix 4: Sample Outline Traffic Management Plan	60
Appendix 5: Records of Public Consultations and FGDs (Galachipa Cyclone Shelter).....	70
Appendix 6: Sample Grievance Registration Form.....	76
Appendix 7: Sample Monthly Reporting Format	77

EXECUTIVE SUMMARY

1. The Coastal Towns Environmental Infrastructure Project (CTEIP) 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 change 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 two-stage process known as a 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. Galachipa cyclone shelters subproject is one of the subprojects proposed under performance criteria Stage I, which is considered critical, as existing cyclone shelters were built over 30 years ago and are in poor condition. ADB requires the consideration of environmental issues in all aspects of its 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 Urban Development (Appendix 1) was conducted, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Galachipa cyclone shelters subproject is classified as environmental category B as per the SPS 2009, as no significant impacts are envisioned. This initial environmental examination (IEE) has been prepared in accordance with ADB SPS 2009 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 "orange-B," and a location clearance certificate (LCC) and environmental clearance certificate (ECC) must be obtained from the DoE.

6. **Subproject scope.** The subproject is formulated to provide more accessible, reliable, and climate-resilient cyclone shelters in a holistic and integrated manner. Investments under this subproject include construction of three cyclone shelters in Galachipa.

7. **Implementation arrangements.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. LGED is the lead EA and DPHE is the co-executing agency (for water

supply and sanitation components)..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 project 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 teams² are responsible for (i) detailed engineering design, contract documents preparation, and safeguards facilitation; (ii) project management and administration support; (iii) assistance in supervising construction; (iv) strengthening of local governance, conducting studies/surveys on flood inundation and climate change impacts, and facilitating disaster risk management capacity building and community level adaptation through locally managed climate resilience funds; and (v) community-based climate adaptation and disaster preparedness, awareness raising on behavioral change in water, sanitation, and hygiene (WASH) activities and facilitating resettlement procedures.

8. **Description of the environment.** Subproject components are located in Galachipa urban area or in its immediate surroundings, which were converted to urban use many years ago, and there is no natural habitat left at these sites. The subproject sites are located in government-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject location. There are no forest areas within or near Galachipa.

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 the design of the Galachipa cyclone shelters subproject are: (i) sites should serve populations in an area most vulnerable to cyclone damage; (ii) sites should be located within or very close to locality of users; (iii) sites must be prioritized in educational, institutional, or commercially-leased compounds, where concerned authority has no objection; (iv) sites should be selected in the area where significant number of population live; (v) facilities should be located on government-owned land to avoid the need for land acquisition and relocation of people; and (vi) it must be ensured that 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 Galachipa cyclone shelters subproject, including: (i) design life of 20 years; (ii) 1 m² per person, with minimum size for 500 people (500 m²); (iii) base level of first floor raised by 200 mm to avoid higher storm surges and sea levels; and (iv) day-to-day use for them, such as integration of the shelter with the use of the institution that is responsible for its maintenance needs. As a result, some measures have already been included in the subproject designs. This means that the impacts and their significance have already been

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)

reduced.

12. During the construction phase, impacts mainly arise from (i) disturbance of residents, businesses, and traffic; (ii) the need to manage excess construction materials and spoils; and (iii) community's and workers' health and safety. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Measures such as conducting work in the lean season and minimizing inconvenience by best construction methods will be employed. 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.

13. 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.

14. **Consultation, disclosure, and grievance redress.** The stakeholders were involved in developing the IEE through discussions on-site and public consultation. Their views 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.

15. **Monitoring and reporting.** The PMU and project management and supervision consultants (PMSU) will be responsible for monitoring. The PMSU will submit monthly monitoring reports to PMU, and the PMU will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

16. **Conclusions and recommendations.** The citizens of Galachipa will be the major beneficiaries of this subproject. As a result of improved access to climate-resilient shelters during extreme weather events, the safety of the residents of Galachipa will be assured. Therefore, the proposed subproject is unlikely to cause significant adverse impacts, and net environmental benefits to citizens of Galachipa 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.

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

I. INTRODUCTION

1. The Coastal Towns Environmental Infrastructure Project (CTEIP) 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 change 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 two-stage process known as a 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. Galachipa cyclone shelters subproject is one of the subprojects proposed under performance criteria Stage I, which is considered critical, as existing cyclone shelters were built over 30 years ago and are in poor condition. These cyclone shelters are also not accessible to most of the population, especially those who are vulnerable and live in the low-lying area of the town.

4. ADB requires the consideration of environmental issues in all aspects of its 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 Urban Development (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

5. ADB requires the consideration of environmental issues in all aspects of its 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.

6. **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.

7. **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.

8. **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

9. 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).

10. 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 30 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 presents specific requirements for the subproject. 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
--	-------------	------------------------------	-----------

	Legislation	Requirements for the Project	Relevance
1.	Environmental Conservation Act of 1995 and amendments in 2000, 2002, and 2010 ¹	<ul style="list-style-type: none"> - Restriction on operation and process, which can be continued or cannot be initiated in the ecologically critical areas - Regulation on vehicles emitting smoke harmful to the environment - Remedial measures for injuries to ecosystems - Standards for quality of air, water, noise, and soil for different areas for various purposes and limits for discharging and emitting waste - Environmental guidelines 	The provisions of the act apply to the entire subproject in the construction and operation and maintenance (O&M) phases.
2.	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	<ul style="list-style-type: none"> - Environmental clearances - Compliance to environmental quality standards 	The subproject is categorized as orange-B and requires LCC and 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)	<ul style="list-style-type: none"> - Clearance for any felling, extraction, and transport of forest produce 	Considered in subproject preparation
4.	Bangladesh Climate Change Strategy and Action Plan of 2009	<ul style="list-style-type: none"> - 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) are put in place to deal with the likely impacts of climate change. - Enhance the capacity of government ministries, civil society, and private sector to meet the challenge of climate change 	Considered in subproject preparation
5.	Bangladesh Labor Law of 2006	<ul style="list-style-type: none"> - Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement - Prohibition of employment of children and adolescents 	The provisions of the act apply to the entire subproject in the construction and O&M phases. Provides for safety of workforce during construction phase.

C. Government of Bangladesh Environmental Assessment Procedures

11. 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).

12. 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

¹ *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 on restrictions on polluting automobiles; restrictions on the sale and production of environmentally harmful items like polythene bags; assistance from law enforcement agencies for environmental actions; breakdown of punitive measures; and authority to try environmental cases. In *ECA Amendment 2010*, no individual or institution (government or semi-government/nongovernment/self-governing) can cut any hill or hillock or fill up or change any remarkable water body. However, in case of national interest, the mentioned activities can be done after getting clearance from the respective departments.

components are likely to be classified as red category.

Table 2: Likely Government of Bangladesh Classification of Galachipa Cyclone Shelters Subproject

	Subproject	Component	Equivalent in Schedule I of ECR	DoE Classification
1.	Cyclone shelters	New or refurbishment of cyclone shelters	Hotel, multi-storied commercial and apartment building	Orange-B

13. Rule 7 of the ECR indicates that the application for ECC must be made to the relevant DoE Divisional Officer, and the application for orange-B 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;
- (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).

14. Under the ECR, DoE has 30 days to respond to receipt of the ECC application for an orange-B category project.

III. DESCRIPTION OF THE PROJECT

A. The Study Area

15. Galachipa is located in Patuakhali District of Barisal Division. It is the largest *upazila* of Patuakhali District with respect to both area and population. Galachipa is located between 21°48' and 22°21' north and between 90°15' and 90°37' east. The proposed cyclone shelters will be located in semi-government institutional lands. The location map of the town is shown as Figure 1.

B. Existing Condition and Need for the Project

16. Research commissioned by the various development partners in Bangladesh² 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. It features a slightly raised unenclosed ground floor, either concrete or earthen, with external steps leading up to a roofed and walled first floor. This area provides the main protection from cyclones. Key issues³ with existing cyclone shelters are: (i) shelters are not located close to where the poor and vulnerable reside, outside embankments; (ii) approach roads do not have all-weather surfacing and the crest is below the flood level, making access during cyclones difficult and unsafe; (iii) structures are of poor quality due to inadequate design, construction supervision, and maintenance; (iv) structures lack or have poor water supply and sanitation

² Coastal Climate Resilient Infrastructure Project, TA 7902 – BAN, Annex N, Cyclone Shelters, kfW, ADB, IFAD, Sept 2012.

³ 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.

facilities; (v) there are no separate sections for women or secure storage areas for personal effects; (vi) many shelters are not used, apart from during cyclones, hence maintenance is not regular; and (vii) many shelters are located below the road level, and the ground floor is often subject to flooding.

17. There are two existing cyclone shelters in Galachipa, which are in useable condition. The existing conditions are given in Table 3.

Table 3: Existing Condition of Cyclone Shelters in Galachipa

Town	Number	Age	Capacity	Remarks
Galachipa	2	20	2 X 200	Being used by a bank (1) and as a school (1)

Source: PPTA Consultant.

C. Proposed Components

18. Investments under this subproject include construction of three cyclone shelters. As per the requirements of LGED's Emergency Cyclone Recovery and Restoration Project (ECRRP), the cyclone shelters-cum-schools will be provided with essential facilities like (i) separate toilets for male and female; (ii) care room for pregnant women; (iii) water supply with deep tube well; (iv) school furniture; (v) rainwater harvesting system; (vi) solar panel, etc. More facilities can be included as necessary during detailed design. Three options for cyclone shelters under ECRRP⁴ were used for Galachipa. Details are given in Table 4.

Table 4: Basic Data on Proposed Cyclone Shelters in Galachipa

No.	Name, Location, Ward No.	Land Ownership	Present Condition	Floor Area	Capacity
1.	Furfura Sharif Quranul Talimul Madrasha in Ward No. 2	Madrassa land (semi-government institutional land)	Open land	247.73 m ²	1,328
2.	Galachipa Degree College compound in Ward No. 9	College Authority (semi-government institutional land)	Damaged tin-shed	247.73 m ²	1,328
3.	Beside Sarshina Khanka and Hafezia Madrassa in Ward No. 3	Madrassa authority (semi-government institutional land)	Open land	247.73 m ²	1,328

Source: PPTA Consultant.

D. Implementation Schedule

18. 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.

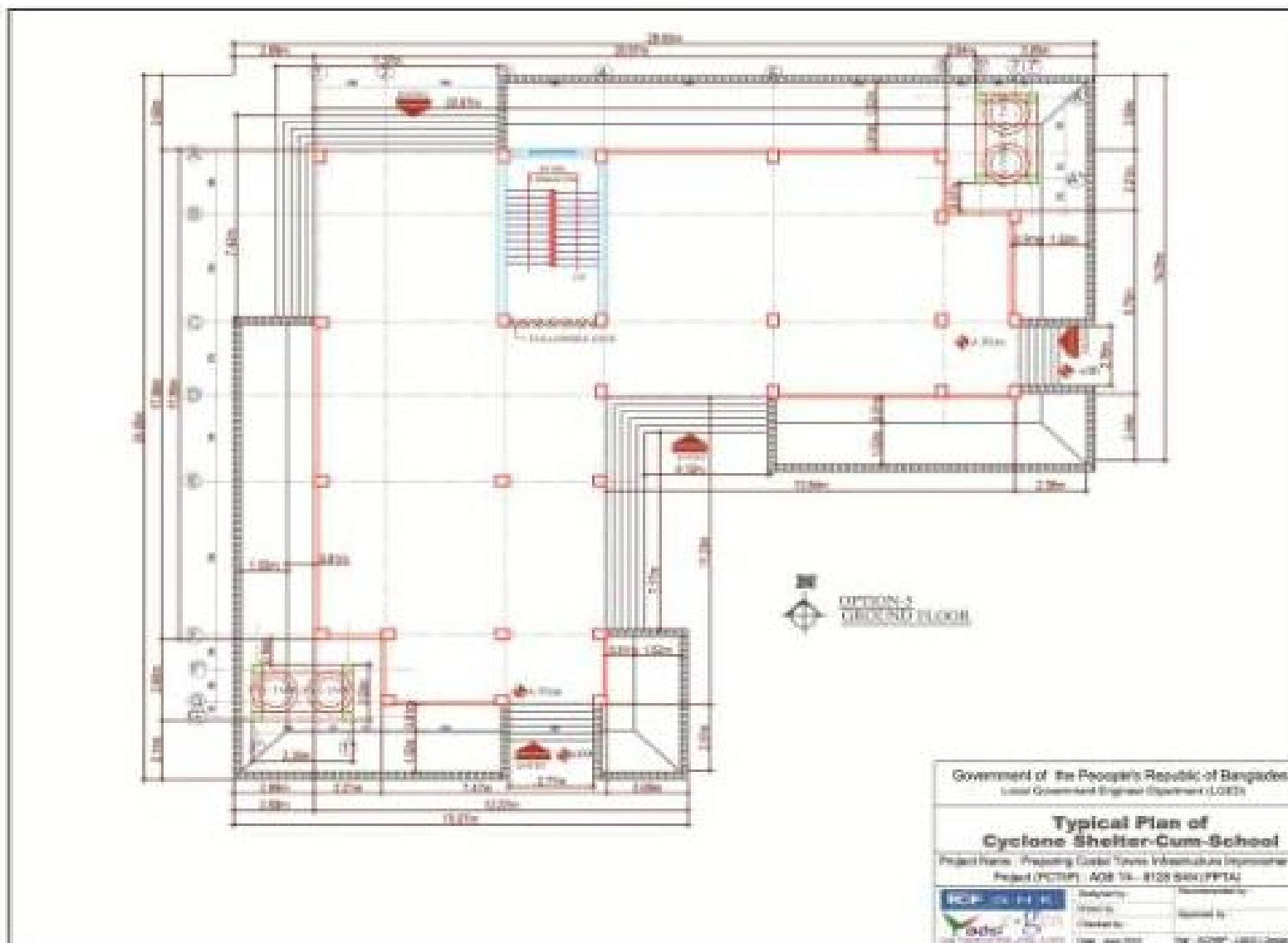
⁴ Government of Bangladesh's Standing Order on Disasters (http://www.ddm.gov.bd/pdf/sod_final.pdf) and Cyclone Shelter Construction, Maintenance, and Management Guideline (2011) specify the different types of cyclone shelters depending on capacity, land requirement, and cost. Type 1 as college/high school/madrassa-cum-multipurpose cyclone shelter with capacity of 1,000 persons; type 2 as primary school-cum-multipurpose cyclone shelter with capacity of 800 persons per floor; and type 3 as multipurpose cyclone shelter with capacity of 750 persons per floor.

