

Initial Environmental Examination

**Project No. 52174-001
June 2019**

**Emergency Assistance Project
ADB Project 52174-001 | Grant 0582-BAN**

BANGLADESH: Emergency Assistance Project - Upgradation of existing 8.8 km link road connecting Cox's Bazar - Teknaf and Marine Drive Highways, Ukhiya and Improvement of R & H Palongkhali Bazar - Chapotkhali Bazar Marine Drive Road by BC at Ch 00-9145m under Ukhiya Upazila, District - Cox's Bazar

Package No.: EAP/LGED/W5

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

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Emergency Assistance Project

ADB Project 52174-001 | Grant 0582-BAN | TA 9546 BAN

Initial Environmental Examination

Package

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Package No.: EAP/LGED/W5

Implementing Agency

Local Government Engineering Department (LGED)
Ministry of Local Government, Rural Development and Cooperatives (MLGRDC)

June 2019

BAN: EMERGENCY ASSISTANCE PROJECT

Output 04: Access road Improved

June 2019

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ABBREVIATIONS

ADB	ASIAN DEVELOPMENT BANK
BCCSAP	BANGLADESH CLIMATE CHANGE STRATEGY AND ACTION PLAN
BREB	BANGLADESH RURAL ELECTRIFICATION BOARD
DPHE	DEPARTMENT OF PUBLIC HEALTH ENGINEERING
EAP	EMERGENCY ASSISTANCE PROJECT
EARF	ENVIRONMENTAL ASSESSMENT AND REVIEW FRAMEWORK
ECA	ENVIRONMENTAL CONSERVATION ACT
ECC	ENVIRONMENTAL CLEARANCE CERTIFICATE
ECR	ENVIRONMENTAL CONSERVATION RULES
EIA	ENVIRONMENTAL IMPACT ASSESSMENT
EIA	ENVIRONMENTAL IMPACT ASSESSMENT
EMP	ENVIRONMENTAL MANAGEMENT PLAN
ETP	EFFLUENT TREATMENT PLANT
GOB	GOVERNMENT OF BANGLADESH
H&S	HEALTH AND SAFETY
IEE	INITIAL ENVIRONMENTAL EXAMINATION
LGED	LOCAL GOVERNMENT ENGINEERING CERTIFICATE
MPEMR	MINISTRY OF POWER, ENERGY AND MINERAL RESOURCES
NFP	NATIONAL FOREST POLICY
NOC	NO OBJECTION CERTIFICATE
RHD	ROADS AND HIGHWAYS
RRRC	THE REFUGEE RELIEF AND REPATRIATION COMMISSION
SPS	SAFEGUARDS POLICY STATEMENT
SSC	SITE CLEARANCE CERTIFICATE
TOR	TERMS OF REFERENCE
UN	UNITED NATIONS
US EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WB	WORLD BANK

Executive Summary

- I. The Government of Bangladesh (GoB) requested Asian Development Bank (ADB) for grant support to provide basic infrastructure and essential services to displaced persons. Given the humanitarian need and heart-wrenching condition of the displaced persons, ADB is providing grant financing of \$100 million for the first phase of the project. ADB support will be focused, selective, and well-targeted in the areas of (i) road access to and within camps; (ii) water and sanitation; (iii) energy supply; and (iv) disaster risk mitigation. It will build on the support provided by GoB and complement support provided by the United Nations (UN) agencies, the World Bank (WB) and other agencies. With the principle of putting people first, the project will seek to ease the vulnerabilities and risk of hunger, disease, and disaster. The project is known as Emergency Assistance Project (Project No. 52174-001, Grant 0582-BAN).
- II. This report is on the Environmental management Plan (EMP) of the Roads Package. The package title reads "BANGLADESH: Emergency Assistance Project – Upgradation of existing 8.8 km link road connecting Cox's Bazar - Teknaf and Marine Drive Highways, Ukhiya and Improvement of R & H Palongkhali Bazar - Chapotkhali Bazar Marine Drive Road by BC at Ch 00-9145m under Ukhiya Upazila, District - Cox's Bazar. The improved road will be mixture of RCC and BC with steel made culverts and roadside drains.
- III. This report fulfils the requirements of IEE under the provisions of the ECR. The IEE identifies potential environmental and social impacts and issues associated with undertaking the proposed project. It provides an outline of the potential positive and negative impacts as a result of the Project and proposes suitable mitigation and management measures.
- IV. The primary purpose of the IEE is to investigate and describe impacts of the proposed subproject to the existing environmental elements. Specifically, the study aims to predict the potential impacts of the project activities and recommend mitigation and abatement measures for impacts (in the pre-construction, construction and operational stages of development) that are considered potentially adverse to the surrounding environment.
- V. The environmental category of the sub-project is listed in Schedule – 1 of ECR. The upgradation of roads is relevant to extension and renovation of local roads and the subproject is listed in Schedule – 1 of ECR and falls in Orange B. The project has been categorized as B for environment under the ADB's Safeguards Policy Statement 2009 (SPS).
- VI. Ukhiya is located at Teknaf peninsula. Teknaf Peninsula is one of the longest sandy beach ecosystems (80 km) in the world. It represents a transitional ground for the fauna of the Indo-Himalayan and Indo-Malayan ecological sub-regions. Important habitats at the site include mangrove, mudflats, beaches and sand dunes, canals and lagoons and marine habitat. Mangrove forest occurs in Teknaf peninsula both as natural forest with planted stands and mostly distributed in the inter-tidal zone. The Teknaf peninsula mangroves supports the habitat of 161 different species of fish. Teknaf reserved forest is one of the oldest reserved forests in Bangladesh.
- VII. Measures of potential impact significance as part of the Project planning and assessment phase presented in this IEE have been determined using a risk based model. The risk based model is a two dimensional matrix of 'magnitude of impact' and 'likelihood'. Both are assigned score between 1 and 5 based on severity or probability and multiplied to obtain the 'risk band'.
- VIII. The score of 'Risk' ranges from 1 to 25. The score is classified in 3 classes. The explanation is given in **Table 10**. The score matrix for risk assessment has been used to identify the priority environmental impact and their mitigation plan.

Table 10 Two-dimensional risk assessment matrix

			MAGNITUDE OF IMPACT				
			Incidental	Minor	Moderate	Major	Severe/cats.
			Score: 1	Score: 2	Score: 3	Score: 4	Score: 5
LIKELIHOOD	Rare	Score: 1	1	2	3	4	5
	Unlikely	Score: 2	2	4	6	8	10
	Seldom	Score: 3	3	6	9	12	15
	Occasional	Score: 4	4	8	12	16	20
	likely	Score: 5	5	10	15	20	25

Anticipated Impacts

- IX. Land Acquisition and resettlement: In some sections the road will need to be widened through the hills. Therefore, hills on both sides needs to be cut down. However, the margin of cutting will be limited to maximum 1m and this will not affect any local residence
- X. Failure to obtain NOC: Failure to obtain necessary consents, permits, NOC's can result in design revisions and/or stoppage of the Works.
- XI. EMP Implementation Training: Often lack of proper training to implement the Environmental Management Plan (EMP) stipulated in the Bid document leads to mismanaged environmental safeguards. Therefore, EMP training for the contractors, workers and implementing agency is necessary before construction goes on-board. A training needs to be arranged before construction starts with all involved parties: contractor, workers and representatives from Implementing Agency to implement the EMP and therefore is necessary.
- XII. Traffic congestion issue: Courtbazar is a relatively busy junction due to presence of Government Primary School. Also, presence of couple of markets around the junction makes the road construction work a potential nuisance of traffic congestion. Additionally, the junction is located on a slope of the hill, which makes traffic slow. Often heavy loaded vehicles get stuck in the area and create traffic congestion.
- XIII. Soil Erosion: Clearing topsoil in proposed widening areas can lead to loss of nutrient and erosion particularly along the hill cut slopes and dust from unprotected storage sites. The erosion risk at hill cut slopes is possible. Gully erosion along the exposed track slope during rainy season may cause localized sedimentation congestions.
- XIV. Hydrology and Surface Water Quality: Near Courtbazar section and through the hills there are potential of erosion due to rainfall-runoff. Earthwork activities during construction at this point may result in drainage congestion. 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.
- XV. Water Pollution from sewage: Untreated sewage from the pit latrines could have the potential to enter surface water if not adequately designed and positioned to reflect the local hydrological and hydrogeological patterns. Periods of high rainfall could lead to the overflow of the pit and overland flow, or rapid through-flow of the effluent to surface water prior to its full digestion in the soil. Raw sewage can potentially impact surface water quality by promoting the growth of algae and delivering pathogens may be harmful to human and ecological receptors. Use of toxic materials such as solvents and vehicle maintenance fluid (oil, coolant) and diesel fuel may contaminate surface and

groundwater if these are disposed of directly into the ground or washed into the streams. Human waste from construction workers may also contaminate surface water and groundwater if there are no adequate sanitary facilities. In this case, there is not surface water or ground water sources nearby. Therefore, contamination of surface and ground water is unlikely.

Mitigation measures

- I. Vegetation clearance and replantation: Clearance of vegetation is expected. However, most vegetation to be cleared is bushy and ornamental. Highest efforts will be necessary to avoid tree cutting. If unavoidable at least two trees will be planted for every tree cut. Plantation of approx. 50 trees as enhancement measures. For erosion prevention along the hill slopes, three types of trees are suggested: i. various species of Fig (Bengali Name: Dumur; deep rooted, erosion preventive; located high and middle hills); ii. Indian gooseberry (Bengali Name: Amla; another deep and spreading rooted, erosion preventive; located in middle hills); iii. Fragrant Padri-Tree (Bengali Name: Parul; deep rooted, erosion preventive, located in top and middle hills). As each section of the construction work is completed, trees and understory vegetation must be planted, in order to help the cleared areas in an effort to attract some wildlife such as birds.
- II. Dust protection and soil erosion management: Raw materials should be purchased locally as long as quality of raw materials is not compromised. Create a local good water and soil conservation plan which shall not only take into account sufficiently the type, mode and intensity of water and soil loss caused by the Project construction, but integrate the general plan of the management area of Project operation period.
- III. Traffic congestion: Formulate traffic direction, diversion and temporary access plans, setting up sufficient traffic direction signs. Information shall be released through local newspapers and posters. Warning lights should be set up along the construction road sections, guiding the access of vehicles. Please follow the Generic Traffic Management Guideline stipulated in the IEE report. Also develop a site-specific traffic management plan.
- IV. Water pollution: Install silt protection curtain at the hill sides. All earthworks must to be conducted during dry season/dry spell to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Local Authority on designated disposal areas. Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low-lying areas. Monitor water quality according to the environmental management plan. Garbage disposal service to be provided, Concrete refuse reused or disposed of without habitat loss.
- V. The EMP implementation cost stands at BDT 398,000.
- VI. The PIUs, will monitor and measure the progress of EMP implementation. The monitoring activities will be corresponding with the project's risks and impacts and will be identified in the IEEs. Appendix 10 provides a content outline for monitoring reports. In addition to recording information of the work, deviation of work components from original scope, the PIUs will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome.

Grievance Redress Mechanism

- VII. The objective the grievance redress mechanism (GRM) is to resolve complaints as quickly as possible and at the local level through a process of conciliation; and, if that is not possible, to provide clear and transparent procedures for appeal. A well-defined grievance redress and resolution mechanism will be established to resolve grievances and complaints in a timely and satisfactory manner. All affected persons will be made fully aware of their rights, and the detailed grievance redress procedures will be publicized through an effective public information campaign.

Stakeholder Consultation

- VIII. 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 local population to determine their thoughts, opinions and feedback on the impact of the project. Attendees in the consultation meeting were apprised of the processes through which the project was to proceed toward implementation and the environmental impacts to arise out of such processes along with the steps to be taken toward mitigating the impacts. They were told about the impacts all of which could be easily mitigated.

Disclosure

- IX. The EAs/IAs will send a written endorsement to ADB for disclosing these documents on the ADB website. The PIUs will provide relevant safeguards information in a timely manner, in an accessible place and in a form and language understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used. Disclosure will follow ADB's Public Communication Policy, 2011.

1 Introduction

1.1 BACKGROUND

1 The Government of Bangladesh (GoB) requested Asian Development Bank (ADB) for grant support to provide basic infrastructure and essential services to displaced persons. Given the humanitarian need and heart-wrenching condition of the displaced persons, ADB is providing grant financing of \$100 million for the first phase of the project. ADB support will be focused, selective, and well-targeted in the areas of (i) road access to and within camps; (ii) water and sanitation; (iii) energy supply; and (iv) disaster risk mitigation. It will build on the support provided by GoB and complement support provided by the United Nations (UN) agencies, the World Bank (WB) and other agencies. With the principle of putting people first, the project will seek to ease the vulnerabilities and risk of hunger, disease, and disaster. The project is known as Emergency Assistance Project (Project No. 52174-001, Grant 0582-BAN).

2 The project will support the Government of Bangladesh in addressing the immediate and urgent needs of the displaced persons from Myanmar in Cox's bazar District, as identified by the United Nations (UN) in its Joint Response Plan (JRP) (displaced persons). The project will mainly support the improvement of water supply and sanitation, disaster risk management, sustainable energy supply, and access roads.

3 The impact of the project will be: Social recovery of affected communities accelerated in the sub-districts of Ukhiya and Teknaf. The outcome will be: Living conditions and resilience of affected communities improved. Four (04) outputs are expected from this project. They are:

- Output 01: Water supply and sanitation improved.
- Output 02: Disaster risk management strengthened
- Output 03: Energy sources provided
- Output 04: Access roads improved.

4 Output 1 is water supply and sanitation improved. The output included mini piped water supply, surface water reserves etc. Output 2 of the project is Disaster Risk Management Strengthened. The output includes constructing in and around the camp areas (a) multipurpose cyclone shelters with emergency access roads; (b) food distribution centers; (c) hill slope protection/toe walls to resist landslides; (d) storm water drainage network; and (f) other disaster risk management measures. Output 4 of the project include a) sub-district and Union roads to connect food storage centers, food distribution centers, field hospitals, primary health care centers, and primary education centers; (b) emergency access roads to the camp areas; (c) existing access roads to and within the camps and drainage systems; and (d) resurfacing the road from Cox's Bazar to Teknaf including improvement of critical sections such as market areas and culverts.

5 A location map of the proposed subproject is presented in **Figure 1**. The proposed sub-project of this report belongs to Output 04.

6 This report is on the Environmental management Plan (EMP) of the Roads Package. The package title reads "BANGLADESH: Emergency Assistance Project – Upgradation of existing 8.8 km link road connecting Cox's Bazar - Teknaf and Marine Drive Highways, Ukhiya and Improvement of R & H Palongkhali Bazar - Chapotkhali Bazar Marine Drive Road by BC at Ch 00-9145m under Ukhiya Upazila, District - Cox's Bazar. The improved road will be mixture of RCC and BC with steel made culverts and roadside drains.

7 The sub-project is designated as EAP/LGED/W5 and located in Ukhiya Upazila in Teknaf.

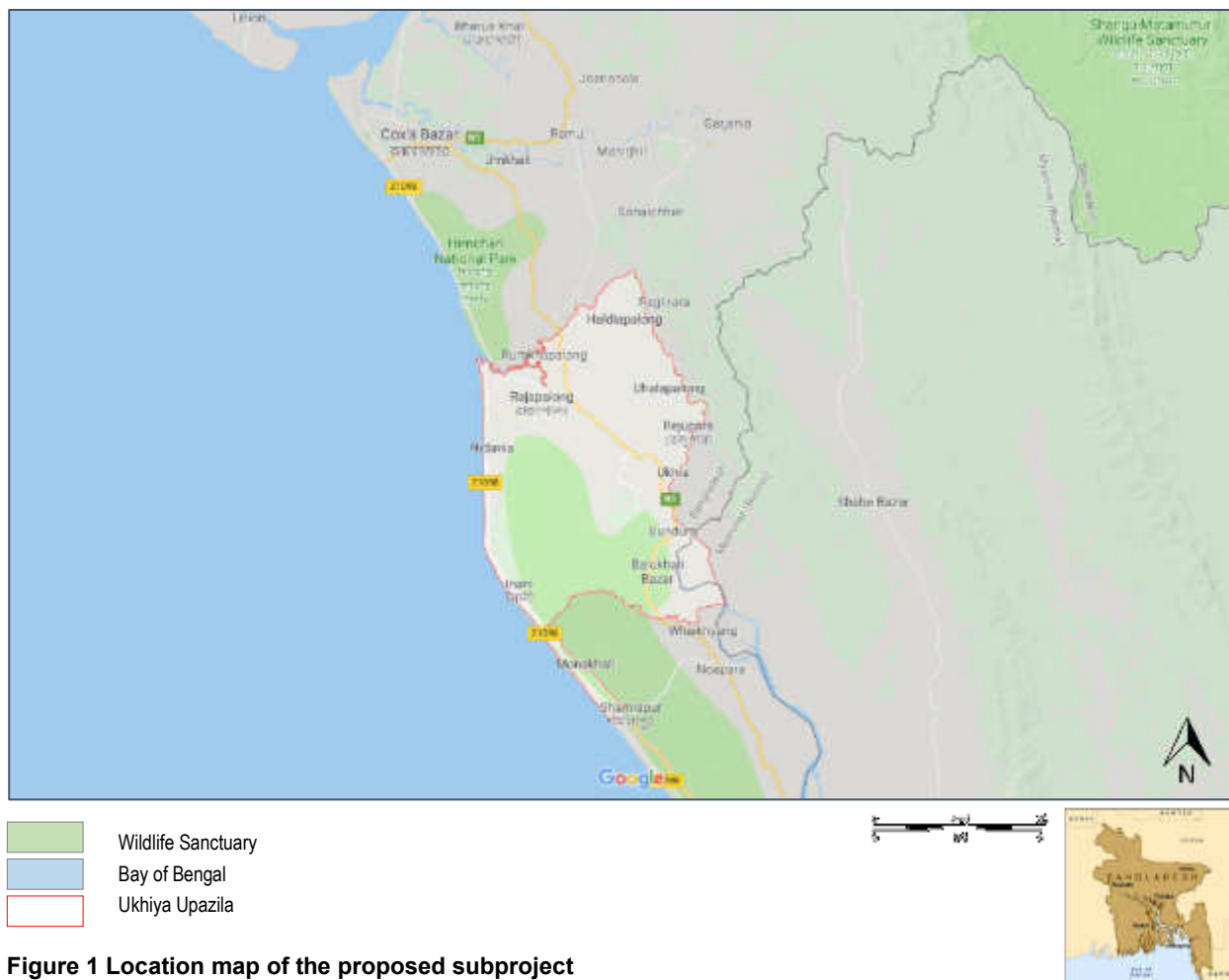


Figure 1 Location map of the proposed subproject

1.2 PURPOSE OF THE REPORT

8 The IEE has been prepared based on the Environmental Assessment and Review Framework (EARF) developed by the ADB and endorsed by Bangladesh Government. The IEE also follows the guidelines of the Department of Environment (DoE) as required by the Environmental Conservation Rule (ECR) 1997 (amended 2002) and in accordance with the Safeguard Policy Statement 2009 (SPS 2009) of ADB and will be disclosed in the websites of the ADB and the implementing agencies. This document shall serve as the base of environmental assessment of the proposed sub-project to be implemented by the executing agency and guideline for environmental management activities on-site.

1.3 SCOPE OF THIS REPORT

9 The Project require that any proposed development will require that the laws and regulations of Bangladesh are applied in full. The Project is then subject to approval under the Government of Bangladesh's Environment Conservation Act (1995) (ECA) and Environment Conservation Rules (1997).

10 The IEE report 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. Moreover, this IEE is to ensure, in line with ADB EARF, that the sub-project, in the entirety of its project cycle, will not deteriorate or interfere with the environmental sensitivity of the project area, but rather improve environmental quality.

11 This report fulfils the requirements of IEE under the provisions of the ECR. The IEE identifies potential environmental and social impacts and issues associated with undertaking the proposed project. It provides an outline of the potential positive and negative impacts as a result of the Project and proposes suitable mitigation and management measures.

12 The scope of this report and the subsequent IEE is specific to the sub-project. It does not provide any assessment for any other/future developments or activities at the location or anywhere else within Cox's Bazaar Area. Should any further development be planned as result of either this Project or other related work, additional planning and assessment to the requirements of the Government of Bangladesh must be carried out specifically in relation to that proposed development.

1.4 APPROACH AND METHODOLOGY

13 The primary purpose of the IEE is to investigate and describe impacts of the proposed subproject to the existing environmental elements. Specifically, the study aims to predict the potential impacts of the project activities and recommend mitigation and abatement measures for impacts (in the pre-construction, construction and operational stages of development) that are considered potentially adverse to the surrounding environment.

14 In general, this IEE intends to:

- Examine and describe the existing status of the various ecological, physical and human related components surrounding the project area;
- Predict the potential significant impacts of the project on the surrounding environment during the pre-construction, construction, operations and maintenance stages and recommend appropriate mitigation and abatement measures; and

- Identify residual impacts of the project and recommend appropriate short-term and long-term management plans.

1.4.1 Data sources of IEE

15 The following documents were used as reference in the preparation of the IEE report:

- Available technical reports from various organization
- Available laws, rules, regulations, acts, policies from Bangladesh Government websites
- Maps from open sources and various governmental and non-governmental websites
- Data from secondary literatures in including books and relevant websites

1.4.2 Scoping and gathering baseline data

16 Scoping of issues to be addressed in the IEE was conducted early in the assessment process (i.e. Field visit) to collect the appropriate baseline information so that collected and the IEE report/study can focused on the relevant issues needed.

17 The objectives of undertaking the scoping activities were:

- To provide an early link among the implementing agency, the recipient and affected community and the IEE preparer;
- To ensure that the IEE will address only relevant issues and concerns;
- To present the scope of environmental studies, issues and alternatives that requires thorough examination and consideration in the master plan; and
- To ensure complete coverage of potential environmental and social issues that is required under the ADB Environmental and Social Considerations.

