Initial Environmental Examination

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BAN: Coastal Towns Environmental Infrastructure Project
– Mathbaria Cyclone Shelter Subproject

Prepared by the Local Government Engineering Department for the Asian Development Bank. This is a revised version of the draft originally posted in August 2014 available on http://www.adb.org/projects/44212-013/documents.

APPENDIX A

Coastal Towns Environmental Infrastructure Project (CTEIP)

(ADB Loan No._____)

Local Government Engineering Department

(Ministry of Local Government, Rural Development and Cooperatives)

INITIAL ENVIRONMENTAL EXAMINATION (IEE)

Batch 1: Stage I CTEIP Programme

Contract Package No.: MAT/CS/01:

Construction of Multipurpose Cyclone Shelter at Momenia Dakhil Madrassa (Ward 1), Mathbaria Pourashava, District: Pirojpur

August 2014

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ABBREVIATIONS

ADB	-	Asian Development Bank
AIDS	-	Acquired Immunodeficiency Syndrome
AP	-	Affected Persons
BAN	-	Bangladesh
BFIDC	-	Bangladesh Forest Industries Development Corporation
BFRI	-	Bangladesh Forest Research Institute
BNH	-	Bangladesh National Herbarium
BOQ	-	Bill of Quantities
BPL	-	Below Poverty Line
BRM	-	Bangladesh Resident Mission
CDTA	-	Capacity Development Technical Assistance
CIF	-	Climate Investment Fund
CO	-	Carbon Monoxide
CRO	-	Complaint Receiving Officer
CTEIP	-	Coastal Towns Environmental Infrastructure Project
DDS	-	Detailed Design services
DoE	-	Department of Environment
DO		Dissolved Oxygen
DoI	-	Department of Irrigation
DPHE	-	Department of Public Health Engineering
DSC	-	Design and Supervision Consultant
ECA	-	Environmental Conservation Act
ECC	-	Environmental Clearance Certificate
ECR	-	Environmental Conservation Rules
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
EO	-	Environmental Officer
FGD	-	Focus Group Discussion
FHH	-	Female House Hold
GAP	-	Gender Action Plan
GoB	-	Government of Bangladesh
GRM	-	Grievances Redress Mechanism
HFL	-	High Flood Level
HIV	-	Human Immunodeficiency Virus Infection
HH	-	House Hold
HTL	-	High Tide Level
ICB	-	International Competitive Bidding
ICCDC		Institutional Capacity and Communication Development Consultant
IEE	-	Initial Environmental Examination
ILO	-	International Labor Organization
ISA	-	Initial Social Assessment
IWTP	-	Inland Water Transport Policy
LAO	-	Land Acquisition Officer
LGED	-	Local Government Engineering Department
LCC	-	Location Clearance Certificate
MAT	-	Mathbaria
MoEF	-	Ministry of Environment and Forest
MCM	-	Million Cubic Meters
mld	-	Million Liters Per Day
MoEF	-	Ministry of Environment and Forest
MS	-	Mild Steel
NEP	-	National Environmental Policy
NFP	-	National Forest Policy
NGO	-	Non-Governmental Organization
NLTP	-	National Land Transport Policy
NOx	-	Nitrogen Oxides
NWP	-	National Water Policy
O&M	-	Operations and Maintenance
OBC	-	Other Backward Classes

PAF	-	Project Affected Family
PAM	-	Project Administrative Management
PAP	-	Project Affected Person
PD	-	Project Director
PIU	-	Project Implementation Unit
PLO	-	Project Liaison Officer
PMSC	-	Project Management Supervision Consultant
PMU	-	Project Management Unit
POL		Petrol, Oil and Diesel
PSC	-	Project Steering Committee
PWD	-	Public Works Department
PPCR	-	Pilot Programme for Climate Change
PPTA	-	Project Preparatory Technical Assistance
RD	-	Roads
RP	-	Resettlement Plan
REA	-	Rapid Environmental Assessment
SCF	-	Strategic Climate Fund
SIA	-	Social Impact Assessment
SOx	-	Sulfur dioxides
SPCR	-	Strategic Programme for Climate Resilience
TA	-	Technical Assistance
TLCC	-	Town Level Co-ordination Committee
SPM	-	Suspended Particulate Matter
STD	-	Sexually Transmitted Disease
SPS	-	Safeguard Policy Statement
TDS	-	Total Dissolved Solids
TSS	-	Total Suspended Solids
ULB	-	Urban Local Body
UNEP	-	United Nations Environmental Programme
VEC	-	Valued Eco-system Components
WLCC	-	Ward Level Co-ordination Committee
WTP	-	Water Treatment Plant

WEIGHTS AND MEASURES

°C	-	Degree Celsius
ha	-	Hectare
km	-	Kilometer
m	-	Meter
mm	-	Millimeter
Tk	-	Taka
%	-	Percentage
km^2	-	Square Kilometre (10^6 m^2)
mm/hour	-	Millimetre per hour
Mm^3	-	Million Cubic Meter (10^6 m^3)
m^3/d	-	Cubic metre per day
ug/m^3	-	Microgram per Cubic metre
ppm	-	Parts per million
dB (A)	-	Decibels
No	-	Number
m^3	-	Cubic meter
m^2	-	Square meter
cm	-	Centimetre
mm	-	Millimetre

Executive Summary

i) Coastal region of Bangladesh mostly comprise low lying areas and is exposed to sea level rise, storm surges and frequent and intense storm events leading to widespread disastrous consequences. Uncontrolled urbanization, coupled with existing inadequate capacities of the Pourashavas to manage requisite infrastructure, makes this region still more vulnerable to adverse impacts of severe and highly variable climatic conditions. Such adverse conditions, along with the burden of increased urban growth, prevailing regional poverty, exacerbated by weak urban governance, have resulted in undue pressure on basic urban services and infrastructure, which has severely impaired economic growth. As a result of these natural disasters the population in the coastal region remains poor and development significantly lags behind the rest of the country even though there is a lot of potential for further development. However, the number, intensity and the regularity of such disasters appear to be increasing and this trend is restricting further development of the coastal region.

ii) The Coastal Towns Environmental Infrastructure Project (CTEIP) is a key infrastructure initiative of the Government of Bangladesh. The intervention is planned to develop climate resilient structures, including Cyclone Shelters; roads and bridges; water supply; sanitation; drainage; solid waste management; municipal facilities and flood protection infrastructural works. The proposed site for construction of the Cyclone Shelter is located within the Mathbaria Pourashava area at Momenia Dakhil madrassa (ward 1), which is mostly within urban and semi urban areas. The Cyclone Shelter is designed as a multipurpose functional building, whereby the shelter has been located within madrassa compound. The building shall accommodate persons during storm/ cyclone events, taken from the immediate local vicinity catchment area.

iii) The challenge for the project is that the Cyclone Shelter is implemented in the most economically feasible, and environmentally and socially sensitive, manner. The PPTA feasibility study, completed in October 2013, has provided a comprehensive set of recommendations for the planning, design and implementation of the Project. Based on the recommendations of this study, the DDS Consultant has completed the detailed engineering design for the construction of the Mathbaria Cyclone Shelter.

iv) The proposed location for the Momenia Dakhil madrassa cyclone shelter was selected based on the recommendations of the PPTA report and subsequent site verification by the DDS Consultant, which is assessed to have minimum environmental impacts. The selected site is well suited for its intended purpose, and has the advantages of immediate accessibility within the town centre of Mathbaria Pourashava.

v) There is no resettlement or land acquisition requirement in this subproject. The adverse environmental impacts will occur during the construction period, and will be of a relatively short duration. Adequate provisions have been incorporated into the planning and design of the cyclone shelter to minimize or mitigate these unavoidable environmental impacts that are a result of the works.

vi) The management plans, bill of quantities and cost estimates were prepared. The emphasis was given for protection of environment, capacity building, training, monitoring and evaluation. The investment in sub-project is estimated over **Tk 31.0 million**. The planned activities include: construction of shelter, internal roads, tube well and rain water harvesting infrastructure. The environmental costs are estimated **Tk 314,793** which is **1.01%** of project costs. The estimates do not include those items which are part of project intervention.

vii) The major positive achievement of the multipurpose is that: the development of the shelter will serve not only the immediate area but also the surrounding area in the town. Establishment of the shelter will stimulate ancillary projects which will improve economical status of the local population; More employment of people during construction phases; will be potential socio-economic enhancement of rural economy by saving the life of people; and skill transfer and training.

viii) The environmental mitigation measures, as stipulated in EMP and in the obtained environmental permit, shall be monitored during implementation of the shelter sub-project. In order to perform monitoring of EMP the contractor shall engage experienced laboratory and third party services in complying the required environmental testing of parameters.

ix) The noise and air quality of the project area is within the permissible limits. The overall impact on air and noise quality during construction is limited to site and of short duration and can be mitigated.

x) The labour camps shall be established with the septic tank and soak pit for treatment and disposal of sewage and sullage water to avoid pollution of water bodies.

xi) The environmental monitoring will be required before the start of the construction and during the construction phase. The parameters of Water Quality, Air Quality, Noise quality, and Soils shall be monitored.

xii) During public consultation recommendations were drawn including: i) involve local communities in all stages of project planning and development, ii) establish permanent communication between project initiators and local authorities, iii) setup grievance redress mechanism which will publicized through Pourashava level co-ordination committee and monitoring register and iv) during construction, local people including women shall be given first priority in the employment of skilled and unskilled labour.

xiii) **Categorization.** An environmental assessment using ADB's Rapid Environmental Assessment (REA) checklist for urban development (**Annexure I**) was conducted and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Mathbaria cyclone shelter 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.

xiv) **Subproject Scope.** The subproject is formulated to provide more accessible, reliable and climate-resilient cyclone shelter in a holistic and integrated manner. Investments under this subproject include construction of the cyclone shelter in the available space within the compound of Momenia Dakhil madrassa, Mathbaria Pourashava.

xv) **Implementation Arrangements.** Local Government Engineering Department (LGED) is the executing agency (EA), and Department of Public Health Engineering (DPHE) is co-executing agency. LGED is responsible for providing support and guidance to Pourashavas concerning performance criteria and Pourashava development planning. Implementation activities will be overseen by a separate program management unit (PMU). The participating Pourashavas are the implementing agencies (IA), with a project implementation unit (PIU) within the Pourashava structure. Local LGED and DPHE offices will be involved in the functioning of the PIUs to provide technical support. Consultant teams 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.

xvi) **Description of the Environment.** Subproject component is located in Mathbaria urban area. The subproject site is 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 Mathbaria.

xvii) The concepts considered in design of the Mathbaria cyclone shelter subproject are: (i) the site serves populations in an area most vulnerable to cyclone damage; (ii) the site is located within or very close to locality of users; (iii) the site has been prioritized in the madrassa compound where the concerned authority has no objection; (iv) the site has been selected in the area where significant number of population live; (v) facility located on government-owned land to avoid the need for land acquisition and relocation of people; (vi) all planning and design interventions and decisions have been made in consultation with local communities and reflecting inputs from public consultation and disclosure for the site selection.

xviii) The detailed engineering design has integrated a number of measures, both structural and non-structural, to mainstream climate resilience into the Mathbaria cyclone shelter subproject,

including: (i) design life of 20 years; (ii) 1 m^2 per person with minimum size for 500 people (500 m^2); (iii) base level of 1st floor raised by 700 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 it maintenance needs. As a result, appropriate measures have already been included in the subproject designs. This means that the impacts and their significance have already been reduced.

xix) 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.

xx) 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.

xxi) **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.

xxii) The LGED will disclose this Environmental Management Framework by making copies available at its head office and in District / Pourashava where the Project is situated. The copies shall also be made available to the Local Government's Agencies, the Environmental and Social Group and other stakeholders. The Government of Bangladesh will also authorize the Asian Development Bank to disclose this IEE and EMP electronically through its InfoShop

xxiii) **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.

xxiv) **Conclusions and Recommendations.** The citizens of Mathbaria will be the major beneficiaries of this subproject. As a result of improved access to the climate resilient shelter during extreme weather events, the safety of the residents of Mathbaria will be safeguarded. 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 the application of recommended mitigation measures and procedures.

xxv) 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).

xxvi) In view of above, it is concluded that the Project will bring benefit to the people of the area and especially during emergency created by cyclones. The negative impacts occurring during implementation are within the manageable limits and shall be mitigated with the proposed Environmental Management Plan and hence project may be implemented.

1 Introduction

1.1 Overview

1 Coastal region of Bangladesh mostly comprise low lying areas and is exposed to sea level rise, storm surges and frequent and intense storm events leading to widespread disastrous consequences. Uncontrolled urbanization, coupled with existing inadequate capacities of the Pourashavas to manage requisite infrastructure, makes this region still more vulnerable to adverse impacts of severe and highly variable climatic conditions. Such adverse conditions, along with the burden of increased urban growth, prevailing regional poverty, exacerbated by weak urban governance, have resulted in undue pressure on basic urban services and infrastructure, which has severely impaired economic growth. As a result of these natural disasters the population in the coastal region remains poor and development significantly lags behind the rest of the country even though there is a lot of potential for further development. However, the number, intensity and the regularity of such disasters, many of which are related to climate change, appear to be increasing and this trend is restricting further development of the coastal region.

2 The Coastal Towns Environmental Infrastructure Project (CTEIP) is a key infrastructure initiative of the Government of Bangladesh. The Project was prioritized in the Government's 2010 Strategic Programme for Climate Resilience (SPCR), prepared under the Pilot Program for Climate Resilience (PPCR), whereby the CTEIP is eligible for financing from the Strategic Climate Fund (SCF) within the multi-donor coordinated Climate Investment Funds (CIF) as a pilot project for demonstrating ways to mainstream climate resilience into development. The intervention is planned to develop climate resilient structures, including Cyclone Shelters; roads and bridges; water supply; sanitation; drainage; solid waste management; municipal facilities and flood protection infrastructural works.

3 The proposed site for construction of the Cyclone Shelter is located within the Mathbaria Pourashava area, which is mostly within urban and semi urban areas. The Cyclone Shelter is designed as a multipurpose functional building, whereby the shelter has been located within madrassa compound. The building shall accommodate persons during storm/ cyclone events, taken from the immediate local vicinity catchment area.

