

Initial Environmental Examination

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

Bangladesh: Emergency Assistance Project

**Construction and operation of mini piped water supply system (5 schemes): Package 5
(EAP/DPHE/W5)**

Prepared by Department of Public Health Engineering for the Asian Development Bank.

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Location of Mini Pipe Water Supply System (5 Schemes) under Package 5

Sl. No	ID	Camp	GPS Coordinates	
			Latitude	Longitude
1	WS-01	Camp-5	21.200990	92.147508
2	WS-02	Camp-8W	21.193314	92.154664
3	WS-03	Camp-8W	21.209433	92.16265
4	WS-04	Camp-8W	21.19955	92.157908
5	WS-05	Camp-8E	21.204668	92.166281

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ABBREVIATIONS

ADB	Asian Development Bank
BREB	Bangladesh Rural Electrification Board
BMD	Bangladesh Meteorological Department
BoQ	Bill of Quantities
DOE	Department of Environment
DTMP	District Transport Master Plan
DPHE	Department of Public Health Engineering
DMSC	Design, Monitoring and Supervision Consultant
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
EMP	Environmental Management Plan
FD	Forest Department
FGD	Focus Group Discussion
GoB	Government of Bangladesh
IEE	Initial Environmental Examination
IUCN	International Union for Conservation of Nature
ISCG	Inter Sector Coordination Group
H&S	Health And Safety
LGED	Local Government Engineering Department
MOEF	Ministry of Environment and Forest
NGO	Non-governmental Organization
NOC	No Objection Certificate
O&M	Operation & Maintenance
OMC	Optimum moisture content
PIU	Project Implementing Unit
PMU	Project Management Unit
REA	Rapid Environmental Assessment
RHD	Roads and Highways
RRRC	The Refugee Relief And Repatriation Commission
SCC	Site Clearance Certificate
SPS	Safeguards Policy Statement
ToR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
WB	World Bank

EXECUTIVE SUMMARY

1 The Emergency Assistance Project is proposed by the Government of Bangladesh from a grant of 100 million USD from Asian Development Bank on 7 May 2018 to provide high-priority basic infrastructure and essential services to help address the humanitarian crisis caused by the arrival of more than 700,000 displaced persons from Myanmar. The project will improve the living conditions and the resilience of displaced persons. The project will directly benefit the lives of people in camps while co-benefitting host communities in some instances.

2 Construction and operation of mini piped water supply system for 5 schemes under DPHE component is designed to provide safe and sustainable water supply to the refugee camps and the adjacent affected villages, which comprises (1) construction of Production well using both truck mounted hydraulic rig and mechanical rig (2) installation of solar pump solution for production well (3) construction of pump houses (4) construction of reservoirs (10000 liter HDPE), (5) construction of HDPE Pipe networks (100mm and 75 mm pipeline) using trench and (6) construction of community tap stand.

3 In accordance with ADB Safeguard Policy Statement (SPS), 2009, an initial screening was conducted using ADB's Rapid Environmental Assessment (REA) checklist for Water Supply (Annex-1). Result of the screening and assessment reveal that the subproject is unlikely to cause significant adverse environmental impact. Thus, the subproject is categorized as category B for environment as per ADB SPS, 2009. In addition, the assessment was also carried out within the policy, legal, and administrative frameworks relevant to water supply projects in Bangladesh.

4 Subproject component is located in displaced persons' mega camp in Kutupalong and the focus area is situated on a combination of plains and small hills, extending into the Chittagong Hill tracts bordering Myanmar. The subproject area is on the Pleistocene formations and have a Dupi Tila formation and soils of the Dupi Tila formations were formed on unconsolidated and compact rocks, moderately well to excessively drained and probably the oldest of the area.

5 The climate of the subproject area is tropical and characterized by a change of four, pre-monsoon (March to May); monsoon (June to September); post-monsoon (October to November); and the dry season (December to February). The main area of the Rohingya camps is located outside of the flood zone, the camps are vulnerable to extreme weather events such as cyclones and have to withstand major precipitation and strong winds. The steep slopes may become unstable in the monsoon seasons and cause landslides, shelter damage and other destruction. The subproject area has limited sources of surface water where the main water sources such as the Naf River and other big channels are at some distance and are saline and brackish especially in the lower part of the rivers. Himchari national park and Teknaf reserved forest is located about 15 km and 6 km away from the subproject area respectively. None of the subproject components are located in the forest area, and no waste water will enter the forest area from the proposed facilities.