1.5 STRUCTURE OF THIS REPORT

18 Following the ADB SPS 2009, the Report is structured as follows:

Executive Summary

- | | |
|------------------|---|
| Chapter 1 | Introduction provides the background on the project, purpose of this report, approach and methodology |
| Chapter 2 | Policy, Legal, and Administrative Framework presents a review of relevant national laws and policies, international environmental obligations, and ADB's environmental requirements, procedure of environmental clearance, environmental categorization |
| Chapter 3 | Description of the Project provides a brief description of the Project, the location, size and need, description of project components |
| Chapter 4 | Analysis of Alternatives presents the alternatives considered during the feasibility study in order to arrive at the best option. |
| Chapter 5 | Description of the Baseline Environment includes details on the baseline data for environmental conditions in the project area (current features and conditions, pre-project) |

Chapter 6	Anticipated Potential Project Impacts identifies the potential environmental, economic and social impacts from pre-construction, construction, and operation phase.
Chapter 7	Environmental Mitigation and Management Plan
Chapter 8	Environmental Monitoring Program and Institutional Responsibilities outlines the environmental monitoring program, institutional responsibilities including the cost of implementing the EMP
Chapter 9	Grievance Redress Mechanism describes the process of addressing complaints
Chapter 10	Stakeholder Consultation and Information Disclosure discusses the issues raised during the consultations, proposed actions to address them, and the information needed to disclose to the public.
Annex I	List of Participants in FGD
Annex II	Traffic Management Plan

2 Policy, Legal and Administrative Framework

2.1 INTRODUCTION

19 This section of the IEE details the Administrative Framework for the Project, covering national requirements as well as applicable international treaties and conventions. The intent of this section is to lay out the regulatory and non-regulatory performance requirements for all stages of the Project. For the purposes of this report, only those regulatory elements directly relevant to the proposed Project will be discussed.

2.2 ENVIRONMENTAL LEGISLATION FRAMEWORK

2.2.1 Overview of the project approval process

20 Key legislation governing the environmental approvals process for the proposed Project is the Bangladesh Environmental Conservation Act, 1995 (BECA, 1995)¹ and the Environmental Conservation Rules (ECR, 1997)².

21 According to Rule 7 of the ECR, proposed developments within Bangladesh are classified as one of four categories, as follows:

- Green;
- Orange A;
- Orange B; and
- Red

22 These categories define proposed developments according to their potential environmental impact. Section 12 of the ECA states that 'No industrial unit or project shall be established or undertaken without obtaining an Environmental Clearance Certificate from the Director General, in the manner prescribed by the Rules'.

2.2.2 Environmental Approval Framework

23 Key milestones in the approvals process are outlined in **Figure 2**. These comprise:

- **Project Authorization Letter:** Formal authorization of the Project by the Department of Energy and Mineral Resources is required in order for the environmental approvals process to formally commence.
- **No Objection Certificate (NOC):** A NOC must be received from the Deputy Commissioner in the sub-project area before the SCC application can be made.
- **Site Clearance Certificate (SCC):** An SCC will be issued by DoE upon approval of the IEE study (note that the IEE submission is to include the Project Authorization Letter, NOC and SCC application form). The SCC will include a ToR for the IEE/EIA study, and typically provides authorization for site establishment works to commence.

¹ The Act was amended by Act Nos 12 of 2000, 9 of 2002, and 50 of 2010.

² The ECR was amended in 2002, 2005, 2010 and 2017.

- **Environmental Clearance Certificate (ECC):** The ECC will be issued by DoE upon approval of the IEE/EIA study (including associated EMP). The ECC allows project construction to commence, and contains specific approvals requirements for matters such as pollution control and environmental monitoring.

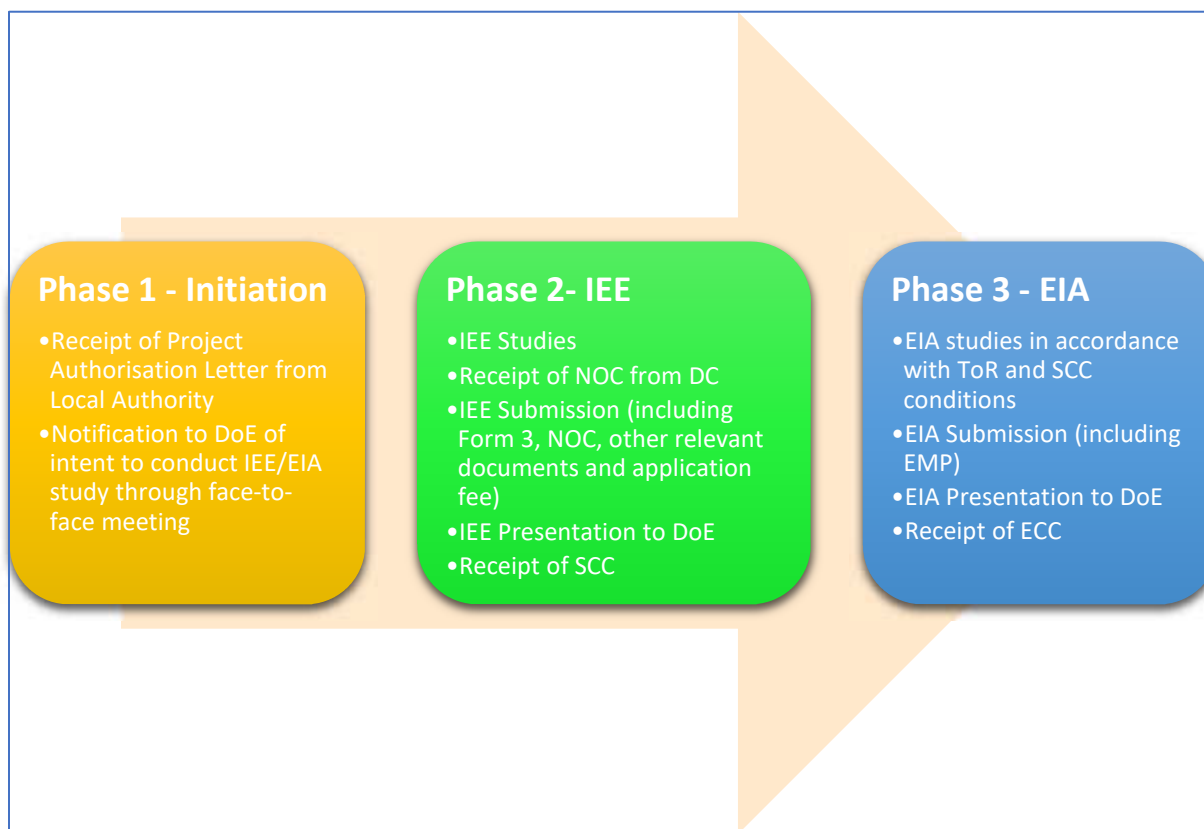


Figure 2 Environmental approval framework

24 **Table 1** provides an overview of key Bangladesh legislative approvals requirements which are relevant to the Project, and the permissions required under this legislation in order to undertake the subproject works.

Table 1 Required Permissions for Project under Bangladesh Legislation

Legislation	Permission Required	Purpose	Permission Given By
Environment Conservation Act (1995) Environment Conservation Rules (1997)	SCC and ECC	DoE will issue an SCC to allow for a detailed EIA as per Section 12 (ECA), Rule- 7 and Form -3 of the ECR.	Director General of the Bangladesh DoE
Acquisition and Requisition of Immovable Property Act (1982)	Application required	To acquire and compensate for any Project land	Ministry of Land and Deputy Commissioner

25 Rule 7 of ECR indicates the procedure and requirements for the issuance of an ECC. The corresponding requirements per category are described below:

Green category projects:

- i. completed application for ECC, and the appropriate fee (shown in Schedule 13);
- ii. general information about the project;
- iii. exact description of the raw materials to be used, and the product to be manufactured (where relevant); and
- iv. No-objection certificate from the local authority.

Orange-A category projects:

Same requirements as green category projects, plus the following:

- i. process flow diagram;
- ii. layout plan (showing location of effluent treatment plant or ETP);
- iii. effluent discharge arrangement; and
- iv. outlines of the plan for relocation and rehabilitation (if applicable).

Orange-B category projects:

- i. completed Application for ECC, and the appropriate fee;
- ii. report on the feasibility of the project;
- iii. report on the IEE for the project, plus process flow diagram, and in the case of an industrial project, layout plan (showing ETP) and ETP design;
- iv. report on the environmental management plan (EMP);
- v. no objection certificate from the local authority;
- vi. emergency plan relating to adverse environmental impact and plan for mitigation of the effect of pollution; and
- vii. outline of the relocation and rehabilitation plan (where applicable).

Red category projects:

Same requirements as Orange Category B, except that Item 3 (IEE) is amended to read as follows:

- i. report on the IEE for the project, and terms of reference for the EIA; or EIA report prepared based on ToR previously approved by DOE;
- ii. in the case of an industrial project, layout plan showing location of ETP, process flow diagram, design, and time schedule of the ETP.

2.3 NATIONAL RELEVANT POLICIES AND STRATEGIES

26 This section 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).

2.3.1 National Environmental Policy

27 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:

- 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.

2.3.2 National Water Policy (NWP)

28 The National Water Policy 2004 (NWP) aims for sustainable management of water. The 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).

2.3.3 National Forest Policy (NFP 1994)

29 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 roadside verges courtyards of rural organization such as Union Parishad, school, Eidgah, mosque-Moktob, temple, club, orphanage home, madrassa etc. and other fallow lands around will be encouraged. The government will encourage this type of initiative and extend technical and other supports.

2.3.4 Bangladesh Climate Change Strategy and Action Plan (BCCSAP 2009)

30 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 emphasize on ensuring existing assets (e.g., coastal and river embankments) are well maintained and fit for purpose and that urgently needed infrastructure 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.

2.4 LEGAL INSTRUMENTS

31 The Ministry of Environment and Forests (MoEF) prepare the environmental policies. MoEF also has formulated regulation toward clearance of projects from environmental angles based on environmental impact assessment report. The Department of Environment (DoE) is responsible for environmental issues while forest issues are looked after Department of Forests. Over the years the MoEF has adopted number

of legal instruments 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 Summary of Environmental Legislations Applicable to the Proposed Project

No.	Environmental Legislation / Act	Objective	Relevance to the Project	Responsible Institution
1	National Environmental Policy, 1992	Ensure that development components do not pollute the environment or degrade resources. It sets out the basic framework for environmental action together with a set of broad sectoral action guidelines.	Restriction on operations which cannot be initiated in ecological critical areas Regulation on vehicles emitting smoke which is harmful to the environment Follow standards on quality of air, water, noise and soil Sets limits for discharging and emitting waste	Ministry of Environment and Forests, and Climate Change
2	National Environmental Management Action Plan (NEMAP), 1995	An action plan to identify key environmental issues affecting Bangladesh, identifies actions for reducing the rate of environmental degradation and improve quality of life.	Sectoral agencies to coordinate with MoEFCC in preparing environmental guidelines	Ministry of Environment and Forests, and Climate Change
3	Environment Court Act, 2000 and subsequent amendments in 2003	Establishment of Environment Court for trial of an offence or for compensation under environmental law, such as environment pollution.	Option to affected persons for grievances related to environment safeguards.	Ministry of Environment and Forests, and Climate Change
4	The Forest Act (1927) and Forest (Amendment) Act (2000)	An act to control trespassing, illegal resource extraction and provide a framework for the forestry revenue collection system;	Requires clearances for any project within forest areas and clearances for any felling, extraction, and transport of forest produce.	Department of Forests
5	National Forest Policy (1994)	To conserve existing forests and bring about 20% of the country's land area under the Forestation Programme and increase reserved forests by 10% per year until 2015	Incorporate tree planting in the subproject Clearance for any felling, extraction, and transport of forest produce	Department of Forests
6	The Bangladesh Wildlife (Conservation & Security) Act, 2012	To conserve and protect wildlife in Bangladesh including designation of protected areas. Protection of wildlife is provided with lists of species with four schedules: first, second, third and fourth schedule. The fourth schedule species have the highest level of protection.	Consultation and necessary permits required if the project will pass through the wildlife sanctuaries and other protected areas.	Department of Forests
7	National Safe Drinking Water Supply and Sanitation Policy of 1998	Ensures access to safe water and sanitation services at an affordable cost	<ul style="list-style-type: none"> Pourashavas and water sanitation authorities will take actions to prevent wastage of water. They will take necessary steps to increase public 	Ministry of Local Government, Rural Development, and Cooperatives

Upgradation of existing 8.8 km link road connecting Cox's Bazar - Teknaf and Marine Drive Highways, Ukhiya and Improvement of R & H Palongkhali Bazar - Chapotkhali Bazar Marine Drive Road by BC at Ch 00-9145m under Ukhiya Upazila, District - Cox's Bazar

No.	Environmental Legislation / Act	Objective	Relevance to the Project	Responsible Institution
			<p>awareness to prevent misuse of water</p> <ul style="list-style-type: none"> Pourashavas shall be responsible for solid waste collection, disposal and their management 	
8	National Water Act 2013	Ensures Bangladesh water sources are free from any type of pollution. Pollution from water in urban outfalls and reservoirs, e.g. lakes, canals, ponds and ditches may result in amenity losses, fisheries depletion, health problems and fish and aquatic species contamination.	Secure clearance certificate on water resource development subprojects	Ministry of Water Resources
9	Wetland Protection Act 2000	Advocates protection against degradation and resuscitation of natural water-bodies such as lakes, ponds, beels ³ , khals, tanks, etc. affected by man-made interventions or other causes. Prevents the filling of publicly-owned water bodies and depressions in urban areas for preservation of the natural aquifers and environment. Prevents unplanned construction on riverbanks and indiscriminate clearance of vegetation on newly accreted land.	In case of diversion of water from any wetland nearby, detailed assessment should be done	Ministry of Water Resources
10	Bangladesh Labor Law, 2006	<p>It is a comprehensive law covering labour issues such as: conditions of service and employment, youth employment, benefits including maternal benefits, compensation for injuries, trade unions and industrial relations, disputes, participation of workers in company's profits, regulation of safety of dock workers, penalty procedures, administration and inspection.</p> <p>This Act pertains to the occupational rights and safety of factory workers and the provision of a comfortable environment for working. It also includes rules on registration of labourers, misconduct rules, income and benefits, health and fire safety, factory plan</p>	<p>Compliance to provisions on employment standards, occupational health and safety, welfare and social protection, labor relations and social dialogue, and enforcement.</p> <p>Prohibition of employment of children and adolescents.</p>	Ministry of Labor and Employment
11	Bangladesh Labor Rules, 2015	Includes rules on registration of laborers, misconduct rules, income and benefits, health and fire safety, factory plan	<p>Contractors to implement occupational health and safety measures</p> <p>Contractor will be liable for compensation for work-related injuries</p>	Department of Labor
12	The Pourashava Act 2009 / Ordinance	Provides guidance for subproject integrated community and workers	Coordinate with pourashava committees on disaster	Local Authorities

³ A beel is a billabong or a lake-like wetland with static water (as opposed to moving water in rivers and canals - typically called khaals), in the Ganges - Brahmaputra flood plains of the Eastern Indian states of West Bengal, and Assam and in the country of Bangladesh.

No.	Environmental Legislation / Act	Objective	Relevance to the Project	Responsible Institution
	issued for the amendment of local government (municipality) ordinance, 2009 and 2010; The Pourashava Ordinance, 1977; Municipal Administration Ordinance, 1960	health and hygiene at the construction and operation and maintenance stages of the project	management measures, water and sanitation and waste management	
13	Bangladesh Climate Change Strategy and Action Plan of 2009	Enhances the capacity of government ministries, civil society and private sector to meet the challenges of climate change	Integrate adaptation measures for buildings in consideration of extreme climatic events	Ministry of Environment, Forests and Climate Change
14	Standing Order on Disaster, 1999 (Updated 2010)	Enhances capacity at all tiers of government administrative and social structures for coping with and recovering from disasters	Geographical information system (GIS) technology will be applied at the planning stage to select location of roads etc. Advice from the concerned District Committee should be obtained prior to final decision	Ministry of Disaster Management and Relief
15	National Disaster Management Act of 2012	Establishes a framework for managing disasters in a comprehensive way.	Setting-up emergency response procedures	Ministry of Disaster and Relief

2.4.1 Occupational Health and Safety

32 During construction, the project needs to conform to the labor laws and occupational and health related rules as outlined in **Table 3**.

Table 3 Relevant Occupational Health and Safety Laws and Rules

Title	Overview
Bangladesh Labor Act, 2006	Provides for safety of work force during construction period. The act provides guidance of employer's extent of responsibility and the worker's right to compensation in case of injury caused by accident while working.
Sewerage Authority Act, 1996	The act calls for ensuring water supply and sewerage system to the public, preservation of system, and other related health and environmental facilities for the community.
Labor Relations under Labor Laws, 1996	General concerns during the project implementation state that the project manager must recognize labor unions.
Public Health (Emergency Provisions) Ordinance, 1994	Calls for special provisions with regard to public health. In case of emergency, it is necessary to make special provisions for preventing the spread of disease, safeguarding the public health, and providing adequate medical service, and other services essential to the health of respective communities and workers during construction-related work.
The Employees State Insurance Act, 1948	Health, injury and sickness benefit should be paid.
The Employer's Liability Act, 1938	Covers accidents, risks, and damages with respect to employment injuries
Maternity Benefit Act, 1950	Framed rules for female employees, who are entitled to various benefits for maternity

2.5 APLICABLE INTERNATIONAL AGREEMENTS

33 Aside from the legal framework on environment, Bangladesh is also a party to several international conventions, treaties and protocols related to environmental protection. The applicable international conventions, treaties and protocols are described in **Table 4**.

Table 4 Applicable International Conventions, Treaties and Protocols

	Conventions	Signed	Ratified/ Accessed(AC)/Accepted(AT)	Relevance
1	International Plant Protection Convention (Rome, 1951) & Plant Protection Agreement for SE Asia and Pacific (1999 Revision)		01.09.1978 04.12.1974 (AC)	Ensures that component work or construction materials do not introduce plant pests
2	Convention on Wetlands of International Importance, 1971 (Ramsar Convention)		20.04.1992 (ratified)	Protection of significant wetland and prevention of draining or filling during construction
3	Convention Concerning the Protection of World Cultural and Natural Heritage (Paris, 1972)		03.11.1983 (ratified)	Prevention of damage or destruction of culturally and/or historically significant sites, monuments, etc.
4	Convention on Biological Diversity, 1992 (Rio de Janeiro)	05.06.1992	03.05.1994	Protection of biodiversity during construction and operation.
5	Convention on Persistent Organic Pollutants, 2001	23.05.2001	In process	Restriction of use of pesticides and herbicides
6	United Nations Framework Convention on Climate Change, 1997	11.12.1997	22.10.2001 13.11.2003 (amended)	Reduce greenhouse gas concentrations in the atmosphere to a level that would prevent dangerous anthropogenic interference with the climate system

2.6 ENVIRONMENTAL CATEGORIZATION AND STANDARDS

2.6.1 Environmental Category: Bangladesh

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

35 The environmental category of the sub-project is listed in Schedule – 1 of ECR. The upgradation of road is relevant to the construction and reconstruction of roads and the subproject is listed in Schedule – 1 of ECR and falls in Orange B. **Table 5** describes DoE classification for road construction and upgradation.

Table 5 DoE Classification of construction project according to ECR 1997

Sl.No	Components	Items in Schedule-1 of ECR	DOE Classification
1	Construction, Re-construction and Extension of Roads	Sl. No. 67 of ECR	Orange-B

Source: ECR 1997

2.6.2 Environmental Category: ADB

36 The Safeguards Policy Statement (SPS 2009) of ADB provides guidance on the environment category of projects based on the degree of anticipated environmental impacts. ADB environmental safeguards objectives are: (i) to ensure the environmental soundness and sustainability of projects and (ii) to support the integration of environmental considerations into the project decision-making process. ADB environmental safeguards are triggered if a project is likely to have potential environmental risks and impacts. The initial process of categorization involves filling out a sectoral Rapid Environmental Assessment (REA) checklist. A project is classified as one of the four environmental categories (A, B, C, or FI) based on the most environmentally sensitive component. Categories are as follows:

Category A: Project that is likely to have significant adverse environmental impacts which are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.

Category B: Project with potential adverse environmental impacts that are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE), including an EMP, is required.

Category C: Project that is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.

Category FI: Project is classified as category FI if it involves the investment of ADB funds to, or through, a financial intermediary.

37 The project has been categorized as B for environment under the ADB's Safeguards Policy Statement 2009 (SPS).

2.7 INSTITUTIONAL CAPACITY

38 The Refugee Relief and Repatriation Commission (RRRC) is proposed to act as the coordinator on behalf the government to execute all interventions. RRRC and ADB will conduct regular coordination meetings involving all Implementing Agencies (IAs), relevant stakeholders including deputy commissioner (DC), Cox's Bazar, other development partners and agencies. ADB plans to establish extended mission office in Cox's Bazar for close coordination, facilitation of sub-projects development and implementation. A steering committee comprising higher officials from relevant ministries coordinated by ERD will be formed to provide necessary guidance to expedite the sub-project development and implementation. The steering committee will have a safeguards focal person.

39 The Local Government Engineering Department (LGED), the Department of Public Health Engineering (DPHE), the Roads and Highways Department (RHD), and the Bangladesh Rural Electrification Board (BREB) will be the executing agencies and implementing agencies. responsible for project oversight and coordination. There will be a safeguards focal person in the EA/IA. The EA/IA will be assisted by PMCs. The EAs/IAs will form project implementation units (PIU). The PIUs will identify a focal person for environmental safeguards. The focal person will be assisted in the conduct of the environmental assessment, the development and implementation of EMPs, and compliance monitoring by project consultants. All the implementing agencies are currently implementing ADB projects under this institutional arrangement (further defined in Section VI). ADB also conducts safeguards training for project executing

and implementing agencies. Thus, the government has sufficient capacity in implementing ADB requirements and strengthening of capacity, other than through the course of the consultant's work with local counterparts, is not required. ADB will continue to conduct capacity building programs during implementation.

3 Description of the project

3.1 INTRODUCTION

40 This report is on the Initial Environmental Examination (IEE) of the Access Roads Package. The package title reads "BANGLADESH: Emergency Assistance Project - Upgradation of existing 8.8 km link road connecting Cox's Bazar - Teknaf and Marine Drive Highways, Ukhiya and Improvement of R & H Palongkhali Bazar - Chapotkhali Bazar Marine Drive Road by BC at Ch 00-9145m under Ukhiya Upazila, District - Cox's Bazar".

41 The proposed subproject is designated as LGED/W5. The proposed project will link Courtbazar and Chapotkhali, Marine Drive Road. The proposed road already exists, but needs improvement (i.e. widening, repairing, additional drainage system). The improved road will be mixture of RCC and BC with steel made culverts and roadside drains. Location of the proposed map is given in **Figure 3**.