4 The project consists of three components i) improved climate-resilient infrastructure ii) strengthening institutional capacity, governance, and awareness, iii) project management and administrative support. The outcome of the project will be improved access to climate disaster resilience municipal services including; i) municipal infrastructure such as drainage, cyclone shelters, urban roads, bridges, culverts, solid waste management, bus terminals, slum improvement, boat landing and markets; ii) water supply and iii) sanitation. In accordance with ADB's Safeguard Policy Statements (SPS 2009), the project requires the preparation of environmental assessment and review framework. The report is on initial environmental examination (IEE) assessment and preparation of review framework for emergency shelter at Mathbaria.

5 This Initial Environmental Examination (IEE) has been conducted by EPTISA Services de Ingenieria S.L., the Detailed Design Services (DDS) Consultant under the CTEIP, in accordance with the ADB's requirements and guidelines. The IEE is based upon a study of available reports and documents, including the Project Preparatory Technical Assistance (PPTA), under TA 8128 BAN; relevant sections of the Capacity Development Technical Assistance (CDTA) Report; discussions with related stakeholders and PIU/Pourashava authorities and consultation with Department of Public Health Engineering (DPHE) personnel. Read this IEE in conjunction with the following documents, attached to this Bid Document:

- Environmental Management Plan (**EMP**) attached hereto as **Appendix B**;
- Resettlement Plan (RP): (Due Diligence Report) attached hereto as **Appendix C**;
- Gender Action Plan (**GAP**) attached hereto as **Appendix D**.

1.2 Purpose of IEE

6 The initial environmental examination aims to provide guidance on safeguard screening, assessment, institutional arrangement and process to be followed for components of the project, where design takes place after Boards approval. This IEE (i) describes the project and its components; (ii) explains the general anticipated environmental impacts and mitigation measures for the subprojects; (iii) specifies the requirements that will be followed in relation to screening and categorization, assessment, and planning, including arrangements for meaningful consultation with affected people and other stakeholders and information disclosure requirements; (iv) assesses the

capability of the project proponents to implement national laws and ADB's requirements, and identifies needs for capacity building; (v) specifies implementation procedures, institutional arrangements, and capacity development requirements; and (vi) specifies monitoring and reporting requirements. The EARF ensures that all subprojects, in the entirety of their project cycle, will not deteriorate or interfere with the environmental sensitivity of a project area, but rather improve environmental quality.

1.3 Scope of Services

7 The scope of the project includes nine infrastructure categories: (i) roads, bridges and culverts, (ii) solid waste management, (iii) cyclone shelters, (iv) boat landing stations, (v) markets, (vi) bus terminals, (vii) drainage and flood control, (viii) water supply, and (ix) sanitation.

8 The major components to be taken up in Mathbaria up under this project are described in **Table 1**. This report is on IEE for Mathbaria cyclone shelter at Momenia Dakhil Madrassa (Ward 1), Mathbaria Pourashava, District: Pirojpur and the package is designated as MAT/CS/01. The project comprises the construction of one multipurpose Cyclone Shelter.

Table 1: Mathbaria Scope of Work (CTEIP Batch 1, Stage 1)

Subproject Component	Scope of Work
Roads/ Bridges	Roads: 5 no., 8.00 km
	Bridge: 1 no., length 42m
Cyclone Shelter	1 No at Momenia Dakhil Madrassa (Ward 1)
Solid Waste Management	5 no. rickshaw vans; 10 no. push carts
Drainage	10.8 km drains: earthen channels; cement concrete block lined;
	Channels; reinforced cement concrete covered drains
	maintenance equipment
Water Supply	land acquisition, 10 acres (4.0 ha)
	Re-sectioning of canal, canal intake
	1 no. surface water treatment plant 7.2 MLD capacity
	embankment around plant 800m, commissioning of plant
	1 no. overhead tank 680m^3; 1 no. ground reservoir 2,000m^3;
	49 km transmission and distribution pipeline;
	3,200 service connections
	3,500 water meters
	10 no. exploratory wells
	mini water testing equipment
	pick-up, 2 no. motorcycles, computer, 1 no. back-up generators
Sanitation	ADB-funded
	5 no. public toilets; 7 no. school latrines; 8 no. community latrines
	1 no. de-sludging truck
	BMGF-funded: public sanitation facility;
	(toilet complex with wastewater treatment) in market area;
	Septage management system/
	treatment plant across from sweepers' colony
	1 no. truck-mounted de-sludging equipment

9 The **scope of work** includes ensuring that construction and/ or implemented of shelter will be in an environmentally sustainable manner and full compliance with Bangladesh's and the Asian Development Bank's environmental safeguard policies and regulations. The scope of services in brief is as follows:

- Document baseline data for various environmental attributes on physical, water, ecological pollution and physical cultural resources and Socio-economic profile;
- Assess positive and negative environmental impacts of proposed shelter;
- Prepare environmental mitigation measures and management plans to effectively address the impacts;
- Prepare IEE so that these are acceptable to Department of Environment (DoE), Bangladesh and the Asian Development Bank;
- Prepare post project monitoring programs, institutional arrangement to implement the environmental plans; and
- Prepare cost estimates for the management and monitoring programs.

1.4 Approach and Methodology

10 The **approach** in preparation of Initial Environmental Examination is to follow the sequence of steps adopted in an EIA study. Apart from following standard environmental impact assessment practices and procedures, **methodolog**y has deployed advanced technologies, techniques and tools to the extent these are applicable and relevant to this project. The approach and methodology flow chart is presented in **Figure-1**.

11 Toward ascertaining **baseline** conditions and assessing the impacts during construction and operation of the project, the consultants have taken into account the various parameters of the environment – topography, physiography, soils, hydrology and drainage, meteorology, qualities of ambient air and noise, surface water, groundwater, biodiversity, socio-economic aspects including gender issues, land/property, physical and cultural resources. The baseline data for environmental attributes were collected from primary and secondary sources. The primary sources include site visits and visual inspection. The secondary sources include the reports, books, maps and documents from various government and non-government organizations on subject matter. The impacts are assessed for various phases of project cycle namely:

- Impacts due to project location and design,
- Impacts due to project construction, and
- Impacts due to project operation.

12 The **impacts** are categorized as negative and positive. The standard methodology for the review, field visit data collection, impact assessment and formulation of management plans is adopted. The Bangladesh National Acts, Legislation and Laws were consulted with a view to ensuring compliance with various requirements. The environmental attributes were compiled from both primary and secondary sources.

13 The **management plans** are essential to ensure that stress/ loads on the systems are within carrying capacity. The management plan aims at maintaining the environmental quality of project area at-least in pre-project stage. An environmental management strategy/ plans were developed to mitigate the adverse impacts. Efforts are made to enhance the quality of environmental attributes.

14 It is necessary to **monitor** the environmental attributes during construction and operation. Monitoring would indicate any environmental problems, which have reviewed. This will facilitate to assess the effectiveness of management and/or mitigation measures.

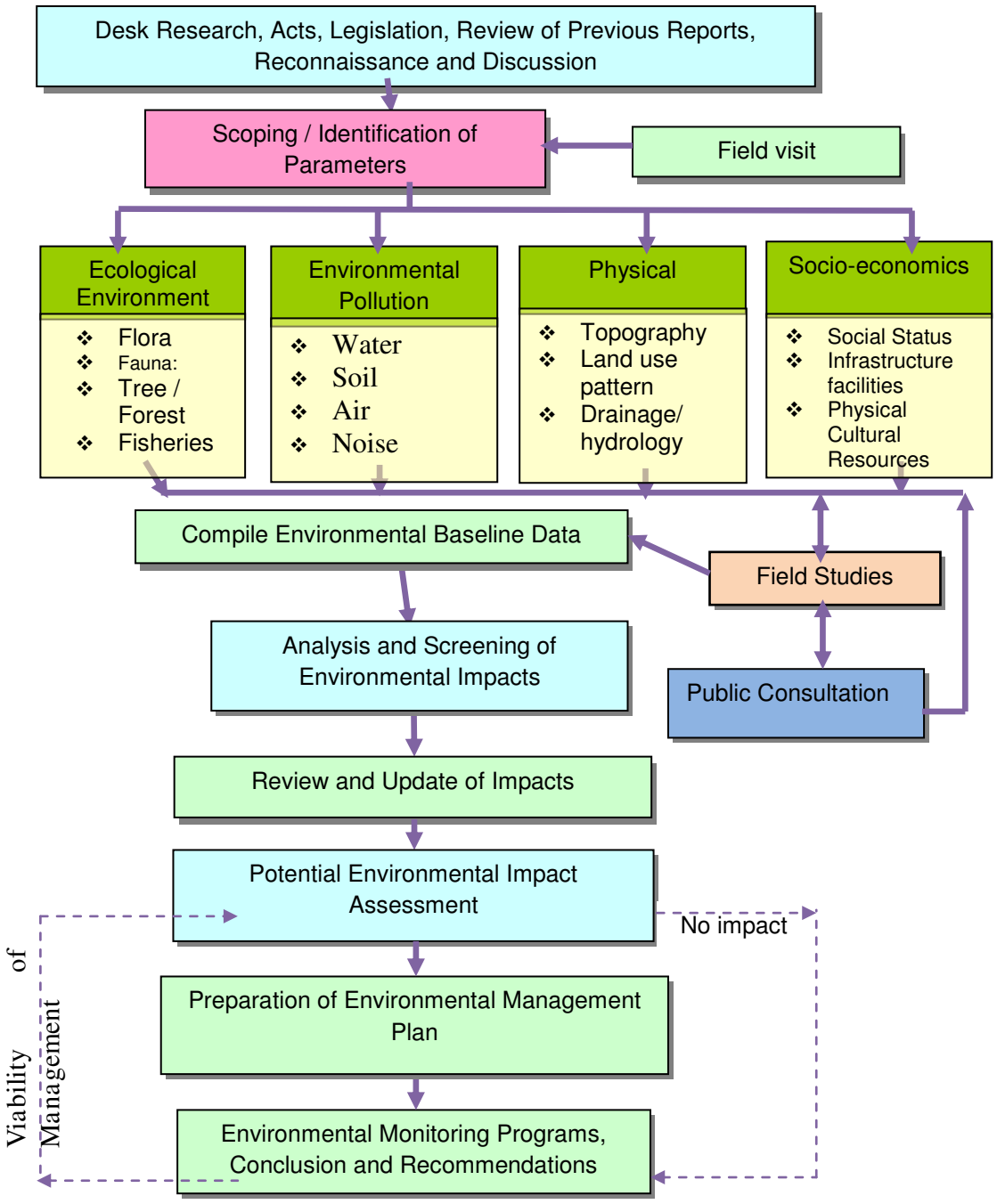


Figure 1: IEE Approach and Methodology Resulting to EMP

1.5 The Format of the Report

15 This report has been prepared taking into consideration the IEE mechanisms, procedures and contents spelt out in Environmental Conservation Act of 1995 and its amendments in 2000, 2002 and 2010[1] of Bangladesh and ADB Environmental Assessment Guidelines (2003) and Safeguard policy statement (2009). The main findings are reported in conclusions and recommendations for discloser locally and the ADB web site. The report has an Executive Summary in the beginning.

Section 1 provides a general introduction to the project along with the project background, objectives and scope of the study and an outline on the approach and methodology adopted for the study.

Section 2 is a concise document on the policy and strategies; legal instruments, and institutional arrangement under which the project will be developed.

Section 3 is on the Project Description which highlights the need for the development. The project Construction Schedules material requirements and cost of project are also summarized.

Section 4 is on the baseline environmental and social conditions in pre-construction phase in sufficient detail to enable an adequate assessment of the potential environmental and social impacts.

Section 5 describes the environmental impacts that could occur as a result of the proposed project.

Section 6 is describing the Grievance Redressal procedures and mechanism;

Section 7 is on public consultation;

Section 8 is on the findings and recommendations along with conclusions;

The literature, books, reports and maps referred are presented as foot notes in the main body of the report. At the end, the report has Annexures which are reported in the main body of the report.

2. Policy, Legal Framework and Institutional Capacity

2.1 National Relevant Policies and Strategy

16 This Section describes the relevant policies and strategies, legal instruments, institutional arrangement and framework applicable to CTEIP-related rehabilitation and /or construction activities in various Pourashava areas in the Bangladesh coastal region. It summarizes the National Laws and describes the procedure for obtaining environmental permits to allow project implementation. Over the years the Government of Bangladesh has enacted environmental acts, rules, policies and regulation toward imposing restrictions facilitating minimization / mitigation of likely impacts due to development projects. The most important Act is Environmental Conservation Act, 1995 (ECA, 1995) and Environmental Conservation Rules (ECR, 1997).

2.1.1 National Environmental Policy

17 The National Environmental Policy was adopted in 1992 and is now under revision. It embraces different sectors related to agriculture, forest, power, health, transport, housing etc. The central theme of policy is to ensure protection and improvement in environment. The policy gives a thrust to sustainable development and long term use of natural resources. The National Environment Policy contains policy statements and strategic options with regard to population and land-use management, management and utilization of natural resources and other socio-economic sectors, as well as the necessary arrangements for the implementation of the policy. The policy enables:

[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 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.

- the country to strike a dynamic balance between population and resources while complying with the balance of ecosystems;
- to contribute to sustainable and harmonious socio-economic development such that, both in rural and urban areas, and well-being in a sound and enjoyable environment; and
- to protect, conserve and develop natural environment.

2.1.2 National Water Policy (NWP)

18 The National Water Policy, 2004 (NWP) aims for sustainable management of water. This policy is relevant as some of the activities such as water supply to the shelter will be from existing sources/ systems. Policy also integrates the environmental impact assessment for water development projects. The policy stresses on issues related to climate change such as:

- Augmentation of dry season flows;
- Awareness raising in consumptive use of surface and ground water;
- Structural and non-structural mitigation measures (early warning systems).

2.1.3 National Forest Policy

19 National Forest Policy (NFP) was established in 1994. Under this policy it is proposed to increase the forest cover and to promote and oversee forestry activities. The policy fixed the target of forest cover at least 20% of geographic area by the year 2015. Tree plantation on the courtyards of rural organization such as Union Parishad, school, Eidgah, mosque-Moktob, temple, club, orphanage home, madrassa etc. and other fallow lands around can be initiated. The government will encourage this type of initiative and extend technical and other supports.

2.1.4 Bangladesh Climate Change Strategy and Action Plan

20 The Bangladesh climate change strategy and action plan was approved in 2009. The climate change plan is built on six pillars namely i) food security, social protection and health; ii) Comprehensive Disaster Management; iii) infrastructure; iv) research and knowledge management; v) Mitigation and low carbon development; and vi) capacity building and institutional. The strategy and action plan emphasizes on ensuring 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.