Figure 1: Location Map

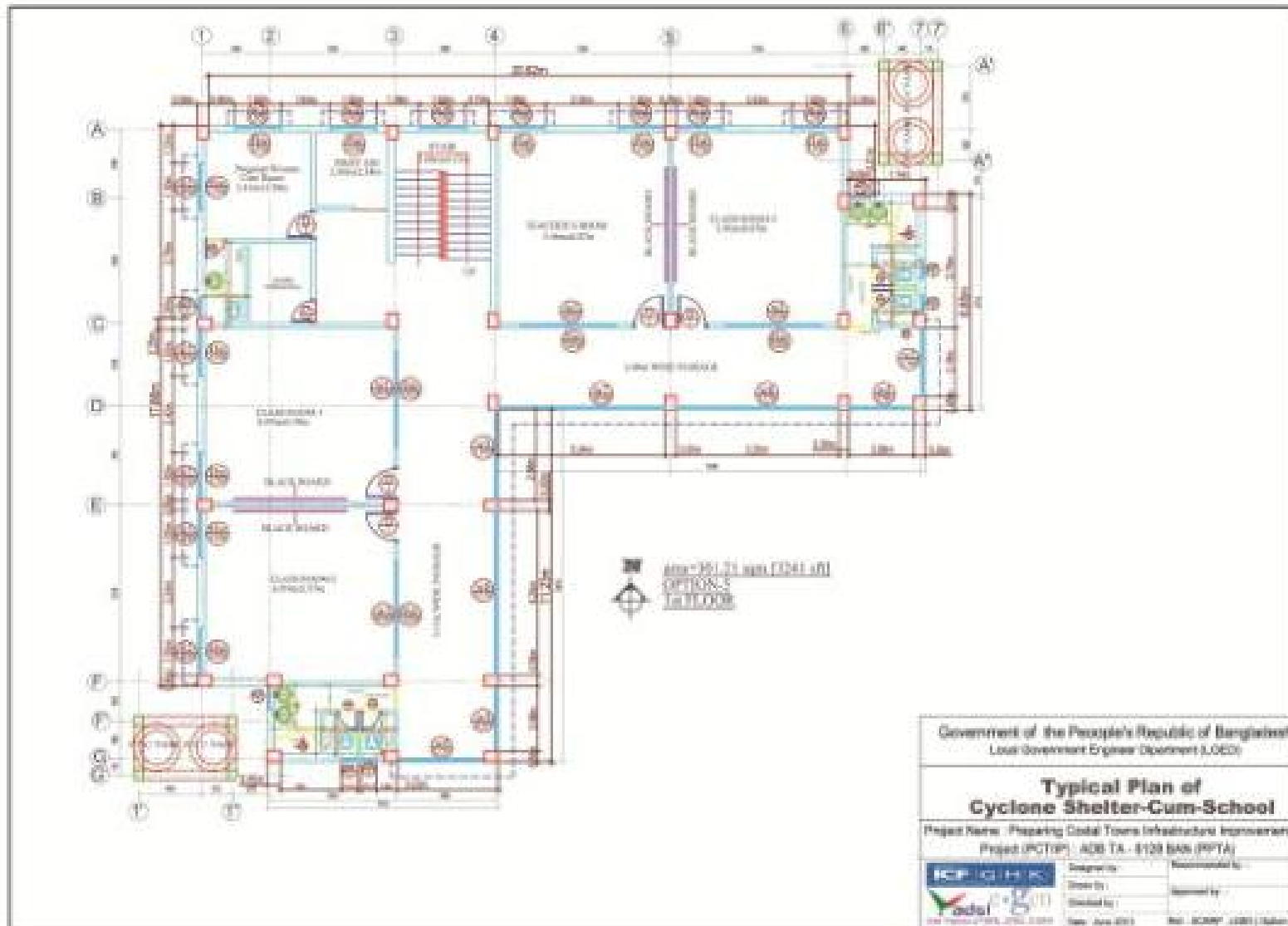


★ Study town

Figure 2: Ground Floor of Cyclone Shelter



Cyclone Shelter: First Floor Plan



IV. DESCRIPTION OF THE ENVIRONMENT

A. Methodology Used for the Baseline Study

19. **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 capacity development technical assistance CDTA and PPTA consultants, LGED, and Galachipa *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.

20. Several visits to the subproject sites were made during the CDTA and PPTA stages 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.

21. **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

22. **Topography, land forms, geology, and soils.** Galachipa *pourashava*, with an area of 3.4 km² located about 32 km from the sea, covers 9 wards and 2 *mouzas*. It is bordered by River Ramnabad coast estuary and the Bay of Bengal. A topographic and physical feature survey of the *pourashava* was undertaken by Sheltech Consultants in 2012. According to that survey, the minimum and maximum ground level varied from 1.5 m to 4.2 m, and the average height was about 2.43 m. The physical survey found that all the wards had flat land. It is greatly influenced by the river network and *khals*.

23. **Climatic conditions.** Galachipa has a tropical monsoon-type climate. January is the coolest month, with temperatures averaging near 26°C (78 °F), and April the warmest, with temperatures from 33 to 36 °C (91-96 °F). 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), with a little in winter (November-February). Galachipa 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.

24. **Water quality.** Galachipa is bounded by the River Ramnabad; however, the subproject sites are not located in or adjacent to this river or *khals* (drainage channels).

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

are in operation within the *pourashava* limit.

26. **Acoustic environment.** Subproject components are in the built-up part of Galachipa, 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 a major cause of noise pollution.

C. Biological Characteristics

27. **Flora and fauna.** Subproject components are located in Galachipa urban area or in its immediate surroundings, which were converted to urban use many 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.

28. **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

29. **Population.** Information about the total number of households, with average size, and population of Galachipa *pourashava*, is presented in Table 5.

Table 5: Population of Galachipa *Pourashava*

Administrative Unit	Area (Km ²)	Households (Nos.)	Population			Average HH Size	Density (Per Km ²)
			Total	Male	Female		
Galachipa	3.40	4,967	21,200	10,888	10,312	4.26	
Ward No. 1	0.27	595	2,483	1,279	1,204	4.17	9,196
Ward No. 2	0.28	502	2,122	1,080	1,042	4.22	7,578
Ward No. 3	0.39	326	1,430	695	735	4.38	3,666
Ward No. 4	0.16	560	2,275	1,255	1,020	4.06	14,218
Ward No. 5	0.23	446	1,755	915	840	3.93	7,630
Ward No. 6	0.68	720	3,352	1,717	1,635	4.65	4,929
Ward No. 7	0.35	746	3,148	1,632	1,516	4.22	8,994
Ward No. 8	0.36	524	2,301	1,158	1,143	4.39	6,391
Ward No. 9	0.67	548	2,334	1,157	1,177	4.26	3,483

Source: Bangladesh Bureau of Statistics Community Report, Zilla: Galachipa, 2011.

30. **Land use.** A land use survey was undertaken by Sheltech Consultants in 2009. The survey results shows that there is dominance of agricultural land (44%), followed by residential land (37%) and water bodies (10%). Galachipa has 12.7 ha of road area, 1.2 ha of *katcha* road, 4.3 ha of semi-*pucca* roads, and 7.2 ha of *pucca* roads. There are 44 bridges, 1 box culvert, 6 pipe culverts, and 2 sluice gates.

31. **Type of community spread.** Galachipa is 92.01% Muslim, 7.95% Hindu, 0.04% Buddhist. Average literacy is 34.8%.

32. **Existing provisions for pedestrians and other forms of transport.** Galachipa roads generally fall into two categories: *katcha* (earthen) construction and *pucca* (formed) roads. Formed roads are mainly BT asphalt roads with CC roads in a few places for main roads, while minor roads may also be brick-on-edge soling, known locally as 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 1 m above ground level. The transportation and traffic management survey results reveal that no public or private bus service is available for intrazonal movement of passengers. Rickshaws are the most dominant transport for intrazonal movement. The water transport network of Galachipa has significant importance in carrying goods.

33. **Socioeconomic status.** Main occupations are agriculture, agricultural labor, wage labor, commerce, service, fishing, transport, construction, and others. Main crops are paddy. About 70% of the households own their house, with 30% living in rented houses. At present, there is a predominance (74%) of *katcha* structures. Most single-storey structures are *pucca* structures.

34. **Other existing amenities for community welfare.** The Upazila Health Complex (UHC) in Galachipa is responsible for providing public health services, although there are a few private doctors and pharmacies in the town. In the UHC, there are 10 doctors and 16 nurses/health technicians.

35. **Water supply.** Under the DPHE- Danish International Development Agency (DANIDA) water supply and sanitation project, two production tube wells with a 1-km transmission pipeline and an 18-km distribution line were installed in 1999. Later, another 8-km pipeline was installed by the *pourashava*, increasing the pipeline total to 26 km. Water from the production tube wells is supplied through the only overhead tank available at present. It is estimated that about 76% of the *pourashava* area is covered by water supply piped networks—household connections and standpipes. The rest of the population has access to public and private hand tube wells. Water test reports of 1999 and 2012 do not indicate any salinity increase in groundwater. Hydro-geological status shows that the aquifer is well protected by confining clay layers.

36. **Drainage.** Primary drains at Galachipa are about 36 km of canals or *khal*s covering 11.4 ha. There is no secondary drainage. There are 5 km of tertiary drains that collect discharged water from households together with storm water, and are mainly man-made (some are being upgraded). Galachipa *khal* is the main canal that drains the waters of the town into the Ramnabad River.

37. **Flood control/disaster preparedness.** Galachipa is adjacent to the Bay of Bengal and is vulnerable to the flooding from cyclones and linked storm surges. The vulnerable period is April-May and October-November, when tropical cyclones form in the Bay of Bengal. Cyclones have struck the area in 1970, 1988, 1991, 2007, and 2008. Wards no. 2, 3, and 4 are the most affected by flooding from high tides. Galachipa is protected by BWDB Polder 55/1. The polder embankments protect it against flood from the rivers, while drainage inside the polder is affected through drainage *khal*s with regulators at the outfall. The polder is 47 km long, with 11 drainage sluices and 13 flushing inlets. Within the polder, the maximum spot level is 5.71 m as measured by the Public Workd Department (PWDs (mPWD), the minimum level is 0.46 mPWD, and the average ground level is 1.72 mPWD. However, a significant part of Galachipa *pourashava* is outside the polder.

38. **Sanitation.** Some 98% of the population served by sanitary latrines, with 40% having septic tanks, 40% having water-sealed slab latrines, and 18% simple pit latrines. There are only three public toilets.

39. **Solid waste management.** There is no solid waste management system in place.

E. Historical, Cultural, and Archaeological Characteristics

40. **Physical and cultural heritage.** The historical places in Galachipa include the markers of the War of Liberation (two monuments). The archaeological heritage and relics sites are Utabaria Dayamayee Mandir (built in 1208 BC) and the single-domed Gurinda Mosque at Ratandi (built in the 18th century). The subproject components are not located in or near the vicinity of these sites.

V. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND SAFEGUARDS

A. Methodology

41. 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 Urban Development (Appendix 1) and ADB SPS 2009.

B. Screening Out Areas of No Significant Impact

42. From the preliminary design and results of the rapid environmental assessment, it is clear that implementation of Galachipa cyclone shelters subproject will not have major negative impacts because activities will be localized/site-specific and short in duration, 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 6) and thus can be screened out of the assessment at this stage, but which will be assessed again during detailed design stage and before implementation.

Table 6: 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 excavation works will be conducted only during construction stage (short-term) and specific to subproject sites.
Climatic conditions	Short-term production of dust is the only effect on atmosphere. However, impact is short-term, site-specific, and within a relatively small area. There are well-developed methods for mitigation.
Water quality	Excavation, runoff from stockpiled materials, and chemical contamination from fuels and lubricants may result in silt-laden runoff during rainfall, which may cause siltation and reduction in the quality of adjacent bodies of water (<i>nallahs</i>). However, impact is short-term, site-specific, and within a relatively small area. There are well-developed methods for mitigation.
Air quality	Conducting works in dry season and moving large quantity of materials may create dust 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, in and near schools, and in areas with small-scale businesses. Temporary increase in noise level and vibrations may be caused by excavation equipment, and the

Field	Rationale
	transportation of equipment, materials, and people. However, the 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 Galachipa <i>pourashava</i> , they will not cause direct impact on biodiversity values. Based on preliminary design, the construction activities do not anticipate any cutting of trees. However, this will be reassessed during detailed design.
C. Socioeconomic Characteristics	
Land use	No alteration on land use. Cyclone shelters will be constructed in vacant government land and existing school compounds.
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 impact is short-term, site-specific, and within a relatively small area. There are well-developed methods for mitigation.
Socioeconomic status	There is no requirement for land acquisition or any resettlements. Manpower will be required during the 24-month construction stage. This can result in 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 Galachipa <i>pourashava</i> , where there are a variety of human activities, will result in impacts to the sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration.
D. Historical, Cultural, and Archaeological Characteristics	
Physical and cultural heritage	The subproject components are not located in or near, and excavation works will not be conducted in, the vicinity of identified historical sites.

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

43. **Land acquisition and resettlement.** The proposed cyclone shelters will be located in semi-government institutional lands. There are no encroachers or residential/commercial structures in these lands. Cutting of trees, if determined during detailed design, will be minimized. Compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to the required tree plantation in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract.

44. 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. The subproject will be in properties held by the *pourashava*, and access to the subproject sites is through public RoW and existing roads; hence, land acquisition and encroachment on private property will not occur.

45. The concepts considered in design of the Galachipa cyclone shelters subproject are: (i) sites should serve populations in an area most vulnerable to cyclone damage; (ii) sites should be located within or very close to locality of users; (iii) sites must be prioritized in educational, institutional, or commercially-leased compound where concerned authority has no objection; (iv) sites should be selected in the area where significant number of population live; (v) facilities should be located on government-owned land to avoid the need for land acquisition and relocation of people; and (vi) it must be ensured that 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.

46. Preliminary designs integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Galachipa cyclone shelters subproject, including: (i) design life of 20 years; (ii) 1 m² per person, with minimum size for 500 people (500 m²); (iii) base level of first floor raised by 200 mm to avoid higher storm surges and sea levels; and (iv) day-to-day use for them, such as integration of the shelter with the use of the institution that is responsible for its maintenance needs. The cyclone shelters will be designed in accordance with relevant national and international building codes to further enhance the resilience of the structures.

D. Anticipated Impacts and Mitigation Measures – Construction Phase

47. 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*, construction will not cause direct impact on biodiversity values.

48. **Construction method.** Tasks to be performed for construction of cyclone shelters are: (i) demolition of existing structures; (ii) site clearing; (iii) laying of foundations; (iv) casting of ground floor slab; (v) construction of floor beams and floor slabs; (vi) construction of roof beams and roofing; (vii) installation of doors and windows; (viii) architectural components and finishes; and (ix) ordering, procurement, and installation of building services. Excavation for the foundation will be dug by backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed nearby, and the materials (brought to site on trucks and stored on unused land nearby) will be placed in the trench by crane or using a small rig. The infrastructures will be constructed manually according to design specifications. Any excavated road will be reinstated.

49. 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.

50. Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject sites in built-up areas of Galachipa, where there are a variety of human activities, will result in 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, Galachipa cyclone shelters subproject is unlikely to cause significant adverse impacts. The potential adverse impacts associated with construction activities can be mitigated to acceptable levels with the following mitigation measures (Table 7).

Table 7: Anticipated Impacts and Mitigation Measures – Construction Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Topography, landforms, geology, and	Significant amount of gravel, sand, and cement will be required for this subproject.	- Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory requirements.

Field	Impacts	Mitigation Measures
soils	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.	<ul style="list-style-type: none"> - 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	Excavation, runoff from stockpiled materials, and chemical contamination from fuels and lubricants may result in 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.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize reuse of excess spoils and materials in construction activities. If spoils will be disposed, consult with Galachipa local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season, such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300 m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. - Take all precautions to minimize the wastage of water in the construction activities. - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting stormwater flow during construction shall not lead to inundation and other nuisances in low-lying areas. - 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. - 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.	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water during dry weather.. - Use tarpaulins to cover soils, sand, and other loose material when transported by trucks. - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants, and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality.
Acoustic environment	Construction activities will be on settlements, in 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	<ul style="list-style-type: none"> - Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Galachipa local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during nighttime. - Horns should not be used unless it is necessary to warn

Field	Impacts	Mitigation Measures
	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.	<p>other road users or animals of the vehicle's approach;</p> <ul style="list-style-type: none"> - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoid 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.	<ul style="list-style-type: none"> - Prepare the debris disposal plan. - Remove all construction and demolition wastes on a daily basis. - Coordinate with Galachipa local authority for beneficial uses of excess excavated soils, or immediately dispose of in designated areas. Avoid stockpiling of any excess spoils. - Suitably dispose of collected materials from drainages, unutilized materials, and debris, either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction. - The site must be kept clean to minimize the visual impact of the site. Manage solid waste according to the following preference hierarchy: reuse, recycle, and dispose of in designated areas.
B. Biological Characteristics		
Biodiversity	Activities being located in the built-up area of Galachipa <i>pourashava</i> , there are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design, there are no trees at the site that need to be removed (to be reassessed during detailed design stage).	<ul style="list-style-type: none"> - 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. - If during detailed design cutting of trees will be required, compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to tree plantation as specified in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract. - All efforts shall be made to preserve trees by evaluation of minor design adjustments/alternatives (as applicable) to save trees. - Special attention shall be given to protecting giant trees and locally important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal)

Field	Impacts	Mitigation Measures
		including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting trees for firewood.
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.	<ul style="list-style-type: none"> - Prepare and implement a traffic management plan (Appendix 5). - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags, and flagmen, informing people of diversions and alternative routes when required. - Notify affected sensitive receptors by providing signboards informing people of the nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishments, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factor this into work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Socioeconomic status	Subproject components will be located in government land and existing school compounds; thus, there is no requirement for land acquisition or any resettlements. Manpower will be required during the 24-month construction stage. This can result in generation of contractual employment and increase in local revenue. Thus, potential impact is positive and long-term.	<ul style="list-style-type: none"> - 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 accommodations. - 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 Galachipa <i>pourashava</i> , where there are a variety of human activities, will result in impacts to the sensitive receptors such as residents, businesses, and the community in general. Excavation may also damage existing infrastructure (such as water distribution pipes, electricity pylons, etc.) located	<ul style="list-style-type: none"> - Obtain details from <i>pourashava</i> on nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible. - Integrate construction of the various infrastructure subprojects to be conducted in Galachipa (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. - Consult with local community to inform them of the nature, duration, and likely effects of the construction work, and to identify any local concerns so that these can be addressed. - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites.

Field	Impacts	Mitigation Measures
	alongside the roads. The impacts are negative but short-term, site-specific within a relatively small area, and reversible by mitigation measures.	<ul style="list-style-type: none"> - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt users of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area, and reversible by mitigation measures.	<ul style="list-style-type: none"> - Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants, and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m away from the nearest dwelling, preferably in the downwind direction. - Consult with Galachipa local authority on the designated areas for stockpiling of soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster excavation progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.⁷ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. - Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. - The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance, along with the action taken, to the environment management specialist within 48 hours of receipt of such complaint/grievance.
Workers' health and	There is invariably a safety risk when construction works such	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on

⁷ These products come in powder form, 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
safety	as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term, but reversible by mitigation measures.	<p>workers health and safety (H&S).</p> <ul style="list-style-type: none"> - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles, and masks) at all times; (iii) providing H&S training⁸ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid units, including an adequate supply of sterilized dressing materials and appliances. - Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking, and washing; (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; and (iii) sanitation facilities are available at all times. - Provide medical insurance coverage for workers. - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injury to fellow workers. - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted. - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas. - Ensure moving equipment is outfitted with audible back-up alarms. - Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by, workers, visitors, and the general public as appropriate. - 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	Construction works will be in built-up areas of Galachipa, thus risk for chance finds is low.	- All fossils, coins, articles of value of antiquity, structures, and other remains of archaeological interest discovered on the site shall be the property of the government.

⁸ 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 , 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 his/her 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
		<ul style="list-style-type: none"> - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures, and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected.

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

51. In the operations and maintenance (O&M) phase, the cyclone shelters will operate with routine maintenance, which should not affect the environment. Routine repairs will be very small in scale, to be conducted manually by small teams, and works will be very short in duration, and thus will not cause significant physical impacts. The cyclone shelters 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 Galachipa local authority, which will be given training by this project. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Table 8).

Table 8: Anticipated Impacts and Mitigation Measures – O&M Phase

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
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.	<ul style="list-style-type: none"> - Plan activities in consultation with Galachipa 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. - Identify any buildings at risk from vibration damage and avoid any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.
B. Socioeconomic Characteristics		
Workers' health and safety	Workers need to be mindful of the occupational hazards. Potential impacts are negative and long-term, but reversible by mitigation measures.	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Mark and provide signboards. 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.

F. Cumulative Impact Assessment

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

- (i) any potential residual project effects that may occur incrementally over time;
- (ii) in consideration of other known relevant projects or activities within the specified study area boundaries, even if not directly related to the project;

- (iii) potential overlapping impacts that may occur due to other developments, even if not directly related to the proposed subproject; and
- (iv) future developments that are reasonably foreseeable and sufficiently certain to proceed.

53. The project has identified the valued components as 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 cyclone shelters. The temporal boundary can be considered as the whole Galachipa *pourashava*.

54. **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.

55. **Socioeconomic and socio-community.** Concerns on existing provisions for pedestrians and other forms of transport will occur spatially during construction activities. Traffic movement along the access roads 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 Galachipa *pourashava*. This can be considered a long-term cumulative benefit of the subproject.

56. Given the scale of the project, it is likely that large numbers of local people will obtain at least temporary socioeconomic 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 vulnerable⁹ groups.

57. Upon completion of the project, the socio-community will be the major beneficiaries of this subproject. With the improved cyclone shelters, they will be provided with reliable and climate-resilient municipal services.

58. **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 during construction, due to their short-term and localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health.

59. Therefore, the project will benefit the general public by contributing to the long-term improvement of municipal services and climate resilience in Galachipa *pourashava*.

⁹ Vulnerable groups are defined 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.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Public Consultation Conducted

60. 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 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.

61. Public consultations and focus group discussions (FGDs) were conducted by PPTA on 20 June 2013, with a total of 65 participants in the proposed cyclone shelter locations. The objective of the meetings was to apprise the stakeholders on 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 6. 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

62. 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 project implementation, to ensure stakeholders participate fully in project execution, as well as to implement a comprehensive information, education, and communication plan.

63. The public consultation and disclosure program with all interested and affected parties 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.

64. 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 hard copies of the 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

65. 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.

66. **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.

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

68. 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) safeguard officer will have the overall responsibility for timely grievance redressal on environmental and social safeguard issues and for registration of grievances, related disclosure, and communication with the aggrieved party through the PIU safeguards assistant.

69. **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 safeguard assistant, contractors, PMU safeguard officer, and PMSC environmental and social safeguard specialists will be posted at all construction sites at visible locations.

- (i) **1st level grievance.** The contractors, PIU supervision personnel, and PIU safeguard 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 the PIU safeguard assistant (the second level of grievance redress), who will attempt to resolve them within 7 days.¹⁰ The PIU safeguard assistant will be responsible to see the process of redressal of each grievance through.
- (iii) **3rd level grievance.** The PIU safeguard assistant will refer any unresolved or major issues to the PMU safeguard 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, 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)¹¹. All paperwork (details of grievances) needs to be completed by the PIU safeguard 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 safeguard assistant.