6 An evaluation of the possible alternative solutions was conducted and production well at deep aquifer is identified as the most favorable option among all the alternatives as surface water is limited, the shallow water aquifer is drying up and contamination has been identified in the subproject area. Five production wells of 250m depth and 200 mm dia. will be constructed under this subproject scheme.

7 Total twelve environmental parameters are likely to be affected by the project implementation. Adverse environmental impacts during construction are temporary, less than significant, and can be easily mitigated. There will be no massive construction activities that can damage the environment. No cutting of trees will be done in the subproject area except some ground vegetation. Water supply pipe-laying is a low impact construction activity since trench excavation is shallow with narrow width. Excavated soil is backfilled to the trench after pipe-laying. Required structures are relatively small in size. Typical construction issues are manageable with the implementation of preventive measures to address: land slide hazard, groundwater quality, dust, noise, biodiversity, worker and public safety. However, the socioeconomic environment is considered to be affected positively as the subproject activities will create

job opportunity for the local people and safe water supply system to mitigate the water scarcity in the camps. Moreover, environmental problems due to operation and maintenance of the proposed water supply system can be avoided by incorporating the necessary measures in the design and use of appropriate operational procedures.

8 An environmental management plan (EMP) is developed to effectively manage any environmental issues arising from the subproject implementation. The EMP includes: (i) mitigating measures to be implemented, (ii) required monitoring associated with the mitigating measures, and (iii) implementation arrangement. The institutional set-up and arrangement identifies the requirements, responsible stakeholders and responsibilities during pre-construction, construction, and operation phases. The EMP applicable for each phase is presented in detail in tabular form with specific information on: (i) required measures for each environmental impact that requires mitigation, (ii) locations where the measures apply, (iii) associated cost, and (iv) responsibility for implementing the measures and monitoring.

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

10 All potential impacts were identified in relation to design, construction and operation phases. However, most of the individual elements of the subproject are relatively small and involve straightforward construction and operation, thus, the proposed subproject is unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

11 DPHE (Executive Agency) have fully endorsed the EMP and is committed to implement all the mitigation measures. DPHE will also ensure that the work is carried out in an environmentally acceptable manner and the monitoring and reporting are completed in a compliant and timely fashion, acceptable to ADB. Therefore, it is expected that there will be no negative impacts to deter the development of the subproject if the subproject is developed following the suggestions given in the EMP of this IEE.

I. INTRODUCTION

A. Background

1. Bangladesh has received more than 700,000 displaced persons from Myanmar (displaced persons) since August 2017¹. These displaced persons, which mostly reached Bangladesh by crossing the nearby border on foot, joined about 400,000 other displaced persons who had arrived in waves from Rahkine State earlier. The vast majority of displaced persons who have arrived in Bangladesh are living in 32 camps in Cox's Bazar District, with more than 600,000 living in the Kutupalong–Balukhali mega camp. The large influx of displaced persons has caused a huge strain on the local people, infrastructure, and economy. The 2:1 ratio of displaced persons to the local population poses significant challenges to the food supply, shelter, health, sanitation, water, and other essential services. Although UN agencies and other donors are providing humanitarian relief such as food, water, medical aid, and temporary shelter, the existing services are stretched, and large gaps remain.

2. The Government of Bangladesh requested the Asian Development Bank (ADB) on 7 May 2018 for grant support to provide high-priority basic infrastructure and essential services to help address the humanitarian crisis caused by the arrival of the displaced persons. The project meets the requirements for emergency assistance financing.

3. The proposed Emergency Assistance Project² will support the Government of Bangladesh in addressing the immediate and urgent needs of the displaced persons in Cox's bazar District, as identified by the United Nations (UN) in its Joint Response Plan (JRP). The project will mainly support the improvement of water supply and sanitation, disaster risk management, sustainable energy supply, and access roads.