3.2 SUB PROJECT FEATURES

42 The proposed road is located in Ukhiya, Cox's Bazaar, some 20km far from the Cox's Bazaar bay and approximately 40 from the closest ECA Sonadia Island. The proposed road is 8.8+9.145km long and will be built with a mix of RCC and Bituminous Carpeting. The road width will vary between 3.7 m and 5.7m (average) with two lanes (proposed) along with roadside drains and culverts (case by case).

43 The road improvement sub-project features the following:

a. Earthworks

The road alignment will require both filling of low land and cutting through the highland in order to achieve a workable grade and required road width. The proposed embankments will be constructed with suitable fill material, likely obtained by suction dredging from the nearby river or the eroded soil from nearby hills will be collected.

b. Make-up and Repair Shoulders

Sometimes earthen shoulders do not have correct slopes and levels. It requires little filling, re-compaction and bring back to correct slopes and provision of turfing.

c. Restore Damaged Slopes

Sometimes existing slope loses correct shape due to sliding and raincut. It requires clearing & Grubbing, earth filling and compaction and turfing.

d. Existing Surface Strengthening

The existing surface will be strengthened by providing 150mm Aggregate Base Type-1 and 50mm overlay/wearing course.

e. Improvement of the Drainage System

In the hill area, the drainage system does not function. It should be improved and replaced to V-shaped gutter. Additionally, the road improvement works also include the construction of longitudinal drains.

f. Safety

The road does not have proper sign, marking and signaling along the corridor and particularly near sensitive locations. The road improvement works include the road safety issue by providing the adequate sign and making at all required locations.

44 **Figure 4** presents the typical arrangements of the 3.7m RCC road, while **Figure 5** shows the cross section of the BC road.



Upgradation of existing 8.8 km link road connecting Coks Bazar - Teknaf and Marine Drive Highways, Ukhiya and Improvement of R & H
Palongkhali Bazar - Chapotkhali Bazar Marine Drive Road by BC at Ch 00-9145m under Ukhiya Upazila, District - Cox's Bazar

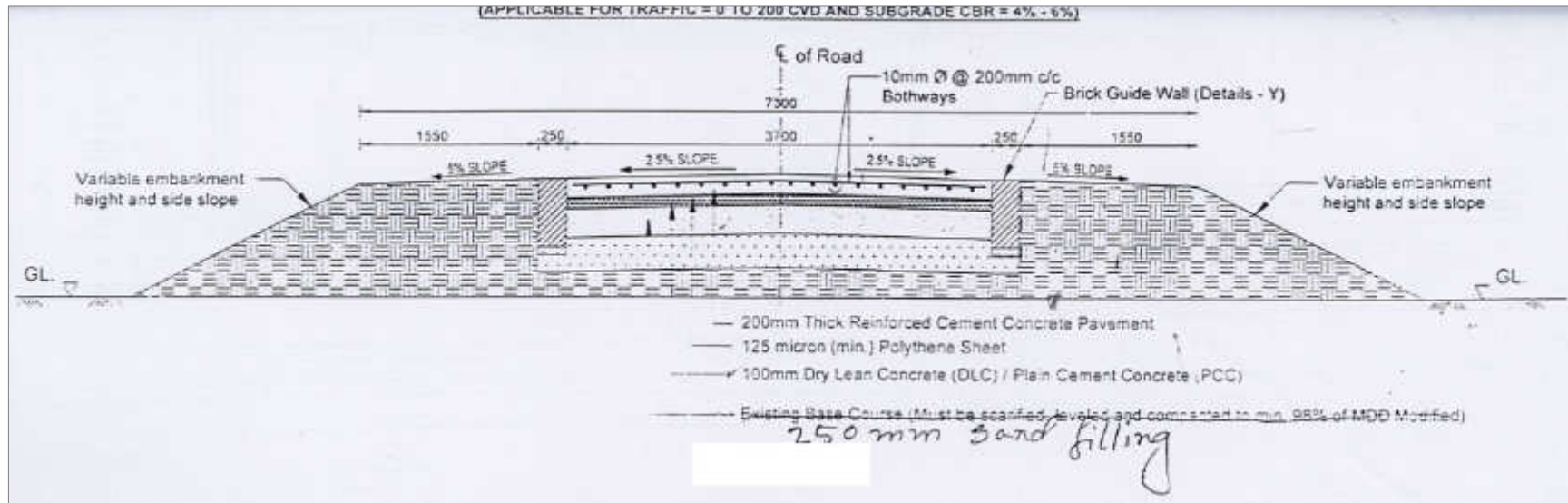


Figure 4 Typical arrangements of the 3.7m RCC road

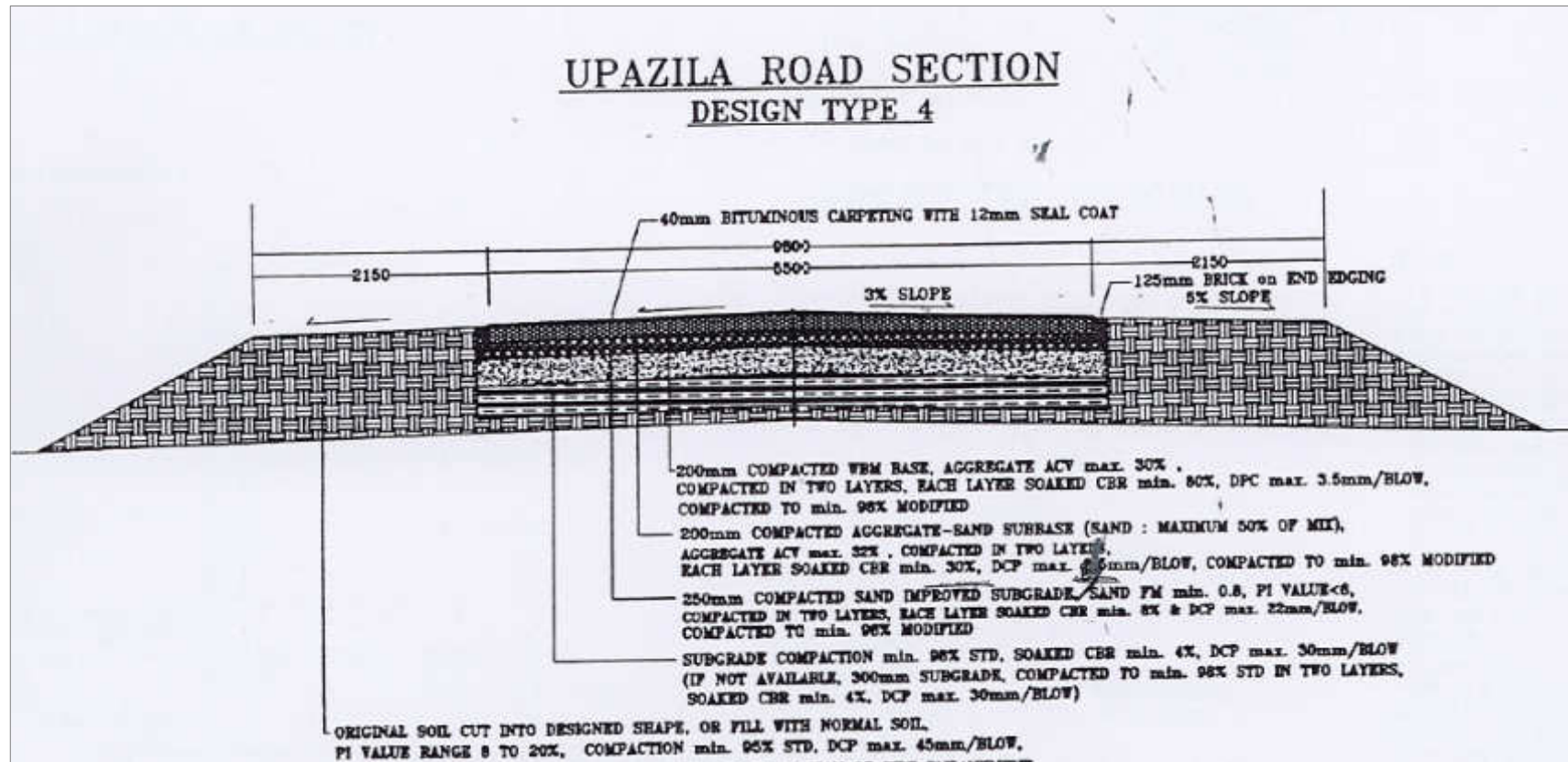


Figure 5 Typical arrangements of the 5.5m BC road

4 Analysis of alternatives

4.1 PRELUDE

45 The primary objective of the “analysis of alternatives” is to identify the location/technology for a particular sub-project that would generate the least adverse impact, and maximize the positive impacts. The preliminary assessment of the project included an analysis of alternatives, addressing the optimal match between required technical specifications and site conditions, as well as addressing any concerns for environmental, social, and economic features in each location.

4.2 CURRENT PROPOSAL

46 The road alignment is predominantly rural for most of its length though there are some semi-urban uses and development at the township. Some disturbance to adjacent uses will be inevitable. It is assumed that the right of way is adequate for the proposed development, but this needs to be confirmed. This is an existing road and there is likely to be clearing of several small grown roadside vegetation. In addition, the social/resettlement issues are likely to be substantial in many areas where there are villages and markets adjacent to the road. Since the RoW is probably wide enough proposed improvement, there is no land acquisition resettlement problems at the market locations also.

47 Based on the Rapid Environmental Assessment (REA) Checklist provided in the Environmental Assessment and Review Framework (EARF) of ADB for this Emergency Assistance Project (EAP), it was found that the current proposal will have the minimal effect on environment and society. Summary of the impacts of current proposal is given in **Table 6**.

Table 6 Impact of current proposal on environment and society

Sector	Impact
Presence Important features along the route	No
Land (Government-owned land are to be given priority)	Existing road alignment
Presence Agricultural/cropped land	Close by, no impact will occur if EMP is followed
Village affected	No
Families affected	No
Loss of structures	No
Impact on Common properties	No
Trees to be chopped down	About 25
Presence of sensitive ecosystem	No
Presence of waterbody	None
Tribal population affected	No

4.3 ‘DO NOTHING’ OPTION

48 From a purely physical and environmental point of view, the ‘do-nothing’ approach is preferable to any project implementation since it would avoid creation of any of the adverse impacts associated with a new road. The without project alternative is not acceptable since this will strongly reduce the potential for socio-economic development of the country. Despite having great potential, the industrial and commercial growth is retarded mainly due to absence of safe and reliable transportation facility. Additionally, carrying

the goods and foods for the Rohingya Refugees an improved road is essential to ensure the humanitarian supports smoothly.

49 Therefore, the 'no-build' alternative is unacceptable, and the potential socio-economic benefits of implementation of such Project far outweigh the adverse impacts, all of which can be controlled and minimized to an acceptable level.

5 Description of baseline environment

5.1 LOCATION SETTING AND EXTENT

50 Ukhiya Upazila is an Upazila under Cox's Bazar District in the Division of Chittagong, Bangladesh. It is located at 21.2833° North, 92.1000° East. It is bounded by Ramu on the north, Myanmar and Naikhongchhari on the east, Teknaf on the south, the Bay of Bengal on the west. Ukhiya thana was established in 1926 and was promoted into an upazila in 1983. The upazila is consisted of five Union Parishads: (i) Halda Palong; (ii) Ranta Palong; (iii) Raja Palong; (iv) Jalia Palong and (v) Palong Khali. Ukhiya Upazila covers an area of 261.8 sq km, located in between 21°08' and 21°21' north latitudes and in between 92°03' and 92°12' east longitudes (Banglapedia 2018). The area is bounded by Ramu upazila on the north, Teknaf upazila on the south, Arakan state of Myanmar and Naikhongchhari upazila on the east, the Bay of Bengal on the west. See **Figure 6** for details.

51 More than half of the upazila is under Ukhiarghat protected forest. The refugee camp situated in Ukhiya is within the protected forest.



Figure 6 Location map of the subproject

Source: <http://en.banglapedia.org/images/e/ee/UkhiyaUpazila.jpg>

5.2 EXISTING CONDITION

52 The proposed road is mostly damaged HBB with brick soling often broken and covered in small pieces. There are some places with BC also, which is damaged and mostly eroded shoulder. In many places hilly sand has come down to the road and covered in mud. The road, especially the link road that runs Court bazar is vulnerable to hilly downwash during rainy season. The Chapotkhali part and the part that runs into the Camps are partly bituminous which is broken in many sections. **Figure 7** presents a photographic view of the project location.



Figure 7 Existing condition at the proposed roads

5.3 PHYSICAL ENVIRONMENT

5.3.1 Landform and ecology

53 Ukhiya is located at Teknaf peninsula. Teknaf Peninsula is one of the longest sandy beach ecosystems (80 km) in the world. It represents a transitional ground for the fauna of the Indo-Himalayan and Indo-Malayan ecological sub-regions. Important habitats at the site include mangrove, mudflats, beaches and sand dunes, canals and lagoons and marine habitat. Mangrove forest occurs in Teknaf peninsula both as natural forest with planted stands and mostly distributed in the inter-tidal zone. The Teknaf peninsula mangroves supports the habitat of 161 different species of fish⁴. Teknaf reserved forest is one of the oldest reserved forests in Bangladesh.

54 The hill area covers 14,602 ha, accounting for 41.8% of the total area. According to its height and morphology, the hill area can be divided into two types: medium-high hills and medium-low hills. The area of medium-high hills is approximately 6940 ha, and the heights of the hills range from 150 to 300 m. The slopes of these hills range from steep (30–50% slopes) to excessively steep (>70% slopes). The hill ranges, which are interrupted by streams and valleys, are oriented from north to south, and they developed over sedimentary rocks. The area of medium-low hills, which developed over soft sedimentary rocks, is 7436 ha, and the hill heights are less than 150 m. The slopes range from excessively steep by steep to slightly

⁴ Chowdhury, N. Shah Nawaz; Hossain, M. Shahadat; Das, Nani Gopal; Barua, Prabal (2010-09-25). "Environmental variables and fisheries diversity of the Naaf River Estuary, Bangladesh". *Journal of Coastal Conservation*. 15 (1): 163–180. doi:10.1007/s11852-010-0130-3. Retrieved 2011-01-01.

steep (<5% slopes). Erosion is very common in steep to very steep areas, while it is less common in flatter areas. Deep soils only developed in flatter areas. Narrow and broad ridges are found alongside the low hills⁵.

5.3.2 Disasters

55 The most of the areas of Cox's Bazar district surrounded by hills, rivers and being adjacent to the Bay of Bengal, natural disaster visited the district every year. Subsequently, the inhabitants of the district suffer much by the disaster. Adding this, climate change effect has speed up the frequency natural disaster like, cyclone, tidal surge, flesh flood, excessive rainfall, rising temperature, increase salinity, land slide, erosion of river banks, thunder storm, earth quake etc. and these are the major disaster for Cox's Bazar district. As part of history of natural disaster for the region there are few events are most remarkable and historic.

56 The most historic and destructive cyclone of 1991 severely affected the whole Cox's Bazar district. All the 8 Upazilas of the district hit by the cyclone. Mostly St. Martin, Kutubdia, Materbari, Dhalghat, many parts of Moheshkhali and Teknaf was severely affected. In an average the tidal surge by the wind speed rise from 20 to 30 feet, and 72 hours continuous water stagnated by the high tide of the sea. There

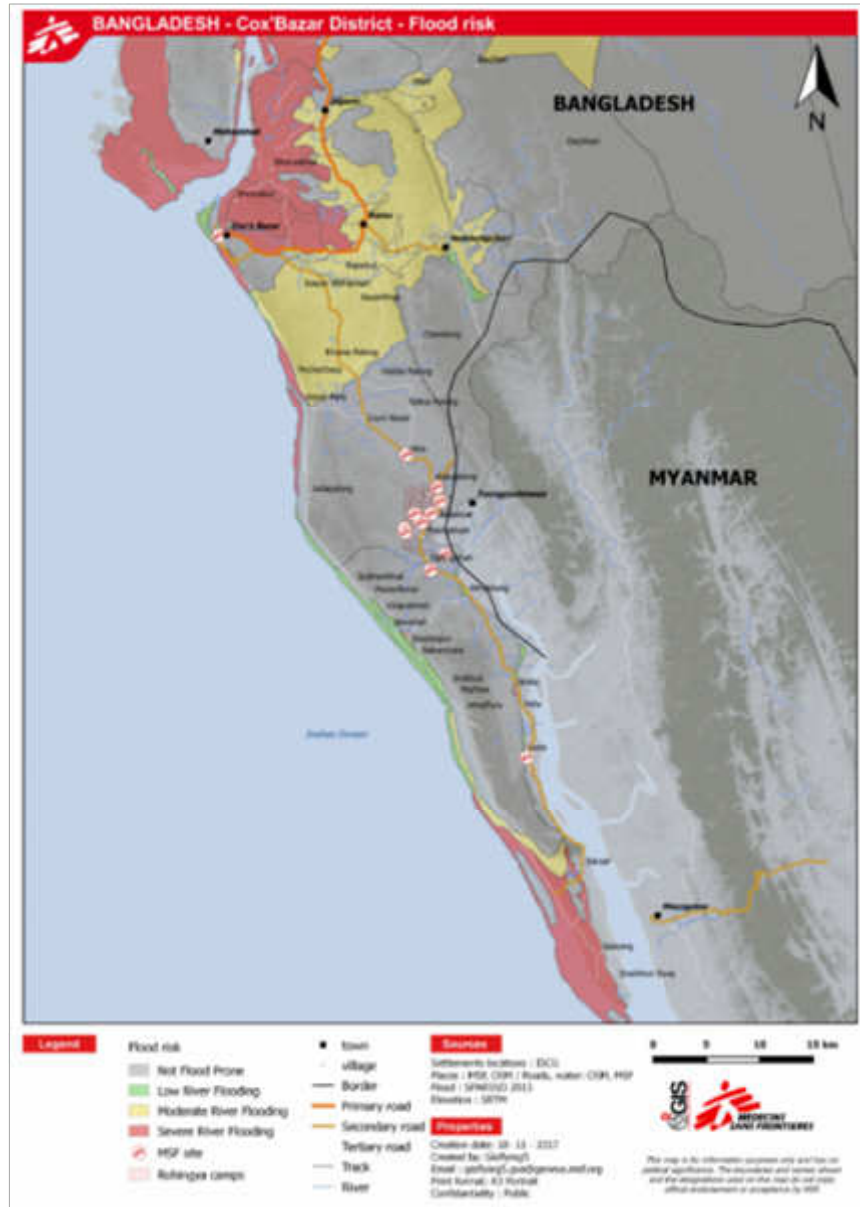


Figure 8 Flood risk in Cox's bazar

Source: <https://reliefweb.int/map/bangladesh/bangladesh-coxs-bazar-flood-risk>

⁵ A.Z.M. Moslehuddin, Md. Abiar Rahman, S.M.A. Ullah, M. Moriyama, and Masakazu Tani (2017) Chapter 2 Physiography, Forests, and People in Teknaf in Deforestation in the Teknaf Peninsula of Bangladesh, Masakazu Tani and Md. Abiar Rahman (eds.)

was cyclone in 1994 and 1997 too which were also affected the overall resources, community life, household, cattle head, crops, infrastructure, green trees, communication system etc.

57 The following areas are identified by the Cox's bazar District Disaster management Plan⁶: Under Ukhiya-Jaliapalong, Sonarpara, Dailpara, Lamburipara, Sonaichari, Nidania, Inani, Shafir bil, Ruppoti, Bailyakhali, Imamerdail, Sepotkhali, Maderbonia, Monkhali, Nalbila, Balukhali, Goalmara, Thaineekhali and Rahmoter bil. Error! Reference source not found. presents a map of flood risk in Cox's Bazar District.

5.3.3 Geology, Topography, and Soils

58 The Teknaf piedmont plain covers 3034 ha (8.6% of the total area). It is situated alongside the hills, mainly on their western side, but is found sporadically on the eastern and south sides of the hills. The landscape is a nearly level high ridge, which is subject to flash floods during the rainy season. See **Figure 9** for geological formation of Cox's Bazar.

59 The tidal floodplain, which runs from north to south through the peninsula, comprises 6838 ha of land (19.57% of the total area). This is located between the hills and the Naf River (on the eastern side of the hills). The area consists of broad, high, and low ridges and depressions. Numerous canals divide the landscape, some of which are subjected to tidal flooding. During the rainy season, most of the areas become mildly inundated with rainwater and occasionally suffer flash floods during heavy rainfall.

60 Beaches cover 9.03% (3155 ha) of the total area, and they lie on the west side of the peninsula along the sea. The landscape is mostly flat with some undulating relief consisting of sandy soil. The coral beach is a minor area (1%) that is located approximately 12 km from the mainland. It is located on St. Martin's Coral Island. The landscape consists of very gently undulating old beach ridges and inter-

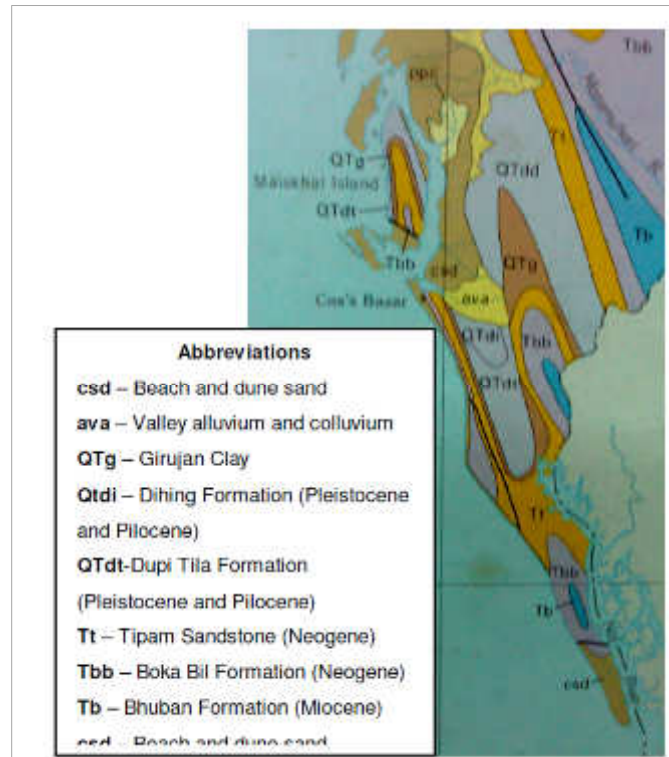


Figure 9 Geology of Cox's Bazar

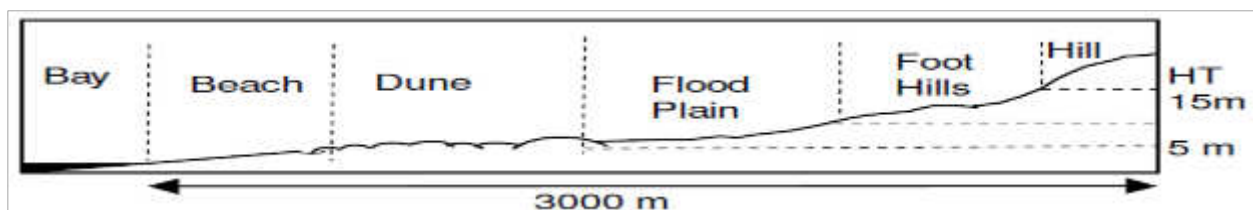


Figure 10 Morphological cross section of Cox's Bazar

⁶ Development of District Disaster Management Plan District: Cox's Bazar, District Disaster Management Committee, Cox's Bazar. August 2014. Government of Bangladesh.

ridge depressions, which are surrounded by sandy beaches. See **Figure 10** for morphological cross section⁷ of Cox's Bazar.