70. The project GRM notwithstanding, 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.

71. 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.

72. **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

¹⁰Grievance redress committees (GRC) have already been formed at town level. For example, in Pirojpur *pourashava*, the GRC is comprised of the panel mayor as chairperson, one councilor, the *pourashava* executive engineer, the *pourashava* secretary, 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.

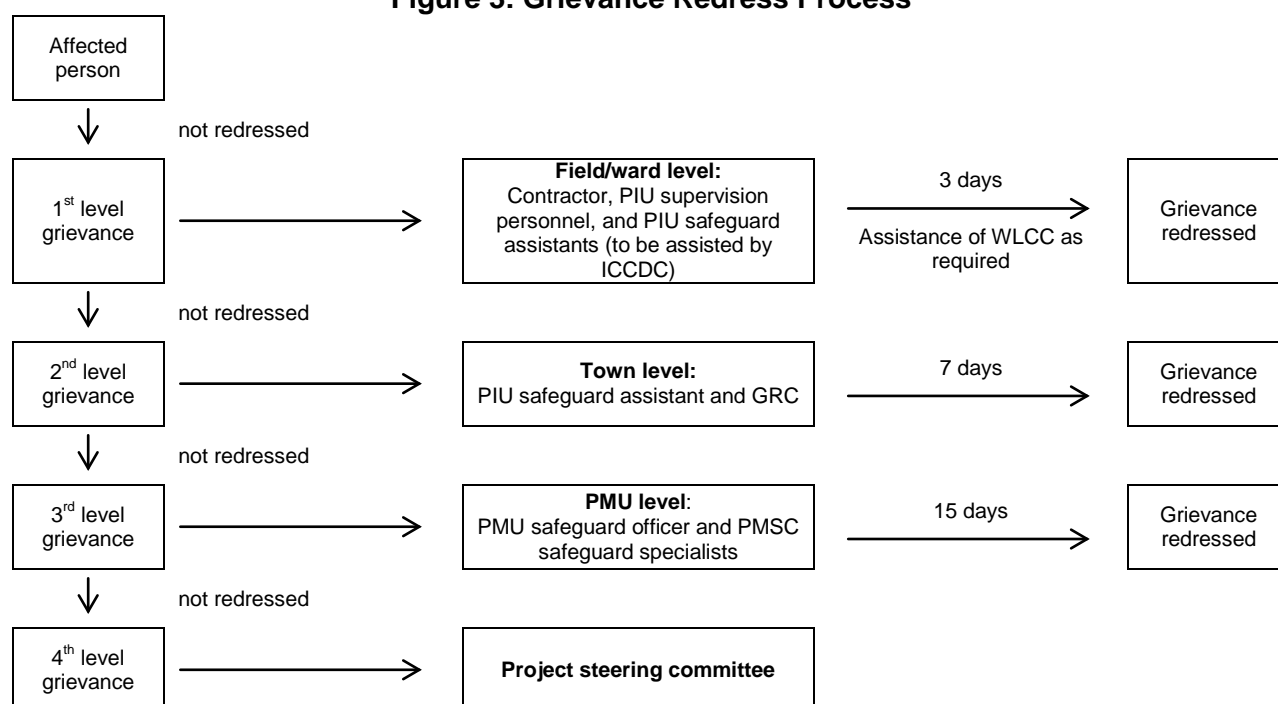
¹¹ The project steering committee (PSC) responsible for grievance redress will have the following as members: Secretary, Local Government Department, as chair; Chief Engineer, LGED; Chief Engineer, DPHE; Project Director, member secretary; General Economic Division, Planning Commission; Physical Planning, 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.

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.

73. **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.

74. **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 3: 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

75. 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.

76. A copy of the EMP must be kept at 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.

77. 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

78. **Executing agency.** The Ministry of Local Government, Rural Development and Cooperatives (MLGRDC) acting through its Local Government Engineering Department (LGED) and the Department of Public Health Engineering (DPHE) will be the Executing Agencies of the project. LGED is the lead EA and DPHE is the co-executing agency (for water supply and sanitation components).. A PMU will be established in LGED.

79. **Project management unit.** The PMU will be staffed with a safeguard officer and will receive support from safeguard specialists (environment and resettlement) on the DDS and PMSC consultant team. Key tasks and responsibilities of the PMU safeguard 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.

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

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

- (i) include IEEs/EMPs in bidding documents and civil works contracts;
- (ii) oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations;
- (iii) take necessary action for obtaining rights of way;
- (iv) oversee implementation of EMPs, including environmental monitoring by contractors;
- (v) take corrective actions when necessary to ensure no environmental impacts;
- (vi) submit monthly environmental monitoring reports to PMU;
- (vii) conduct continuous public consultation and awareness;
- (viii) address any grievances brought about through the grievance redress mechanism in a timely manner as per the IEEs; and
- (ix) organize an induction course for the training of contractors, preparing them on EMP implementation, 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.

82. 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.¹²

83. **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.

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

¹² Reduce, reuse, and recycle (3R) and water, sanitation, and hygiene program (WASH)

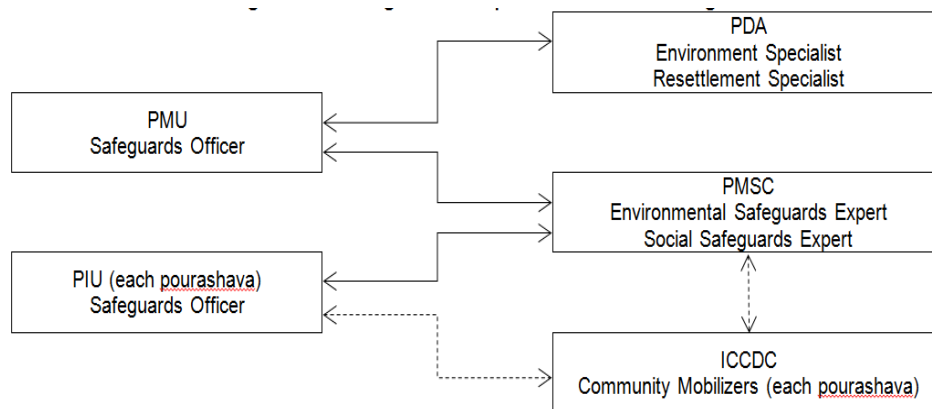
Figure 3: Safeguards Implementation Arrangement

Table 9: Environmental Management and Monitoring Plan – Pre-, During, and Post-construction Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
1. Pre-construction Activities						
Consents, permits, clearances, no-objection certificate (NOC), etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result in design revisions and/or stoppage of works	<ul style="list-style-type: none"> - Obtain all necessary consents, permits, clearance, NOCs, etc. prior to start of civil works. - Acknowledge in writing and provide report on compliance to all obtained consents, permits, clearance, NOCs, etc. - Include in detailed design drawings and documents all conditions and provisions if, necessary 	Project management unit (PMU), project implementing unit (PIU), project design advance (PDA) detailed design consultants, and project management and supervision consultants (PMSC)	Incorporated in final design and communicated to contractors	Prior to award of contract	<p>No cost required. Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works is responsibility of PMU and PIU.</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA and PMSC.</p>
Existing utilities	Disruption of services	<ul style="list-style-type: none"> - Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction activities. - Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. - Require contractors to prepare spoils management plan (Appendix 4) and traffic management plan (Appendix 5). 	PMU, PIU, PDA, and PMSC	<ul style="list-style-type: none"> - List of affected utilities and operators - 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 4), and traffic management plan (Appendix 5) 	During detailed design phase	<p>No cost required</p> <p>Mitigation measures are included as part of TOR of PMU, PIU, PDA, and PMSC.</p>
Construction work camps, hot mix plants, stockpile areas, storage areas,	Disruption of traffic flow and sensitive receptors	<ul style="list-style-type: none"> - Determine locations prior to award of construction contracts. 	PMU, PIU, PDA, and PMSC	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas,	During detailed design phase	<p>No cost required</p> <p>Mitigation measures are included as part of TOR of PMU,</p>

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
and disposal areas				and disposal areas (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land		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; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	During detailed design phase	No cost required 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 training, including spoils management, standard operating procedures (SOP) for construction works, health and safety (H&S), core labor laws, applicable environmental laws, etc.	Construction contractor with assistance of PIU and PMSC environmental safeguard specialist	- Proof of completion (safeguards compliance orientation) (ii) Posting of proof of completion at worksites (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. Other costs responsibility of contractor.
2. During Construction Activities						
A. Physical Characteristics						
Topography, landforms, geology, and soils	Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of	- Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure these conform to all relevant regulatory	Construction contractor	- Records of sources of materials	Monthly by PIU	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	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.	requirements. - Borrow areas and quarries (if these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner, and contractor.				
Water quality	Excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result in 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.	<ul style="list-style-type: none"> - Prepare and implement a spoils management plan (Appendix 4). - Prioritize reuse of excess spoils and materials in construction activities. If spoils will be disposed of, consult with Galachipa local authority on designated disposal areas. - All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season, such as problems from runoff. - Location for stockyards for construction materials shall be identified at least 300 m away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to 	Construction contractor	<ul style="list-style-type: none"> - Areas for stockpiles, storage of fuels and lubricants and waste materials - Number of silt traps installed along trenches leading to water bodies - Records of surface water quality inspection - Effectiveness of water management measures - No visible degradation to nearby drainages, <i>khals</i>, or water bodies due to construction activities 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of cyclone shelters 	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>water bodies.</p> <ul style="list-style-type: none"> - Take all precautions to minimize the wastage of water in the construction activities. - Take all precautions to prevent entering of wastewater into streams, watercourses, or irrigation system. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. - Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low-lying areas. - While working across or close to any water body, 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. - Monitor water quality according to the environmental management plan. 				
Air quality	Conducting works in dry season and moving large quantity of materials may create dust and increase in	<ul style="list-style-type: none"> - Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather. - Use tarpaulins to cover soils, sand, and other 	Construction contractor	<ul style="list-style-type: none"> - Location of stockpiles. - Number of complaints from sensitive receptors - Heavy equipment and machinery with air pollution control 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be 	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	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.	<p>loose material when transported by trucks.</p> <ul style="list-style-type: none"> - Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. - Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants, and crushers (if these establishments are being set up exclusively for the subproject). - Monitor air quality. 		<p>devices</p> <ul style="list-style-type: none"> - Certification that vehicles are compliant with air quality standards 	finalized during detailed design stage and final location of cyclone shelters	
Acoustic environment	Construction activities will be in settlements, in 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.	<ul style="list-style-type: none"> - Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. - Plan activities in consultation with Galachipa local authority so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance. - Use of high noise generating equipment shall be stopped during 	Construction contractor	<ul style="list-style-type: none"> - Number of complaints from sensitive receptors - Use of silencers in noise-producing equipment and sound barriers - Equivalent day and nighttime noise levels 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of cyclone shelters 	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	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.	<p>nighttime.</p> <ul style="list-style-type: none"> - Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; - Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. - All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). - Monitor noise levels. Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. - Identify any buildings at risk from vibration damage and avoid any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly. 				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
Aesthetics	Based on preliminary design, construction activities do not anticipate any cutting of trees (to be reassessed during detailed design), 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.	<ul style="list-style-type: none"> - Prepare the debris disposal plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with Galachipa local authority for beneficial uses of excess excavated soils, or immediately dispose of in designated areas Avoid stockpiling of any excess spoils. - Suitably dispose of collected materials from drainages, unutilized materials, and debris either through filling up of pits/wasteland or at pre-designated disposal locations. - All vehicles delivering fine materials to the site and carrying waste debris for disposal shall be covered to avoid spillage of materials. All existing roads used by vehicles of the contractor shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. - Lighting on construction sites shall be pointed downwards and away from oncoming traffic and nearby houses. - In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site 	Construction contractor	<ul style="list-style-type: none"> - Number of complaints from sensitive receptors - Worksite clear of hazardous wastes such as oil/fuel - Worksite clear of any wastes, collected materials from drainages, unutilized materials, and debris - Transport route and worksite cleared of any dust/mud 	<ul style="list-style-type: none"> - Visual inspection by PIU and supervision consultants on monthly basis - Frequency and sampling sites to be finalized during detailed design stage and final location of cyclone shelters 	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.</p> <ul style="list-style-type: none"> - The site must be kept clean to minimize the visual impact of the site. <p>Manage solid waste according to the following preference hierarchy: reuse, recycle, and dispose of in designated areas.</p>				
B. Biological Characteristics						
Biodiversity	<p>Activities being located in the built-up area of Galachipa <i>pourashava</i>, there are no protected areas in or around subproject sites, and no known areas of ecological interest. Based on preliminary design, there are no trees at the site that need to be removed.</p>	<ul style="list-style-type: none"> - 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. - If during detailed design cutting of trees will be required, compensatory plantation for trees lost at a rate of 10 trees for every tree cut, in addition to tree plantation as specified in the design, will be implemented by the contractor, who will also maintain the saplings for the duration of his contract. - All efforts shall be made to preserve trees by evaluation of minor design 	Construction contractor	<ul style="list-style-type: none"> - PMU and PIU to report in writing the number of trees cut and planted if tree-cutting will be required (to be determined during detailed design stage) - Number of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing, etc. 	<ul style="list-style-type: none"> - Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises 	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		adjustments/ alternatives (as applicable) to save trees. - Special attention shall be given for protecting giant trees and locally important trees (with religious importance) during implementation. - Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal), including fishing in any water body in the subproject vicinity. - Prohibit employees from poaching wildlife and cutting trees for firewood.				
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. 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 5) - Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites. - Maintain safe passage for vehicles and pedestrians throughout the construction period. - Schedule truck deliveries of construction materials during periods of low traffic volume. - Erect and maintain barricades, including signs, markings, flags, and flagmen informing	Construction contractor	- Traffic route during construction works including number of permanent signages, barricades, and flagmen on worksite as per traffic management plan (Appendix 5) - Number of complaints from sensitive receptors - Number of signages placed at project location - Number of walkways, signages, and metal sheets placed at project location	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises - Frequency and sampling sites to be finalized during detailed design stage and final location of cyclone shelters	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>people of diversions and alternative routes when required.</p> <ul style="list-style-type: none"> - Notify affected sensitive receptors by providing signboards informing people of nature and duration of construction activities and contact numbers for concerns/complaints. - Leave spaces for access between mounds of soil. - Provide walkways and metal sheets where required to maintain access across for people and vehicles. - Increase workforce in front of critical areas such as institutions, place of worship, business establishments, hospitals, and schools. - Consult businesses and institutions regarding operating hours and factor this into work schedules. Ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions. 				
Socioeconomic status	There is no requirement for land acquisition	<ul style="list-style-type: none"> - Employ at least 50% of labor force from communities in the vicinity 	Construction contractor	<ul style="list-style-type: none"> - Employment records - Records of sources 	- Inspection by PIU and supervision consultants on	Cost for implementation of mitigation measures