2.2 Legal Instruments

21 The environmental policies are prepared by the Ministry of Environment and Forests (MoEF). MoEF also has formulated regulation toward clearance of projects from environmental angles based on environmental impact assessment report. The Department of Environment is responsible for environmental issues while forest issues are looked after Department of Forests. Over the years the MoEF has adopted number of legal instrument in the form Acts for the protection and conservation of the environment. **Table 2** summarizes the Environmental Legislation applicable to the sub-project.

Table 2: Applicable GoB Environmental Legislations

S.No	Legislation	Requirement for the Project	Relevance
1	Environmental Conservation Act of 1995 and amendments in 2000, 2002 and 2010[2]	• 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 and limits for discharging and emitting waste • Environmental guidelines	The provisions of the Act apply to the entire subproject in the construction and operation and maintenance (O&M) phases.
2	Environmental Conservation Rules of 1997 and amendments in 2002 and 2003	Environmental clearances • Compliance to environmental quality standards	The subproject is categorized as Orange-B and requires LCC and ECC. All requisite clearances from DoE shall be obtained prior to commencement of civil works.
3	Forest Act of 1927 and amendments (2000)	• Clearance for any felling, extraction, and transport of forest produce	Refer Baseline and EMP
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 project design components
5	Bangladesh Labour Law of 2006	• Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labour 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.

Source: TA 8128 Coastal Towns Infrastructure Improvement Project Volume 6

[2] *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 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 raise any hill or hillock; earthfill or change the status any water body/wetland/lake, even in national interest; the aforementioned activities can be done only after getting clearance from respective departments.

2.3 Institutional Arrangements / Framework

22 The main Ministry, Department, Institutions and Boards responsible for development of policy, framing regulation, developing projects, monitoring and approval of issues related to environment protection and conservation are presented in this section. The Department of Environment (DoE) was established in 1977 under the Environment Pollution Control Ordinance, 1977. During 1987-89, Forestry was a Division of Agriculture Ministry with a Secretary to Government in charge of the Forestry Division. With the formation of the new Ministry of Environment and Forests, in 1989, both the departments were transferred to this new Ministry. The DoE has been placed under the MoEF as its technical wing and is statutorily responsible for the implementation of the Environment Conservation Act, 1995. Besides these two departments, MoEF controls the Bangladesh Forest Industries Development Corporation (BFIDC), Bangladesh Forest Research Institute (BFRI) and Bangladesh National Herbarium (BNH).

23 The **Ministry of Environment & Forests** is the nodal agency in the administrative structure of the Central Government, for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. MoEF oversees all environmental matters in the country and is a permanent member of the Executive Committee of the National Economic Council. The Ministry also plays a pivotal role as a participant of United Nations Environment Programme (UNEP). The principal activities undertaken by Ministry of Environment & Forests consist of conservation & survey of flora, fauna, forests and wildlife, prevention & control of pollution, forestation & regeneration of degraded areas and protection of environment, in the framework of legislations. The main tools utilized for this include surveys, impact assessment, control of pollution, regeneration programmes, support to organizations, research to solve solutions and training to augment the requisite manpower, collection and dissemination of environmental information and creation of environmental awareness among all sectors of the country's population. The organizational structure of the ministry covers a number of divisions, directorate, board, subordinate offices, autonomous institutions and public sector undertakings. In short, Ministry of Environment & Forest (MoEF) has the following major functions:

- Management of environment and ecology.
- Matters relating to environment pollution control.
- Conservation of forests and development of forest resources (government and private), forest inventory, grading and quality control of forest products.
- Forestation and regeneration of forest extraction of forest produce.
- Plantation of exotic cinchona and rubber.
- Botanical gardens and botanical surveys.
- Tree plantation.
- Planning cell is responsible for preparation of schemes and coordination in respect of forest.
- Research and training in forestry.
- Mechanized forestry operations.
- Protection of wild birds and animals and establishment of sanctuaries.
- Matters relating to marketing of forest produce.
- Liaison with international organizations and matters relating to treaties and agreements with other countries and world bodies relating to subjects allotted to this Ministry.

24 Apart from two major departments, i.e., Department of Environment and Department of Forest, working under this ministry, there are three others as discussed below:

25 **Bangladesh Forest Research Institute (BFRI)** is mandated to provide research support to the Forestry sub-sector of the country, including Forest Department, Bangladesh Forest Industries Development Corporation, NGO and other private enterprises. BFRI's research activities aim to develop appropriate technologies to maintain sustainable productivity of forest land and of forest industries without resource depletion.

26 **Bangladesh National Herbarium (BNH)** is a plant survey, collection, identification and conservation organization. It documents the plant biological diversity of the country and its collections are accessible samples of natural population. The collection of the herbarium is a national property that goes down to the posterity through generation for hundreds of years and work as reference materials on the flora of the country. The National Herbarium serves as repository of technical information on plant genetic resources and advises the Government on technical aspects of question

dealt with by the herbarium. It also provides direction required in the implementation of policies laid down by the Government in relation to plant biodiversity conservation.

27 **Bangladesh Forest Industries Development Corporation (BFIDC)** is mandated to rubber plantation, processing and to extract timber from inaccessible Forest areas. After sawing, seasoning and treatments, these timbers are used in wood based industries for production of quality furniture, electric poles, anchor logs, cross arms, railway sleepers, doors & windows and plywood etc. In addition to this, BFIDC have been raising Rubber plantation in the district of greater Chittagong, Sylhet, Mymensingh and Tangail, BFIDC so far has raised 32,625 acres of started plantation. Besides, about 33,000 acres rubber plantation has been raised in private sector with technical assistance of BFIDC.

2.3.1 Environmental Clearance Procedure

28 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 Environmental Clearance Certification Process is shown in **Figure 2.**

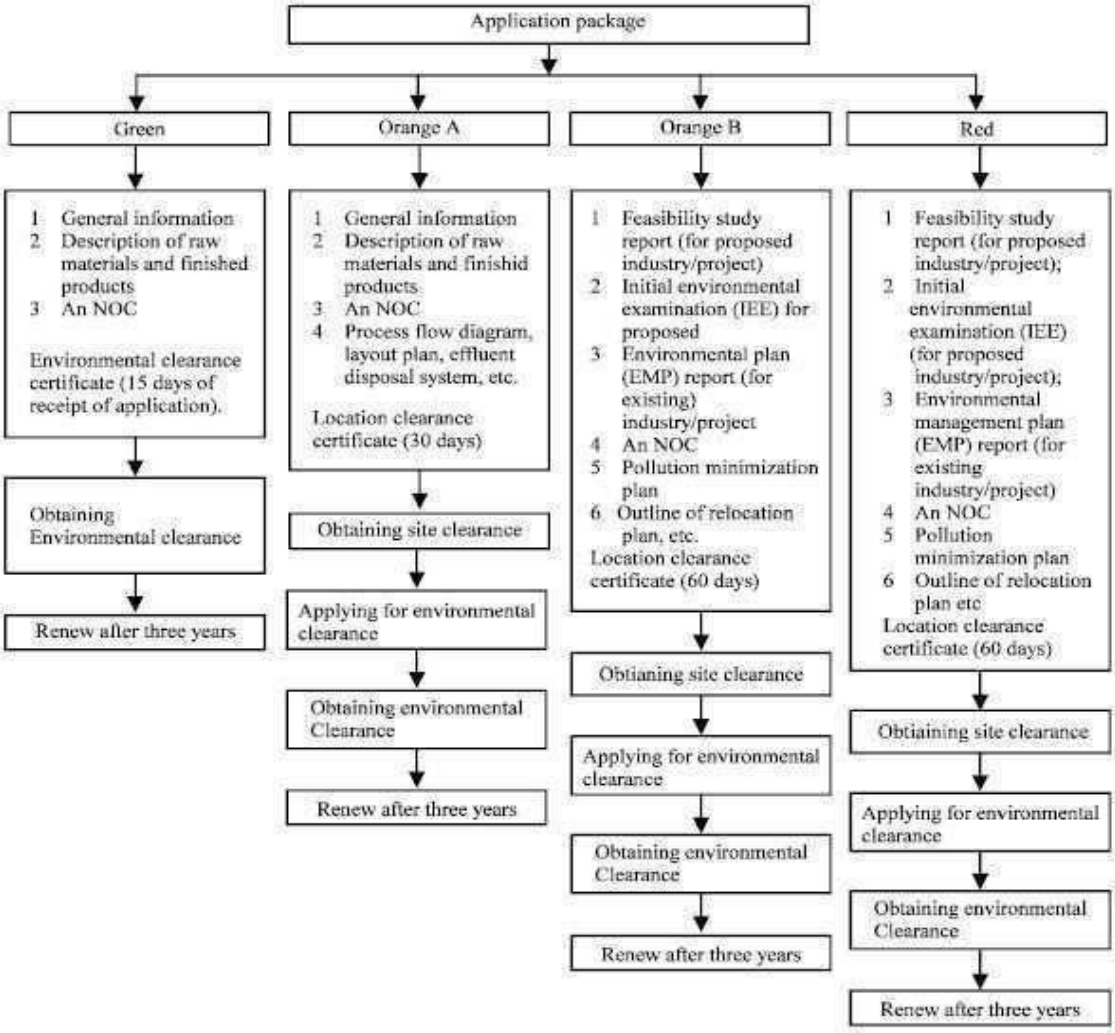


Figure 2: Environmental Clearance Process in Bangladesh

29 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:

- Completed Application for ECC, and the appropriate fee;
- Report on the feasibility of the project;
- Report on the IEE for the project;
- Report on the environmental management plan (EMP);
- No objection certificate from the local authority;
- Emergency plan relating to adverse environmental impact and plan for
- Mitigation of the effect of pollution; and
- Outline of the relocation and rehabilitation plan (where applicable).

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

2.4.1 Environmental Category: Bangladesh

31 For the purpose of issuance of Environmental Clearance Certificate, the industrial units and projects shall, in consideration of their site and impact on the environment, be classified into the following four categories:- (a) Green; (b) Orange – A; (c) Orange – B; and (d) Red. The Industries and projects included in the various categories are specified in sub-rule (1) have been described in Schedule – 1. 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). **Table 3** describes DoE classification for emergency shelters.

Table 3: DoE Classification of Emergency Shelters

S.No	Components	Items in Schedule-1 of ECR	DOE Classification
1	Emergency Shelters	Construction of Multi-storeyed Building	Orange-B
		Construction of Pollution Reduction Systems (septic Tank and Soak Pit)	Orange-B

No industrial unit or project shall be established or undertaken without obtaining environmental clearance from DoE in the manner prescribed by the rules.

2.4.2 Environmental Category: ADB

32 Asian Development Bank (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.

33 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:

- **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
- **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.
- **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- **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.

2.4.3 Bangladesh Environmental Standards

34 The Ministry of Environment and Forest has developed standards from time to time for water and air quality for discharge in the ambient air. The relevant standards are summarized in **Table 4.**

Table 4: Relevant Environmental Quality Standards

Sl.No	Standards	ECR 1997 Rule
1	Air Quality	Schedule 2
2	Inland Surface Waters	Schedule 3
3	Drinking Water	Schedule 3
4	Noise	Schedule 4
5	Sound from Motor Vehicles	Schedule 5
6	Emission from Motor Vehicles	Schedule 6
7	Odor	Schedule 8
8	Sewage Discharge	Schedule 9
9	Waste water from Industrial Units	Schedule 10

2.4.4 Institutional Capacity

35 The Ministry of Environment and Forests has the capacity to formulate policy, legislation, standards and review the environmental impact assessment (EIA) of the development projects. The project is cleared by two committees. The Pourashava gives the site clearance by location clearance committee (LCC). The project is submitted to DoE for environmental clearance committee (ECC). The projects are implemented at local or Pourashava level and executed at central level. Local Government Engineering Department (LGED) execute the projects on water supply, sewerage, solid waste management, etc. The environmental impact assessment is conducted by the consulting agencies by outsourcing. The sphere of LGED activities is for a better environment and health. Most of the engineers involved with design and construction activities are familiar with the environmental issues. The LGED has also appointed an Executive level officer to look into the critical issues. The LGED is assisted by consultants for monitoring of environmental attributes and training. LGED has established a quality control lab where parameters related to water, waste water and soils can be monitored. However there is a scope to train engineers at each level for conducting environmental impact assessment and preparation of management plans. Further, to avoid adverse negative environmental impacts of a proposed shelter, no contract tender should be launched before specific IEE / EIA based on final design is prepared, the EMP with the management measures is approved by DoE.

3. Project Description

3.1 Overview

36 The Coastal Towns Environmental Infrastructure Project (CTEIP) is a key infrastructure initiative of the Government of Bangladesh. 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.

37 CTEIP finances basic urban services improvements and aims to increase climate resiliency that are vulnerable to the effects of climate change. The eight project Pourashavas as shown in **Figure 1.1** in **Subsection 5**, will receive investments in two stages: (i) Stage 1 focuses on infrastructure crucial for climate resilience (e.g., roads, cyclone shelters, solid waste, drainage, water supply, and sanitation); and (ii) Stage 2 includes other infrastructure that contributes to general economic development (e.g., additional roads, markets, boat landings and bus terminals). The total project amount for the eight Pourashavas is estimated to be $117.1 million, and the implementation period is five years.

38 There are no existing cyclone shelters in Mathbaria. The demand (needs) for cyclone shelters, as determined by the PPTA during Pourashava consultations is: Amtoli (8 no.), Galachipa (9 no.), Mathbaria (9 no.) and Pirojpur (12 no.) The proposed investment levels of CTEIP limits the agreed scope for the Batch I Pourashavas to a total of 12 new multipurpose cyclone shelters-cum-schools/ madrassa, as part of Stage 1 investments: 3 no. in Amtoli, 3 no. in Galachipa, 5 no. in Pirojpur, and 1 no. in Mathbaria.

3.2 Selection and Siting of Cyclone Shelter

39 The cyclone shelter at Mathbaria Pourashava is in Pirojpur District. The district head quarter is about 185 km from Dhaka by road. The aerial distance is about 125 km. Site reconnaissance visits were made during February 2014 to April 2014. Particular attention has been paid to the data and recommendations contained in the PPTA Reports, which have been further reviewed and site verified in advance of progressing with the detailed design. Four sites were identified for the location of the shelter. Based on risk and vulnerability; the ADB's subproject selection criteria, the discussion with stakeholders which includes the Pourashava administration, local people, Mosque and Madrasa administration. Finally, the site for the cyclone shelter is selected at Momenia Dakhil Madrassa (Ward 1) at Mathbaria. **Figure 5** gives the photographic front view of Momenia Dakhil Madrassa main building. The siting of the CS building is laid in such a way so that it does not interfere with the activities of other buildings and it is easily approachable by the people through road. These are the factors responsible for selection of cyclone shelter at Mathbaria. Site reconnaissance visits were made during February 2014 to April 2014. Particular attention has been paid to the data and recommendations contained in the PPTA Reports, which have been further reviewed and site verified in advance of progressing with the detailed design.