61 There are four main soils or physiographic units can be recognized, viz. I) The higher hill ranges occupy a narrow belt: the most common soils are strong brown, friable, silty clay loams and silty clays, which grade into broken shale rock at 2-4 feet. II) The lower hill ranges are developed in unconsolidated sands and clays. Soils are mainly deep red, friable, clay loams to clays. All the soils are strongly acid and sandy soils are droughty. III) The coastal plains are underlain by heavy marine or tidal clays characterized by more sandy and silty deposit near the foot of the hills and along the course of rivers and streams which cross the plains. Near the coast, some of these soils become saline at the end of the dry seasons. IV) The tidal mangrove swamps are most extensive at the mouth of the Matamuhuri River Here the soils are grey clay flooded twice daily by saline water and unsuitable for agriculture. According to Geological Survey Bangladesh (GSB, 1978) the falls in medium intensity seismic zone (Zone-II, Basic Seismic Coefficient 0.05g).

62 The major soil types are red, alluvial, muddy and sandy soil. The soils of the Dupitila formations were formed on unconsolidated and compact rocks, moderately well to excessively drained and probably the oldest of the area. See **Figure 11** for details.

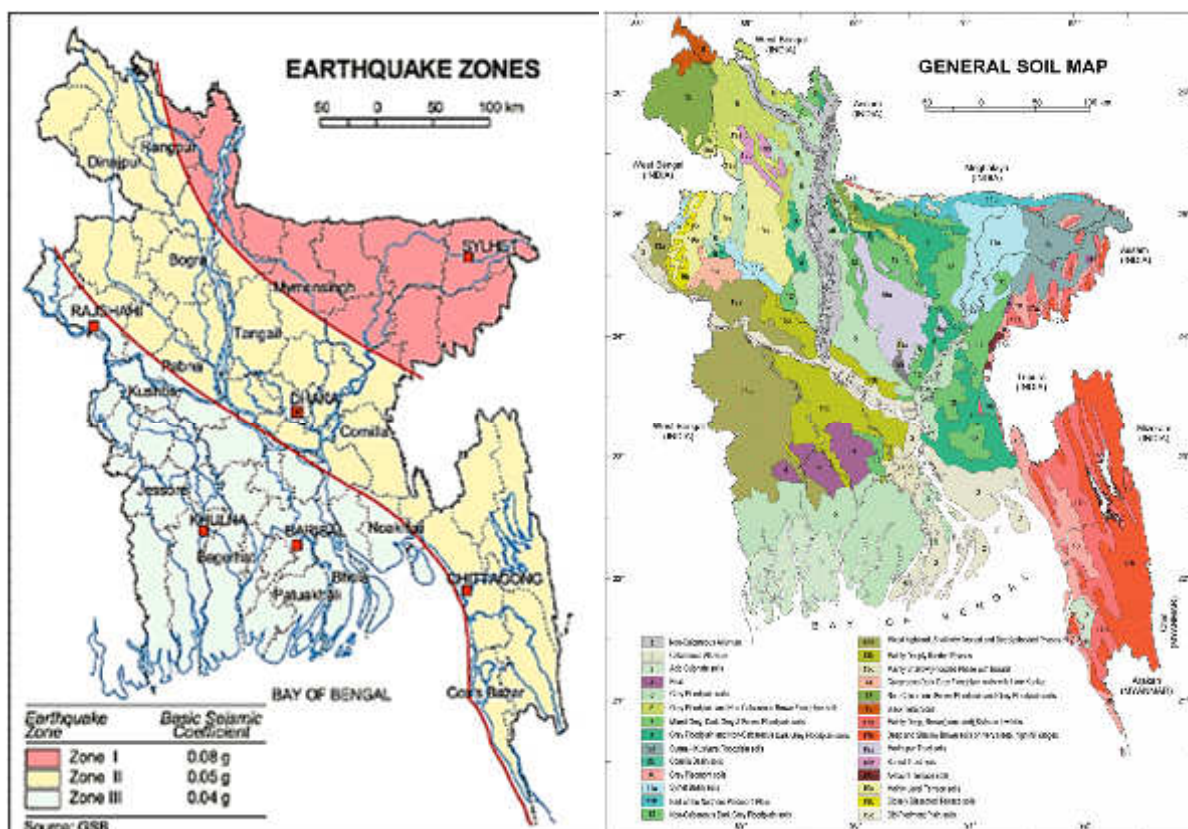


Figure 11 Earthquake zone and general soil map of Bangladesh

⁷ Alam M.S., Huq N.E. and Rashid M.S. 1999. Morphology and sediments of the Cox's Bazar coastal plain, south-east Bangladesh. Journal of Coastal Research, 15(4) : 902-908.

5.3.4 Climate and Meteorology

63 Generally, maximum temperature in the year reach between the last week of March and end of May. Temperature data is recorded at station Cox's Bazar. As dis discussed above, Ukhiya is a upazilla (subdistrict) of the Cox's Bazar zilla (District). The average maximum temperature in Cox's Bazar is 31.28°C in April and minimum is 22.0°C in January (Data from BMD 2016). See **Figure 12** for details⁸.

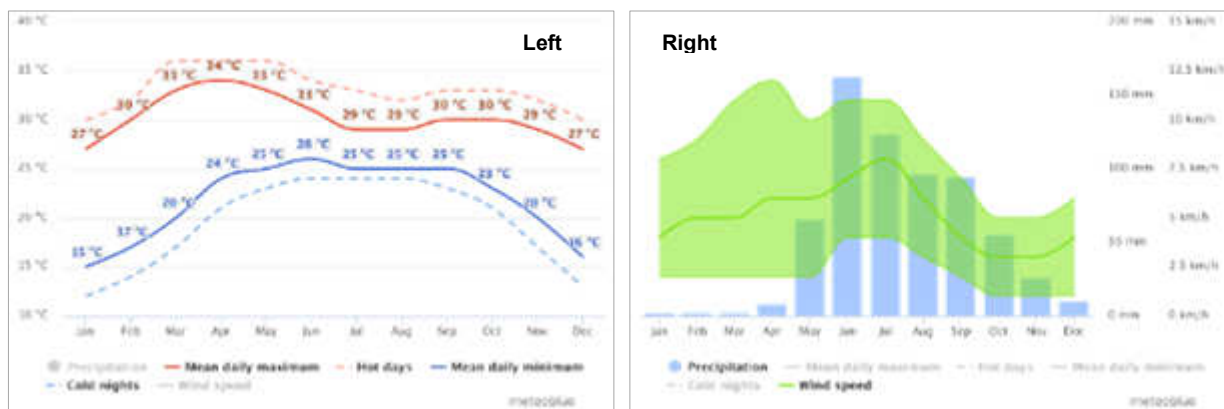


Figure 12 Left: Temperature pattern in Cox's Bazar; Right: Rainfall pattern in Cox's Bazar

64 The trend of rainfall of Cox's Bazar district was as usual and normal before 1991, however, radical changes have been observed in the recent years, in particularly after the year 2000. Once, the rainfall and its continuation was steady according to the seasons of the year. Interestingly, 1994 a remarkable change in rainfall has observed. In general, there was no much rain during the month of January to April, and it happened during from April to June of the year. On the contrary, sometime rainfall occurs during the month

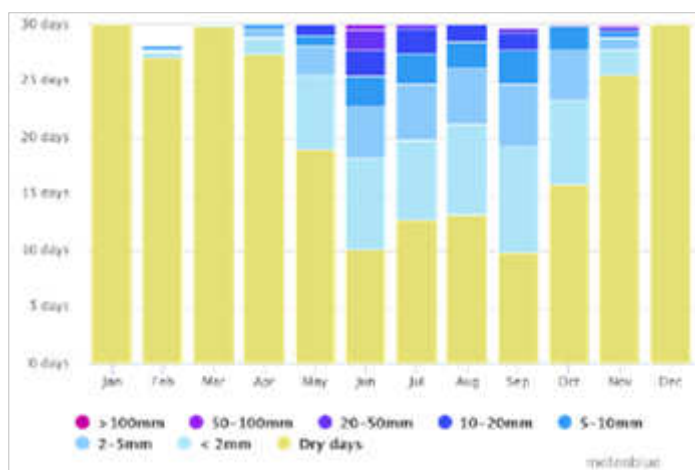


Figure 13 Rainfall analysis (amount) for Cox's Bazar station

⁸ Source: <https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine-cox-s-bazar,Bangladesh> Date Accessed: 7 Nov 2018

of December which creates flooding. The variation in the precipitation between the driest and wettest months is 401 mm. See **Figure 13** for details⁹.

65 The humidity is high throughout the year. March and April are the least humid months in the region. The relative humidity is found over 80% during June, July, August and September. The least humid month in the area is January, February and March. Lowest average humidity is recorded 62% at Cox's Bazar.

66 South-east and westerly winds are strong in Cox's Bazar. The wind rose (**Figure 14**) shows how many hours per year the wind blows from the indicated direction. From all the wind rose diagrams it can be said that the region is predominantly characterized by North-east, East-Southeast, South-East, and West wind flow. The average wind speed ranges from 5 to 19 km/h during maximum period in a year.

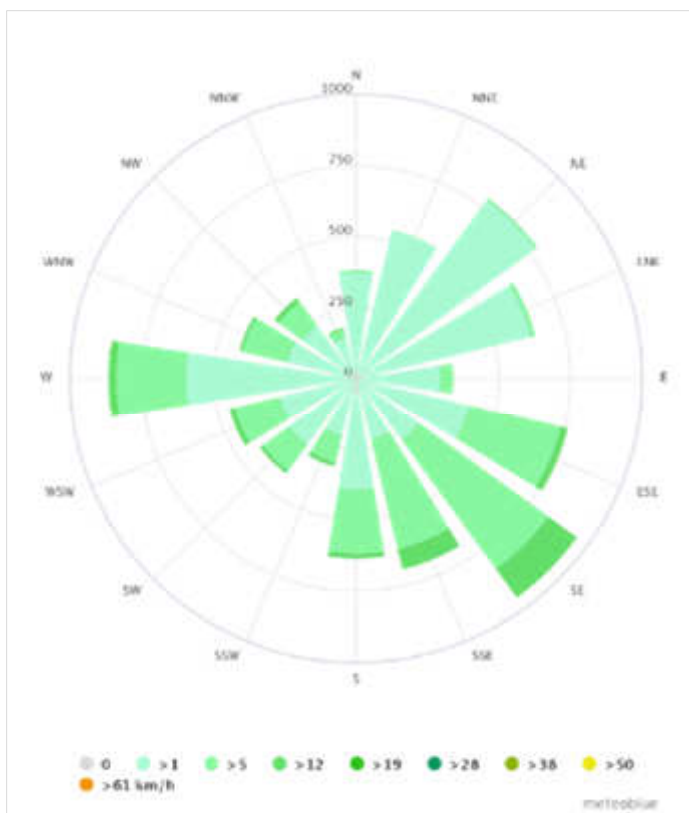


Figure 14 Wind rose of Cox's Bazar Station

5.3.5 Hydrology

67 The Moheshkhali Channel, Baak Khali and Naf rivers and Bay of Bengal are the main waterways of the region. The Moheshkhali Channel flows into the Bay of Bengal near Cox's Bazar and passes the north western boundary of the area of influence. The Bakkhali River originates from the Chittagong Hill Tracts and flows into the Bay near Cox's Bazar. Five other canals run through the hilly hinterland. They are the Reju, Inani, Mankhali, Rajachora and Mathabanga canals. In addition, a stream network runs through the camp area.

68 Naf It flows along the southernmost border line of the country. It originates in the northern hills of Myanmar and enters Bangladesh near Palong Khali of Ukhiya upazila of Cox's Bazar district. The river flows through Ukhiya and Teknaf and discharges into the Bay of Bengal near Sabrang (Teknaf upazila, Cox's Bazar). Most of the downstream reach of the river demarcates the Myanmar-Bangladesh border. The river is 62 km long. BWDB has one hydrometric station on the river at Teknaf and data from 1968 are available.

69 There are 14 canals in the Upazila, which flow throughout the Upazila. Reju Canal-starting from Rejur mukh crosses painnasia, sonaichoara, sonarpara, chorpora, jummapara and lamburi para. It has length of 7 kilometres. Monkhali Canal-starting from Monkhali mouth up to Nuton Chaka para. It is 8 kilometres. Sowankhali Canal- it is 8 kilometre long started from Swankhali area and stretched up to Bay of Bengal. Chepokhali Canal-It is 10 kilometre long started from Madarbonia and arrives to Chepotkhali. Inani Canal-it is 15 kilometre long started from Chenchuli to Inani. Inani Choto Canal-It is 20 kilometre long started from Chenchuli to Inani. Paglir Canal- 8 kilometre long canal started from Guarerdeep and stretches to

⁹ Same as 6.

Patabari area. Duchori Canal-the canal is 15 kilometre long started from Tuturbil to Madhurghona. Goyalmara Canal-it is 18 kilometer long starting from Tuturbil and up to Modhurghona. Balikhali Canal-the canal starting from Modhurchara and reached to the Naf river covering a length of 7 kilometre. Thiankhali Canal-It is 8-kilometer-long starting from Achortoli to Naf river crossing through Tarulapara and Fashiakhali.

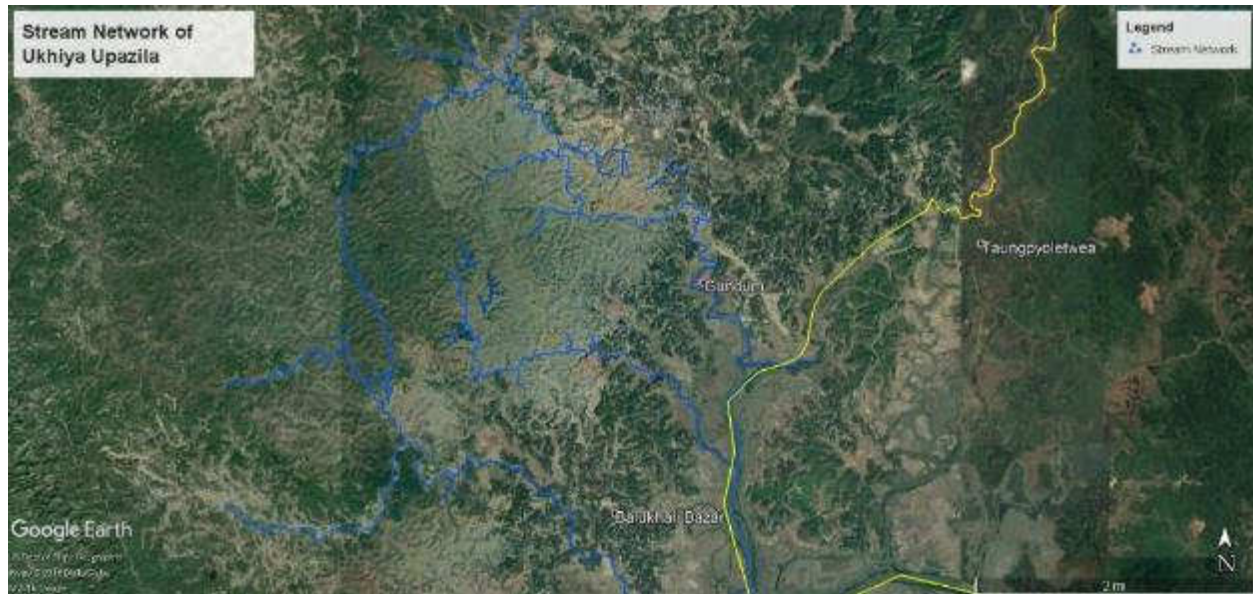


Figure 15 Stream network in the Sub-project area

Palongkhali Canal- This is 14-kilometer-long starting from Nojumora falls into Naf river crossing different parts of Ukhia and Teknaf Upazila. Balukhali Canal: a 6-kilometer-long started from Madhuchara reaches to the Naf river crossing through BGB camp, Chowdhur para and Barua para. **Figure 15** represents the stream network in the region.

70 **Reju Khal:** The khal has originated from Arakan boarder of Myanmar and Wading hills, it has flowed through Nihongchoriupazila of Bandarban entering into Holodiapalong of Ukhia Upazila and Khunia union of Ramu Upazila. It has finally entered Jaliapalong of Ukhia and arrives at Bay of Bengal. It is about 20 kilometres long within Bangladesh.

71 Bangladesh is considered rich in ground water resources. Properties of ground water storage reservoirs and volumes of annual recharge determine ground water resources. In this region, ground water level is shallow, usually ranges between 5-7m¹⁰.

¹⁰ BARC, Bangladesh agricultural research council, September 2015. URL: <http://www.barc.gov.bd/>

5.3.6 Flooding, Water Logging and Drainage Pattern

72 Eastern side of the upzila comprising high land and gradually down towards the western side. Matamuhuri River is flowing beside the upazila in north-east and north-west direction. Several natural streams act as the natural drainage system of the region. The mainland surrounding the upazila is generally high from the level of tide. As a result, most of the area is free from flood. Waterlogging problem has not been reported. However, there exist erosion and instability problems in the hilly and elevated areas. **Figure 16** shows a flood affected area map of the study region.

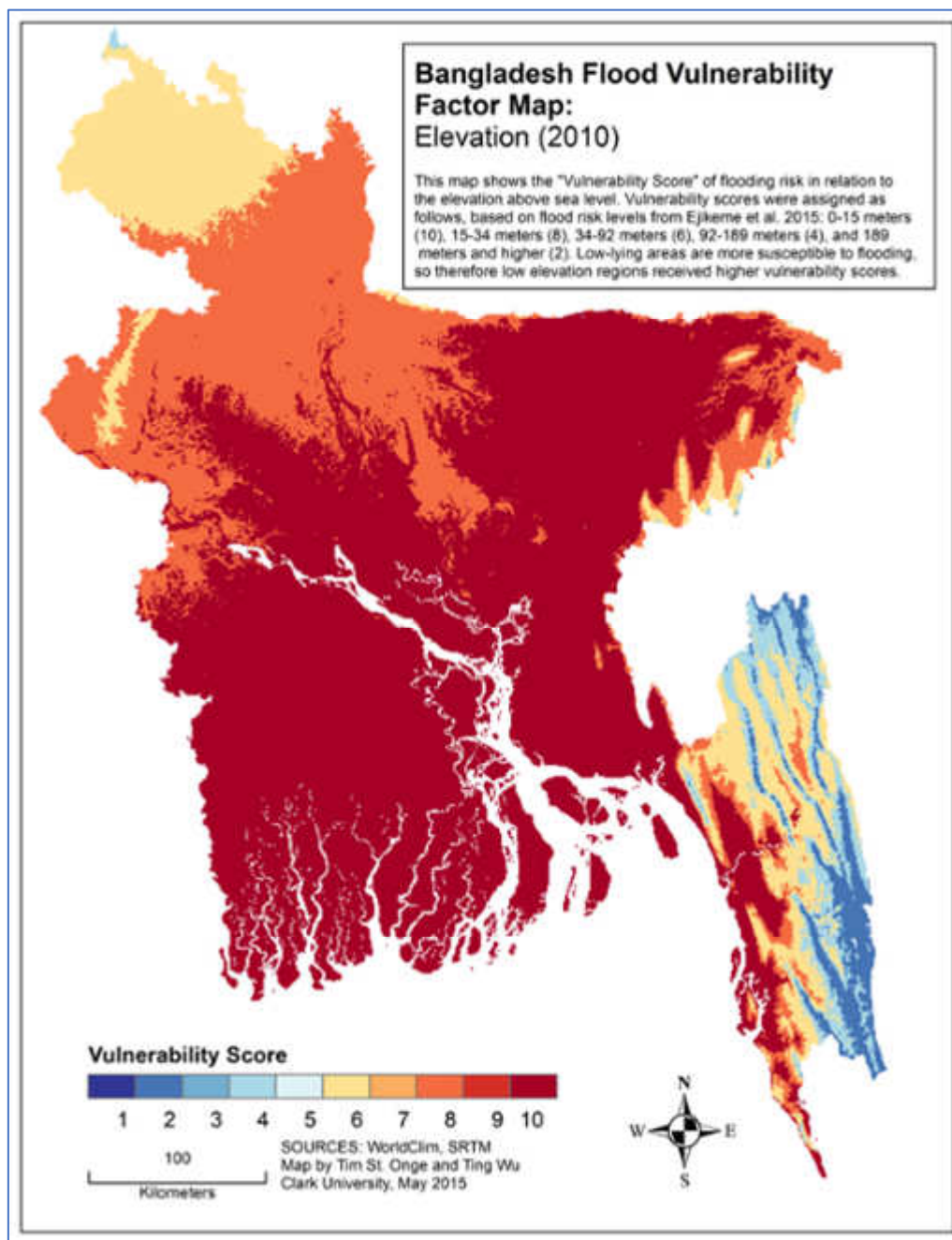


Figure 16 Flood vulnerability map of Bangladesh

5.3.7 Land Slides and erosion

73 The region, especially the Kutupalong camp area is prone to land slide and erosion. In fact, land slide is a major problem in the Cox's Bazaar mountain zones, of Bangladesh by killing people every year besides damaging the properties and blocking the public utilities. **Figure 17** shows the landslide prone areas around the subproject area.