B. Need for the Project

4. The Emergency Assistance Project is proposed by the Government of Bangladesh from a grant from Asian Development Bank to provide high-priority basic infrastructure and essential services to help address the humanitarian crisis caused by the arrival of the displaced persons from Myanmar. The Project is aligned to accelerate the social recovery of affected persons in Teknaf and Ukhia sub-districts. The project will improve the living conditions and the resilience of displaced persons. The project will directly benefit the lives of people in camps while co-benefitting host communities in some instances. Under this project a component is designed to provide water supply to the camp and adjacent host community by implementing mini-piped water supply systems with production tube-wells, pipe network, and stand-pipe water distribution points.

C. Impact and Outcome

5. The project is aligned with the following impact: social recovery of displaced persons in Teknaf and Ukhia camps accelerated. The project will have the following outcome: living conditions and the resilience of displaced persons improved. The project will directly benefit the lives of people in camps while indirectly co-benefitting host communities in some instances. ADB is cognizant of sensitivities and potential conflicts among and within affected communities. These will be addressed through a gender- and socially-inclusive approach, among others.

¹ United Nations, Strategic Executive Group. 2018. *2018 JRP for Rohingya Humanitarian Crisis, March–December 2018*. Cox's Bazar. Various terminology is used in media, official and unofficial documents to describe the affected people. Terminology used herein is intended solely to identify such people for the purposes of this paper, and not to assert any view regarding the manner or circumstances of such persons' displacement. Such terminology may not reflect the terminology used or accepted by any government or any agency thereof. ADB expresses no view and takes no position herein regarding the legal rights or political assertions or the characterization of any such persons. The use of the term "displaced persons" in this paper is not intended to have the same meaning as the term "displaced persons" defined in ADB's Safeguard Policy Statement (2009).

² Asian Development Bank. Grant 0582-Bangladesh: Emergency Assistance Project, <https://www.adb.org/projects/52174-001/main#project-pds>.

D. Outputs

6. The project has the following four outputs:

7. **Output 1: Water supply and sanitation improved.** This consists of providing the camp areas with (i) mobile water carriers for the distribution of treated water; (ii) community bathing facilities for women; (iii) mini piped water supply systems with a production tube well, distribution pipe network, and standpipe water distribution points; (iv) an integrated waste management facility with collection system; and (v) small surface water treatment plants.

8. **Output 2: Disaster risk management strengthened.** This includes constructing in and around the camp areas (i) multipurpose cyclone shelters with emergency access roads, (ii) food distribution centers, (iii) hill slope protection and/or toe walls to resist landslides, and (iv) storm water drainage networks. The project will also provide lightning arresters and support the preparation of gender-sensitive disaster risk management plans with community-based disaster risk reduction approach.

9. **Output 3: Energy sources provided.** This includes providing the camp areas with (i) retained heat cookers; (ii) stand-alone solar powered street lights with solar photovoltaic panels, battery boxes, and mini grid-connected street lights; and (iii) access to electricity by augmenting substations, distribution lines, and transformers.

10. **Output 4: Access roads improved.** This consists of rehabilitating (i) rural roads to connect to food storage and distribution centers, field hospitals, primary health care centers, and primary education centers; (ii) emergency access roads to the camp areas; and (iii) existing access roads to and within the camps and drainage systems. The project also supports resurfacing the road from Cox's Bazar to Teknaf, which is the main supply line.

E. Subproject

11. Construction and operation of mini piped water supply system with Production Tube Well along with pipe network, and stand-pipe water distribution points in camps and adjacent affected villages which is located in Kutupalong, Ukhia, Cox's Bazar displaced persons' mega camp.



Figure I.1: Location map of the Rohingya refugee camps in Ukhia and Teknaf

F. Objectives and Scope of the Report

12. The project is categorized as category 'B' in accordance with ADB's Safeguard Policy Statement (SPS), 2009 warranting an initial environmental examination (IEE). The IEE has been prepared based on the Environmental Assessment and Review Framework (EARF) developed 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 subproject to be implemented by the executing agency and guideline for environmental management activities on-site.

13. The IEE study has four basic objectives; (i) identify the environmental issues that should be taken into account due to project interventions (ii) determine the magnitude of potential environmental concerns and to ensure that environmental considerations are given adequate weight at planning/design stage (iii) identify need for further environmental studies or Environmental Impact Assessment (EIA) and (iv) suggest enhancement measures, if any.