3.3 Environmental Categorization

40 As part of the project preparatory technical assistance (PPTA 8128-BAN), environmental assessment for the Batch 1 stage I Pourashavas of Amtoli, Galachipa, Mathbaria and Pirojpur was conducted and six sample initial environmental examination reports (IEEs) with Environmental Management Plan (EMP) were prepared in accordance with requirements of the ADB Safeguard Policy Statement (SPS). As per DoE classification mentioned in Para 29, the construction of multistoried building falls in environmental category Orange-B. The land on which the shelter will be constructed is already available with authorities. Hence, there is no problem due to land acquisition, rehabilitation and resettlement. The environmental issues related to construction are anticipated during construction phase. In order to follow ECA, Bangladesh and ADB SPS the IEE has been conducted. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigating measures and by adopting environmentally sound engineering and construction practices. No Category A type of works (with significant impacts) is considered.

3.4 Existing Condition and Need for the Project

41 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, 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. The population of the area has been regular victim of the frequent storm surges. The history and future prediction have indicated storm surges of 9.4 m without decay due to land hindrances. Storm surge level of 5.7 m is anticipated due to climate change in 2050 with decay in surge height. Generally shelters are designed as framed structure that can withstand storm flows and high winds. A slightly raised unenclosed ground floor, either concrete or earthen with external steps leading up to a roofed and walled first floor are important. This area provides the main protection from cyclones. Key issues 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. This makes 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 facilities; (v) there are no separate sections for women or secure storage areas for personnel effects; (vii) many shelters are not used apart from during cyclones hence maintenance is not regular; and (viii) many shelters are located below the road level and the ground floor is often subject to flooding

3.5 Proposed Components

42 Investments under this subproject include construction of one cyclone shelters. As per the requirements of LGED, the cyclone shelter-multipurpose will be provided with essential facilities like (i) separate toilets for male, female and pregnant ladies; (ii) care room for pregnant-women; (iii) water supply with deep tube-well, (iv) furniture, (v) rainwater harvesting system, and (vi) septic tank and soak pit for waste water treatment and disposal. The details on present situation are presented in **Table 5.** The facilities have following components:

- Faculties and the design thereof, of the 3 storey buildings, is based on tropical cyclones and surges; and wind velocity to take care of climate change;
- The Cyclone Shelter is to provide protective facilities for the public residing in the immediate catchment area for meeting basic human needs for at least 500 persons (capacity of 1 person per square metre), inclusive of provision for access by the disabled and vulnerable groups, during periods of extreme storms events;
- Two overhead and integral water storage reservoirs have been provided for roof rainwater harvesting. The storage tanks have been placed below the roof and above each toilet block, which will be used during appropriate periods for rainwater storage, as well as for pumped water storage. Two separate compartments have been provided to facilitate segregated use, rainwater and pumped supply; and to provide standby capabilities during periodic maintenance of the reservoirs.
- The building will have three floors; first and second floors will be used as school/madrassa classrooms, staff room and store etc. For assured sanitary conditions, each floor has the provision of two toilets on one side of the building for male and three toilets for women at the other side of the building, including one isolated WC for pregnant women.
- Ramp access provisions are given at the front entrance stepped locations for ease of access by the disabled, for unaided access to the ground floor area. Further access of the disabled, to the first and second floors, shall be through aided means.

Table 5: Basic Data on Proposed Cyclone Shelter

S.No	Name Location and Ward No	Land Ownership	Present Conditions	Floor Area (m^2)	Capacity (Nos)
1	Momenia Dakhil Madrassa (Ward 1)	Madrassa	Open low Land	508.60	507

Refer to **Figure 3** for selected photographs of the existing Momenia Dakhil Madrassa.

Existing madrassa: 2 room capacity

Rear of Tin shed blogging road cross drain

Mathbaria Momenia Dakhil Madrassa (Ward 1): Tin shed structure to be replaced by Option 01 Cyclone Shelter

Figure 3: Photographs of Momenia Dakhil Madrassa

3.6 Implementation Schedule

43 Two types of prototype buildings (Option-1 & Option-5), as executed by Emergency 2007 Cyclone Shelter Recovery & Restoration Project – 2007 (ECRRP-2007), have been considered for adaptation in the CTEIP. The type of building, Option-1 or Option-5, will be accommodated into the available sites as found specifically suited. The shelter has been fitted in the size and shape of the existing primary school or madrassa layout, according to the specific site conditions. The contract is planned to be implemented in a period of 12 months. Designs will be finalized by May 2014. The package for the construction of the Mathbaria Cyclone Shelter is proposed to be implemented by post-qualified contractors under a single envelope single stage bidding process through National Competitive Bidding (NCB) procedures.

44 The construction schedule of feeder roads depends on the methodology adopted for construction. In general the time period will also depend on the resources put in place by the contractor. The multipurpose shelter project may take 12 months of construction. Pre-construction activities include detailed design, tendering process (Notice inviting Tender, Tender bid submission, evaluation and award of work to the contractor). The pre-construction activities will be completed in 6 months.

45 The summarized Construction Schedule is shown in **Figure 4.** The site plan, along with ground, first floor, roof plans and front elevations are given in **Subsection 5**.

Figure 4: Summarized Construction Schedule

Activity	Duration In Months									
	Pre Construction			Construction						Post Construction
	0-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20
Detail designs, Tender documents and BOQ										
Notice inviting Tender, Tender process evaluation & award										
Mobilization and Preliminary works, Tube well and clearing										
Construction of Building and Floors etc.										
Building Ancillary works such as doors, windows, water tank, soak pit and septic tank										
Testing and Commissioning Monitoring and Evaluation										

3.7 Cost of Environmental Management

46 The project includes the construction of a multi-purpose cyclone shelter. The Contractor's environmental management cost, included in the overall cost of the contract, amounts to **Tk. 314,793**. The contract is designated as MAT/CS/01.

4. Description of Baseline Environment

4.1 Mathbaria Pourashava and Environment

47 Mathbaria came into existence in 1981 as a *Thana*. Mathbaria Pourashava was established in 1993 and classified as a Class-C Pourashava. Later it was upgraded as Class-A Pourashava in 2010. The Pourashava is divided into 9 wards. Mathbaria is the largest Pourashava of Pirojpur District in respect of both area and population. It is located between 22009' and 22024' north latitude and between $89^0$52' and $90^0$03' east longitude. It is located in Pirojpur District of Barisal Division. The Pourashava is bounded by Dhanisafa Union to the north, Bara Masua Union to the west, Tushkhali to the north and Tikikata Union to the south-east. Mathbaria has a total area of 344.23 km^2 including 8.55 km^2 forest area. Mathbaria Pourashava is the only urban area of the *Upazila*, and occupies an area of 6.55 km^2.

48 The topography of Mathbaria *Upazila* is mostly flat. The elevation ranges mostly between 0.2 m to 4.5 m. Most of the Pourashava area is below 2.3 m 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.

49 The Pourashava area is located on the southern part of Bengal Basin making a part of Barisal Gravity High. The 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.

4.1.1 Rainfall and Temperature

50 The annual average rainfall in Mathbaria is 2,758 mm against Bangladesh annual average rainfall of 2,286 mm. The seasonal distribution shows that most of the rainfall occurs in monsoon season amounting to 2,079 mm against Bangladesh monsoon rainfall of about 1,656 mm/year which is 60.0% of annual rainfall. Rainfall exhibits increasing trend in all seasons[3]. The geographic distribution of annual rainfall shows that the coastal zone experiences around 2000-3500 mm of rainfall, but it is relatively higher over the south-eastern coastal zone and gradually decreases towards the west. Over the areas containing the study towns the annual rainfall is around 2400-3000 mm. The deficit and excess rainfall from normal becomes critical causing droughts and floods.

51 Mathbaria has a tropical wet and dry climate. The annual average temperature is about 25 °C and monthly means varying between 18 °C in January and 29 °C in August.

4.1.2 Hydrology

52 The Baleshwar River flows 8 km west and the Bishkahali River flow 12 km east of Mathbaria influence the surface water hydrological state of the Pourashava. Both rivers are tidal rivers, which exhibits semi-diurnal tidal fluctuations. The Mathbaria-Machua Khal flows from the Baleshwar River and the Mathbaria-Dowatola Khal flows from the Bishkhali River meet at a confluence within Mathbaria. A number of khals running through Mathbaria effectively function as a drainage system for the Pourashava.

53 There are some 300 ponds within the Pourashava. Water is available throughout the year in many of these ponds (PPTA estimates 67%). The remaining ponds hold water for 6-7 months. About 30% (PPTA) ponds are being used for culture fishery (source: Baseline Survey Final Report, Ground Water Management and Feasibility Study for 148 Pourashavas, (DPHE).

54 Quite a number of *khals* run through the Pourashava and the ponds contribute to the surface water resource. All khals are tidal and get the flow of water from the Baleshwar River or the Bishkhali River. In the wet season the *khals* remain full but some of them get water during spring tide in the dry season. The *Khal* water is somewhat turbid and contains algae. Water hyacinth is abundant on the watercourses. The water of canals coming from Baleshwar River is saline, with a lesser degree during the monsoon months.

[3] TA 8128 BAN: Preparing Coastal Towns Infrastructure Improvement Project- Final report –Annex 4: Infrastructure, Water Resources; October 2013.

4.1.3 Drainage and Flood Control

55 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 with* brick and concrete. The secondary drains comprise both natural earth and *pucca* channels.

4.1.4 Ambient Air Quality

56 Other than normal, there are no undue air emission sources at the construction site except for limited vehicular emissions from inter-Pourashava traffic which are occasional and limited to a 3-4 meter width on both sides of the market bound roads.

4.1.5 Ambient Noise

57 The en-route area is peri-urban to urban within the Mathbaria market area. The noise levels in the Pourashava are similar to that of any small urban area. In this urban location noise is due to vehicles, machinery and other related activities, and is normally in the range of 55 to 75 dB(A).

4.1.6 Surface Water Quality

58 Surface water sources include the four canals of Tushkhali, Boyratala, Mirukhali and Machua/Ramna khals, flowing inside the Pourashava area; where tidal water is available round the year. People of the area generally use this water for domestic use, and drinking after filtration and sometimes after boiling. A good number of khals 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 Baleshwar or Bishkhali River. In the wet season the khals 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.

4.1.7 Groundwater Quality and Availability

59 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. Consequently, most of the tube well water is not used for drinking, but used for other domestic purposes. The water in the deep aquifer in Mathbaria is also severely saline contaminated. 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.

4.1.8 Biological Environment

60 The Mathbaria urban location is mainly devoid of vegetation other than nominal roadside trees, with some secondary growth trees and shrubs. There are no forests, national parks or sanctuaries in and around the proposed Cyclone Shelter site.

4.1.9 Economic Development

61 The Pourashava has insufficient capacity and resources and is finding it difficult to respond to the need for forward planning and investment in basic urban infrastructure and services. This undercuts sustainable local urban governance, makes local planning ineffective and undermines local economic development. The impact of climate change further exacerbates the weaknesses in municipal management more generally. The Second stage infrastructure, subject to attaining the set project goals and achieving the targeted performance levels, will support local economic development including (i) commercially important roads, (ii) markets, (iii) bus terminals, and (iv) boat landings. Mathbaria Pourashava does not have any form of water supply reticulation systems and will avail under the CTEIP Batch 1, Stage I programme.

4.1.10 Socio-economic Characteristics

a) Population

62 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 is summarized in **Table 6**. Mathbaria is composed of Muslim 87.52%, Hindu 12.37% and others 0.11%.

Table 6: Mathbaria Pourashava Population Data

Administrative Unit	Area (km^2)	Houses	Population			Household Size	Density/km^2
			Male	Female	Total		
Mathbaria	6.56	4,330	9,124	9,251	18,375	4.24	2,805

63 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.

b) Land Use

64 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%.

c) Socio-economic Status

65 The economy of Mathbaria is agriculture dependent. The principal crops are paddy, wheat, sugarcane, chilli and pulses. Cottage industries include weaving, bamboo work, goldsmith, blacksmith, potteries, tailoring, wood work, and welding. Main occupations are agriculture (42.95%), agricultural labourer (21.14%), wage labourer (4.12%), commerce (10.85%), service (5.28%), fishing (2.62%), construction (1.11%), transport (1.41%), and others (10.52%).

d) Other Existing Amenities for Community Welfare

66 Mathbaria has 1 Upazila health complex, 7 family planning centres, 49 rural (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 madrassas.

e) Historical, Cultural and Archaeological Characteristics

67 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 near the site, no excavation works will be conducted in the vicinities of these sites. There are no other scheduled or unscheduled archaeological, paleontological, or architectural sites of heritage listed by local and/or national authority. There is a small graveyard near the site (20 ft) as well as religious properties. 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.

5. Assessment of Environmental Impacts and Safeguards

5.1 Environmental Screening Considerations

68 Issues for consideration have been raised by the following means: (i) input from interested and affected parties; (ii) desktop work on information relevant to the proposed subproject; (iii) site visits; and (iv) evaluation of proposed design scope and potential impacts. The baseline environmental data (Section 3) indicate that the subproject component is located in Mathbaria urban area and hence no natural habitat is left at the site. There are no protected areas, forest within or near the location of the proposed Cyclone Shelter. The shelter is located within the compound of the Momenia Dakhil Madrassa (Ward 1), and is directly accessible by the existing urban based road system of Mathbaria Pourashava. The proposed subproject has been planned to minimize any adverse environmental impacts, and adequate provisions have been incorporated into the project design to mitigate the impacts.

69 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. From this, it can be seen that the environmental impacts have been identified as temporary impacts, including noise and dust, occurring during the time of the construction activities.

70 Preliminary design and results of the rapid environmental assessment indicate that Mathbaria multi-purpose shelter subproject implementation will not be having major negative impacts as activities will be localized/site-specific and of short duration. There is no rehabilitation and resettlement issues due to the proposed sub-project, as the construction works will be on existing unoccupied and vacant government land. Several aspects of the environment, that are not expected to be affected by the subproject, can be screened out of the assessment at this stage. **Table 7** reports the extent of impact.