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	or any resettlements. Manpower will be required during the 24-month construction stage. This can result in generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term.	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 accommodations. - Secure construction materials from local market.		of materials - Records of compliance to Bangladesh Labor Law of 2006 and other applicable standards	monthly basis, or more frequently as the need arises - Frequency and sampling sites to be finalized during detailed design stage and final location of cyclone shelters	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 Galachipa <i>pourashava</i> where there are a variety of human activities, will result in impacts to the sensitive receptors such as residents, businesses, and the community	- Obtain details from <i>pourashava</i> on nature and location of all existing infrastructure, and plan excavation carefully to avoid any such sites to maximum extent possible. - Integrate construction of the various infrastructure subprojects to be conducted in Galachipa (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. - Consult with local community to inform them of the nature, duration, and likely effects of the	Construction contractor	- Utilities contingency plan - Number of complaints from sensitive receptors	- Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises - Frequency and sampling sites to be finalized during detailed design stage and final location of cyclone shelters	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	in general. The impacts are negative but short-term, site-specific within a relatively small area, and reversible by mitigation measures.	<p>construction work, and to identify any local concerns so that these can be addressed.</p> <ul style="list-style-type: none"> - Existing infrastructure (such as water distribution pipes, electricity pylons, etc.) shall be relocated before construction starts at the subproject sites. - Prior permission shall be obtained from respective local authority for use of water for construction. Use of water for construction works shall not disturb local water users. - If construction work is expected to disrupt use of community water bodies, notice to the affected community shall be served 7 days in advance and again 1 day prior to start of construction. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions. 				
Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small	<ul style="list-style-type: none"> - Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants, and crushers (if these establishments are being set up exclusively for the subproject) shall be located at least 100 m 	Construction contractor	<ul style="list-style-type: none"> - Number of permanent signages, barricades, and flagmen at worksite as per traffic management plan (Appendix 5) - Number of complaints from sensitive receptors - Number of walkways, signages, 	<ul style="list-style-type: none"> - Inspection by PIU and supervision consultants on monthly basis, or more frequently as the need arises - Frequency and sampling sites to be finalized during detailed design stage and final 	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
	area, and reversible by mitigation measures.	<p>away from the nearest dwelling, preferably in the downwind direction.</p> <ul style="list-style-type: none"> - Consult with Galachipa local authority on the designated areas for stockpiling of soils, gravel, and other construction materials. - If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. - Use small mechanical excavators to attain faster progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.¹³ - Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. - Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. - A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers 		<p>and metal sheets placed at project location</p> <ul style="list-style-type: none"> - Agreement between landowner and contractors in case of using private lands as work camps, storage areas, etc. 	location of cyclone shelters	

¹³ These products come in powder form, 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 Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>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.</p> <p>- 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</p>				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		<p>management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction.</p> <ul style="list-style-type: none"> - 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	<p>There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term, but reversible by mitigation measures.</p>	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. - Produce and implement a site health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; 	Construction contractor	<ul style="list-style-type: none"> - Site-specific H&S plan - Equipped first-aid stations - Medical insurance coverage for workers - Number of accidents - Records of supply of uncontaminated water - Condition of eating areas of workers - Record of H&S orientation trainings - Use of personal protective equipment - Percentage of moving equipment outfitted with audible back-up alarms - Permanent sign boards for hazardous areas 	<ul style="list-style-type: none"> - Daily inspection by contractors supervisor - Inspection by PIU and supervision consultants on monthly basis, or as the need arises - Frequency and sampling sites to be finalized during detailed design stage and final location of cyclone shelters 	Cost for implementation of mitigation measures responsibility of contractor

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		(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 ¹⁴ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. - Arrange for readily available first aid units, including an adequate supply of sterilized dressing materials and appliances. - Maintain necessary living accommodations 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.		- Signages for storage and disposal areas - Condition of sanitation facilities for workers		

¹⁴ 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 his/her 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 Indicators	Frequency of Monitoring	Cost and Source of Funds
		<ul style="list-style-type: none"> - Provide medical insurance coverage for workers - Provide H&S orientation training to all new workers to ensure that they are apprised of the basic rules of work at the site, personal protective protection, and preventing injury to fellow workers - Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted. - Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas. - Ensure moving equipment is outfitted with audible back-up alarms. - Mark and provide signboards 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, 				

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
		workers, visitors, and the general public as appropriate. - 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	Construction works will be in built-up areas of Galachipa, thus risk for chance finds is low.	- All fossils, coins, articles of value or antiquity, structures, and other remains of archaeological interest discovered on the site shall be the property of the government. - Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value or antiquity, structures, and other remains of archaeological interest. - Stop work immediately to allow further investigation if any finds are suspected.	Construction contractor	- Records of chance finds	- Inspection by PIU and supervision consultants on monthly basis	Cost for implementation of mitigation measures responsibility of contractor
E. Others						
Submission of EMP implementation report	Unsatisfactory compliance to EMP	(i) Appointment of supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports, including pictures	Construction contractor	- Availability and competency of appointed supervisor - Monthly report	- Monthly monitoring report to be submitted by PIU to PMU - PMU to submit semi-annual monitoring report to ADB	Cost for implementation of mitigation measures responsibility of contractor
3. Post-construction Activities						
Post-	Damage due to	(i) Remove all spoils	Construction	PMU/PMSC report in	- Prior to turnover of	Cost for

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring Indicators	Frequency of Monitoring	Cost and Source of Funds
construction clean-up	debris, spoils, excess construction materials	<p>wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required.</p> <p>(ii) All excavated roads shall be reinstated to original condition.</p> <p>(iii) All disrupted utilities shall be restored.</p> <p>(iv) All affected structures shall be rehabilitated/compensated.</p> <p>(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.</p> <p>(vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be topsoiled and regressed using the guidelines set out in the revegetation specification that forms part of this document.</p> <p>(vii) The contractor must arrange the cancellation of all temporary services.</p> <p>(viii) Request PMU/PMSC to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.</p>	contractor	<p>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 is satisfactory.</p>	completed works to <i>pourashava</i>	implementation of mitigation measures responsibility of contractor

Table 10: Environmental Management and Monitoring Plan – O&M Phase

Field	Impacts	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Frequency of Monitoring	Cost and Source of Funds
A. Physical Characteristics						
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.	<ul style="list-style-type: none"> - Plan activities in consultation with Galachipa 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. - Identify any buildings at risk from vibration damage and avoid any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly. 	Galachipa <i>pourashava</i>	<ul style="list-style-type: none"> - No complaints from sensitive receptors 	During repair works	Included in O&M cost
B. Socioeconomic Characteristics						
Workers' health and safety	Workers need to be mindful of the occupational hazards. Potential impacts are negative and long-term but reversible by mitigation measures.	<ul style="list-style-type: none"> - Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. - Ensure that all site personnel have a basic level of H&S training. - Mark and provide signboards. 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. 	Galachipa <i>pourashava</i>	<ul style="list-style-type: none"> - No complaints from sensitive receptors - No complaints from workers related to O&M activities - Zero accident 	During repair works	Included in O&M cost

B. Institutional Capacity Development Program

85. The PMSC environmental safeguard 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 11.

Table 9: Training Program for Environmental Management

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation workshop	Module 1 – Orientation - ADB Safeguards Policy Statement - Government of Bangladesh Environmental Laws and Regulations Module 2 – Environmental Assessment Process - ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements - Review of environmental assessment report to comply with ADB requirements - Incorporation of EMP into the project design and contracts	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 - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day	PMU PIUs Contractors
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed	1 day on a regular period to be determined by PMU, PIUs, and PMSC	PMU PIUs Contractors

C. Staffing Requirement and Budget

86. 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.

87. LGED and DPHE will aim to produce a single document that is acceptable to both ADB and DoE to avoid duplication of effort, and the documents produced by the PPTA will be used as a guide. For budgeting purposes it is assumed this IEE report will also be deemed satisfactory by DoE.

88. The infrastructure involved in each scheme is generally straightforward, and will take between 3 and 9 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 the PMSC environmental management specialist assisted by the PMU environment officer. The PMSC environmental management specialist will update the IEE as necessary and perform tasks as specified in the TOR. Therefore, no separate budget is required for the PMSC environment management specialist.

89. 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.

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

91. The indicative costs of EMP implementation are shown in Table 12.

Table 10: 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.	Noise levels monitoring	- Pre-construction - 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 Safeguard Policy Statement, Government of Bangladesh environmental laws and regulations, and environmental assessment process; (ii) induction course for contractors, preparing them on EMP	Module 1 – immediately upon engagement of the PMSC environmental safeguard specialist Module 2 – prior to award of civil works contracts (twice a year for 4 years)	Lump sum		Module 1 – 30,000 Module 2 – 30,000 Module 3 – 30,000	90,000	Covered under PMSC and ICCDC contract

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost Covered By
	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	Module 3 – prior to start of Phase 2 and upon completion of the project					
D. Consultants Costs							
1.	PMSC environmental safeguard 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 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 pre-construction and construction phase, including public awareness campaign through media	As per requirement	Lump sum		1,000,000	Covered under PMSC and ICCDC contracts
2.	GRM implementation	Costs involved in resolving complaints (meetings, consultations,		Lump sum		As per PMU budget	PMU cost

	Particulars	Stages	Unit	Total Number	Rate (Taka)	Cost (Taka)	Cost Covered By
		communication, and reporting/information dissemination)					
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

92. 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.

93. 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 9. 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.

94. 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, 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).

95. 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 reestablish 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

96. The process described in this document has assessed the environmental impacts of all elements of Galachipa cyclone shelters subproject. All potential impacts were identified in relation to design and location, construction, and operation phases.

97. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the project design or location were not significant.

98. 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 involves excavation. However, the routine nature of the impacts means that most can be easily mitigated. 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, which will also 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.

99. 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.

100. 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.

101. The EMP will assist the PMU, PMSC, 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.

102. The citizens of Galachipa will be the major beneficiaries of this subproject. With the improved cyclone shelters, they will be provided with reliable and climate-resilient municipal services. .

103. Therefore, the proposed subproject is unlikely to cause significant adverse impacts, and net environmental benefits to citizens of Galachipa 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.

104. Per Government of Bangladesh Environment Conservation Act, 1995 (ECA, 1995) and Environment Conservation Rules (ECR, 1997), the subproject is categorized as “orange-B,” and a location clearance certificate (LCC) and environmental clearance certificate (ECC) must be obtained from the DoE. Consultations with DoE on the nature of documentation required for the LCC and ECC confirmed that conformance to ADB safeguard policies will be considered compliance to government requirements. The IEE has been prepared as a uniform document satisfying both ADB and government requirements, and no any additional studies are envisaged.