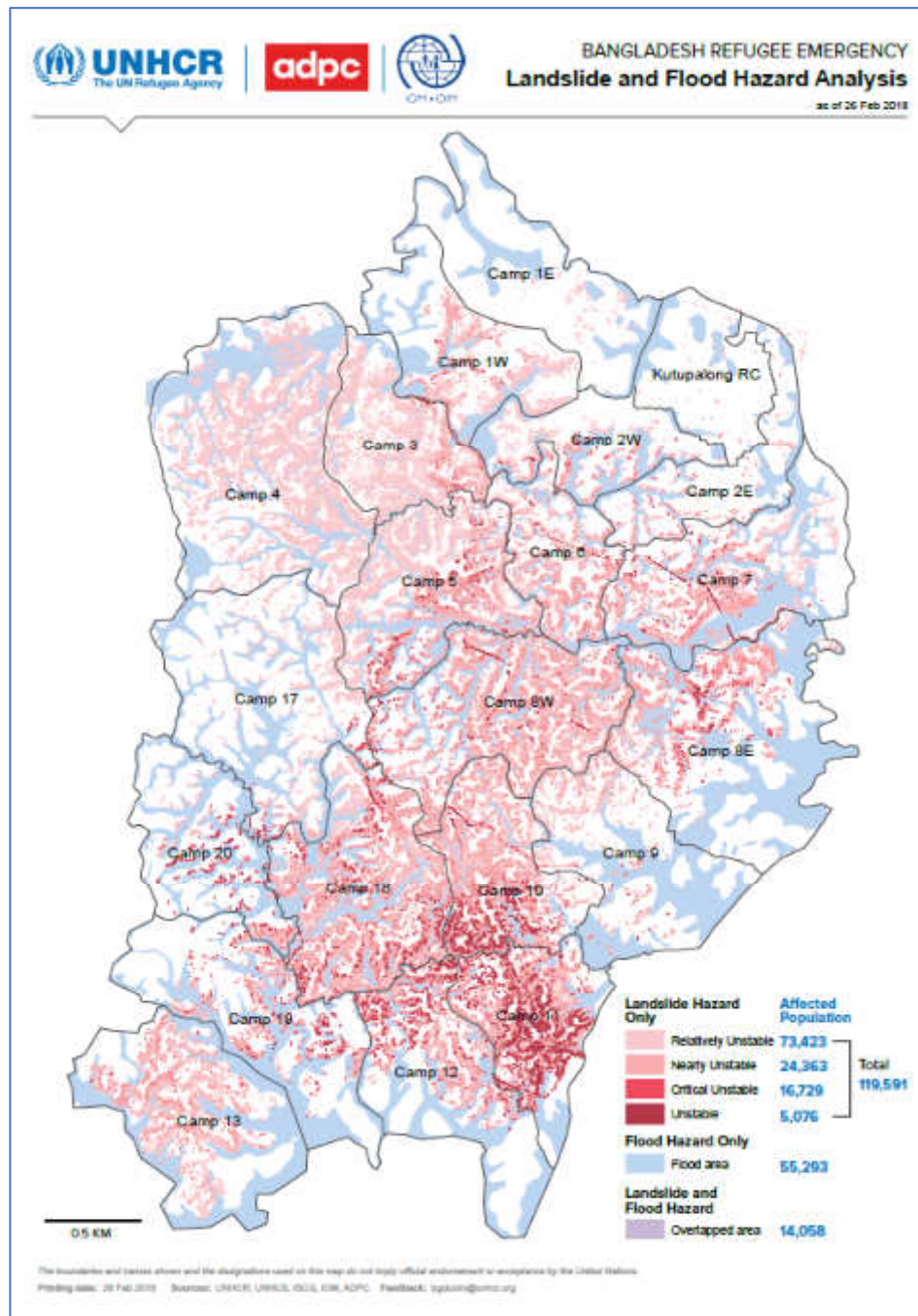


Figure 17 Landslide vulnerability areas around the subproject

5.3.8 Air Quality and Dust

74 As there are no major industries in subproject area as well as Ukhiya Upazila, the main sources of air pollution are vehicles movement and non-point sources such as open burning and black smoke emission from vehicles. During dry season the windblown dust also degrades the air quality.

5.3.9 Noise Level

75 Noise level data is not available for the region. The major causes for noise in the subproject area are the vehicle movement (motor cycles, pick-up, mini-trucks, CNG rickshaw and auto-rickshaws), playing of loud-speaker and mass people gathering (for advertising of products and political, social and religious aspects) and local market. This is a common experience of the peri-urban population that noise poses a threat to the ill / physically weak people health and nerves.

5.3.10 Health and Sanitation

No reliable data available on health and sanitation.

5.3.11 Solid Waste Management

76 With the increase population and rapid urbanization, it is natural that generation of solid waste will also increase. If these wastes are not properly managed, it can have detrimental effects on the environmental quality. So, collection and management of solid waste is a great challenge for the Ukhiya Upazila. No specific information on the Upazila is available. However, some information on Cox's Bazar solid waste management is available in the form of literatures, especially focusing on Kutupalong Rohingya Refugee camp. Cox's Bazar district has limited infrastructure for solid waste management. This is particularly the case within the rural communities near to the Kutupalong Camp. There are currently no landfill sites available for the camp or host communities and Bangladesh has banned the use of waste incinerators. There are a number of solid waste management projects either proposed or planned by the government of Bangladesh and other agencies including landfill construction and waste collection.

5.4 BIOTIC ENVIRONMENT

5.4.1 Flora

77 This subproject area is full of natural vegetation. Plant species found on road sides within 5km radius of the subproject are: mehgani, arjun, pitali, eucalyptus, bot, jam, akashmoni, auricoliformis, am, kadam, shisoo, koro, krishna chura, babla, ipil-ipil, shimul, shirish, etc (**Figure 18**). Among crop-field vegetation, aman is grown during summer rains and boro (winter rice) cultivated by irrigation in winter. Rabi crops like mustard and lentils are also grown.

78 The forestland in the Ukhiya upazila is covered by tropical evergreen and semi-evergreen forests dominated by Garjan (*Dipterocarpus* spp.) occurring in deep valleys and shaded slopes. Human activities have denuded most parts of the hills which have been re-occupied by sungrass, herbs and shrubs. Still, the area houses rich biodiversity, especially within the protected areas (PA). A list of naturally grown seedling are provided below (**Table 7**). However, the list provided below is not complete and detailed survey in this aspect is required.

Table 7 List of naturally grown seedlings in the area

Sl. No.	Family	Scientific name	Local name
1	Apocynaceae	Holarrhena antidysenterica	Kuruch
2	Bignoniaceae	Stereospermum chelonoides	Darmara
3	Burseraceae	Bursera serrata	Gutgutia
4	Combretaceae	Terminalia bellirica	Bohera
5	Dilleniaceae	Dillenia pentagyna	Hargaza
6	Euphorbiaceae	Macaranga denticulate Phyllanthus emblica	Bura Amloki
7	Lauraceae	Beilschmiedia Pseudomicrocarpa	Tuangiri
8	Leguminosae	Erythrina variegata	Madar
9	Meliaceae	Toona ciliate	Toon
10	Moraceae	Ficus hispida Ficus racemosa	Dumur Joggi Dumur
11	Musaceae	Musa textiles	Pahari kola
12	Myrtaceae	Syzygium fruticosum	Puti Jam
13	Sterculiaceae	Abroma augusta	Ulat kombol
14	Tiliaceae	Microcos paniculata	Achargula
15	Verbenaceae	Callicarpa macrophylla	Bormala

79 Near to the settlements, the most common trees are the raintree (*Albizia saman*), mango (*Mangifera indica*), coconut (*Cocos nucifera*), mahogany (*Swietenia mahogany*), gogon siris (*Albizia richardiana*), betel palm (*Areca catechu*) and guava (*Psidium guajava*) plus banana (*Musa sp.*). Sessile joy weed (*Alternanthera sessilis*), thorny amaranth (*Amaranthus spinosus*), bermuda grass (*Cynodon dactylon*), smartweed (*Polygonum sp*), creeping oxalis (*Oxalis corniculata*), etc., are the common weed species. See **Figure 18** for photos of vegetation in the region.

**Figure 18 Terrestrial flora around the site**

5.4.2 Fauna

80 There are some nearby wetland areas to the west of the subproject area which provide habitat for common coastal wading birds including heron, dahuk, ibis and stork, as well as various gulls and terns. Common bird species noted in the Project corridor were Asian crow, myna, cuckoo, kingfisher, pigeon and dove satore, drongo, weaver bird choroi, babui, and dahuk. The mammals include shial, monkey, begi, bhodar, heza, various rodents, guishap, baghdash, and badur. There are also several species of frog, lizard, and snake.

81 Apart from the degradation, this forest area still houses rich biodiversity including megafauna like the Asian elephant (*Elephas maximus*) and many different bird species. It has been confirmed that more than 50% of the country's wildlife species are living in the forests of Ukhiya, Teknaf, Inani and Himchari within the Cox's Bazar South Forest Division.

5.4.3 Fisheries

82 Local villagers reported catching fish in all the water bodies in the Project area. Major fishes in the rivers and canals in the Project area are carps (rui, catla, mrigal, ghania, kalbausa, and kalia), catfish (boal, pangas, silon, ayeir, and bacha) and snake head (shol, gazar, and taki), freshwater shrimp and several other tropical whitefish species. These species are well adapted to the silt-load extreme water temperature oxygen conditions in the subproject waterbodies.

5.4.4 Asian Elephants

83 The Asian elephant is an endangered species in the South and SE Asian countries they occur in. It is listed as endangered in IUCN's Red List and well as in Bangladesh's red list. There are likely less than 300 animals remaining in the country with about 200 resident (i.e., not crossing international borders) and 100-150 having a transboundary range with India and Myanmar, and about 40,000 animals in the world, with the greatest populations found in Myanmar and India. The presence of elephant in an area is an indicator of a healthy ecosystem, and also one of the key drivers in maintaining a diversity of habitat and inhabitants.

84 There is evidence of presence of elephants in the subproject area. A few incidents of human-elephant conflict has been reported in 2018. The IUCN has conducted a study on such conflict and suggested a few mitigation measures to reduce such conflicts. **Figure 19** presents a map of recent human-elephant conflicts prepared by the IUCN.

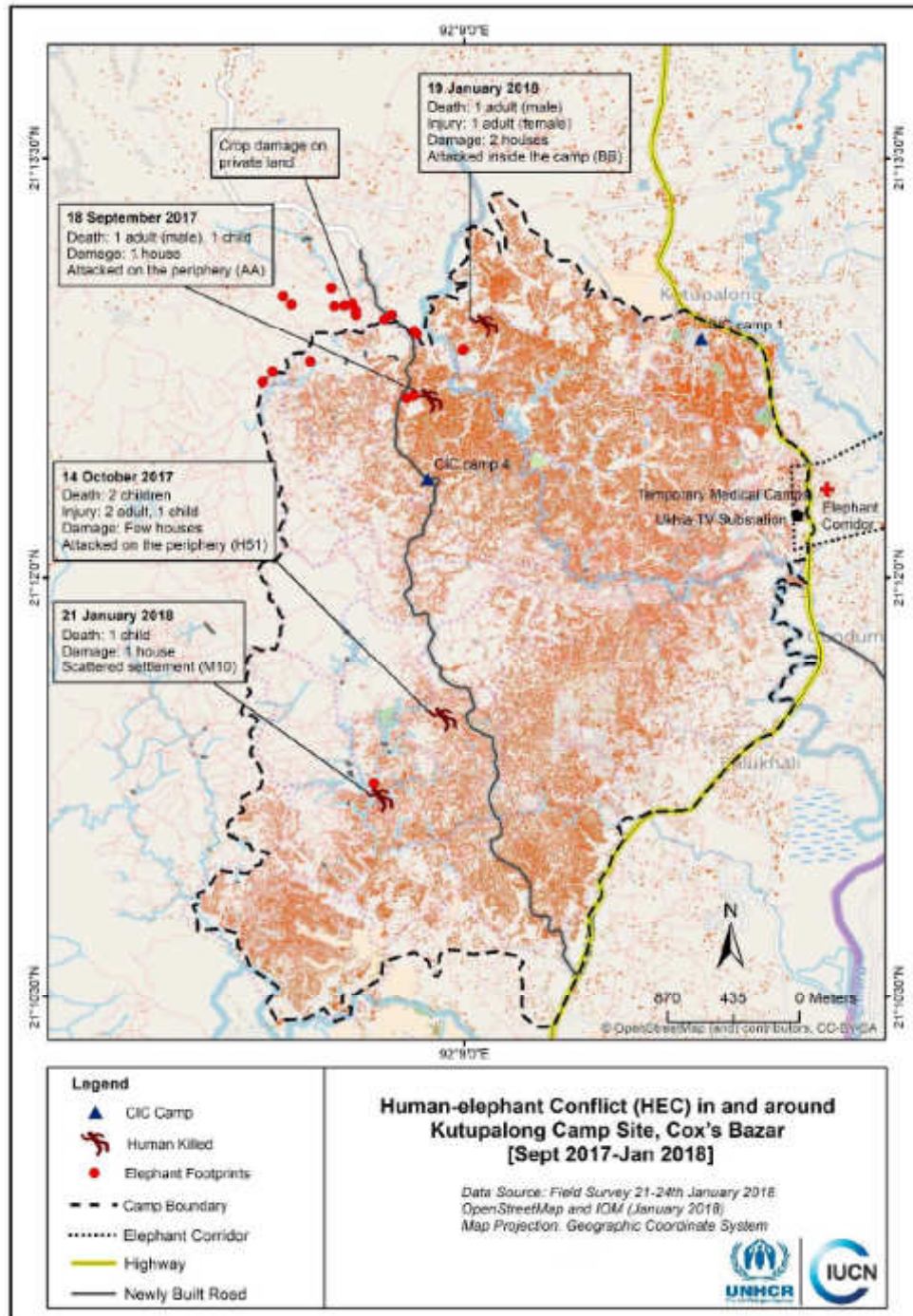


Figure 19 Human-Elephant conflict map around the sub-project area

5.5 SOCIO-ECONOMIC AND SOCIO-CULTURAL ENVIRONMENT

5.5.1 Land Use Pattern, Status of Housing and Built-up Infrastructure

85 The subproject areas are mixed zone of urban and peri-urban area with residential and agricultural zone. The road side infrastructures are mainly residential houses (pucca, semi-pucca, tin shed and katcha), shops, bazars, educational and religious institutes (**Figure 20**).

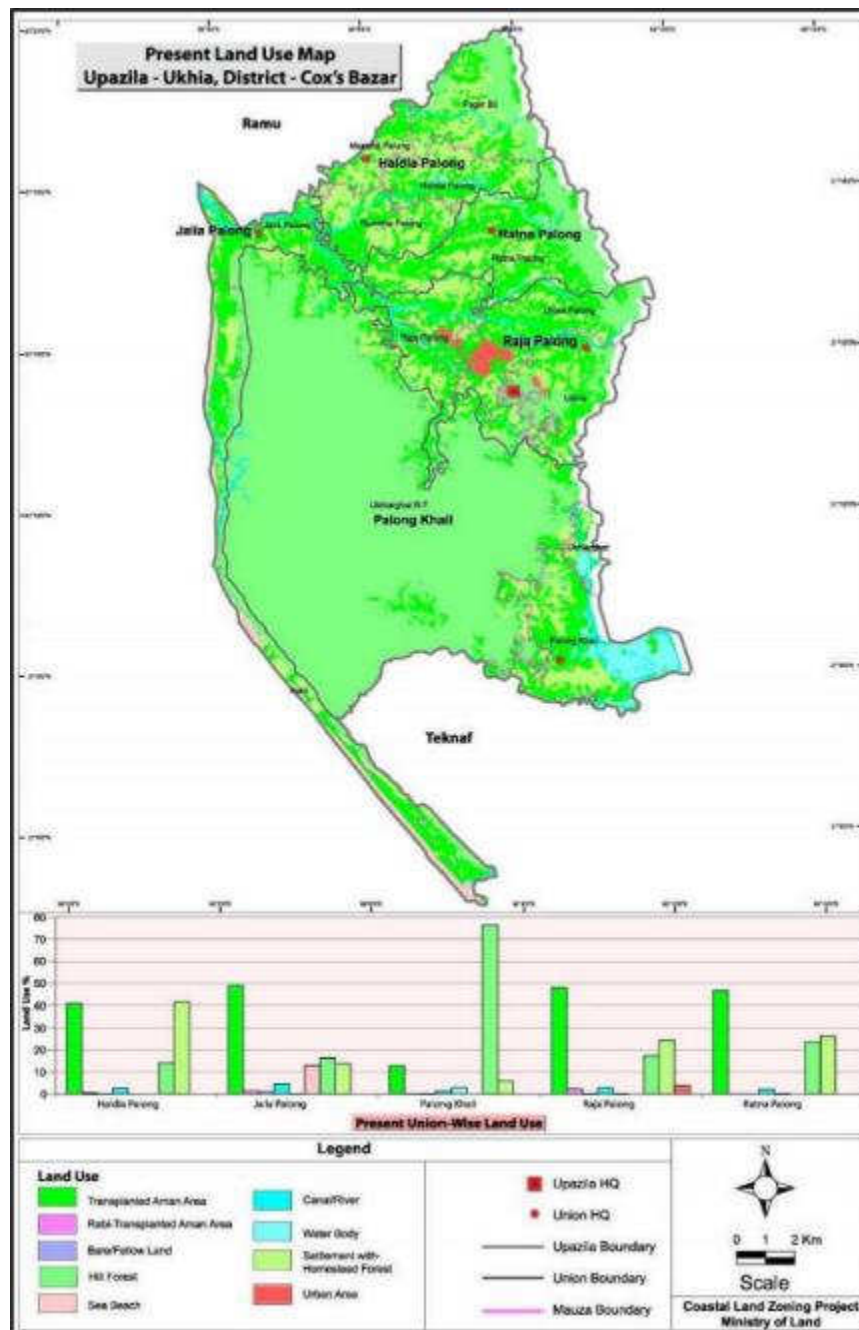


Figure 20 Land use map of Ukhiya

5.5.2 Education

86 In the subproject area, literacy rate is higher (61.3%) than the total average (51.8%) of country. The literacy rate for male (62.6%) is higher than female (59.8%). (Population and Housing Census, 2011).

5.5.3 Tribal Communities

87 There is no indigenous or tribal people settlement in the subproject area. T

5.5.4 Cultural Heritage and Protected Areas

88 Within the influence area of the subproject no historical sites were identified. Religious center (such as Mosques, temples), educational institutions and local bazar bring cultural values to the community people. **Figure 21** shows the protected areas of Bangladesh.

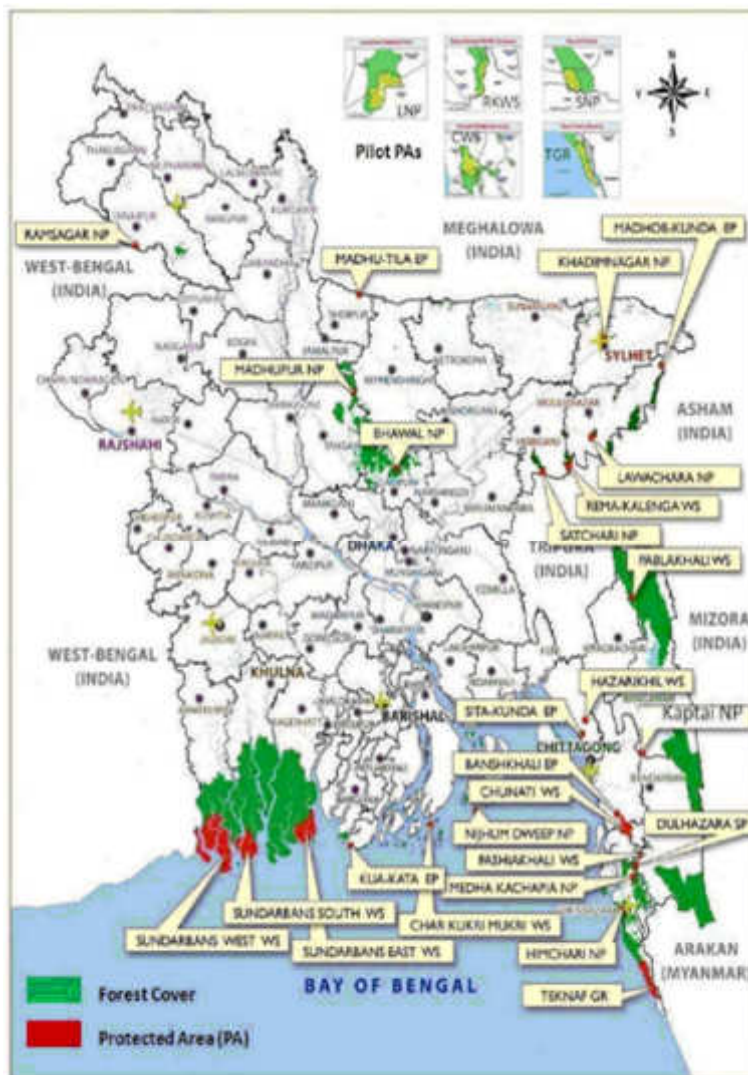


Figure 21 Protected areas of Bangladesh

6 Potential Impacts

6.1 METHODOLOGY

89 This section identifies the potential impacts that the various elements of the proposed Project may have on aspects of the physical, biological and socio-economic environment. The identification of the potential impacts will be considered for the two distinctive Project stages (construction and operation) as detailed in **Section 3**. The activities undertaken during each of these Project stages form the basis for potential impact identification and analysis.

90 Assessment of potential impacts requires a multi-disciplinary approach in which a wide range of issues are taken into consideration to identify and determine which potential Project impacts may be significant and therefore require the application of reasonable and effective management and/or mitigation. Most projects result in positive and negative potential impacts on the environment, society and economy, all of which are identified and assessed in this section.

91 Certain impacts identified in this section have the potential to be significant. The determination of whether a given potential impact is significant depends on several factors:

- The potential for on-site and off-site impacts;
- The potential for direct and indirect impacts;
- The frequency and duration of a potential impact;
- The geographic area affected by a potential impact
- The period of time affected by any potential impact;
- The sensitivity of the receiving environment; and
- The degree of confidence with which the potential impacts of the action/activity are known and understood.