Table 7: Fields in which the Subproject is not Expected to have Significant Impacts

S.No	Attribute	Rationale
A	**Physical Characteristics**	
1	**Topography, land use, geology and soils**	• Land is already in possession of Madrassa Authority hence no change in land use is anticipated; • Construction materials will not cause change in Topography, geology and soils. • Erosion hazard is insignificant as trenching and excavation works will be conducted only during construction stage specific to shelters/ buildings. • No degradation of land will occur as a result of the foundation works as the excavated soil will be stored and reused in backfilling.
2	**Air Quality**	• Conducting works at dry season and moving large quantity of materials may create dust and increase concentrations 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.
3	**Water Quality**	• Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants shall be suitably controlled during construction phase and will not result in water pollution particularly during rainfall runoff which could cause siltation and reduction in the quality of adjacent bodies of water. However, impact is short term, site-specific and within a small area.
4	**Noise and Vibration**	• Temporary increase in noise level and vibrations may be caused by excavation equipment and the transportation of equipment and materials during construction. Adequate mitigation measures to be taken according to the EMP.
B	**Biological Characteristics**	
1	**Biodiversity, Forest and Trees**	• Activities being located in the built-up area of Mathbaria Pourashava will not cause direct impact on biodiversity values. The construction activities do not anticipate any cutting of trees or encroachment of forest.

S.No	Attribute	Rationale
C	**Socioeconomic Characteristics**	
1	**Socio-Economic**	• The project will have positive impact in providing additional job opportunity, skill transfer, training, safety during storms and space for social community activities. • Road closure is not anticipated. Hauling of construction materials and operation of equipment on-site will not cause any traffic problems.
D	**Historical, Cultural, and Archaeological Characteristics**	
1	**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 adjacent to subproject sites. The subproject components are not located in or near and excavation works.

5.2 Anticipated Impacts and Mitigation Measures – Pre-construction Phase

71. Land acquisition and resettlement. The proposed cyclone shelter will be located in semi-government institutional lands. There are no encroachers or residential/commercial structures in these lands. Cutting of trees 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.

72. 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.

73. The concepts considered in design of the Mathbaria cyclone shelter subproject are: (i) the site serves populations in an area most vulnerable to cyclone damage; (ii) the site is located within or very close to locality of users; (iii) the site has been prioritized within the madrassa and hence complies as educational, institutional compound where the concerned authority has no objection; (iv) the site is selected in the area where significant number of population live; (v) locating facilities are on government-owned land, and hence avoids the need for land acquisition and relocation of people; (vi) all planning and design interventions and decisions have been made in consultation with the local communities and has reflected inputs from public consultation and disclosure for site selection.

74. The Detailed Engineering Design has integrate a number of measures, both structural and non-structural, to mainstream climate resilience into the Mathbaria cyclone shelter subproject, including: (i) design life of 20 years; (ii) 3 storey building with ground floor open plan and 1st and 2nd storey accommodation accommodating 1 m^2 per person with minimum size for 500 people (500 m2); (iii) base level of the 1st floor is raised by 700 mm to avoid higher storm surges and sea levels; and (iv) day-to-day use and integration of the shelter with the use of the madrassa authorities that are responsible for it maintenance needs. The cyclone shelter has been designed in accordance to relevant national and international building codes to further enhance the resilience of the structure.

5.3 Anticipated Impacts and Mitigation Measures – Construction Phase

75. In the case of this subproject (i) the key elements of construction are relatively simple and small and will 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 precast piling, and excavation works, inclusive of earth movements; and (iii) being located in the built-up area of the Pourashava, will not cause direct impact on biodiversity values.

76. Construction method. Tasks to be performed for construction of the Mathbaria cyclone shelter are: (i) site clearing; (ii) laying of foundations; (iii) casting of ground floor slab; (iv) construction of floor beams and floor slabs; (v) construction of roof beams and roofing; (vi) installation of doors and windows; (vii) architectural components and finishes; and (viii) ordering, procurement and installation of building services. Excavation for the foundation will be dug by backhoe digger (or similar), 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.

77. There is sufficient space for a staging area, construction equipment, and stockpiling of materials. The contractor will remove all construction and demolition wastes on a daily basis.

78. Although construction of the cyclone shelter involves quite simple techniques of civil work, invasive precast piling and related excavation works shall be conducted. The subproject site is not located in a built-up area of Mathbaria and hence a variety of human activities will not prevail, and so will not adversely impact on the environment and sensitive receptors such as residents, businesses, and the community in general. The 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 cyclone shelter subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with construction activities can be mitigated to acceptable levels as detailed in the **Environmental Management Plan** given in **Appendix B**.

5.4 Anticipated Impacts / Mitigation Measures – O&M Phase

78. In the operations and maintenance (O&M) phase, the cyclone shelter will operate with routine maintenance, which should not affect the environment. Routine repairs 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. The cyclone shelter 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 under this project. The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels as detailed in the **Environmental Management Plan** given in **Appendix B**.

5.5 Cumulative Impact Assessment

79 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 are reasonably foreseeable and sufficiently certain to proceed.

80 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.

6. Grievance Redress Mechanism

6.1 Procedures

81 Generally complaint procedures are developed for those who have been adversely affected by the Project infrastructure and/or have not been compensated as per law/ legal entitlement. In this case no land related dispute is applicable as the land is already owned by the authorities. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the 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. A common GRM will be in place for social, environmental, or any other grievances related to the project. GRM was discussed with stakeholders during field visits. The GRM will provide an accessible and trusted platform for receiving and facilitating 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.

82 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. 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.

6.2 Grievance Registration

83 The grievance registration form is available in **Annexure II.** 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.

6.3 Grievance Redress Process

84 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.

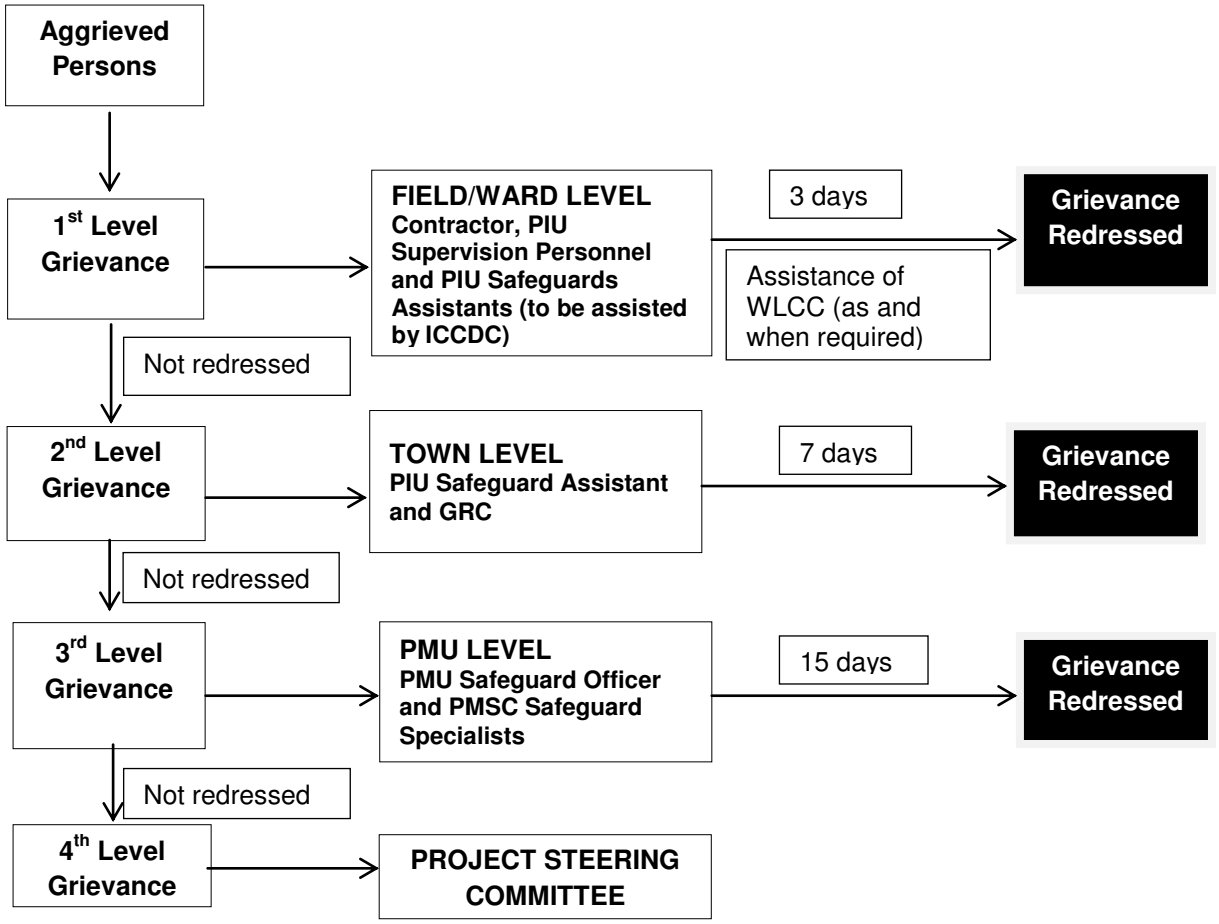
(ii) **2nd Level Grievance.** All grievances that cannot be redressed within 3 days at field/ward level will be jointly reviewed by the grievance redress committee (GRC) at town-level and PIU safeguards assistant, who will attempt to resolve them within 7 days. The PIU safeguards assistant will be responsible 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) to be resolved within 14 days. All decisions taken by the GRC and PSC will be communicated to the APs by the PIU safeguards assistant. 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 ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the project GRM.

85 Grievance redress process can be diagrammatically represented as under **Figure 5**.

Figure 5: Grievance Redress Process



6.4 Records

86 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.

6.5 Grievance Redress Costs

87 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.

7. Public Consultation

7.1 Public Consultations and Participation

88 Public participation and community consultation has been taken up as an integral part of environmental assessment process of the project. Consultation was used as a tool to inform and educate stakeholders about the proposed action both before and after the development decisions were made. It assisted in identification of the impacts problems associated with the project as well as the needs of the Project Affected People (PAP). This participatory process helped in reducing the public resistance to change and enabled the participation of the local people in the decision making process. Initial Public consultation has been carried out in the project area with the objectives of minimizing probable adverse impacts of the project and to achieve speedy implementation of the project through bringing in awareness among the community on the benefits of the project.

89 As part of the project consultations, efforts were made to consult with the public as well as a number of local authorities, to determine their thoughts, opinions and feedback on the impact of the proposed Shelter. Information and comments collected from the public early in the study process were of use. Different stakeholders were consulted to give them the opportunity to express their views and concerns. As part of the process, they were also provided with relevant and sufficient information on the project prior to its start - up. These stakeholders include the central and local authorities, as well as the population so as to determine their thoughts, opinions and feedback on the impact of the project.

7.2 Stakeholders

90 Involving stakeholders through participatory direct or indirect consultations is central to completion of the IEE. Therefore, during the public consultations and disclosure of information, various groups of stakeholders were consulted. The stakeholders were those who have an interest in the project, and who will be involved in the further consultative process. The main groups of stakeholders met are:

- Local authorities;
- Community People and potential shelter Users' and
- Mosque, Madrassa and cooperative leaders.

91 During the consultative process, beside the local authorities and ordinary population (potential users), other educational organizations were also invited to attend the communication meetings.

7.3 Public Participation – Methods and Process

92 During these consultations, the communities were explained about the project, its benefits, social and environmental impacts. The participants were encouraged to (i) be open and make known their concerns and claims. The presentation highlighted the project background, objectives, expected upcoming activities, social economic information, and environmental information. The salient features of the meetings are presented below:

- Create awareness of the project;
- To obtain stakeholders responses, feedback and concerns on the project;
- To obtain environmental information on the community.

93 After the presentations, the community was given opportunity to give their views, comments and queries. Different community problems were addressed during the meeting in which the local participants expressed repeatedly their main concerns as follows:

- Road connectivity and access;
- Prospects of jobs and income generating activities;
- Use of proposed cyclone Shelter during non storm season.

94 Comments or questions raised by stakeholders were responded to. Safety opportunities associated was a theme brought up in the meetings. The consultant explained that positive and negative impacts of the project on people and the environment will be analysed such as air

pollution, dust, influx of people, employment. The consultant team highlighted that the project will follow government policies in protecting the population. All the participants confirmed that they appreciate the Project. The project received high degree of acceptability which will boost local economy due to no-loss of life during storms.

7.4 Findings from Public Consultation Meeting

95 The data obtained from public consultation and views as well as concerns from different stakeholders are given is details in **Table 8**.

Table 8: Summary of Public Consultation Outcome

1	**Question**	What will be the criteria for labour recruitment during construction?
	Answer	This largely depends on the types of job and will be assessed on a case to case basis by the contractor according to needs.
2	**Question**	Happy for this project, as it comes to solve the problem of shelter during storms
	Answer	Accepted thankfully
3	**Question**	How does this project help vulnerable people, people with disabilities?
	Answer	The layout has provided separate space for male, female and pregnant women including separate toilet. Ramp access to ground floor is provided to take care of people with disabilities.
4	**Question**	Priority for jobs should also consider women; women can do the same work.
	Answer	Priority will include women and there will not be any discrimination.
5	**Question**	Raised the issue of employment, he suggested that the local people should be the first ones to be employed in the project.
	Answer	The consultant team explained that local people will be employed accordingly to job requirement.
6	**Question**	Wishes to speed up the project.
	Answer	It was explained that implementation will take place immediately after the rainy season.
7	**Question**	The construction creates lot of dust and noise, is there any increase anticipated.
	Answer	The increase in dust and noise will be at construction site and all mitigation measures will be put in place by the contractor

7.4.1 Focus Groups Discussions (FGD)

96 As part of the impact assessment, the consultants conducted a focus group discussion with selected group. Focus groups are useful in obtaining a particular kind of information that would be difficult to obtain using other methodologies. A focus group typically can be defined as a group of people who possess certain characteristics and provide information of a qualitative nature in a focused discussion. Focus group discussion provides the opportunity to stimulate discussions and interaction between small groups of people from a similar socio cultural background. This enables the consultants to have a diversity of ideas related to the topic. Refer to **Figure 6** for selected photographs of the FGD held at site of the Momenia Dakhili Madrasa Cyclone Shelter.