105. 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 Is the project area adjacent to or within any of the following environmentally sensitive areas?	✓		Galachipa <i>pourashava</i> is predominantly residential. There are no protected areas in or around subproject sites, and no known areas of ecological interest in Galachipa.
Cultural heritage site		✓	
Protected area		✓	
Wetland		✓	
Mangrove		✓	
Estuarine		✓	
Buffer zone of protected area		✓	
Special area for protecting biodiversity		✓	
B. Potential environmental impacts Will the project cause...		✓	
▪ impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services?		✓	Not anticipated
▪ deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded, and the capacities to manage these systems are overwhelmed?		✓	Not anticipated
▪ degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds, and forests)?		✓	Not anticipated
▪ dislocation or involuntary resettlement of people?		✓	Not anticipated
▪ disproportionate impacts on the poor, women and children, indigenous peoples, or other vulnerable group?		✓	Not anticipated
▪ degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	Not anticipated
▪ occupation of low-lying lands, floodplains, and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		✓	Not anticipated
▪ water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and groundwater quality, and pollution of receiving waters)?		✓	Not anticipated
▪ air pollution due to urban emissions?	✓		Increase in concentration of vehicle-related pollutants during construction phase. The impacts are negative but short-term, site-specific within a relatively small area, and reversible by mitigation measures.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?		✓	Not anticipated
▪ road blocking and temporary flooding due to land excavation during rainy season?	✓		Road closure not anticipated. Excavations may result in temporary ponding of water during construction phase. The impacts are negative but short-term, site-specific within a relatively small area, and reversible by mitigation measures.
▪ noise and dust from construction activities?	✓		Anticipated during construction phase. The impacts are negative but short-term, site-specific within a relatively small area, and reversible by mitigation measures.

Screening Questions	Yes	No	Remarks
▪ traffic disturbances due to construction material transport and wastes?	✓		Anticipated during construction phase. The impacts are negative but short-term, site-specific within a relatively small area, and reversible by mitigation measures.
▪ temporary silt runoff due to construction?	✓		Excavations may result in 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.
▪ hazards to public health due to ambient, household, and occupational pollution, thermal inversion, and smog formation?		✓	Not anticipated
▪ water depletion and/or degradation?		✓	Not anticipated
▪ overpaying of groundwater, leading to land subsidence, lowered groundwater table, and salinization?		✓	Not anticipated
▪ contamination of surface and ground waters due to improper waste disposal?		✓	Not anticipated
▪ pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	Not anticipated
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Not anticipated
▪ social conflicts if workers from other regions or countries are hired?		✓	Not anticipated
▪ 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 anticipated
▪ 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?		✓	Not anticipated

<u>Climate Change and Disaster Risk Questions</u> 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, tsunamis, or volcanic eruptions and climate changes (see Appendix I)?	✓		Low-lying areas of Galachipa 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.
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 socioeconomic 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)?			
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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 project 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

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 who 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.

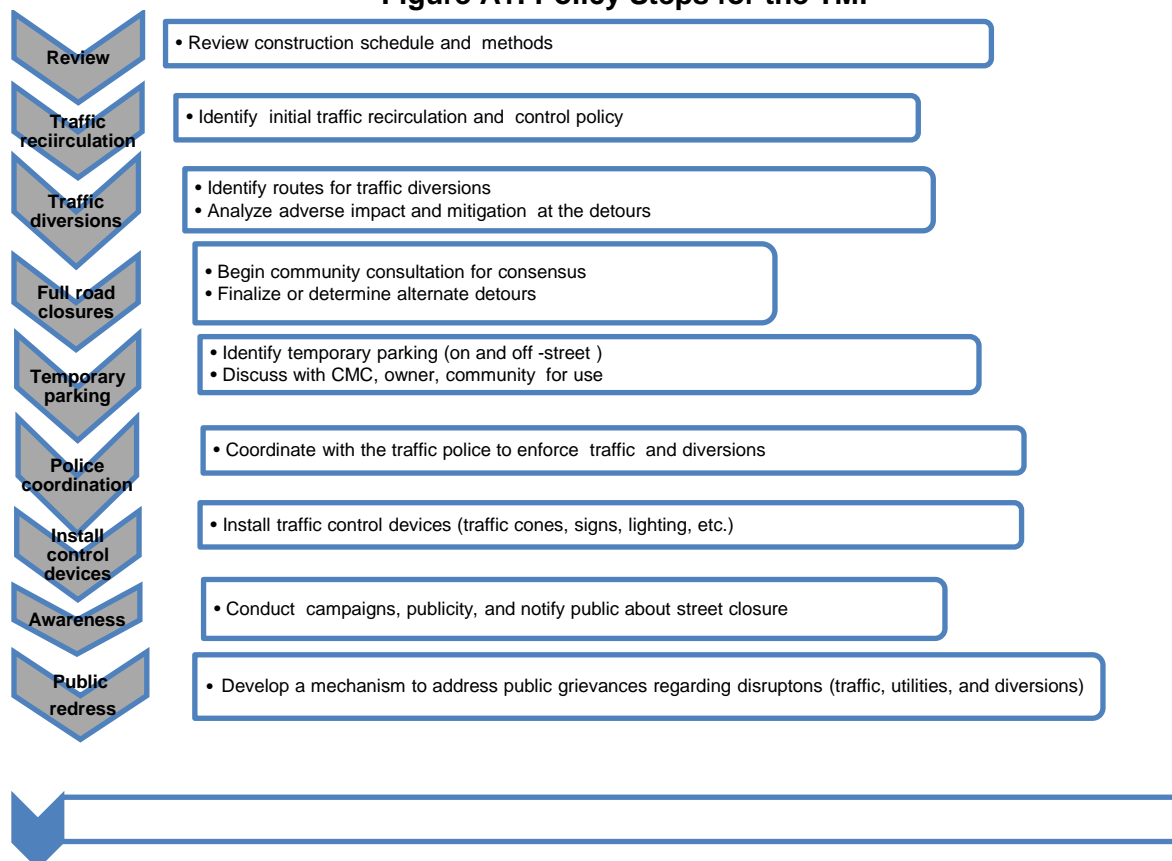
C. Analyze the Impact Due to Street Closure

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 for 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 construction, 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 to 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 behavior 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 behavior 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 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 the old city roads are 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. **Figures A2 to A12** illustrate a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the roadway, and road geometrics:

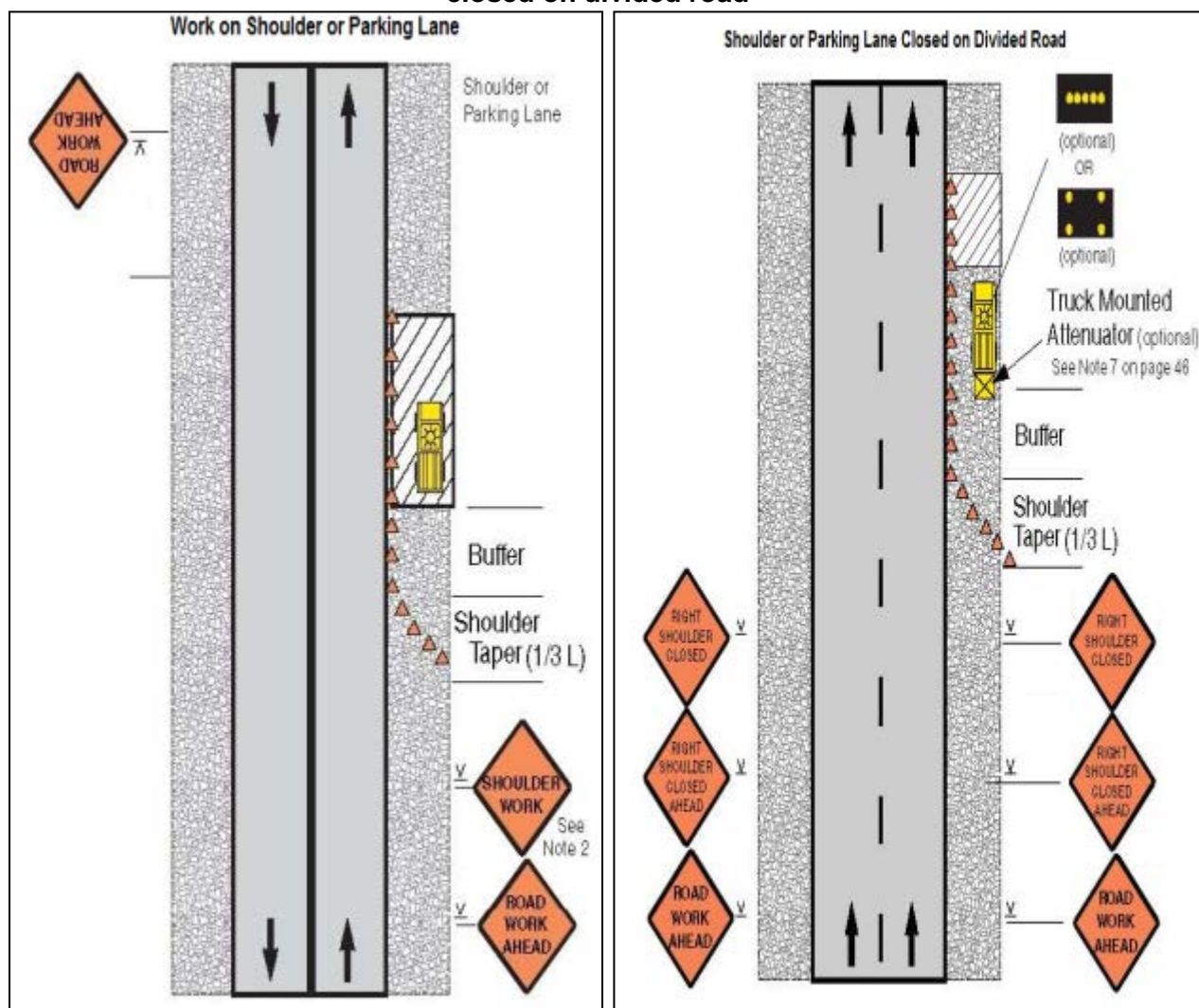
- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in travel lane
- Lane closure on road with low volume
- Lane closure on a two-lane road with low volume (with yield sign)
- Lane closure on a two-lane road with low volume (one flagger operation)
- Lane closure 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.

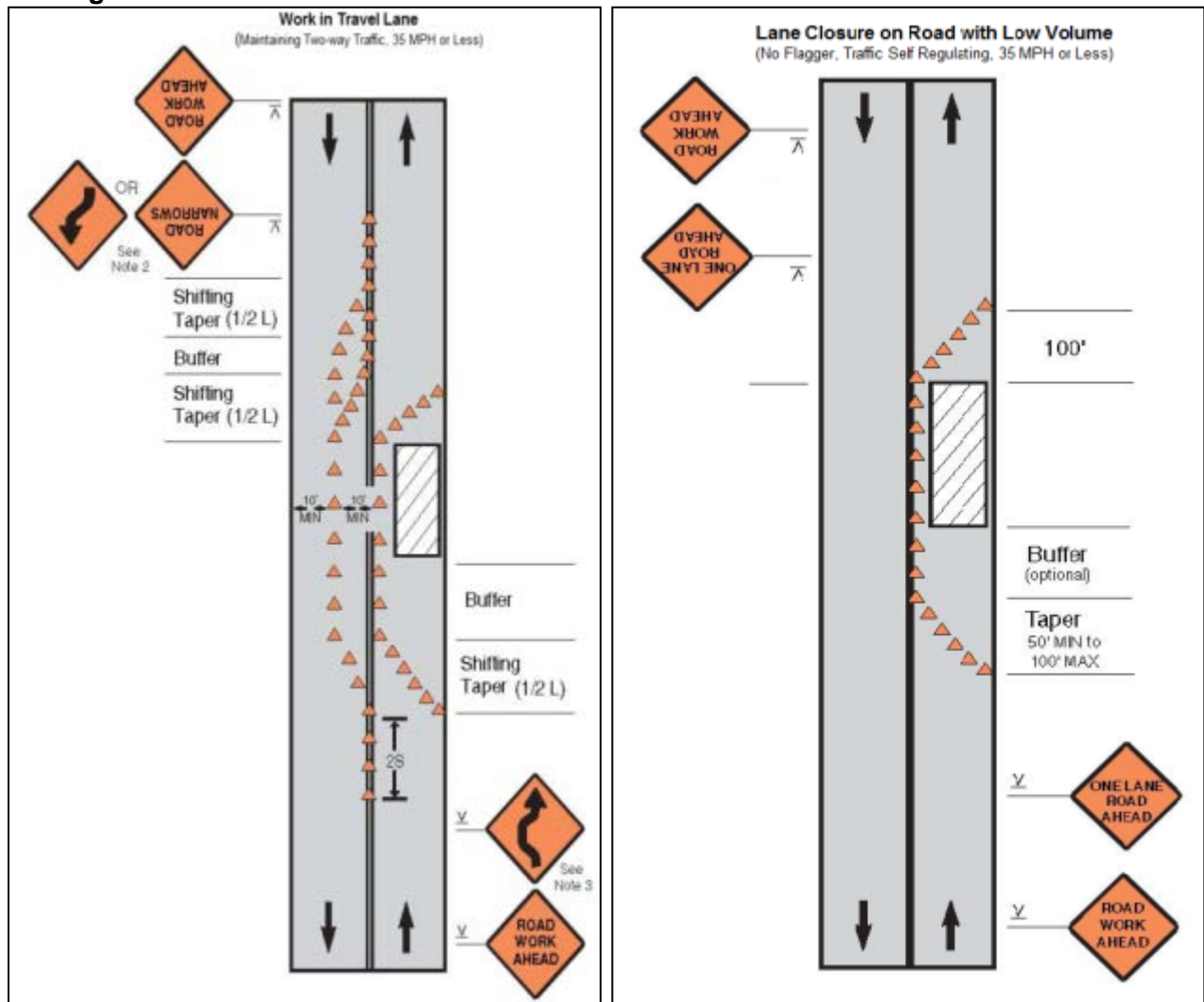
14. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion resulting from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED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

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.