92 Measures of potential impact significance as part of the Project planning and assessment phase presented in this IEE have been determined using a risk based model. The risk based model is a two dimensional matrix of 'magnitude of impact' and 'likelihood'. Both are assigned score between 1 and 5 based on severity or probability and multiplied to obtain the 'risk band'.

93 The 'magnitude of impact' is a 5-point based scale set by expert's judgement. The scale and its explanation is given in **Table 8**.

Table 8 Explanation and assignment of scores to 'magnitude of impact'

Colour Band	Incidental	Minor	Moderate	Major	Severe/catastrophic
Score	Score: 1	Score: 2	Score: 3	Score: 4	Score: 5
Explanation	Impacts such as localized or short-term effects on habitat, species or environmental media.	Localized, long term degradation of sensitive habitat or widespread, short-term impacts to habitat, species or environmental media	Impacts such as localized but irreversible habitat loss or widespread, long-term effects on habitat, species or environmental media	Widespread and persistent changes in habitat, species or environmental media	Persistent reduction in ecosystem function on a landscape scale or significant disruption of a sensitive species.

The 'likelihood' is also a 5-point based scale set by expert's judgement. The scale and its explanation is given in **Table 9**.

Table 9 Explanation and assignment of scores to 'likelihood'

Colour Band	Rare	Unlikely	Seldom	Occasional	Likely
Score	Score: 1	Score: 2	Score: 3	Score: 4	Score: 5
Explanation	Rare or unheard of	Reasonable to expect that the consequence will not occur during this project though has occurred several times in industry	Exceptional conditions may allow consequences to occur within the project lifetime	Conditions may allow the consequence to occur during the project lifetime, or the event has occurred within similar projects	Consequence can reasonably be expected to occur in life the project

94 Therefore, "Risk" factor is derived from the following equation:

$$\text{Risk} = \text{Magnitude} \times \text{likelihood} \quad (1)$$

95 The score of 'Risk' ranges from 1 to 25. The score is classified in 3 classes. The explanation is given in **Table 10**. The score matrix for risk assessment has been used to identify the priority environmental impact and their mitigation plan.

Table 10 Two-dimensional risk assessment matrix

			MAGNITUDE OF IMPACT				
			Incidental	Minor	Moderate	Major	Severe/cats.
			Score: 1	Score: 2	Score: 3	Score: 4	Score: 5
LIKELIHOOD	Rare	Score: 1	1	2	3	4	5
	Unlikely	Score: 2	2	4	6	8	10
	Seldom	Score: 3	3	6	9	12	15
	Occasional	Score: 4	4	8	12	16	20
	likely	Score: 5	5	10	15	20	25

6.2 DISCUSSION ON POTENTIAL IMPACTS

6.2.1 Sector where no significant impact envisaged

96 Some aspects of the environment that are not expected to be significantly affected by the construction process have been screened out and will not be mentioned further in assessing the impacts of the construction process (**Table 11**).

Table 11 Sectors where no significant impacts envisaged

Field	Rationale
Climate	Short-term production of dust is the only effect on atmosphere
Geology and seismology	Excavation will not be large enough to affect these features
Industries	There are no major industries in any areas to be affected by the project
Tourism	Tourists mostly drive by the villages located as these are located on the highway
Community	Construction will not affect population numbers, location or composition

6.2.2 Impacts during Planning Phase

97 Land Acquisition and resettlement: In some sections the road will need to be widened through the hills. Therefore, hills on both sides needs to be cut down. However, the margin of cutting will be limited to maximum 1m and this will not affect any local residence

98 Failure to obtain NOC: Failure to obtain necessary consents, permits, NOC's can result in design revisions and/or stoppage of the Works.

99 EMP Implementation Training: Often lack of proper training to implement the Environmental Management Plan (EMP) stipulated in the Bid document leads to mismanaged environmental safeguards. Therefore, EMP training for the contractors, workers and implementing agency is necessary before construction goes on-board. A training needs to be arranged before construction starts with all involved parties: contractor, workers and representatives from Implementing Agency to implement the EMP and therefore is necessary.

6.2.3 Impacts and mitigation measures during Construction Phase

100 Traffic congestion issue: The courtbazar joint is a relatively busy junction due to presence of Government Primary School. Also, presence of couple of markets around the junction makes the road construction work a potential nuisance of traffic congestion. Additionally, the junction is located on a slope of the hill, which makes traffic slow. Often heavy loaded vehicles get stuck in the area and create traffic congestion.

101 Soil Erosion: Clearing topsoil in proposed widening areas can lead to loss of nutrient and erosion particularly along the hill cut slopes and dust from unprotected storage sites. The erosion risk at hill cut slopes is possible. Gully erosion along the exposed track slope during rainy season may cause localized sedimentation congestions. There is no water body (e.g., khal, pond) located close to the proposed road locations, therefore the potential adverse impact (e.g., through discharge of waste/ wastewater from sub-project activities, spills and leaks of oil/ chemical) on water quality (in the absence of any mitigation/management) could to be classified as "none". The location of the proposed road sites is on elevated land and well above flood level, therefore the construction works is not expected to obstruct the flow of natural drainage water, and therefore impact on drainage would most likely be "minor".

102 Hydrology and Surface Water Quality: Near the Courtbazar section there is a potential of erosion due to rainfall-runoff. Earthwork activities during construction at this point may result in drainage congestion. Excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall, which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short term, site-specific within a relatively small area and reversible by mitigation measures. Therefore, risk score for this issue has been calculated as '6', which is medium risk.

103 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 proposed road is relatively small and narrow. Therefore, the impacts should be negative but short-term, site-specific within a relatively small area and reversible by mitigation measures. Planning activities in consultation with Local Authority is suggested so that activities with the greatest potential to generate noise are conducted during periods of the day, which will result in least disturbance.

104 Acoustic Environment: Temporary increase in noise level and vibrations may be caused by excavation equipment, and the transportation of equipment, materials, and people. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.

105 Water Pollution from sewage: Untreated sewage from the pit latrines could have the potential to enter surface water if not adequately designed and positioned to reflect the local hydrological and hydrogeological patterns. Periods of high rainfall could lead to the overflow of the pit and overland flow, or rapid through-flow of the effluent to surface water prior to its full digestion in the soil. Raw sewage can potentially impact surface water quality by promoting the growth of algae and delivering pathogens may be harmful to human and ecological receptors. Use of toxic materials such as solvents and vehicle maintenance fluid (oil, coolant) and diesel fuel may contaminate surface and groundwater if these are disposed of directly into the ground or washed into the streams. Human waste from construction workers may also contaminate surface water and groundwater if there are no adequate sanitary facilities. In this case, there is not surface water or ground water sources nearby. Therefore, contamination of surface and ground water is unlikely.

106 Disturbance in wildlife: Clearing of existing vegetation may result in loss of associated ecological habitats and their fauna. Noise, vibrations, and intrusive activities related to construction works may scare away animals remaining onsite after vegetation clearance. Elephant-human conflicts may arise if elephant movement pathways are disrupted. Wildlife may be impacted by vegetation clearance and the temporary loss of small habitat locations at pole sites. However, subproject area is located in the sites where open spaces are already provided with existing school buildings, which are devoid of any wildlife, vegetation or elephant. Therefore, no impact is predicted.

107 Hazardous Materials and Waste: Similarly, waste management facilities, if improperly managed, may result in potential impacts to surface water by the introduction of harmful substances during runoff events. Of particular importance are the potential impacts from chlorides, nutrients such as nitrates and phosphates, and pathogens such as E. coli or Typhoid, all of which are present in typical domestic waste. Chlorides can have acute effects on aquatic biodiversity, as well as longer-terms effects such as inhibition of plant growth and interruption of invertebrate reproductive cycles. Nutrients such as phosphates or nitrates can also be immediately toxic to aquatic fauna, but may also result in algal blooms (also known as eutrophication) or excessive growth of undesirable plant species. The proposed site does not have proper disposal site or facilities to dump solid waste; rather the solid waste is dumped in nearby lowlands. It would be important to establish formal solid waste management strategy to properly handle solid waste generated in these sites.

108 Construction Camp: Poor siting and improper management of construction camps may lead to several adverse impacts on environment: (i) loss of vegetation due to use of wood as fuel source for cooking, (ii) deterioration of nearby surface water quality, (iii) compaction and contamination of soil due to uncontrolled disposal of solid waste, (iv) increase in generation of domestic solid waste; (v) temporary air an noise pollution from machine operation; and (vi) poor sanitation resulting to transmission of

communicable diseases. In the subproject area, construction camp is suggested to be established outside of the camp area to avoid the predicted impacts.

109 **Occupational, Health, and Safety Risks:** Occupational hazards may arise if not properly managed (risk of fall and electrocution, etc.). Increase in dust may cause health problems to workers. Insufficient supply and improper use of personal protective equipment (PPE) and lack of safety procedures may cause injuries or fatal accidents. For safety, there will be a need to interrupt electricity supply to existing businesses while new poles, conductors and other installations are put in place. This needs to be done in a phased manner allowing small sections of lines to be reconnected to the network, keeping down time to a minimum for existing users. Close contact with persons afflicted with diseases and lack of sanitation in workers camps may also pose health risks. Outbreaks of diseases like diphtheria and measles can be avoided by observing proper sanitation facilities and observing good personal hygiene habits.

110 **Community Health and Safety Hazards:** Community hazards may arise during construction (dust, air quality, noise, electrocution etc.). Traffic accidents and vehicle collision with pedestrians during material and waste transportation may occur if no proper signage is placed.

111 **Social and Cultural Resources:** Ground disturbance can uncover and damage archaeological and historical remains. In the subproject area, such possibilities are limited, but should be accounted for.

7 Environmental Management Plan (EMP)

7.1 PURPOSE OF THIS EMP

112 The objective of this Environmental Management Plan (EMP) is to formulate measures, which will:

- Mitigate adverse impacts on various environmental components, which have been identified during observation;
- Protect environmental resources where possible;
- Enhance the value of environmental and social components where possible.

113 The EMP also includes a monitoring plan to enable evaluation of the success or failure of environmental management measures, and to carry out reorientation of the plan if found necessary. It is emphasized that many of the protective and enhancement measures can be implemented by adopting suitable planning and design criteria for construction of the project. This EMP is also made site specific with guidelines for the contractors to be able to operate according to the Bangladesh Government and ADB requirements to comply with their relevant policies.

7.2 SUMMARY OF PRIMARY OBSERVATION ON ENVIRONMENT

A summary environmental observation of the proposed road package, the basis of this EMP, is presented in **Table 12**.

Table 12 Summary observation of Environment

SL. No	Sector	Summary Description
1	Topography and landform	Soil: Brown Hill soil, magnesium rich; topography: hilly, erosion prone
2	Hydrology and drainage	Above flood level
3	Water quality	Not known
4	Flora and fauna	The project area is vegetated. Grass and shrubs are commonly found. No medicinal plant or plant of significant conservation value was found.
5	Air quality	No data available.
6	Land use	Elevated, vegetated, used for building complexes

7.3 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

114 The EMP is necessary on the grounds that it will manage the environment by off-setting the negative impacts with possible mitigation measures and enhancing the positive impacts within the allocated fund from the project. Thus, the main objectives of the EMP for the construction of the access road project are:

- Define the responsibilities of the project proponents in accordance with the three project phases (design, construction and operation);
- Facilitate the implementation of the mitigation measures by providing the technical details of each project impact, and proposing an implementation schedule of the proposed mitigation measures;
- Define a monitoring mechanism and identify monitoring parameters to ensure that all proposed mitigation measures are completely and effectively implemented;

- Identify training requirements at various levels and provide a plan for the implementation of training sessions;
- Identify the resources required to implement the EMP and outline corresponding financing arrangements; and Providing a cost estimate for all proposed EMP actions

115 The Environmental Management Plan (EMP) presented in **Table 13**. Only the prioritized risks are presented in the EMP for specific measures.

7.3.1 List of major mitigation measures

116 **Vegetation clearance and replantation:** Clearance of vegetation is expected. However, most vegetation to be cleared is bushy and ornamental. Highest efforts will be necessary to avoid tree cutting. If unavoidable at least two trees will be planted for every tree cut. Plantation of approx. 50 trees as enhancement measures. For erosion prevention along the hill slopes, three types of trees are suggested: i. various species of Fig (Bengali Name: Dumur; deep rooted, erosion preventive; located high and middle hills); ii. Indian gooseberry (Bengali Name: Amla; another deep and spreading rooted, erosion preventive; located in middle hills); iii. Fragrant Padri-Tree (Bengali Name: Parul; deep rooted, erosion preventive, located in top and middle hills). As each section of the construction work is completed, trees and understory vegetation must be planted, in order to help the cleared areas in an effort to attract some wildlife such as birds.

117 **Dust protection and soil erosion management:** Raw materials should be purchased locally as long as quality of raw materials is not compromised. Create a local good water and soil conservation plan which shall not only take into account sufficiently the type, mode and intensity of water and soil loss caused by the Project construction, but integrate the general plan of the management area of Project operation period.

118 **Traffic congestion:** Formulate traffic direction, diversion and temporary access plans, setting up sufficient traffic direction signs. Information shall be released through local newspapers and posters. Warning lights should be set up along the construction road sections, guiding the access of vehicles. Please follow the Generic Traffic Management Guideline stipulated in the IEE report. Also develop a site-specific traffic management plan.

119 **Water pollution:** Install silt protection curtain at the hill side. All earthworks must to be conducted during dry season/dry spell to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Local Authority on designated disposal areas. Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low-lying areas. Monitor water quality according to the environmental management plan. Garbage disposal service to be provided, Concrete refuse reused or disposed of without habitat loss.

120 The full fledged EMP with mitigation plan in given in **Table 13** and **Table 14**.

Table 13 Environmental Management Plan (EMP) for the road Subproject

Ref. No.	Impact/Issue	Magnitude	Likelihood	Risk Factor	Measure
1.0 Pre-construction (site screening and design) phase					
1.1	Land Acquisition and Resettlement <ul style="list-style-type: none"> Potential impact on original residents In some sections the road will need to be widened through the hills. Therefore, hills on both sides needs to be cut down. However, the margin of cutting will be limited to maximum 1m and this will not affect any local residence 	1	1	1	<ul style="list-style-type: none"> No impact on land acquisition and local residents are expected. No mitigation measures needed.
1.2	Considerations of Asian Elephants <ul style="list-style-type: none"> The road does not cross any elephant crossing areas, which is further north-east from the project location. 	4	1	4	<ul style="list-style-type: none"> No impact is expected, no mitigation measure needed
1.3	Vegetation clearing and Landscape <ul style="list-style-type: none"> No tree cutting is expected due to the improvement of the road. However, some saplings within the RoW of proposed alignment, and workers camp setting areas will be felled and removed during pre-construction period resulting in very minimal ecological and economic loss. 	1	2	2	<ul style="list-style-type: none"> Clearance of vegetation is expected. However, most vegetation to be cleared is bushy and ornamental. Highest efforts will be necessary to avoid tree cutting. If unavoidable at least two trees will be planted for every tree cut. Plantation of approx. 50 trees as enhancement measures. For erosion prevention along the hill slopes, three types of trees are suggested: <ul style="list-style-type: none"> Various species of Fig (Bengali Name: Dumur; deep rooted, erosion preventive; located high and middle hills) Indian gooseberry (Bengali Name: Amla; another deep and spreading rooted, erosion preventive; located in middle hills) Fragrant Padri-Tree (Bengali Name: Parul; deep rooted, erosion preventive, located in top and middle hills) As each section of the construction work is completed, trees and understory vegetation must be planted, in order to help the cleared areas in an effort to attract some wildlife such as birds.
1.4	Dust and soil erosion <ul style="list-style-type: none"> Impact of dust from transportation on surrounding residents 	3	1	3	<ul style="list-style-type: none"> Raw materials should be purchased locally as long as quality of raw materials is not compromised Create a local good water and soil conservation plan which shall not only take into account sufficiently the type, mode and intensity of water and soil loss caused by the Project

Ref. No.	Impact/Issue	Magnitude	Likelihood	Risk Factor	Measure
	<ul style="list-style-type: none"> The region is erosion prone and vulnerable to hydrological events like excessive rainfall. There is a risk of soil and water pollution during construction work 				construction, but integrate the general plan of the management area of Project operation period.
1.5	Existing utilities: <ul style="list-style-type: none"> Disruption of services Impact on flora and fauna 	3	1	3	<ul style="list-style-type: none"> Drawing from the consultant's visit, there was no utility or services found. Therefore, disruption in services is not expected. There is vegetation alongside the existing road. It is expected that road widening, construction of culverts and drainage system may require clearing of vegetation. At design stage, the required vegetation clearance will be identified so that an estimate can be found of how many trees are to be chopped off and after construction where tree plantation can be done. Native trees with deep roots are suggested for tree plantation program.
1.6	EMP Implementation Training: If the contractors and construction supervision engineers are not aware about the implementation of this EMP, the project may not proceed and comply with ADB and GoB environmental policies.	3	2	6	<ul style="list-style-type: none"> 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.
1.7	Consents; NOC's: Failure to obtain necessary consents, permits, NOC's can result in design revisions and/or stoppage of the Works	3	2	6	<ul style="list-style-type: none"> Obtain all necessary consents, clearances, permits, NOC's prior to start of the Works; NOC is required from the District Administration (in this case DC of Cox's Bazaar District) 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.
2.0 During Construction Phase					
2.1	Social Disruption: Traffic congestion issue <ul style="list-style-type: none"> The Courtbazar joint is a relatively busy junction due to presence of Government Primary School. Also, presence of couple of markets around the junction makes the road construction work a potential nuisance of traffic congestion. Additionally, the junction is located on a slope of the hill, which makes traffic slow. 	2	4	8	<ul style="list-style-type: none"> Formulate traffic direction, diversion and temporary access plans, setting up sufficient traffic direction signs. Information shall be released through local newspapers and posters. Warning lights should be set up along the construction road sections, guiding the access of vehicles. <p>Please follow the Generic Traffic Management Guideline stipulated in the IEE report. Also develop a site-specific traffic management plan.</p>

Ref. No.	Impact/Issue	Magnitude	Likelihood	Risk Factor	Measure
	Often heavy loaded vehicles get stuck in the area and create traffic congestion.				
2.2	Soil Erosion <ul style="list-style-type: none"> Clearing topsoil in proposed widening areas can lead to loss of nutrient and erosion particularly along the hill cut slopes and dust from unprotected storage sites. The erosion risk at hill cut slopes is possible. Gully erosion along the exposed track slope during rainy season may cause localized sedimentation congestions 	3	1	3	<ul style="list-style-type: none"> Topsoil storage areas must be protected during the dry season, wind erosion—by covering. Rapid revegetation and use of hydro-seeding and jute erosion protection mats should be applied in areas where erosion is noted during the regular monthly inspections
2.3	Topography and Landscape changes <ul style="list-style-type: none"> Visual intrusion from large piles of bridge/culverts materials and ballast obstructing views and excavation along the edge of the alignment leaving large unsafe holes is possible. 	2	3	6	<ul style="list-style-type: none"> Bridge/culvert sites to be planted with trees to promote natural vegetation; as well as fast growing grasses such as Napitar / Elephant etc. Only low grass and shrub erosion protection measures here. Material stockpiles will be removed as soon as work is completed and the area re-landscaped. Same applies to borrow areas.
2.4	Hydrology and Surface Water Quality: <ul style="list-style-type: none"> At Courtbazar section there is a potential of erosion due to rainfall-runoff. Earthwork activities during construction at this point may result in drainage congestion Excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall, which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short term, site-specific within a relatively small area and reversible by mitigation measures. 	2	3	6	<ul style="list-style-type: none"> Install silt protection curtain at the hill sides. All earthworks must to be conducted during dry season/dry spell to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. Prioritize re-use of excess spoils and materials in construction activities. If spoils will be disposed, consult with Local Authority on designated disposal areas. Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low-lying areas. Monitor water quality according to the environmental management plan. Garbage disposal service to be provided, Concrete refuse reused or disposed of without habitat loss; <ul style="list-style-type: none"> All other effluents not to be disposed of directly into natural waters, but via settling basins to allow suspended sediment to settle out.
2.5	Surface water quality at work camp <ul style="list-style-type: none"> The surface water at workers camp and Project site areas may become pollute due to faecal, 	4	1	4	<ul style="list-style-type: none"> Workforce camps will be located away from water resources. All practical measures such as provision of septic tanks, garbage bags, and other sanitation facilities will be

Ref. No.	Impact/Issue	Magnitude	Likelihood	Risk Factor	Measure
	organic and other contamination. Disposed wastes and effluents from the construction sites may cause further degradation of surface water.				<p>implemented at the construction camps to prevent the wastewater and solid wastes from entering well and groundwater recharge areas.</p> <ul style="list-style-type: none"> Wells used for drinking will be tested quarterly to ensure potability. The wells will be designated during labour camp establishment. <p>Take all precautions to minimize the wastage of water in the construction activities. In this case there is no waterbody nearby. However, it needs to be noted that, no temporary or long-term waterlogging during the construction should be allowed.</p>
2.6	Ground Water <ul style="list-style-type: none"> The potential exists for drinking water sources to be contaminated by the seepage of wastes from workers camps through the soil profile into the GW aquifer (particularly if wells access the shallow aquifer). There are small hilly streams on the RoW potentially be contaminated seepage wastes from workers camp and stockpile materials 	4	1	4	<ul style="list-style-type: none"> Workforce camps will be located away from water resources. All practical measures such as provision of septic tanks, garbage bags, and other sanitation facilities will be implemented at the construction camps to prevent the wastewater and solid wastes from entering well and groundwater recharge areas. Wells used for drinking should be tested once a year to ensure portability.
2.7	Air Quality: <ul style="list-style-type: none"> 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 proposed road is relatively small and narrow. Therefore, the impacts should be negative but short-term, site-specific within a relatively small area and reversible by mitigation measures. 	2	3	6	<ul style="list-style-type: none"> Damp down exposed soil and any sand stockpiled on site by spraying with water during dry weather; Use tarpaulins to cover soils, sand and other loose material when transported by trucks. Unpaved surfaces used for haulage of materials within settlements shall be maintained dust-free. Arrangements to control dust through provision of windscreens, water sprinklers, and dust extraction systems shall be provided at all hot-mix plants, batching plants and crushers (if these establishments are being set up exclusively for the subproject). Monitor air quality.
2.8	Acoustic Environment: Temporary increase in noise level and vibrations may be caused by excavation equipment, and the	2	3	6	<ul style="list-style-type: none"> 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.