97 Further Public consultations and focus group discussions (FGDs) were conducted on the 16th June 2014 with a total of 34 participants at the site of the proposed cyclone shelter. The objective of the meeting was to further appraise the stakeholders about the current progress of the subproject and to reiterate environmental and social impacts of the proposed subproject and safeguards to mitigate the same. Comments or questions raised by the group were discussed until they were satisfied with the level of information provided. Key issues discussed were similar to those already voiced during the community consultation meetings and included:

- Justification of site selection for construction/establishment of the Cyclone Center;

- Ownership and present position of land selected for Cyclone center;
- Conditions of providing required land for Cyclone Center;
- Resettlement and Environmental issues and mitigation measures according to Resettlement Framework prepared and approved by ADB and government Bangladesh for this project;
- Participation of local community in construction, operation & maintenance of Cyclone Center;
- Roles and responsibilities of different stakeholders for realizing desired outcome;
- Potential social and economic impacts of the proposed Cyclone Shelter;

Summary of discussion

98 Momenia Dakhili Madrasha located in suitable place of Mathbaria Pourashava with road communication. The proposed cyclone shelter will be constructed and established on Madrasa land and within its compound. The representatives of Pourashava, Madrasa and local people considered that the selected site is suitable from technical and social point of view. Madrasa management offered this land for the construction of the cyclone shelter free of cost. In addition, the management committee assured that they would provide maintenance service on a regular basis. The selected site is free from resettlement and environmental impacts.

99 The local people have expressed their greater interest for this cyclone shelter for their safety during disaster period and using this facility for education purpose. They have also assured that they will provide required support in construction, operations and maintenance of this cyclone shelter. Pourashava, Madrasa management and local community will be responsible for providing required services for construction, operation and maintenance of cyclone shelter. The services/uses of cyclone shelter will result in saving lives of local people and reduce damage to their properties that caused due to irregular disaster in this coastal area.

100 Pourashava staff and representatives organized a Focus Group Discussion session at the selected site for construction/establishment of Cyclone Shelter under Coastal Town Environmental Infrastructure Project (CTEIP). The Mayor Mr. Md. Rafiuddin Ahmed Ferdous, Project Director Mr. Md. Abul Bashar, Team Leader Mr. Philip. D. H. Philip joined the FGD session held with Madrasha management, local beneficiary people (male & women) and representatives and concerned officials of Mathbaria Pourashava. Md. Nurul Hoque, Resettlement Expert, worked as facilitator.

Figure 6: Photo of FGD held at site of Momenia Dakhili Madrasa Cyclone Shelter

7.4.2 Future Consultation and Disclosure

101. 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.

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

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

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

103. 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.

8. Conclusion and Recommendations

8.1 Conclusions

104 Based on Project Description **(Section 3),** Environmental Baseline Data **(Section 4),** Environmental Impacts **(Section 5),** and Environmental Mitigation Measures, **(Section 6)**; the following conclusion are drawn:

i. The location of the Mathbaria Cyclone Shelter at Momenia Dakhil madrassa (ward 1) has been assessed as being a viable solution for providing a reliable protection facility to the nearby populous during extreme storm events.

ii. The challenge for the project is that the Cyclone Shelter is implemented in the most economically feasible, and environmentally and socially sensitive, manner.

iii. The PPTA feasibility study, completed in October 2013, has provided a comprehensive set of recommendations for the planning, design and implementation of the Project. Based on the recommendations of this study, the DDS Consultant has completed the detailed engineering design for the construction of the Mathbaria Cyclone Shelter.

iv. The proposed location for the Momenia Dakhil madrassa cyclone shelter was selected based on the recommendations of the PPTA report and subsequent site verification by the DDS Consultant, which is assessed to have minimum environmental impacts.

v. The selected site is well suited for its intended purpose, and has the advantages of immediate accessibility within the town centre of Mathbaria Pourashava.

vi. There is no resettlement or land acquisition requirement in this subproject. Categorization form is prepared and submitted **in Annexure –III.**

vii. The adverse environmental impacts will occur during the construction period, and will be of a relatively short duration. Adequate provisions have been incorporated into the planning and design of the cyclone shelter to minimize or mitigate these unavoidable environmental impacts that are a result of the works.

viii. The management plans, bill of quantities and cost estimates were prepared. The emphasis was given for protection of environment, capacity building, training, monitoring and evaluation.

ix. The planned activities include: construction of shelter, internal roads, tube well and rain water harvesting infrastructure. The environmental costs are estimated **Tk 314,793**.

x. The major positive achievements of multipurpose shelters are as follows:
- Development of shelter will serve not only the influence area but also the surrounding area in the town.
- Establishment of shelter development will stimulate ancillary projects which will improve economical status of the local population;
- More employment of people during construction phases;
- Will be potential socio-economic enhancement of rural economy by saving the life of people;
- Skill Transfer and Training.

xi. The environmental mitigation measures as stipulated in the EMP and in the obtained environmental permit shall be monitored during implementation of the shelter sub-project. In order to perform monitoring of the EMP, the contractor shall engage experienced laboratory and third party services in complying the required environmental testing of parameters listed in **Section 8**.

xii. The noise and air quality of the project area is within the permissible limits. The overall impact on air and noise quality during construction is limited to site and of short duration and can be mitigated.

xiii. The labour camps shall be established with the septic tank and soak pit for treatment and disposal of sewage and sullage water to avoid pollution of water bodies.

xiv. The environmental monitoring will be required before the start of the construction and during the construction phase. The parameters of Water Quality, Air Quality, Noise quality, and Soils shall be monitored; as specified in **Section 8**.

xv. During public consultation recommendations were drawn including: i) involve local communities in all stages of project planning and development, ii) establish permanent communication between project initiators and local authorities, iii) setup grievance redress mechanism which will publicized through Pourashava level co-ordination committee and monitoring register and iv) during construction, local people including women shall be given first priority in the employment of skilled and unskilled labour.

8.2 Recommendations

105 In view of above, it is concluded that the Project will bring benefit to the people of the area and especially during emergency created by cyclones. The negative impacts occurring during implementation are within the manageable limits and shall be mitigated with the proposed Environmental Management Plan and hence project may be implemented.

8.3 Disclosure of Environmental Safeguards Instruments

106 The LGED will disclose this Environmental Management Framework by making copies available at its head office and in District / Pourashava where the Project is situated. The copies shall also be made available to the Local Government's Agencies, the Environmental and Social Group and other stakeholders. The Government of Bangladesh will also authorize the Asian Development Bank to disclose this IEE and EMP electronically through its InfoShop.

ANNEXURE I: RAPID ENVIRONMENTAL ASSESSMENT CHECKLISTS

Construction of a Cyclone Shelter at Momenia Dakhil Madrassa

Screening Questions	Yes	No	Remarks
A. Project Siting			
Is the project area adjacent to or within any of the following areas:			
• Underground utilities		No	
• Cultural heritage site		No	Madrassa site
• Protected Area		No	
• Wetland		No	
• Mangrove		No	
• Estuarine		No	
• Buffer zone of protected area		No	
• Special area for protecting biodiversity		No	
• Bay		No	
B. Potential Environmental Impacts			
Will the Project cause:			
• Encroachment on historical/cultural areas?		No	
• Encroachment on precious ecology (e.g. sensitive or protected areas)?		No	
• Impacts on the sustainability of associated sanitation and solid waste disposal systems?		No	
• Dislocation or involuntary resettlement of people?		No	
• Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		No	
• Accident risks associated with increased vehicular traffic, leading to loss of life?		No	
• Increased noise and air pollution resulting from increased traffic volume?	Yes		EMP: to be followed
• Occupational and community health and safety risks?		No	EMP to be followed
• Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?		No	
• Generation of dust in sensitive areas during construction?	Yes		EMP: to be followed
• Requirements for disposal of fill, excavation, and/or spoil materials?	Yes		EMP to be followed
• Noise and vibration due to blasting and other civil works?		No	
• Long-term impacts on groundwater flows as result of needing to drain the project site prior to construction?		No	
• Long-term impacts on local hydrology as a result of building hard surfaces in or near the building?		No	
• Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		No	
• Social conflicts if workers from other regions or countries are hired?		No	
• Risks to community safety caused by fire, electric shock, or failure of the buildings safety features during operation?		No	
• Risks to community health and safety caused by management and disposal of waste?		No	EMP to be followed
• 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?		No	

Note: Hazards are potentially damaging physical events.

ANNEXTURE II: GRIEVANCE REGISTRATION FORM

(Bangla translation to be available)

The **Coastal Towns Environmental Infrastructure Project (CTEIP)** 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 the 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:

ANNEXTURE IIIa: CATEGORIZATION FORM

Date: ___/___/2014

A. Project Data

Country/Project No./Project Title	:	Country: Bangladesh ADB No.: (No. to be designated) Coastal Towns Environmental Infrastructure Project (CTEIP) Subproject: MAT/CS/01

B. Involuntary Resettlement Category

[ ] New [ ] Recategorization — Previous Category [ ]

☐ Category A	☆ Category B	☐ Category C	☐ Category FI

C. Comments

No unavoidable dislocation or involuntary resettlement of persons affected by the subproject will take place as a result of the construction of the Cyclone Shelter at the site of Momenia Dakhil madrassa (Ward 1), Mathbaria Pourashava, District: Pirojpur.

Refer to Involuntary Resettlement Impact Categorization Checklist below.

ANNEXTURE IIIb:

INVOLUNTARY RESETTLEMENT IMPACT CATEGORIZATION

Probable Involuntary Resettlement Effects	Yes	No	Not Known	Remarks
Involuntary Acquisition of Land				
1. Will there be land acquisition?		No		
2. Is the site for land acquisition known?				**Not applicable**
3. Is the ownership status and current usage of land to be acquired known?				**Not applicable**
4. Will easement be utilized within an existing Right of Way (ROW)?				**Not applicable**
5. Will there be loss of shelter and residential land due to land acquisition?				**Not applicable**
6. Will there be loss of agricultural and other productive assets due to land acquisition?				**Not applicable**
7. Will there be losses of crops, trees, and fixed assets due to land acquisition?				**Not applicable**
8. Will there be loss of businesses or enterprises due to land acquisition?				**Not applicable**
9. Will there be loss of income sources and means of livelihoods due to land acquisition?				**Not applicable**
Involuntary restrictions on land use or on access to legally designated parks and protected areas				
10. Will people lose access to natural resources, communal facilities and services?		No		
11. If land use is changed, will it have an adverse impact on social and economic activities?		No		Madrassa Institutional and religious status will not change
12. Will access to land and resources owned communally or by the state be restricted?		No		
Information on Displaced Persons:				**Not Applicable**
Any estimate of the likely number of persons that will be displaced by the Project? [--] No [--] Yes If yes, approximately how many? _____				
Are any of them poor, female-heads of households, or vulnerable to poverty risks? [--] No [--] Yes				
Are any displaced persons from indigenous or ethnic minority groups? [--] No [--] Yes				

Note: The project team may attach additional information on the project, as necessary.

APPENDIX B

Coastal Towns Environmental Infrastructure Project (CTEIP)

(ADB Loan No._____)

Local Government Engineering Department

(Ministry of Local Government, Rural Development and Cooperatives)

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Batch 1: Stage I CTEIP Programme

Contract Package No.: MAT/CS/01:

Construction of Multipurpose Cyclone Shelter at Momenia Dakhil Madrassa (Ward 1), Mathbaria Pourashava, District: Pirojpur

August 2014

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List of Tables:

1. Environmental Management Plan

1.1 Management Plans

1 Conservation, protection and preservation of environment have always been a primary consideration in Bangladesh ethos, culture and traditions. In order to meet people's requirement during storms the construction of shelter is planned which affects the environment of sub-project area. Management of Environment by provision of necessary safeguards in planning of the project itself can lead to reduction of adverse impacts due to project. This section spells out the set of measures to be undertaken during project construction to reduce, or mitigate, or bring down, the adverse environmental impacts to acceptable levels based on the proposed Environmental Management Plan. Mitigation measures are actions that are intended to avoid, alleviate or reduce environmental impacts on the environment. The most reliable way to ensure that the plan will be integrated into the overall project planning and implementation is to establish the plan as a component of the project. This will ensure that it receives funding and supervision along with the other investment components. For optimal integration of EMP into the project, there should be investment links for:

- Funding,
- Management and Training, and
- Monitoring.

2 The purpose of the first link is to ensure that proposed actions are adequately financed. The second link helps in embedding training, technical assistance, staffing and other institutional strengthening items in the mitigation measures to implement the overall management plan. The third link provides a critical path for implementation and enables sponsors and the funding agency to evaluate the success of mitigation measures as part of project supervision, and as a means to improve future projects. For every issue discussed for above measures, the implementing agency as well as staffing, equipment, phasing and budgeting have been presented as far as possible. All required funds will be channelled through the executing agency. The mitigation measures are set forth to maximise positive impacts and minimise negative impacts as a result of the proposed activity. The following general mitigation measures will be applied:

- Cut material shall be temporarily stored along the side to prevent eroding into the streams and it will be reused in the site levelling activities.
- Stabilization of quarry and borrow areas by replanting the trees to minimize erosion;
- Works are recommended to be implemented during the dry season;
- Excavated areas should be restored immediately after excavation to limit the exposure of loose soils, thus minimizing soil erosion;
- Land clearing should be limited to site only;
- Provision of water supply and sanitation facilities in construction camps; Provision of covered trucks from top carrying earth to avoid air dust pollution;
- Disposal of solid waste generated from construction activities as construction spoils and domestic solid waste from house activities; and
- Tree plantation on side of shelter wherever possible to reduce erosion.

1.2 Proposed Mitigation Measures in Different Project Phases

3 Based on project description, Environmental Baseline Data and Environmental Impacts, the Environmental Management and Monitoring Plan is given in **Table 1**, inclusive of the detailed Environmental Fields versus the related impacts, mitigation measures for negative impacts, various responsibilities, monitoring indicators, frequency of such monitoring and related costs.

The Environmental Management Plan is to be applied and closely monitored, according to the staed frequency, for the Pre-construction; Construction; and Operation and Maintenance phases of implementation of the Sub-project.