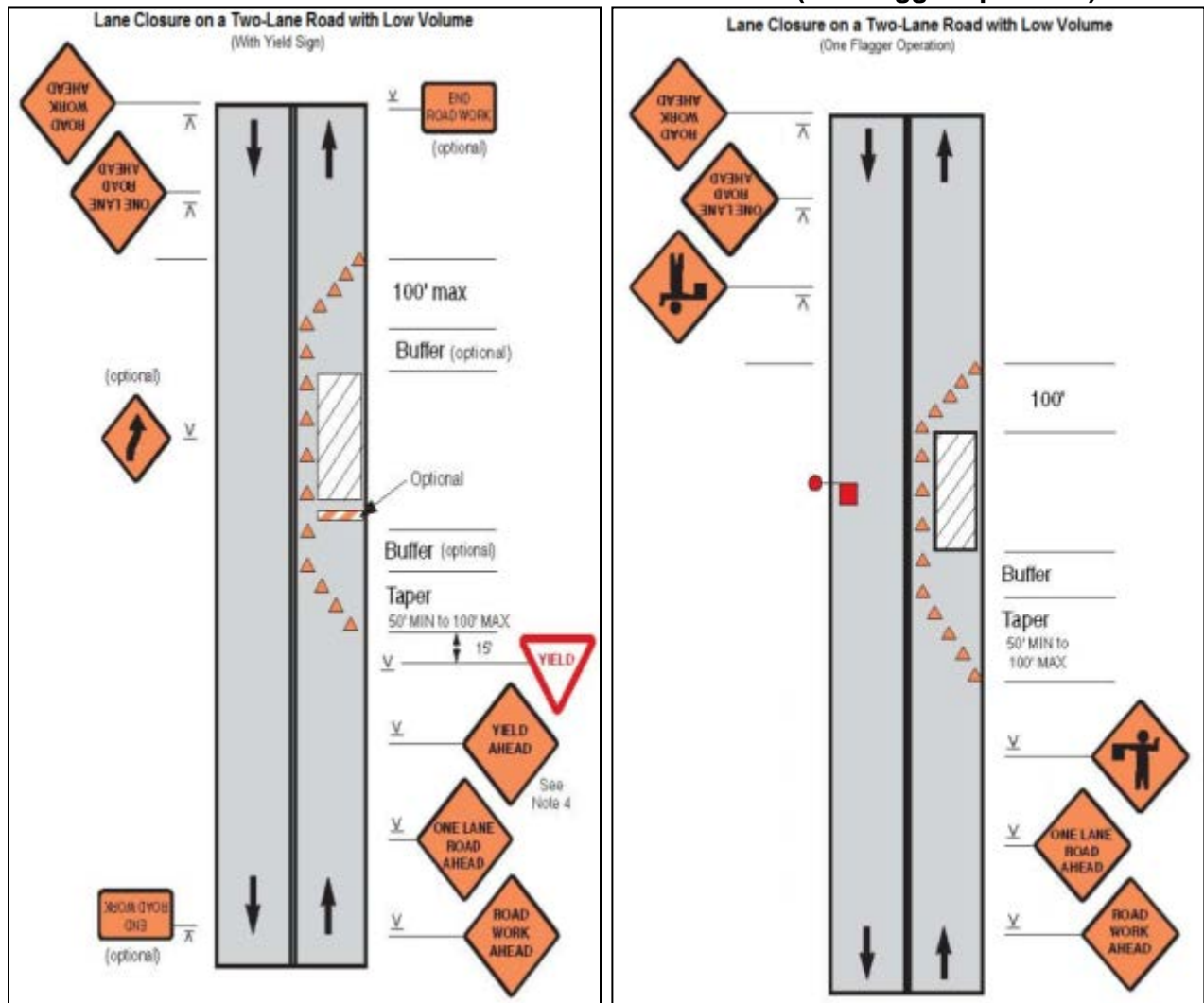
Figures A2 and A3: Work on shoulder or parking lane and shoulder or parking lane closed on divided road



Figures A4 and A5: Work in travel lane and lane closure on road with low volume



Figures A6 and A7: Lane closure on a two-lane road with low volume (with yield sign) and lane closure on a two-lane road with low volume (one flagger operation)



Figures A8 and A9: Lane closure on a two-lane road (two flagger operation) and lane closure on a four-lane undivided road

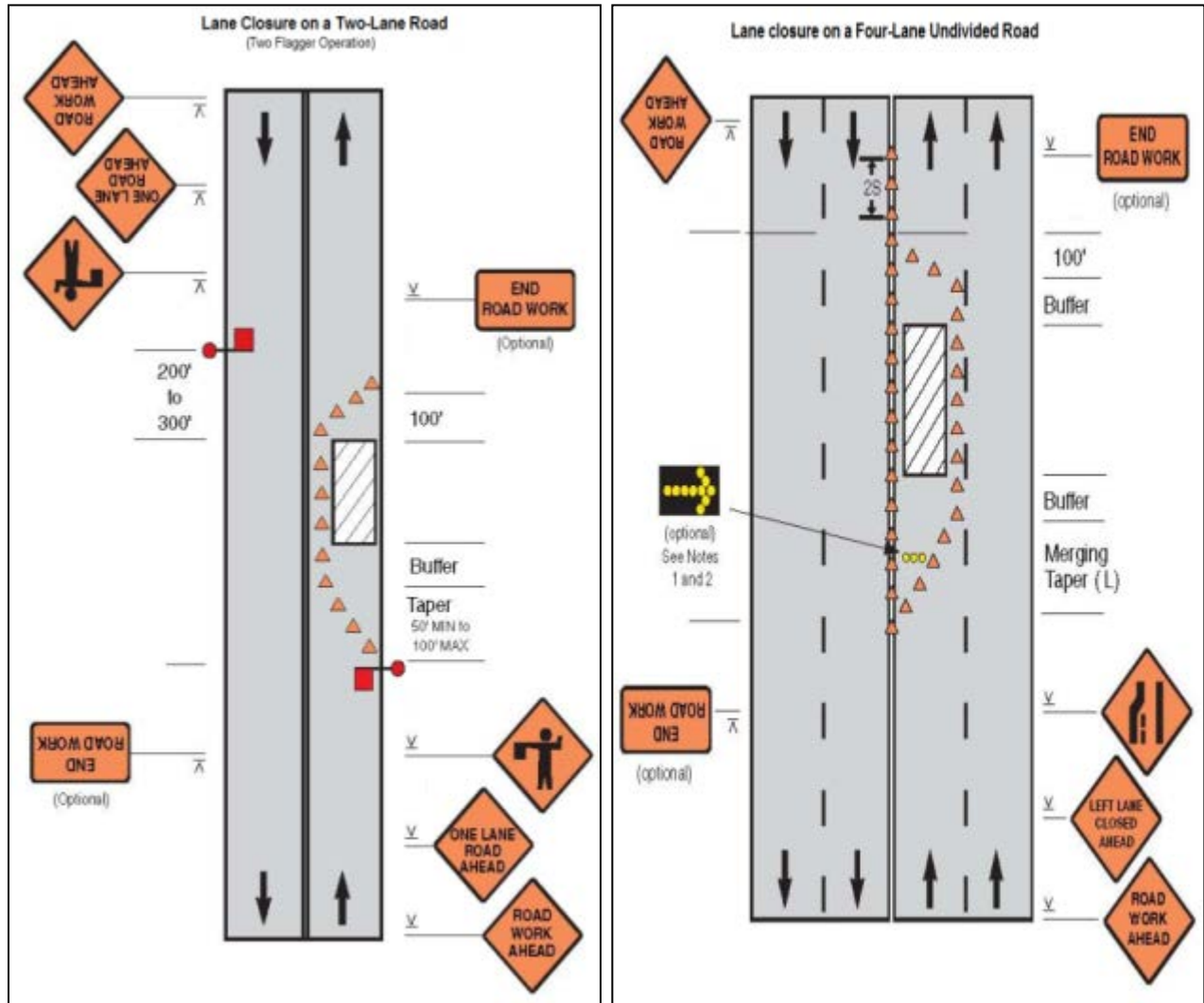


Figure A10 and A11: Lane closure on divided roadway and half road closure on multi-lane roadway

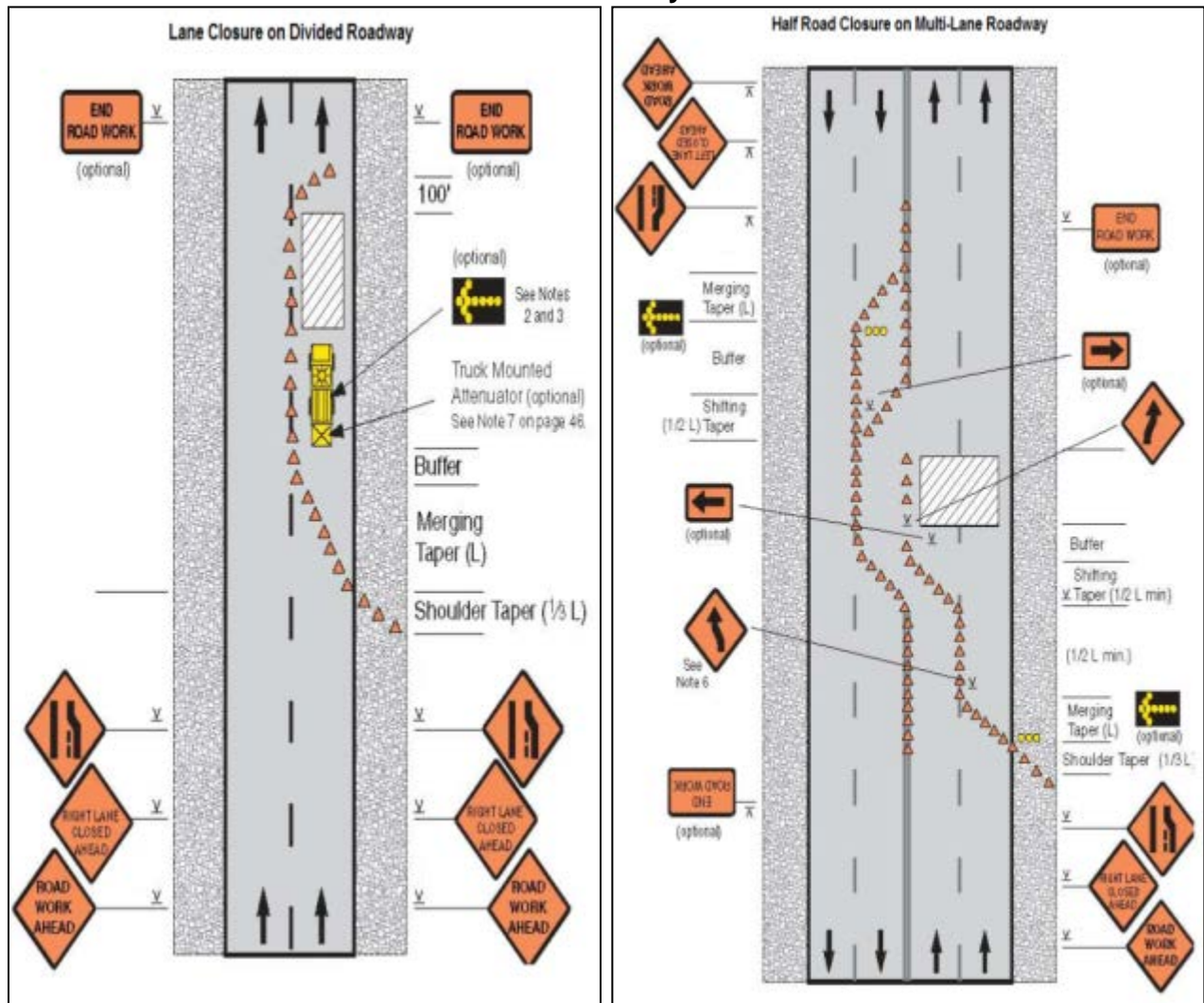
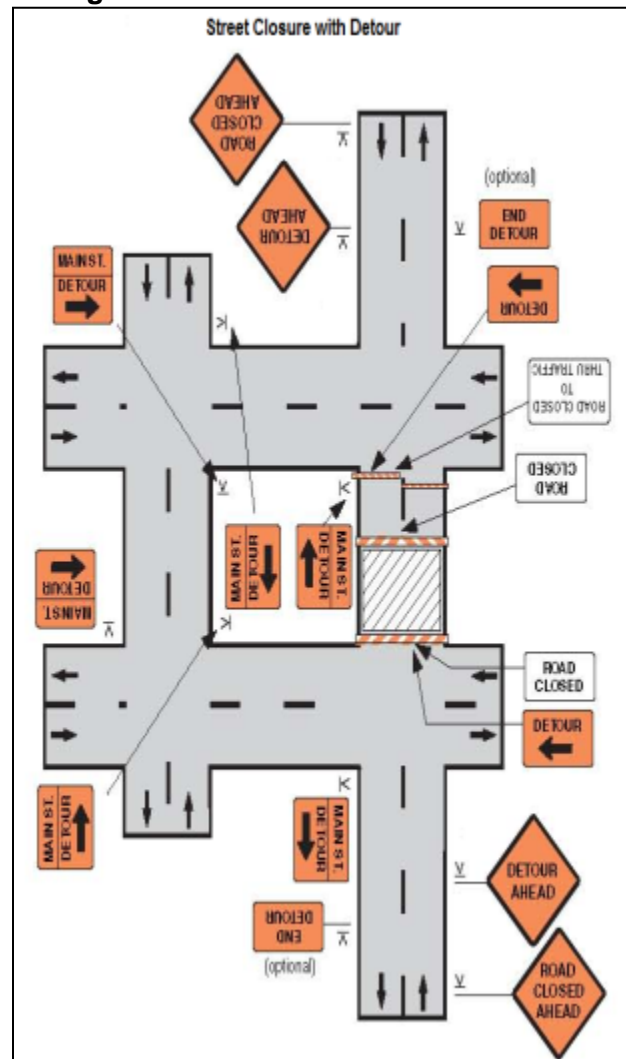