14. The Scope of works will include:

- (i) Describe the project and its components.
- (ii) Determination of the environmental baseline conditions of the project considering the existing and proposed interventions.
- (iii) Assessment of the environmental impacts of the proposed interventions.
- (iv) Preparation of an EMP integrating the adaptation and mitigation measures, scaling-up measures and an environmental monitoring plan.
- (v) Specify the monitoring and reporting requirements. Moreover, IEE is to ensure, in line with EARF, that the subproject, 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.

G. IEE Methodology

15. This IEE report has been prepared on the basis of EARF, field investigations and stakeholder consultations to meet the requirements for environmental assessment process and documentation as per ADB's Safeguard Policy Statement (SPS), 2009. Supplementary information was taken from direct consultations with DPHE staff, field observations of subproject site at Rohingya camps in Ukhia, review of documents and project plans, designs and previous reports on similar projects implemented in other areas in Bangladesh.

16. A scoping and field reconnaissance was conducted at subproject sites, to establish the potential impacts and categorization of subproject activities. The methodology of the IEE study was then elaborated in order to address all impacts. Subsequently primary and secondary baseline environmental data were collected from possible sources, and the intensity and likely locations of impacts were identified with relation to sensitive receivers. The significance of impacts from construction of the subproject was then assessed and, for those impacts requiring mitigation measures were proposed to reduce impacts within acceptable limits. Informal public consultations (PC) were carried out in subproject area.

H. Structure of the Report

17. The report has been structured in compliance with ADB SPS 2009.

- (i) **Executive Summary**
- (ii) **Chapter 1-** Introduction: Presents a brief overview of the assignment along with its background, objectives, scope of work and methodology etc.
- (iii) **Chapter 2-** Legislative, Regulatory and Policy Consideration: Outlines the Policy and Legislation on environmental issues.
- (iv) **Chapter 3-** Project Description: Describes the proposed interventions including background, project category, need for the project, location, size and magnitude of operation.
- (v) **Chapter 4-** Description of the Environment: Presents a description of the environmental baseline condition (socioeconomic, physical and biological) of the project area.
- (vi) **Chapter 5-** Analysis of Alternative: Analyzes the environmental situation "With and Without project".

- (vii) **Chapter 6-** Anticipated Potential Project Impacts: Deals with environmental parameters are identified, predicted the impact and formulate the mitigation measures need to be taken for reducing impact.
- (viii) **Chapter 7-** Environmental Management Plan and Environmental Monitoring Plan: Mainly deals with the environmental management plan. However, Deals with the indicator to be monitored during construction and operation as well as frequency of monitoring. Moreover, outlines the environmental monitoring program, institutional responsibilities including the cost of implementing the EMP.
- (ix) **Chapter 8-** Grievance Redress Mechanism describes the process of addressing complaints.
- (x) **Chapter 9-** Public 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.
- (xi) **Chapter 10-** Conclusion and Recommendations: It presents the findings, conclusion and recommendations of the IEE study.
- (xii) **Annexes**

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. Introduction

18. The Government of Bangladesh (GoB) has developed a complete legal framework, including laws, regulations, decrees, and standards addressing environmental safeguards for promoting ecologically sustainable development through the conservation and ecologically sustainable use of natural resources. It is not limited to the Environmental conservation law. Rather, other laws, regulations and policies have also acknowledged related environmental responsibilities. Of the existing legal framework, those most relevant to this subproject are summarized in this chapter.

B. Environmental Legislation Framework

1. Overview of the Project Approval Process

19. Key legislation governing the environmental approvals process for the proposed Project is the Bangladesh Environmental Conservation Act, 1995 (BECA, 1995)³ and the Environmental Conservation Rules (ECR, 1997)⁴.

20. 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

21. 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'.