Ref. No.	**Field:** Impacts	Mitigation Measures	Implementing Agency/ Responsibility	**Monitoring Frequency:** Monitoring Indicators	Cost (TK)
1.0	**During Pre-Construction Phase**				
1.1	**Landscape**: Adverse effects on aesthetics	• Development of the designs for the shelter must be compatible with the surrounding environment.	Executive agency/ Consultant/ contractor	**During Design Stage**: Incorporated design considerations	Consultancy Cost and EMP
1.2	**Consents; NOC's**: Failure to obtain necessary consents, permits, NOC's can result in design revisions and/or stoppage of the Works	• Obtain all necessary consents, clearances, permits, NOC's prior to start of the Works; • Acknowledge in writing and provide report on compliance all obtained on consents, clearances, permits, NOC's; • Include in detailed design drawings and documents all conditions and provisions if necessary.	PMU/PIU, DDS Designer, PMSC	**During Design Stage**: Incorporated design considerations	No costs required as mitigated measures put in place during Design phase
1.3	**Existing utilities**:: Disruption of services	• Identify and include locations and operators of theses utilities in detailed design documents to prevent unnecessary disruption of services during construction activities; • Require construction contractors to prepare contingency plan to include actions to be done in case of unintentional interruption of services; • Require construction contractors to prepare spoils management plan: **i) Spoils Information**: Materials Type; Potential Contamination; Expected Volume and Sources; Spoil Classification **ii) Spoils Management**: Transportation of Spoil; Storage of Spoil; Contamination of Spoil; Approved Reuse and/or Disposal Sites **iii) Records** of Reuse and/or Disposal	PMU/PIU, DDS Designer, PMSC	**During Design Stage**: • List of affected utilities and operators in Bid Document; • Required contingency plans for service interruption; • Follow Spoils Management Plan.	No costs required as mitigated measures put in place during Design phase
1.4	**Construction work camps**,: Hhot mix plants, stockpile areas, storage disposal areas: Disruption to traffic flow and sensitive receptors	• Determine locations prior to award of construction contracts;	PMU/PIU, DDS Designer, PMSC	**During Design Stage**: • List of selected sites; • Indentified sources of materials; • Written consent by landowners for disposal to agricultural land.	No costs required as mitigated measures put in place during Design phase
1.5	**Sources of Materials**: Extraction of material can disrupt natural land contours and vegetation	• Prepare list of approved quarry sites and sources of materials.	PMU/PIU, DDS Designer, PMSC	**During Design Stage**: • List of approved quarries and sources of materials;	No costs required as mitigated measures put in

Ref. No.	Field: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	Monitoring Frequency: Monitoring Indicators	Cost (TK)
	resulting in accelerated erosion, disturbance in natural drainage, patterns, ponding and water logging and water pollution			• Bid document to include appropriate clauses; • Bid document to include clause for verification of suitable sources	place during Design phase
1.6	**EMP Implementation Training**: Negative 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 labour laws, and applicable environmental laws.	Contractor with assistance of PIU, ICCDC and PMSC	**During Design Stage and during mobilization of workers to site**: • Safeguard compliance protocols in place; • Prove of training completion at sites; • Posting of EMP at work sites.	Costs: PMU/PIU Contractor
2.0	**During Construction Phase**				
2.1	**Physical Characteristics**				
2.1.1	**Topography, landforms geology and soils**: Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of construction materials may cause localized changes in topography and landforms. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	Utilize readily available sources of materials. If contractor procures materials from existing burrow pits and quarries, ensure these conform to all relevant regulatory requirements. Borrow areas and quarries (If these are being opened up exclusively for the subproject) must comply with environmental requirements, as applicable. No activity will be allowed until formal agreement is signed between PIU, landowner and contractor.	Executive agency/ consultant/ contractor	**Monthly by PIU**: • Records of sources of materials.	Mitigation measures: Contract Cost
2.1.2	**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	- Prepare and implement a spoils management plan; - Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with 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	Contractor	**Monthly by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage)**: • Areas for stockpiles, storage of fuels and lubricants and waste materials; • Numbers of silt traps installed along trenches leading to water bodies; • Records of surface water quality	Mitigation measures: Contract Cost

Ref. No.	**Field**: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	**Monitoring Frequency**: Monitoring Indicators	Cost (TK)
	area and reversible by mitigation measures.	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.		inspection; • Effectiveness of water management measures with no visible degradation due to construction activities.	
2.1.3	**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, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons) which will affect people who live and work near the sites. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Damp down exposed soil and any sand stockpiled on site by spraying with water 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.	Contractor	**Monthly Inspection by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage)**: • Location of stockpiles; • Numbers of complaints from sensitive receptors; • Heavy equipment and Heavy equipment and pollution control devices; • Certification that vehicles are compliant with air quality standards; • Maintain records.	Mitigation measures: Contract Cost
2.1.4	**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,	- 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 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.	Contractor	**Monthly visual Inspection by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage):** • Numbers of complaints from sensitive receptors;	Mitigation measures: Contract Cost

Ref. No.	**Field**: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	**Monitoring Frequency**: Monitoring Indicators	Cost (TK)
	materials, and people. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- 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.		• Use of silencers in noise producing equipment; • Use of sound barriers; • Equivalent allowable day and night time noise levels maintained; • Maintain records.	
2.1.5	**Aesthetics**: The construction activities do not anticipate any cutting of trees but will produce excess excavated earth (spoils), excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Prepare the Debris Disposal Plan - Remove all construction and demolition wastes on a daily basis. - Coordinate with 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.	Contractor/ District Authority	**Monthly visual Inspection by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage):** • Numbers of complaints from sensitive receptors; • Work site clear of, hazardous waste, oil/fuel, ; • Work site clear of any wastes collected materials from drainages, unutilized materials, debris; • Transport routes to and fro site, within site, cleared of any dust/mud; • Maintain records.	Mitigation measures: Contract Cost

Ref. No.	Field: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	Monitoring Frequency: Monitoring Indicators	Cost (TK)
		- - 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.			
2.2	**Biological Characteristics**				
2.2.1	**Biodiversity**: Activities being located in the built-up area of Pourashava. There are no protected areas in or around subproject sites, and no known areas of ecological interest. There are no trees at the site that need to be removed.	- Check if tree-cutting will be required during detailed design stage. No trees, shrubs, or groundcover may be removed or vegetation stripped without the prior permission of the environment management specialist. - 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.	Contractor	**Monthly Inspection by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage):** **OR** **More frequently as the need arises:** • PMU and PIU to report in writing the number of trees cut and planted; • If tree cutting required, to be determined during Design stage; • Numbers of complaints from sensitive receptors on disturbance of vegetation, poaching, fishing etc.	Mitigation measures: Contract Cost
2.3	**Socioeconomic Characteristics**				
2.3.1	**Existing provisions for pedestrians and other forms of transport**: Road closure is not anticipated. Hauling of construction materials and operation of equipment on- site may cause traffic problems. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- 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	Contractor	**Monthly Inspection by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage):** **OR** **More frequently as the need arises:** • Traffic route during construction works including number of permanent signages barricades and flagmen on worksite as per Traffic Management Plan; • Numbers of complaints from sensitive receptors; • Number of signages placed at	Mitigation measures: Contract Cost

Ref. No.	**Field**: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	**Monitoring Frequency**: Monitoring Indicators	Cost (TK)
		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 clientele. - Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.		project location; • Number of walkways signages, and metal sheets placed at project at project location.	
2.3.2	**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-months construction stage. This can result to generation of contractual employment and increase in local revenue.	Employ at least 50% of labour 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. Enforcement Gender protocol according to the Gender Action Plan.	Contractor	**Monthly Inspection by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage):** **OR** **More frequently as the need arises:** • Employment records; • Records of sources of materials; • Records of compliance to Bangladesh Labour law and other applicable standards; • Utilities contingency plan; • Numbers of complaints from sensitive receptors.	Mitigation measures: Contract Cost
2.3.3	**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 the Pourashava where there are a variety of human activities, will result in impacts to the sensitive receptors such	- 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 the Pourashava (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	Contractor	**Monthly Inspection by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage):** **OR** **More frequently as the need arises:** • Utilities contingency plan; • Numbers of complaints from sensitive receptors.	Mitigation measures: Contract Cost

Ref. No.	**Field**: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	**Monitoring Frequency**: Monitoring Indicators	Cost (TK)
	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.	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.			
2.3.4	**Community Health and Safety**: Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	- Contractor's activities and movement of staff will be restricted to designated construction areas. - Locations of hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject) shall be shall be located at least 100 m away from the nearest dwelling preferably in the downwind direction. - Consult with the 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.[1] - 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	Contractor	**Monthly Inspection by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage):** **OR** **More frequently as the need arises:** • Number of permanent signages, barricades and flagmen on worksite as per Traffic Management Plan; • Numbers of complaints from sensitive receptors; • Number of walkways signages, and metal sheets placed at project at project location; • Agreement between landowner and contractors in case of using private lands as work camps, storage areas etc.	Mitigation measures: Contract Cost

[1] 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.

Ref. No.	**Field**: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	**Monitoring Frequency**: Monitoring Indicators	Cost (TK)
		aware of the following general rules: - 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.			
2.3.5	**Worker's health and safety**: There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in urban areas. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.	- Comply with requirements of Government of Bangladesh Labour 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 behaviour 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,	Contractor	**DAILY INSPECTION BY CONTRACTOR'S SUPERVISOR** **Monthly Inspection by PIU and PMSC (frequency and sampling sites to be finalized during design stage and agreed during construction stage):** **OR** **More frequently as the need arises:** • Site-specific H&S Plan;	Mitigation measures: Contract Cost

Ref. No.	Field: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	Monitoring Frequency: Monitoring Indicators	Cost (TK)
		footwear, gloves, goggles and masks) at all times; (iii) providing H&S training [2] 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.		• 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; • GAP compliance record; • Signages for storage and disposal areas; • Condition of hygiene and sanitation facilities for workers.	
2.4	**Historical, Cultural and Archaeological Characteristics**				
2.4.1	**Physical and cultural heritage**: Construction works will not be in built-up	- 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	Contractor	**Monthly Inspection by PIU and PMSC**:	Mitigation measures:

[2] Key areas that are to be covered during training shall be in compliance with the Health and Safety Manual according to site specific requirements and shall be conducted by the PMSC:

Ref. No.	Field: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	Monitoring Frequency: Monitoring Indicators	Cost (TK)
	areas of the Pourashava but risk for chance finds maybe low.	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.		• Records of chance finds.	Contract Cost
3.0	**Others**				
3.1	**Submission of EMP implementation Report** Unsatisfactory compliance to EMP	- Appointment of Supervisor to ensure EMP implementation; - Timely submission of monitoring reports including pictures.	Contractor	**Monthly monitoring report to be submitted by PIU and PMSC** **PMU to submit semi-annual monitoring report to ADB**: • Availability and competency of appointed Supervisor; • Monthly Report.	Mitigation measures: Contract Cost
4.0	**Post Construction Activities**				
4.1	**Post-construction clean-up**: Damage due to debris, spoils, excess construction materials.	- Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; - All excavated roads shall be reinstated to original condition; - All disrupted utilities restored; - All affected structures rehabilitated/compensated; - The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up; - All hardened surfaces within the construction camp area shall be ripped; - All imported materials removed and the area shall be top soiled and regressed using guidelines set out in the re-vegetation specification that forms part of this document; - The contractor must arrange the cancellation of all temporary services; - Request PMU/PMSC to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.	Contractor	**Prior to turn-over of completed Works to the Pourashava**: • PMU/PMSC 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 cleanup is satisfactory.	Mitigation measures: Contract Cost

Ref. No.	**Field**: Impacts	Mitigation Measures	Implementing Agency/ Responsibility	**Monitoring Frequency**: Monitoring Indicators	Cost (TK)
5.0	**Operation and Maintenance Phase**				
5.1	**Physical Characteristics**				
5.1.1	**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 the 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.	Contractor and Pourashava	**During repair works**: • No complaints from sensitive receptors.	Included in O&M Costs
5.2	Socioeconomic Characteristics				
5.2.1	**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 Labour 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.	Pourashava	**During repair works**: • No complaints from sensitive receptors • No complaints from workers related to O&M activities; • Zero accidents.	Included in O&M Costs

1.3 Specific Issues and Management Plan

1.3.1 Soil Erosion due to Land Clearing

4 The site will need excavation for pillars. This area shall be treated through environmental measures. Mitigation measures include careful planning and timing of cut-and fill operations and re-vegetation. In general, construction works shall be stopped during monsoon season. Cost involved to prevent erosion has been included in the actual construction cost.

1.3.2 Brick Kiln, Quarries and Crushers

5 It is appropriate to give consideration to the environmental implications in selection of brick kiln, quarry sources since poorly run operations create dust problems, contribute noise pollution, ignore safety of their employees, or cause the loss of natural resources. To ensure adequate mitigation of potential adverse impacts, only licensed quarrying, brick kiln and crushers operations are to be used for material sources. Efforts should be made to use material commonly found near the construction site.

1.3.3 Water Quality

6 The proposed subproject will not alter the existing water quality on a permanent basis, but during the construction phase extent of surface runoff and silt load may increase giving rise to a negative impact on receiving natural bodies especially the marshy, streams, and rivers. The water will be consumed/ utilized and not likely to pose serious water pollution problems. However, additional water supply provision needs to be made in water supply system. To prevent the water pollution from the construction site following measures will be taken:

- Silt fencing to prevent sediments from the construction site into the nearby water resources;
- Sedimentation chamber to remove the sediments from road side runoff to avoid entry in nearby water courses;
- Oil interceptor for the removal of oil and grease from point sources during construction as well as during operation.

1.3.4 Water Supply and Sanitation

7 Water supply will be needed both for the labour camp and for construction activities. In addition public health facilities, such as sanitation and toilets will be required in contractor's camp. Water supply provision may be made at 70 litres of water per day per person for such locations. Water should be treated well before use and should be brought up to drinking water standards. It is recommended that water should be treated by conventional water treatment process like sedimentation, filtration and chlorination so as to render it safe for drinking and other purposes. This will help in reduction of water borne diseases among the labour force. Collection and safe disposal of human wastes are among the most critical problems of environmental health. Individual sewerage disposal system by way of septic tank could be adopted for sewage from contractor's Labour Camp. The capacities for septic tanks serving individual dwellings are indicated in **Table 2**. It will be the responsibility of the contractor to provide proper water supply and sanitation facilities.