Figure A12: Street closure with detour



Appendix 5: Records of Public Consultations and FGDs (Galachipa Cyclone Shelter)

	Proposed Project Facility/Alignment Discussed	Date	Venue	No. of Participants and Gender	Key Safeguard Issues Discussed	Overall Concerns Expressed Related To Project	Suggestions From People	Willingness To Participate in Project
1.	Cyclone shelter	20 June 2013	Galachipa Degree College	M=15 F=0 T=15	<ul style="list-style-type: none"> Existing abandoned tin shed house within the complex of college will be used for proposed site of cyclone shelter. Thus, there are no resettlement issues. At the same time, being in the same compound, it should be ensured that the construction works will not hamper regular classes and safety of the people working in that compound (especially college students); 	<ul style="list-style-type: none"> Interviewees expressed that the proposed shelter should be usable both as college classroom and cyclone shelter. According to them, proposed building should be maintained by the college authority. 	<ul style="list-style-type: none"> Building should be four storeys. Minimum internal width of classroom should be 40 feet. Solar panel should be ensured for electricity. Provide water on each floor using the hand tube well facilities. 	<ul style="list-style-type: none"> They will cooperate to built this cyclone shelter.
2.	Cyclone shelter	20 June 2013	Sunnia Deenia Madrasa Complex, Galachipa	M=15 F=0 T=15	<ul style="list-style-type: none"> Free land owned by <i>madrassa</i>. No resettlement issues. Being in the same compound, it should be ensured that the construction works will not hamper regular classes and safety of the (specially <i>madrassa</i> students). 	<ul style="list-style-type: none"> Building is to be <i>madrassa</i> classroom-cum-cyclone shelter. This building should be maintained by the <i>madrassa</i> authority. 	<ul style="list-style-type: none"> Water supply/tube well, solar electricity, separate toilet for male/female, prayer room, maternity room, hall room should be ensured. 	<ul style="list-style-type: none"> They will cooperate to built this cyclone shelter.
3.	Cyclone shelter	20 June 2013	40 Barak Pukur Par, Galachipa	M=11 F=14 T=25	<ul style="list-style-type: none"> Free government land adjacent to the Pukur and near the river No resettlement or safeguard issues 	<ul style="list-style-type: none"> Since there is no school there, Interviewees expressed that the proposed shelter should be a school-cum-cyclone shelter. This building should be maintained by the <i>pourashava</i> authority/ proposed school authority. 	<ul style="list-style-type: none"> Multi-storied building would be necessary. Water supply/tube well, lighting/solar electricity, and separate toilet arrangements for male and female should be ensured. 	<ul style="list-style-type: none"> They will cooperate to built this cyclone shelter.
4	Cyclone shelter	20 June 2013	Taleb Nagar, Galachipa	M=8 F=14 T=22	<ul style="list-style-type: none"> Government free land No resettlement or safeguard issues 	<ul style="list-style-type: none"> Since there is no school there, Interviewees had expressed that proposed shelter should be a school-cum-cyclone 	<ul style="list-style-type: none"> Multi-storied building, water/tube well, school/<i>maktab</i>, prayer room, separate toilet arrangements for male and female should be 	<ul style="list-style-type: none"> They will cooperate to built this cyclone shelter.

	Proposed Project Facility/Alignment Discussed	Date	Venue	No. of Participants and Gender	Key Safeguard Issues Discussed	Overall Concerns Expressed Related To Project	Suggestions From People	Willingness To Participate in Project
						shelter. • This building should be maintained by the <i>pourashava</i> authority/ proposed school authority.	ensured.	

(M=no. of male participants; F= no. of female participants; T=total participants)

Photographs



FGD-40 Barak Pukur Par



FGD-Khankaye-Sunnia Dinia Madrassa



FGD-Talebnagar Abashan



FGD-Galachipa Degree College

PARTICIPANTS LIST

Focus Group Discussion-CTEIP
Galachipa Town

Components: Water-overhead tank, pump, cyclone shelter, and school toilet

Location: Galachipa Degree College, Ward No. 9

Meeting Place: Galachipa Degree College Hall Room

Date: 20 June 2013

Time: 11.45 am

Sl.No	Name	Designation	Signature
1	Md. Forkan Kabir	Principal-Galachipa Degree College	
2	Md. Khalid Hossain Milton	Member-Government Committee- Galachipa Degree College	
3	Md. Shorab Ali	Teacher	
4	Md. Shafiul Islam	Teacher	
5	Md. Mohsin	Teacher	
6	Gazi Mohammad Babul Akhter	Teacher	
7	Goalm Moula	Teacher	
8	Md. Mosharraf Hossain	Teacher	
9	ASM Khalilur Rahman	Teacher	
10	Md. Riaduzzaman	Teacher	
11	Md. Shah Alam	Teacher	
12	Tapash Kumar Karmaker	Teacher	
13	Md. Liakat Hossain Ghosh	Teacher	
14	Md. Mizanur Rahman	Teacher	
15	Md. Delwar	Teacher	

Focus Group Discussion-CTEIP
Galachipa Town

Component: Cyclone shelter

Location: Galachipa Khankae Shania Denea Complex, Ward No. 3

Meeting Place: Galachipa Khankae Shania Denea Complex

Date: 20 June 2013

Time: 2.30 pm

Sl.No	Name	Designation	Signature
1	Md. Abdul Halim Mirdha	Business operator	
2	Md. Sirajul Islam	Service provider	
3	Md. Masum Mridha	Business operator	
4	Md. Amirul Mridha	Rickshaw puller	
5	Abdul Aziz Peda	Business operator	
6	Md. Mahabub Mridha	Rickshaw puller	
7	Md. Riaz Peda	Business operator	
8	Md. Arif Mridah	Business operator	
9	Md. Shahin Mridha	Business operator	
10	Md. Nazrul Mridha	Business operator	
11	Abdul Malek Mridha	Service provider	

Sl.No	Name	Designation	Signature
12	Md. Abdul Wahab	Teacher	
13	Md. Ohidul Islam	Teacher	
14	Hazi Mohammad Hafez Molla	Farmer	
15	Md. Sazzad Hossain Mridha	Student	

Focus Group Discussion-CTEIP
Galachipa Town
Component: Cyclone shelter
Location: 40 Barak Pukur par, Ward No. 1
Meeting Place: 40 Barak Pukur par

Date: 20 June 2013

Time: 3.40pm

Sl.No	Name	Designation	Signature
1	Md. Ripon	Day laborer	
2	Md. Jahangir	Tea stall operator	
3	Md. Badal Mridha	Business operator	
4	Ayaton Bibi	Shopkeeper	
5	Hoshneara	Laborer	
6	Buauti Begom	Housewife	
7	Rokshana	Laborer	
8	Kakoli Begom	Laborer	
9	Kulshum Begom	Laborer	
10	Setara Begom	Housewife	
11	Parvin Begom	Housewife	
12	Nur Sharif	Wood keeper	
13	Kala Mia	Sweeper	
14	Md. Badal Howlader	Laborer	
15	Md. Kalu Mia	Laborer	
16	Md. Sujan Sharif	Laborer	
17	Md. Chunnu Mia	Fisherman	
18	Md. Ibrahim Khan	Day laborer	
19	Md. Insan Mia	Day laborer	
20	Salina Begom	Laborer	
21	Rina Begom	Laborer	
22	Renu Begom	Laborer	
23	Piara Begom	Laborer	
24	Shakhina Begom	Day laborer	
25	Kohinor Begom	Day laborer	

Focus Group Discussion-CTEIP
Galachipa Town
Component: Cyclone shelter
Location: Taleb Nagar, Ward No. 1
Meeting Place: Taleb Nagar

Date: 20-06-13

Time: 4.50pm

Sl.No	Name	Designation	Signature
1	Md. Abul Kalam Gazi	Tea stall operator	
2	Md. Abul Hossain	Laborer	
3	Md. Moinuddin	Tea stall operator	
4	Md. Monir Dhali	Business operator	
5	Abdur Rahman Akan	Laborer	
6	Rashida Begom	Housewife	
7	Yasmin	Housewife	
8	Razia Begom	Tea stall operator	
9	Alo Begom	Tea stall operator	
10	Tahmina Begom	Housewife	
11	Nupur Begom	Tea stall operator	
12	Parul Begom	Housewife	
13	Rina Begom	Hotel business operator	
14	Salma Begom	Hotel business operator	
15	Sagorica	Laborer	
16	Mala Begom	Business operator	
17	Jahanara Begom	Laborer	
18	Shahnaz Begom	Housewife	
19	Shahjahan Sikder	Fisherman	
20	Md. Nuruzzaman Molla	Business operator	
21	Tapan Sutradhar	Laborer	
22	Pakhi	Housewife	

Appendix 6: Sample Grievance Registration Form

(To be available in Bangla and English)

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

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

Date		Place of registration			
Contact information/personal details					
Name		Gender	* Male * Female	Age	
Home address					
Place					
Phone no.					
E-mail					
Complaint/suggestion/comment/question Please provide the details (who, what, where, and how) of your grievance below:					
If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
Mode of communication: Note/letter E-mail Verbal/telephonic	
Reviewed by: (Names/positions of officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	

Appendix 7: Sample Monthly 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 subprojects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and subproject progress and status

No.	Subproject Name	Status of Subproject				List of Works	Progress of Works
		Design	Pre-construction	Construction	Operational Phase		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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 reports, followed by a summary in the semi-annual report sent to ADB. Visual assessments and reviews 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) are there any dewatering activities, and 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; and
- (xi) checking if there are any activities being undertaken 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.	Subproject 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)		
			PM ₁₀ µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM ₁₀ µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³

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	Nighttime

Site No.	Date of Testing	Site Location	LAeq (dBA) (Monitoring Results)	
			Day Time	Nighttime

IV. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

V. APPENDICES

Photos

Summary of consultations

Copies of environmental clearances and permits

Sample of environmental site inspection report

Others