Ref. No.	Impact/Issue	Magnitude	Likelihood	Risk Factor	Measure
	transportation of equipment, materials, and people. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.				<ul style="list-style-type: none"> If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. Monitor air quality and vibration during construction works. 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 (e.g. excavator, trucks) shall be stopped during night time. Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensure that these are maintained to manufacturers' specifications at all times. All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required).
2.9	Biodiversity- Flora and Fauna: There are no protected areas in or around subproject sites, and no known areas of ecological interest.	1	3	3	<ul style="list-style-type: none"> The proposed runs through the hills. In some places hills will be cut to widened the road. Grass trufing (vertiver/elephant grass) is suggested in such areas to protect slope erosion and sedimentation. Trees, especially native hill area species can be planted on the hill side at a safe distance from the sites (at least 10m). The trees needs native in nature and deep rooted so that they can prevent soil erosion. Suggested species are enlisted in Section 1.3 of this Table. Prohibit employees from poaching wildlife and cutting of trees for firewood.
2.10	Waste <ul style="list-style-type: none"> Construction waste from construction work Domestic waste from workers Hazardous waste 	2	3	6	<ul style="list-style-type: none"> Conduct separate waste collection, promote recycling and reuse. Appropriate disposal of non-recyclable waste according to rules Hazardous waste should be treated under the related regulation
2.11	Community Health and Safety: <ul style="list-style-type: none"> Construction works will impede the access of residents and businesses in limited cases. The 	4	3	12	<p>The following Generic Mitigation measures are advised:</p> <ul style="list-style-type: none"> Contractor's activities and movement of staff will be restricted to designated construction areas.

Ref. No.	Impact/Issue	Magnitude	Likelihood	Risk Factor	Measure
	impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.				<ul style="list-style-type: none"> 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.¹¹ Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do. Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance.

¹¹These 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.	Impact/Issue	Magnitude	Likelihood	Risk Factor	Measure
					<ul style="list-style-type: none"> Create traffic regulation and diversion zones during construction work. The proposed site is on the main road, and it is expected that heavy vehicle movements can cause traffic nuisance. Therefore, traffic regulation and diversion will be important to avoid traffic nuisance.
2.12	Road safety During the construction period and operation period, lack of proper road signages, especially in the hilly areas with twists and turns, may lead to road accidents	3	2	6	<ul style="list-style-type: none"> Install Proper signages along the road Speed bump near the villages/ community Reflector at the risky turns, trees to avoid accident
2.13	Worker's health and safety: <ul style="list-style-type: none"> There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in populous 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. 	4	3	12	The following Generic Mitigation measures are advised: <ul style="list-style-type: none"> Comply with requirements of Government of Bangladesh Labour Law of 2006 (amended in 2013) and all applicable laws and standards on workers' health and safety (H&S). Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing H&S training ¹² for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances Maintain necessary living accommodation and ancillary facilities in functional and hygienic 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;

¹²Key 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 Supervision consultants

Ref. No.	Impact/Issue	Magnitude	Likelihood	Risk Factor	Measure
					<ul style="list-style-type: none"> Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; Ensure moving equipment is outfitted with audible back-up alarms; Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by 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.
3.0 Post-construction phase					
3.1	Post-construction clean-up: Damage due to debris, spoils, excess construction materials.	4	4	16	<p>The following generic measures should be taken:</p> <ul style="list-style-type: none"> 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 PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.
4.0 Others					

Ref. No.	Impact/Issue	Magnitude	Likelihood	Risk Factor	Measure
4.1	Submission of EMP implementation Report: Unsatisfactory compliance to EMP	3	1	3	<ul style="list-style-type: none"> • Appointment of Supervisor to ensure EMP implementation; • Timely submission of monitoring reports including pictures.

8 Environmental Monitoring Plan

8.1 ENVIRONMENTAL MONITORING PLAN

121 Monitoring points have been selected based on the sensitivity of the location with respect to sensitive receptors. The following areas should be monitored to check if the proposed project is having any impact:

A. Forest Area and Tree Plantation

The proposed sites are covered with more or less thick vegetation. Hilly vegetation is sensitive to erosion and running polluted water. The adjacent forest areas need to be monitored to detect any changes due to the implementation of the project. Tree plantation is also suggested in the EMP and need to be monitored when planted so that the planted vegetation survives.

B. Soil Erosion and Drainage Congestion

This another important issue that needs be monitored during project implementation. The entire area around the site is prone to erosion. Also, hilly runoffs are common around the area. Therefore, monitoring soil erosion around the project site will be a major task to undertake. Any change in stability at the adjacent hill or hint of erosion needs to be noted and information must be sent to the Environmental Officer in charge for further action.

C. Air and Noise Quality

Due to the variability of the construction activities, namely changes in batch composition, type of construction activity and other anthropogenic influences, the ambient air quality of the project area may change. If the air quality with respect to any parameter exceeds by more than 25% of its last monitored value, the monitoring frequency shall be doubled and cause of the increase investigated. If the construction activities are found to be the reason for this increase, suitable measures should be adopted.

Similarly, due to the variability in traffic movement, namely changes in traffic volume, traffic compositions and other anthropogenic influences, the noise quality in the project area is likely to change. If the noise quality exceeds by 20% of the applicable ambient noise quality standard or 5% of its last monitored value, the monitoring frequency shall be increased and the cause of the increase investigated. If the construction activities are found to be the reason for this increase, suitable measures should be adopted.

122 The full-fledged Environmental Monitoring Plan with frequency and responsibilities is detailed in **Table 14.**

Table 14 Environmental Monitoring Plan for the subproject

No	Environmental Issues	Significant Impact	Purpose of the Monitoring	Monitoring Method			Responsibility	
				Method of Collecting and Reporting Data	Location	Duration and Frequency	Implementation	Supervision
Pre-Construction Phase								
1.1	Trees and Landscape	No tree cutting is expected due to the improvement of the road. However, some saplings within the RoW of proposed alignment will be felled and removed during pre-construction period resulting in very minimal ecological and economic loss.	<ul style="list-style-type: none">Confirm that a tree cutting and replanting programme is fully ready to implement during the preconstruction periodPlantation of 50 trees as enhancement measures.Confirm that this planting plan is following during the construction period also.	Tree replanting plan and record of compensation	Along the alignment	During the pre-construction period	Contractor	LGED
1.3	EMP Implementation Training	Better understanding of environmental safeguards and how they are to be implemented is needed. LGED needs to provide this briefing to the contractor	Implementation of EMP	Obtain record of presentation	At LGED Office	Prior to contractor mobilization	LGED	LGED
Construction Phase								
2.1	Topography and Landscape Changes	Visual intrusion will be due to large piles of embankment materials obstructing views; Excavation along the edge of the alignment will leave large unsafe holes.	<ul style="list-style-type: none">Restoration of changes due to construction activitiesVisual amenity	Inspection/ consultation with adjacent households and LGED authority to get opinion on work being completed	Along the alignment	Construction stage/ Weekly inspection	Contractor	Construction Supervision Engineer, LGED
2.2	Air Quality	<ul style="list-style-type: none">Dust resulting from construction workExhaust gas from construction machinery and vehicles used for mobilization of equipment	Evaluation of effect of the mitigation measure towards air pollution	Visual inspection is suggested since no sensitive areas nearby	Along the alignment	Daily	Contractor	Construction Supervision Engineer, LGED
2.3	Wastes and drainage congestion	<ul style="list-style-type: none">Construction waste from construction workDomestic waste from workers	Evaluation of effect of the mitigation measure for waste	Record of kinds and quantity of waste, and the disposal method	Along the road and Workers camp	Daily	Contractor	Construction Supervision Engineer, LGED

No	Environmental Issues	Significant Impact	Purpose of the Monitoring	Monitoring Method			Responsibility	
				Method of Collecting and Reporting Data	Location	Duration and Frequency	Implementation	Supervision
		<ul style="list-style-type: none"> Hazardous waste such as dry batteries, etc. 						
2.4	Disturbance to local business	Decrease in business opportunities at the bazaar areas along the road alignment.	<ul style="list-style-type: none"> Improvement of the local economy Improvement of living standards of local residents Consideration to local residents' emotions 	<ul style="list-style-type: none"> Hearings from the related institutions Interviewing residents 	Bazar locations	weekly throughout the construction period	Social Safeguards officer, Contractor	Social Safeguards Expert, LGED
2.5	Disturbance to Existing Social Infrastructure and Services	<ul style="list-style-type: none"> Increased road traffic may disturb the local residents Traffic jams caused by increased vehicles during construction 	Evaluation of effect of construction schedule	Record of numbers construction vehicles	Project site	Continuous Record	Contractor	Social Safeguards Expert, LGED
2.6	Infectious Diseases such as HIV/AIDS	Temporary influx of migrant labor during construction may increase risk of infection	Evaluation of sanitation for labor	Labor health record	Related institutions	Twice a year	Contractor	Social Safeguards Expert, LGED
2.7	Work condition (including work safety)	Labor accidents	Evaluation of effect of the work safety plan	Record of accidents	Contractor's office	Continuous Record	Contractor	Social Safeguards Expert, LGED
2.8	Accidents	Traffic accidents	Evaluation of effect of traffic schedule	Record of accidents	Contractor's office	Continuous Record	Contractor	Social Safeguards Expert, LGED
2.9	Disturbance to Community traffic and installation of proper road signage	Traffic accidents	Evaluation of effect of the work safety plan, Evaluation of effect of traffic schedule	Records of road signage implemented, visual inspection	Along the road	Continuous record	Contractor	Environmental /social safeguards specialist, LGED
Operation Phase								
3.1	Air Quality	<ul style="list-style-type: none"> Exhaust gas from vehicles used for mobilization of equipment and workers Dust from road 	Evaluation of effect of the mitigation measure towards air pollution	Collecting samples at the site, analyzing at the lab.	Residential area around the road	Once every year for years 1, and 3	LGED/ Environmental Consultant	LGED
3.2	Noise and vibration	<ul style="list-style-type: none"> Noise caused by vehicles moving along the road carrying passengers and goods. 	Evaluation of effect of the mitigation measure towards noise level	Measurement using noise level meter	Along the road and Forest area	Once every year for 2 years	LGED / Environmental Consultant	LGED
3.3	Accidents	<ul style="list-style-type: none"> Traffic accidents 	Evaluation of effect of the work safety plan	Record of accidents and fire	Along the road	Continuous Record	LGED	LGED

8.2 EMP IMPLEMENTATION COST

Sl. No	Monitoring and Management Issue	Frequency	Unit cost (BDT)	Calculation	Cost (BDT)
1	Soil erosion and drainage congestion monitoring at every working sections of the road during construction. Especial attention should be paid at the Camp site also. Soil erosion and drainage congestion should be monitored using visual inspection and will be judged by the supervision environmental officer/engineer EMP reference: 2.1, 2.6, 3.1	Continuous, reporting bi-monthly, over construction period	lump some	3 sites along the road @ BDT 5,000 sites identified before construction works	15,000
2	Tree plantation around the road including maintenance for 2 years as required and as per direction of the E.I.C. Plantation should be following the suggestion in the EMP Table 13 Error! Reference source not found.. The payment is to be made only when trees are fully grown) EMP Reference: 2.5	Before and during construction	1000 per tree	40 trees @BDT 1000	40,000
3	Debris disposal and waste management on site. Temporary camp site waste disposal facility improvement 2 nos (1 no of organic waste and 1 no of inorganic waste disposal facility) EMP Reference: 2.6, 3.1	Continuous over construction period	Lump some	1 camp site @ BDT 30,000	30,000
4	Dust suppression measures: like water sprinkling on aggregates / unpaved roads, in and around the work site EMP Reference: 2.3	Continuous over construction period	lump some	along the RoW @ BDT 30,000	30,000
5	a. Labor camp establishment, b. soak pit establishment, c. water supply establishment (including water filter), d. electrification, e. safety gears f. first aid box EMP Reference: 2.8	Once before construction	Lump some	1 site @ BDT 200,000	200,000
6	Traffic management during construction, equipment for traffic management EMP Reference: 2.7	Continuous over construction period	Lump some	along the RoW @ BDT20,000	20,000
7	EMP Implementation Training EMP Reference: 1.3	Once before start of construction	Lump some	1 2-day training @ 15,000	15,000
8	Slope and Road edge Protection: Grass trufing and native bush planting around the unstable edges of roads EMP Reference: 2.1	During construction, as and when required	Lump some	Grass turfing of estimated 100sqm@BDT340	34,000
9	Implement proper road signage where appropriate EMP Reference: 2.8	During construction	Lump some	Estimated 20 signs along the road @ BDT 700	14,000
Total					398,000

The EMP implementation cost stands at BDT 398,000.

8.3 INSTITUTIONAL RESPONSIBILITIES

8.3.1 Oversight Body

123 The RRRC is proposed to act as the coordinator on behalf the government to execute all interventions. RRRC and ADB will conduct regular coordination meetings involving all EA/IAs, relevant stakeholders including deputy commissioner (DC), Cox's Bazar, other development partners and agencies. ADB plans to establish extended mission office in Cox's Bazar for close coordination, facilitation of sub-projects development and implementation.

124 A steering committee comprising higher officials from relevant ministries coordinated by ERD will be formed to provide necessary guidance to expedite the sub-project development and implementation. An organogram of the institutional arrangements is presented in **Figure 23**.

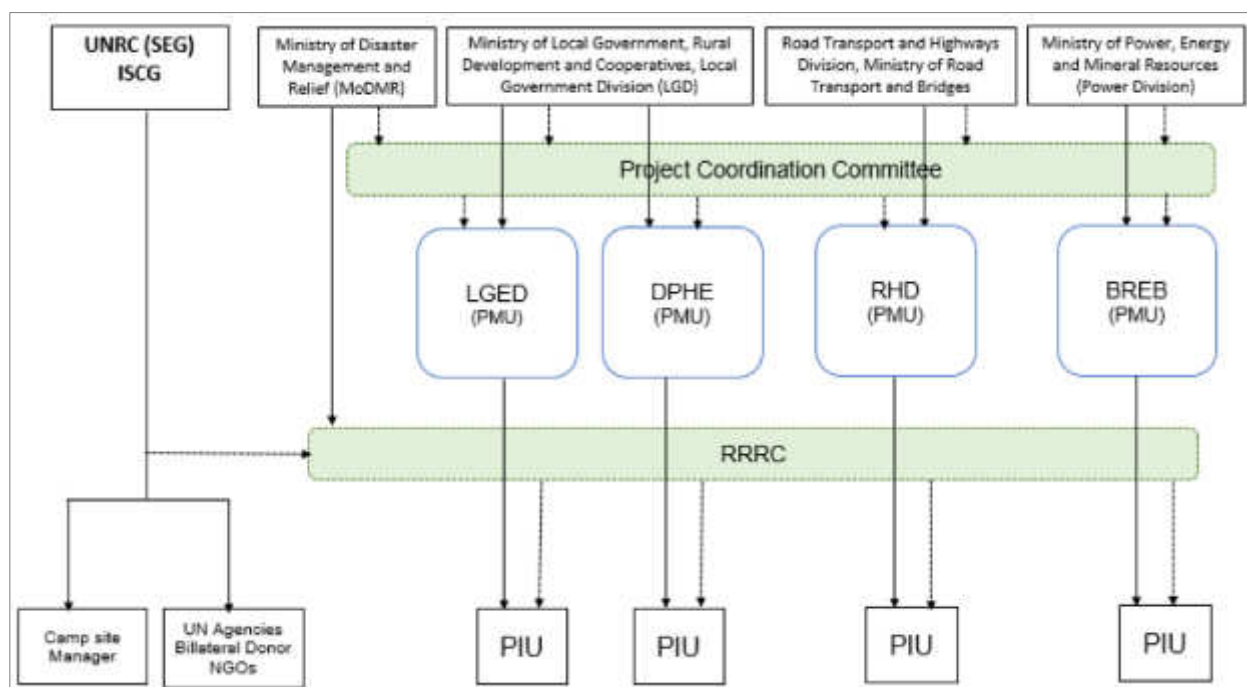


Figure 22 Project Organization Structure

8.3.2 Executing Agency / Implementing Agency

125 The Local Government Engineering Department (LGED), the Department of Public Health Engineering (DPHE), the Roads and Highways Department (RHD), and the Bangladesh Rural Electrification Board (BREB) will be the EA/IA for the Project. The EA/IA will coordinate environment safeguards planning and implementation and ensure that the environmental assessment and review framework is followed during subproject implementation. There will be a safeguards focal person in the EA/IA. The EA/IA will be assisted by PMCs. Consultants will include an Environment Specialist engaged during project implementation.

8.3.3 Project Implementing Unit (PIU)

126 PIUs will be formed in each of the IAs, with a dedicated safeguards focal person. PIUs will be assisted by DSC. Consultants will include Environment Specialists engaged during project implementation.

8.3.4 Design and Supervision Consultants (DSC)

127 The DSCs together with the PIU, will assist in developing and updating IEEs through the conduct of the DMS in a participatory and transparent way and consistent with the ADB's environment principles and the environmental assessment and review framework. Once approved by the PMU and reviewed and concurred by ADB, the DSC will provide technical advice in the implementation of the approved IEE and EMP. The DSC will likewise provide capacity-building orientation and skills training, as needed, to concerned personnel of the PMU and PIU.

128 Together with the EA/IA and PIU, the DSC will supervise civil works activities to ensure that the contractors adhere with the terms of their contract relative to avoiding and/or minimizing environmental impacts, in addition to ensuring that contractors provide the necessary compensation and/or assistance to the affected households prior to and/or during construction activities. The DSC will assist the PIU in regular monitoring of EMP implementation

8.4 MONITORING AND REPORTING

129 The PIUs, will monitor and measure the progress of EMP implementation. The monitoring activities will be corresponding with the project's risks and impacts and will be identified in the IEEs. Appendix 10 provides a content outline for monitoring reports. In addition to recording information of the work, deviation of work components from original scope, the PIUs will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome.

130 DSCs will submit monthly monitoring and implementation reports to the PIUs, who will take follow-up actions, if necessary. PIUs will submit the quarterly monitoring and implementation reports to the EAs/IAs. The EAs/IAs will submit semi-annual monitoring reports to ADB. Project budgets will reflect the costs of monitoring and reporting requirements. Monitoring reports will be posted in a location accessible to the public.

131 The EAs/IAs will document monitoring results, identify the necessary corrective actions, and reflect them in a corrective action plan. The EAs/IAs, in each quarter, will study the compliance with the action plan developed in the previous quarter. Compliance with grant covenants will be screened by the executing agency.

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

- (i) conduct periodic site visits for projects with adverse environmental impacts;
- (ii) review the periodic monitoring reports submitted by the executing agency to ensure that adverse impacts and risks are mitigated as planned and as agreed with ADB;

- (iii) work with executing agency to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the legal agreements, and exercise remedies to re-establish compliance as appropriate; and
- (iv) prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.

9 Grievance Redress Mechanism

133 The objective the grievance redress mechanism (GRM) is to resolve complaints as quickly as possible and at the local level through a process of conciliation; and, if that is not possible, to provide clear and transparent procedures for appeal. A well-defined grievance redress and resolution mechanism will be established to resolve grievances and complaints in a timely and satisfactory manner. All affected persons will be made fully aware of their rights, and the detailed grievance redress procedures will be publicized through an effective public information campaign. The grievance redress process includes three levels:

9.1 FIRST LEVEL OF GRM

134 The first level and most accessible and immediate contact for the fastest resolve of grievances are the contractors, with assistance from DSC on site. Prior to construction of any works, the PIU will ensure local community meetings are held to notify residents and businesses of any temporary disturbances, and to inform them of the Project and the GRM. If any complaints arise, the contractors, with assistance from DSC can immediately resolve the complaint on site. The contractor's and DSC's office phone number will be posted in public areas within the subproject areas and construction sites. Any person with a grievance related to the project works can contact the project to file a complaint. The contractor may seek the assistance of the DSC safeguards specialists (the environmental specialist or social safeguards specialist) to resolve the issue. The DSC safeguards (environment and resettlement) focal person will immediately address and resolve the issue with the contractor within 1-2 days, if the complaint remains unresolved at the field level. The DIU safeguards focal person will fully document the following information: (i) name of the person; (ii) date complaint was received; (iii) nature of complaint; (iv) location, and (v) how the complaint was resolved.

9.2 SECOND LEVEL OF GRM

135 Should the grievance remain unresolved; the contractor with assistance from DSC will forward the complaint to the PIU safeguards focal person. The person filing the grievance will be notified by DSC safeguards focal person that the grievance was forwarded to the PIU safeguards focal person. The PIU will address the grievance. Grievances will be resolved through continuous interactions with affected persons, and the PIU will answer queries and resolve grievances regarding various issues including environmental or social impacts. Corrective measures will be undertaken at the field level by the PIU safeguards focal person within 7 days. He/she will fully document the following information: (i) name of the person; (ii) date complaint was received; (iii) nature of complaint; (iv) location and (v) how the complaint was resolved.

9.3 THIRD LEVEL OF GRM

136 Should the grievance remain unresolved, the PIU's project director will activate the third level of the GRM by referring the issue (with written documentation) to a Grievance Redress Committee (GRC), which will, based on review of the grievances, address them in consultation with the PIU, contractor, DSC, and affected persons. The GRC will consist of Refugee Relief and Repatriation Commission (RRRC), as chairperson, EA/IA representative, camp-in-charge, and other relevant stakeholders. A meeting will be called with the GRC, if necessary, where the affected person can present his/her concern and issues. The process will promote conflict resolution through mediation. The GRC will meet as necessary when there are grievances to be addressed. The GRC will suggest corrective measures at the field level and assign

clear responsibilities for implementing its decision within 15 days. The functions of the GRC are as follows: (i) to provide support to affected persons on problems arising from environmental or social disruption, asset acquisition (where required), and eligibility for entitlements, compensation, and assistance; (ii) to record grievances of affected persons, categorize and prioritize them, and provide solutions within 15 days; and (iii) to report to the aggrieved parties' developments regarding their grievances and decisions of the GRC. The EA/IA safeguards focal person will be responsible for processing and placing all papers before the GRC, recording decisions, issuing minutes of the meetings, and taking follow-up action to see that formal orders are issued, and the decisions carried out.