Table 2: Capacity of Septic Tanks for Individual Dwellings

S. No.	Max persons served	Liquid capacity of tank (gallons)	Recommended dimensions (m)			
			Width	Length	Liquid depth	Total depth
1.	8	1100	1.22	2.60	1.37	1.68
2.	10	1300	1.22	3.05	1.37	1.68

Source: Consultants Computations

1.3.5 Air Quality

8 During construction period the impact on air quality is mainly due to the material movement. However air quality over a small area is affected, though, not in significant levels. There is an increase in the dust levels all along the haul roads, the borrow areas and dumping areas. The emissions from the construction machinery are the source of ambient air pollution during the actual construction. Continuous use of generators, bulldozers, rollers, crane, trucks etc. give rise to the ambient levels. The mitigation measures are as follows:

- In order to curb the increased fugitive dust emissions in the area due to vehicular movement and raw material transport, provisions should be made for sprinkling of water on the haul roads in the area. Sprinkling of water should be carried out at least once a day on a regular basis during the entire construction period. Special attention should be given to all the haul roads passing through residential areas in the region. Daily inspection at haul roads and at construction site should be carried out to ensure removal of construction debris to the landfill sites.
- Covered trucks shall be used for transportation of materials prone to fugitive dust emissions. Additionally materials which may collect on the horizontal surfaces of these trucks during loading should be removed before transportation.
- Idling of delivery trucks or other equipments should not be permitted when not in active use.
- The emission levels from diesel vehicles being used should be checked on monthly basis and brought to the required levels of emission standards.
- Proper care should be taken for storage of furnace oil, diesel, petrol etc.
- Work schedule and the operation time of construction machinery should be suitably modified to exercise a control on ambient air quality standards.
- To ensure the efficacy of the mitigation measures suggested, air quality monitoring shall be carried out as per environmental monitoring plan;
- As soon as the construction activity is over the surplus earth should be utilized to fill up the low lying areas, if any.

1.3.6 Noise Quality

9 Noise quality is also important for the construction phase. During the construction phase, there would be an increase in ambient noise levels due to construction machinery operation and movement of construction vehicles. Following mitigation measures may be adopted:

- Construction yard shall be established at least 200 m away from any residential area. This will allow the noise to attenuate.
- Special acoustic enclosures should be provided for individual noise generating equipments. Enclosures may be provided by way of noise shields, which can, be either brick masonry structure or any other physical barrier which is effective in adequate attenuation of noise levels. A 3 m structure made up of brick and mud with internal plastering and of non-reflecting surface will be very effective in this regard.
- Noise measurement should be conducted during construction to assess the prevailing noise levels. Earplugs should be provided to those workers who will be working very close to noise generating construction machinery.
- The exposure of workers to high noise levels especially, near the construction site needs to be minimized during construction period. This could be achieved by: Job rotation, Protective devices, and Noise barriers. Stationery construction equipment should not be located near human habitation in particular schools, hospitals and institutions.

- Noise levels from loading and unloading can be reduced by usage of various types of cranes and by placing materials on sand or on the beds of sandy bags.
- Use of noisy construction equipment should not be permitted during night hours near residential areas or sensitive areas.

1.3.7 Health, Safety and Fuel Provisions

10 The Project will have no significant impact on disease transmission or other health factors. Positive health impacts will include improved access to health care facilities and quicker response time in emergency situations. No additional mitigation actions related to health are warranted. Mitigation related to potential safety impacts will include improved signage. The construction camps will be fenced off using chain-link fencing to prevent unauthorized entry. Chain link is commercially available in rolls and can be raised on site along the perimeter of the construction camps, vehicle-parking areas and any other areas where temporary enclosure is required. The chain-link fencing will ensure that visual continuity is intact. The contractor shall provide the cooking gas in the contractor camp to reduce pressure on the cutting of trees from the area. However, it will be appropriate to employ local labour on site. This will also decrease the fuel requirements in the camps.

1.3.8 Construction Spoil & Debris Disposal

11 During construction about 10% of gravel, sand, bricks and cement is left as construction spoils. If it is not disposed properly it may become a place of mosquito breeding. Hence it is advocated that construction spoils shall be disposed off at a site approved by law.

1.4 Environmental Management Plan Implementation

12 Institutional strengthening will be undertaken to achieve the goals of the project including sound environmental management. This EMP will be implemented by involving directly or indirectly in the project under the following sub-headings:

- Organization and Staffing;
- Environmental Training;
- Monitoring and Reporting; and
- Record-keeping.

1.4.1 Organization and Staffing

13 The **Asian Development Bank** is the financier of the project including monitoring and evaluation of the implementation of the EMP within the budget of CTEIP**.** The main role of the Bank is to ensure that compliance is achieved as per the requirements of the EMP. **Ministry of Environment and Forest (MoEF)** will process the environmental clearance. MoEF communicates the clearance to the project developer (LGED). The project developer has their own monitoring as per requirement of environmental clearance conditions. The role of the LGED is to implement mitigation measures, building the capacity of other actors in PMU, and in environmental management. The PMU Project Director will be the focal point for training and will liaise with the MoEF. The capacity building activities should be through Institutional Capacity and Community Development Consultant (ICCDC). The role of PMU will be to ensure that the infrastructures are constructed according to the specifications of international technical and safety standards. PMU will designate one of its officers to act as Environmental Safety Officer (EO), to formally address environmental and social issues on a routine basis, who will have an oversight of environmental aspects of the construction contracts, including the enforcement of all monitoring provisions, the locations of construction and labour camps, etc. Before the commencement of construction, the designated EO will receive training in the environmental issues associated with road construction and maintenance projects. The designated EO will further organise the training. The main duties of the designated EO will include:

- Review of bids to ensure their adherence to the environmental specifications and the requirements of the Environmental Management Plan (EMP).
- Collection and dissemination of relevant environmental documents including amendments to environmental protection acts and rules.

- Co-ordination with government departments on environmental issues and obtaining the necessary clearances from the regulatory authorities.
- Monitoring the environmental aspects during construction to ensure that the environmental requirements of the contract and the mitigation measures proposed in the EMP are implemented.
- Supervising contractors and preparation of environmental input to the quarterly progress report.

1.4.2 Environmental and Social Training

14 The training program will cover measurement techniques in the field, tools for the prediction of pollutants, reforestation methods and procedures, conservation of water bodies including marshy lands, etc. ICCDC will organize such training. The need for additional and specialised training will be examined and appropriate training will be undertaken as required. Training of personnel to be deployed on the proposed project during construction and operation, with regard to environmental requirements should be the integral part of the planning. Apart from the training, such programme should include guidelines for safety, methods of disaster prevention, action required in case of emergency, fire protection, environmental risk analysis etc. Capacity to quantitatively monitor water sediments or turbidity (by suitable portable test equipment) and noise is always advantageous, but monitoring will primarily involve ensuring that actions taken are in accordance with contract and specification clauses, and specified mitigation measures. Some awareness training will be provided to the contractor personnel to ensure that this occurs effectively.

1.4.3 Monitoring and Reporting Procedures

15 The baseline data should be collected before the project begins. This will help in monitoring and controlling environmental impacts caused by the development of the project. The project in charge and designated EO will visually assess contractor's practices and, if high pollutant levels are suspected, will direct the contractor to private sector laboratories to verify measurements on a routine basis. Photographic records will be established to provide useful environmental monitoring tools. A full record will be kept as part of normal contract monitoring. All applicable regulations need to be enforced by the Project In charge and designated EO. Under the Environment Clearance Rule, water quality discharge standards, air pollution emission standards and noise standards have been established. It is a legal obligation of the Contractor that any discharges from the work sites meet these standards. Steps will be taken by the designated EO to ensure that regular monitoring of water quality parameters such as pH, suspended solids, turbidity, Magnesium, oil and grease be carried out as provided in the contract. Regular monitoring of noise and dust will also be carried out as provided in the environmental monitoring program.

1.4.4 Record Keeping

16 Monitoring form should be devised for documentation, analysis and record of parameter. The form should focus attention on environmental issues and provide feedback for the future stages of the work. Mitigation measures adopted in final design will be explicitly under the bill of quantities (BOQ) so that performance and completion is readily documented. Daily project diaries would record environmental problems (spills, dust, noise, etc.) as well as safety incidents and will be retained as part of accepted modern contract management and summarized in Quarterly Environmental Reports.

1.4.5 Implementation Schedule

17 The most important aspects of the implementation are the appointment of the Environmental Officer to oversee the implementation of the environmental mitigation measures incorporated in the design and contract specifications. Development and delivery of an environmental training program for selected staff responsible for overseeing the construction contracts can commence immediately thereafter. This will be an ongoing process. Contracts will be awarded over a period of time stretching over many months. Schedule for Implementation of

Environmental Management Plan (EMP) is given in **Table 3**. Bill of quantity and cost of EMP is presented in **Table 4**.

Table 3: Schedule for Implementation of EMP

S. No.	Activity	Frequency and/or Implementation Date	Responsibility
1.	Appoint Environmental Officer	Date to be determined	LGED
2.	Initiate First Training Program	Date to be determined	PMU/ ICCDC
3.	Ongoing Training	As required	ICCDC
4.	Check Monitoring	Quarterly	PIU
5.	Prepare Environmental Reports	Quarterly	PIU/ Environmental officer
6.	Construction Supervision	During Construction	PMSC

Source: Consultant Proposal

Table 4: Bill of Quantities and Cost Estimates for Environmental Management Plan

S.No	Impact Description	Unit	Quantity	Frequency	Rate	Total (TK)
A	**Mitigation Measures**					
1	Water sprayer/ Watering for dust suppression	km	1	As and When Required	10,000	10,000
2	Sewage, Solid waste, disposal during construction (Septic Tank & Soak pit) 30 people	Number	1	One set	124,793	124,793
	Sub Total of A					**134,793**

1.5 Labour Standard in Construction Management

18 The labour standards shall be maintained as per law of the land. However the ILO convention 138 and 182 means that child under age of 18 is prohibited for any labour works. All forms of bonded labour as per ILO convention 29 and 105 will not be permitted. Any forced labour in the form of bonded labour shall not be allowed.

19 The contractor is expected to hire workers on the basis of skill and ability of work. There must be equal treatment and opportunity (ILO Conventions 100, 111 and ILO code of practices for HIV / AIDS 85 for all who seek employment. No discrimination based on race, caste, origin, region, religion, disability, gender is permitted.

20 The contractor shall comply with the applicable minimum age labour laws and other labour laws and requirements of (including applicable treaties, which have been ratified by) the Government of Bangladesh and applicable ADB policies regarding hazardous forms of child labour. The ADB will review compliance with such labour laws, requirements and ADB policies.

2. Environmental Monitoring Program

2.1 Environmental Monitoring

21 Environmental monitoring programme is a vital process of any environmental management action plan of the development project. This helps in signalling the potential problems resulting from the proposed project and will allow for prompt implementation of effective corrective measures. The environmental monitoring will be required during construction and operational phases. The following parameters shall be monitored:

- Water Quality,
- Air Quality,
- Noise levels, and
- Soil conservation.

22 The parameters have to be monitored during construction phases. A matrix has been developed for monitoring of impacts to facilitate the monitoring frame work which includes the following:

- Parameters to be monitored,
- Indicators,
- Method used for verification,
- Frequency of monitoring,
- Responsibility, and
- Costs involved.

23 **Table 5** summarizes the above monitoring program. The bills of quantities (BOQ) have been prepared for environmental monitoring plans along with costs, presented in **Table 6**.

2.2 Total Environmental Monitoring Costs

24 The environmental monitoring cost is estimated as **Tk. 180,000** while environmental management cost is **Tk. 134,793** (excluding those included in the cost of shelter design)**.** The total cost of Environmental Management and Monitoring Plan is **Tk. 314,793** which is **about 1.01%** of the subproject cost. The total cost of the environmental mitigation measures is presented in **Table 7**.

Table 5: Environmental Monitoring Costs

S.No	Impact	Parameter to be Monitored	Indicator	Method	Frequency	Responsibility	Cost Estimates (Tk)
1	Grievances Mechanism	Grievances	Issue Based	Discussion	On monthly Basis	Grievances Officer (Part Time)	10,000
2	Water Pollution	pH, DO, As, TSS, Turbidity, Coli form Count	Test Results	Laboratory Analysis as per Standard Methods	Once in Two months	Contractor/ Laboratory	36,000
3	Air Pollution	Dust	Test Results		Once in Two months	Contractor/ Laboratory	72,000
4	Noise Pollution	Noise Levels	Test Results		Once in Three months	Contractor/ Laboratory	48,000
5	Soil Pollution	Oil & Grease, Organic Matter,	Test Results		Once in Three months	Contractor/ Laboratory	24,000
6	Training	Training organized	Status	Feedback	As per BOQ	ICCDC	Included in ICCDC costs

Table 6: Bill of Quantities (BOQ) and Cost Estimates

Sl.No	Impact Description	Unit	Quantity	Frequency	Rate	Total (Tk)
	Environmental Monitoring					
1	Air Quality (SPM, RPM, and CO) During Construction	Samples	(1 location x 6 per year = 6 samples)	Once in two Months, during construction	12,000	72,000
2	Water Quality Monitoring during pre-construction, construction and operation phases	Samples	1 locations (Total 6 samples)	1 samples/year, before construction, 5 during construction (1 years)	6,000	36,000
3	Noise Levels	Samples	(4 locations x 6 times x one years = 24 samples)	3 locations during construction for a day and at equipment yards, as and when necessary.	2,000	48,000
4	Soil Monitoring (Organic Matter, Nitrogen, Phosphate, and Oils and Greases)	Samples	6 samples	As an when soil is expected polluted	4,000	24,000
	Sub-Total of A					**180,000**
	Total					**180,000**

Table 7: Total Cost of Environmental Mitigation/Enhancement Works

Sl. No	Description of Item with Measurement	Quantity	Unit	Rate (Tk.)	Amount (TK.)
1.	(EM 01) Overall environmental management in addition to compliance to the clauses PCC 2.3 (j) and Appendix-A (IEE) to the entire satisfaction of Engineer In-Charge. a) Temporary Campsite waste treatment and disposal facilities including prevention of waste/effluent spillage/leakage, water pollution, etc., to the entire satisfaction of Engineer In-Charge.	1,000	each	124,793.00	124,793.00
2.	(EM 02) Overall environmental management in addition to compliance to the clauses PCC 2.3 (j) and Appendix-A (IEE) to the entire satisfaction of Engineer In-Charge. b) Dust suppression measures to the entire satisfaction of Engineer In-Charge	1,000	each	10,000.00	10.000.00
3.	(EM 03) Overall environmental management in addition to compliance to the clauses PCC (j) and Appendix-A (IEE) to the entire satisfaction of Engineer In-Charge. c) Environmental Monitoring	1.000	each	180,000.00	180,000.00
Total Environmental Mitigation/Enhancement Cost of the Package (Tk.)					**314,793.00**