137 Safeguard monitoring reports will include the following aspects pertaining to progress on grievances: (i) number of cases registered with the GRC, level of jurisdiction (first, second, and third levels), number of hearings held, decisions made, and the status of pending cases; and (ii) lists of cases in process and already decided upon may be prepared with details such as affected person, date of notice, date of application, date of hearing, decisions, remarks, actions taken to resolve issues, and status of grievance (i.e. open, closed, pending).

138 All costs involved in resolving the complaints (meetings, consultations, communication and reporting / information dissemination) will be borne by the EA/IA.

139 Where an affected person is not satisfied with the outcomes of the 3 levels of the Project GRM, the affected person should make good faith efforts to resolve issues working with the South Asia Regional Department through ADB's Bangladesh Resident Mission. As a last resort, the affected person can access ADB's Accountability Mechanism (ADB's Office of Special Project Facility or Office of Compliance Review).¹³ ADB's Accountability Mechanism, including information on how to file a complaint, will also be explained to affected households.

140 The grievance redress mechanism and procedure are depicted in **Figure 24**.

¹³ Contact information on ADB's Bangladesh Mission is in <https://www.adb.org/countries/bangladesh/main>. Information on ADB's Accountability Mechanism is in www.adb.org/site/accountability-mechanism/main.

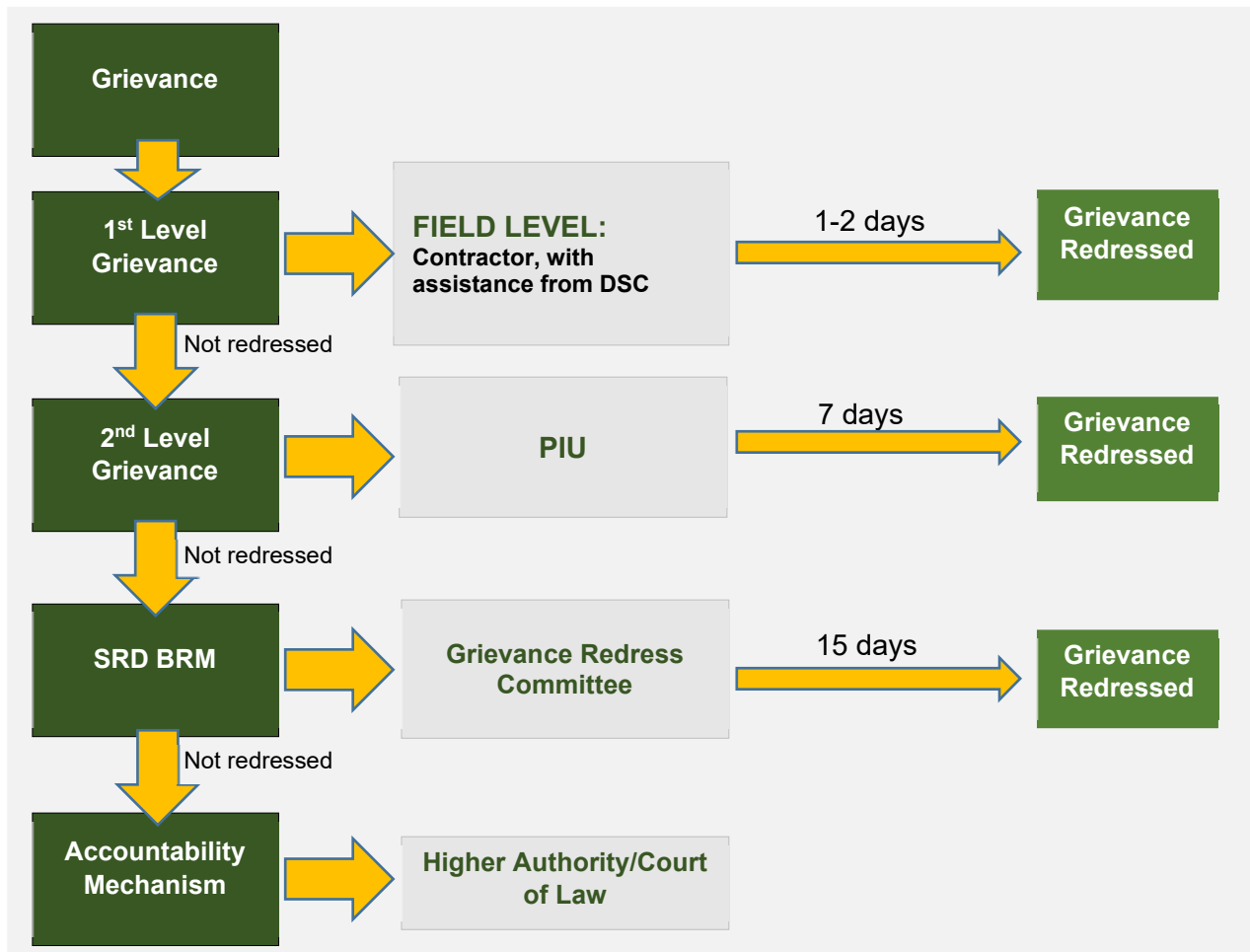


Figure 23 Grievance redress process

10 Stakeholder consultation and information disclosure

10.1 STAKEHOLDER CONSULTATION

141 Meaningful stakeholder consultation and participation is part of the project preparation and implementation strategy. Consultation, participation and will ensure information is provided and feedback is obtained and considered on the implementation of subprojects. Affected persons will be consulted at various stages of subproject preparation to ensure: (i) incorporation of views/concerns of affected persons, particularly the vulnerable, on environmental impacts and mitigation measures; (ii) identification of any help required by affected persons during rehabilitation; and (iv) avoidance of potential conflicts for smooth project implementation.

142 It will also provide adequate opportunities for consultation/participation of all stakeholders and inclusion of the vulnerable in subproject process. Relevant information on any major changes to the Project or subproject scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders.

10.1.1 Stakeholder consultation Strategy for Emergency Assistance Project

143 At minimum, stakeholders will be consulted regarding the scope of an impact assessment before work is commenced and they will be informed of the likely impacts of the subproject and proposed mitigation once the draft IEE and EMP documents are prepared. The safeguards documents will record views of stakeholders and indicate how these have been taken into account in subproject development. Consultations will be held with a special focus on vulnerable groups.

10.1.2 Key target stakeholders

144 The key stakeholders to be consulted during subproject preparation, EMP implementation and subproject implementation include:

- (i) Beneficiaries;
- (ii) Elected representatives, community leaders, religious leaders and representatives of community based organizations;
- (iii) Local non-government organizations (NGOs);
- (iv) Local government and relevant government agency representatives, including local authorities responsible for land acquisition, protection and conservation of forests and environment, archaeological sites, religious sites, and other relevant government departments;
- (v) Residents, shopkeepers, business persons, and farmers who live and work alongside transport and education/district infrastructure which will be rehabilitated;
- (vi) Executing agency, implementing agency, PIU, staff and consultants; and
- (vii) ADB and Government.

10.1.3 Public Consultation History

145 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. 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 in their respective locations. Information and comments collected from the public early in the study process were of use.

146 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 local population to determine their thoughts, opinions and feedback on the impact of the project. Attendees in the consultation meeting were apprised of the processes through which the project was to proceed toward implementation and the environmental impacts to arise out of such processes along with the steps to be taken toward mitigating the impacts. They were told about the impacts all of which could be easily mitigated. The audience expressed satisfaction of such mitigation measures (**Figure 25**). The public consultations were held during field visit in 23 September 2018.



Figure 24 Public consultation for the road subproject

10.1.4 Findings of the Public Consultation

147 The people in the area Refugee Camp Dwellers. Most of the people were keen to know the possibility of employment in the project. There is a requirement of about 20 people during the peak period of the project. The employment is largely depending on the types of job and will be assessed on a case-to-case basis by the contractor according to needs. Findings of the public consultation summarized below (**Table 15**).

Table 15 Summary of the public consultation

Sl no.	Question	Answer
01	During labour recruitment, should the locals be given priority during construction?	<ul style="list-style-type: none"> This largely depends on the types of job and will be assessed on a case-to-case basis by the contractor according to needs.

Sl no.	Question	Answer
02	What would be length of the new road? Where you will be repairing the roads?	<ul style="list-style-type: none"> The consultants and LGED representatives showed the map of proposed roads and explained
03	Priority for jobs should also consider women; women can do the same work.	<ul style="list-style-type: none"> Priority will include women and there will not be any discrimination as far as possible depending on the nature of the job.
04	People present at site suggested that the local people should be the first ones to be employed in the subproject.	<ul style="list-style-type: none"> The consultant team explained that local people would be employed accordingly to job requirement.
05	Wishes to speed up the subproject.	<ul style="list-style-type: none"> It was explained that implementation would take place immediately after the rainy season.

10.1.5 Information disclosure

148 Information is disclosed through public consultation and making available relevant documents in public locations. The following documents will be submitted to ADB for disclosure on its website:

- (i) IEEs (including subproject EMP);
- (ii) Updated IEEs (including EMP) and corrective action plan prepared during project implementation, if any; and
- (iii) Environmental monitoring reports.

149 The EAs/IAs will send a written endorsement to ADB for disclosing these documents on the ADB website. The PIUs will provide relevant safeguards information in a timely manner, in an accessible place and in a form and language understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used. Disclosure will follow ADB's Public Communication Policy, 2011.

11 Annex I List of Participants in FGD

List of Participants for FGD

FGD No. 03

Address Kot Bazar, Uni Ratna palong, up: Ukha, Cox's Bazar

Date 25.12.18 Time 2:00 - 3:00

GPS Location N-24°16.344" E 092°06.116"

Sl No.	Participant's Name	Age	Occupation	Telephone No.	Signature
1	Md. Nojibul Atom	28	Job	01831968799	[Signature]
2	Md. Samsul Atom	32	Driver	01839637016	[Signature]
3	Md. Monir Atom	30	"	01815079960	[Signature]
4	Md. Dil Mohammad	26	"		[Signature]
5	Md. Jahagir Atom	23	"		[Signature]
6	Bitu baruah	28	"		[Signature]
7	Md. Saddam Hossain	25	Business	01819-553070	[Signature]
8	Apel baruah	22	Student		[Signature]
9	Topon mistree	36	Business	01825996079	[Signature]
10	Md. Abu kalam	34	Job	01719823109	[Signature]
11	Md. Karimul	25	Job	01861283077	[Signature]
12	Md. Abu Saifed	31	Business	01774178916	[Signature]
13	Nurjahan Begum	37	Housewife	01640914854	[Signature]
14	Asia Sultana	32	Business	01825319139	[Signature]
15	Rahima Begum	39	Housewife	-	[Signature]

Facilitated By _____

Signature _____

12 Annex II Traffic Management Plan

A. Principles

One of the prime objectives of the Contractor's **TMP** is to ensure the safety of all the road users along the work zone, and to address the following issues:

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

B. Operating Policies for TMP

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

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

Figure A1 to Figure A6 illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the Impact Due to Street Closure

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

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

- e) Considering how access will be provided to the worksite;
- f) Contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
- g) Developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

If full road-closure of certain roads within the area is not possible, due to inadequate capacity of the detour arrangements, the full closure can be restricted to weekends with the construction commencing on Thursday night and ending on Sunday morning prior to the morning peak period. The traffic management guidelines are as follows:

- Review construction schedule and methods;
- Identify initial traffic recirculation and control policy;
- Identify routes for traffic diversions;
- Analyze adverse impact & mitigation at the detours;
- Begin community consultation for consensus;
- Finalize or determine alternate detours;
- Identify temporary parking (on and off -street);
- Discuss with CMC, owner, community for use;
- Coordinate with the Traffic Police to enforce traffic and diversions;
- Install traffic control devices (traffic cones, signs, lightings, etc);
- Conduct campaigns, publicity, and notify public about street closure; and
- Develop a mechanism to address public grievances regarding disruptors of traffic, utilities, etc.

D. Public Awareness and Notifications

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

The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

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

- a) Traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
- b) defensive driving behavior along the work zones; and
- c) Reduced speeds enforced at the work zones and traffic diversions.

It may be necessary to conduct the awareness programs/campaigns on road safety during construction. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these

campaigns will be conducted in schools and community centers. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

- a) Explain why the brochure was prepared, along with a brief description of the project;
- b) Advise the public to expect the unexpected;
- c) Educate the public about the various traffic control devices and safety measures adopted at the work zones;
- d) Educate the public about the safe road user behavior to emulate at the work zones;
- e) Tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
- f) Indicate the office hours of relevant offices.

E. Install Traffic Control Devices at the Work Zones and Traffic Diversion Routes

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

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

Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary "STOP" and "GO").

Figure A1 to Figure A6 illustrate typical set-ups for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics. The Contractor would need to consider such Traffic Management situations for these typical arrangements and others that may occur during road construction works. The Contractor would need to coordinate closely with the road management and road police authorities and submit their Traffic Management proposals, with not less than a month's prior notice, to the PIU for obtaining prior approval, before any closure of roads are considered.

- Work on Shoulder or Parking Area;
- Work with Lane Closure: Low Traffic;
- Work on Lane Closure With Yield Sign on Two Lane: Low Volume;
- Work on Lane Closure With Single Flag Operator on Two Lane : Low Volume;
- Lane Closure: Two Flag Operators on Two Lane Road; and
- Street Closure with Detour.

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

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

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

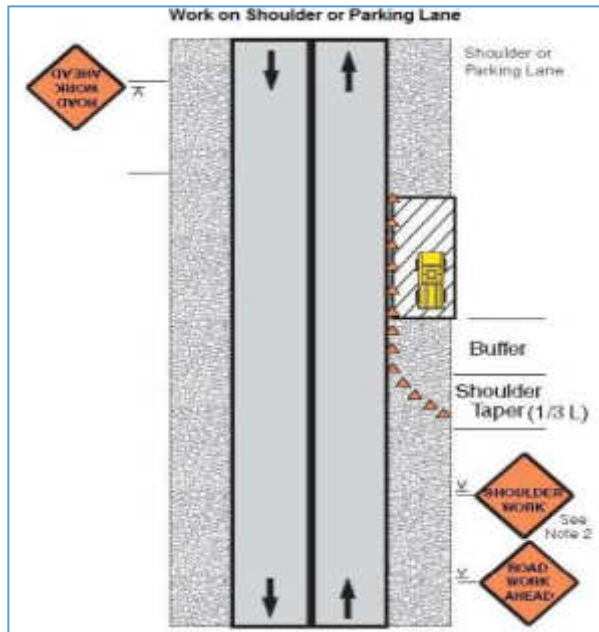


Figure A1 Work with shoulder or Parking area

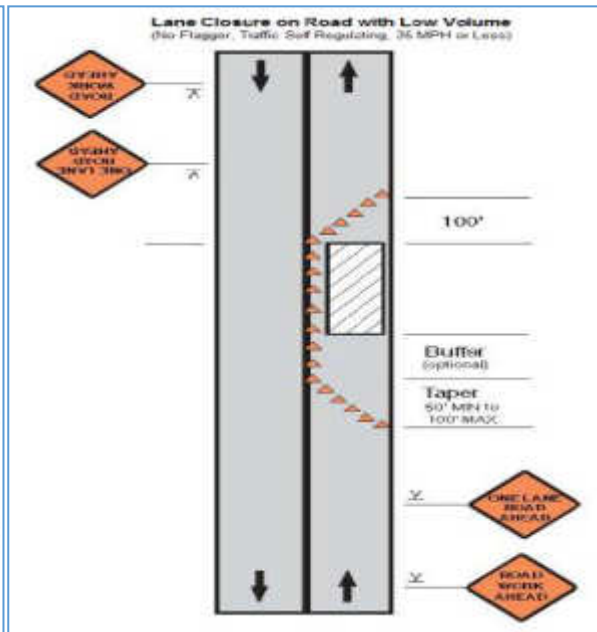


Figure A2 Work with lane closure: low traffic

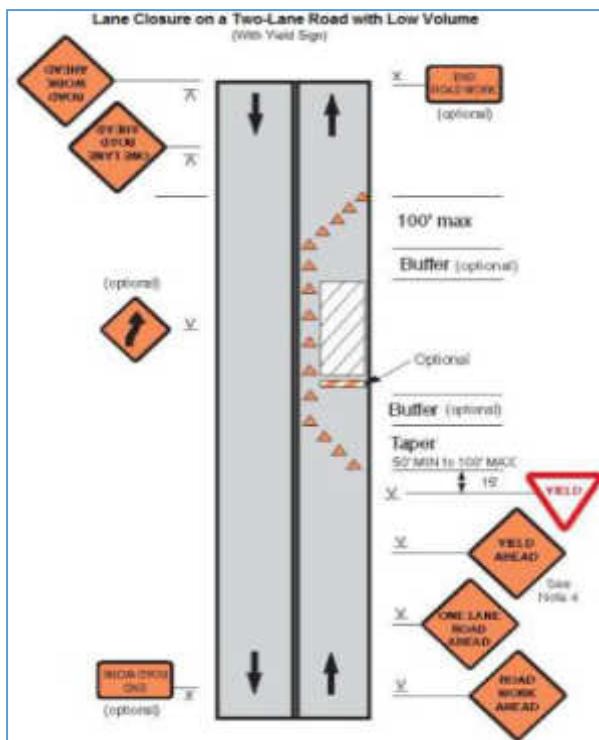


Figure A3 Work on Lane Closure with Yield Sign on Two Lane: Low Volume

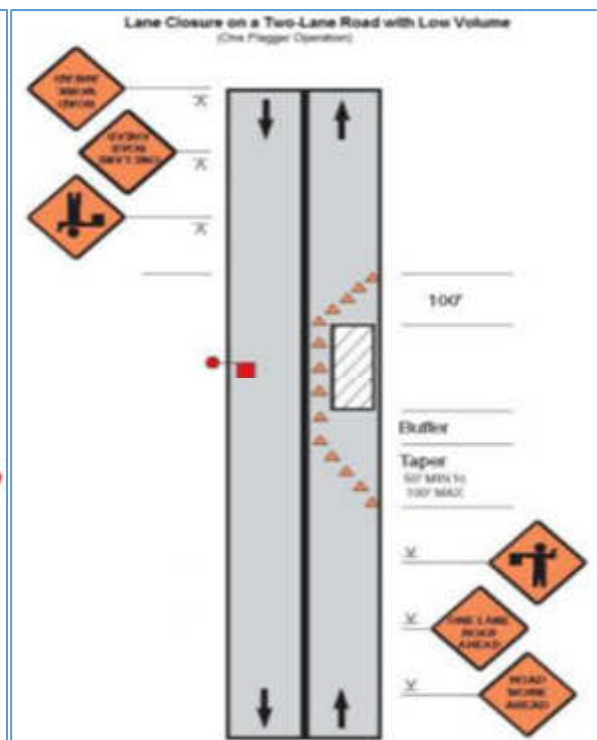


Figure A4 Work on Lane Closure With Single Flag Operator on Two Lane : Low Volume

Upgradation of existing 8.8 km link road connecting Coxs Bazar - Teknaf and Marine Drive Highways, Ukhiya and Improvement of R & H Palongkhali Bazar - Chapotkhali Bazar Marine Drive Road by BC at Ch 00-9145m under Ukhiya Upazila, District - Cox's Bazar

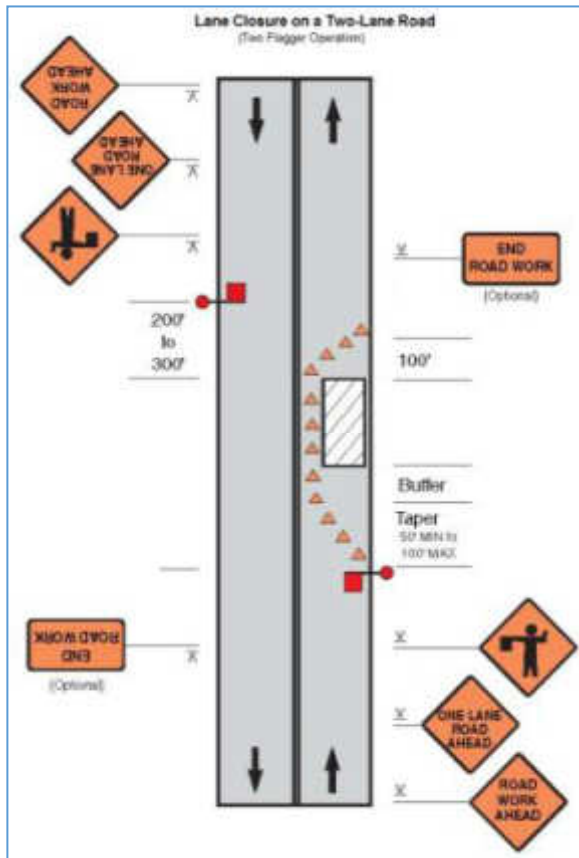


Figure A5 Lane Closure: Two Flag Operators on Two Lane Road

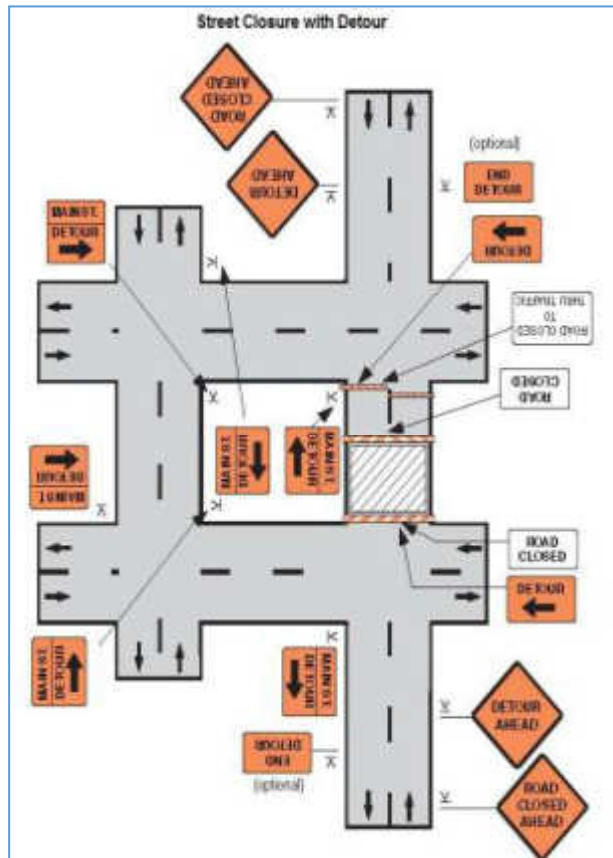


Figure A6 Street Closure with Detour