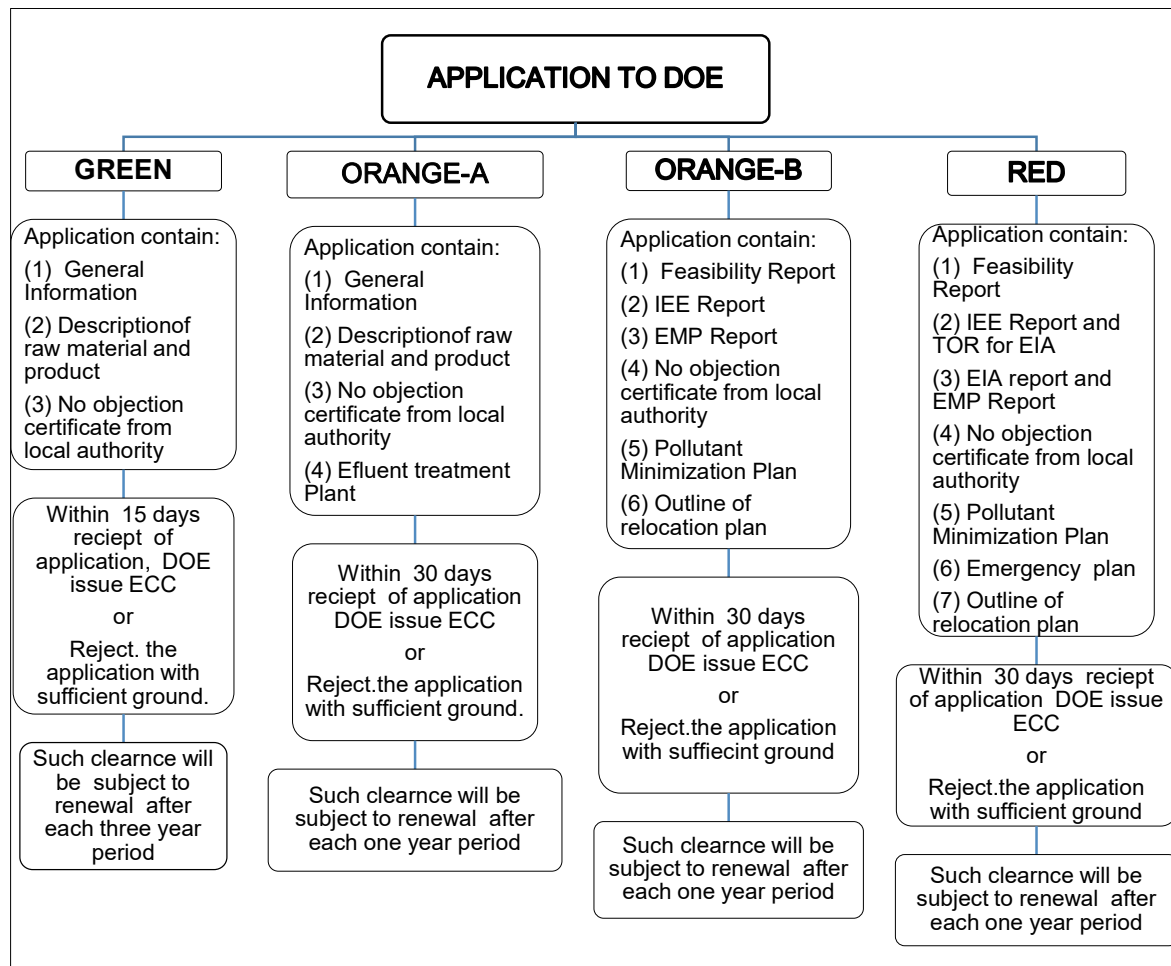
2. Environmental Approval Framework

22. Key milestones in the approvals process are outlined in Figure II.1. These comprise:

- **Project Authorization Letter:** Formal authorization of the Project by the Department of Public Health and Engineering 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.
- **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.

³ The Act was amended by Act Nos 12 of 2000, 9 of 2002, and 50 of 2010.

⁴ The ECR was amended in 2002, 2005, 2010 and 2017.



DOE = Department of Environment, EIA = environmental impact assessment, ECC = Environmental Compliance Certificate, EMP = environmental management plan, IEE = initial environmental examination, TOR = term of reference

Figure II.1: Environmental approval framework

23. Table II.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 II.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

24. 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:**

25. 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:**

26. 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.

C. National Policies, Laws, Regulations

27. The Government of Bangladesh (GoB) has developed a complete legal framework, including laws, regulations, decrees, and standards addressing environmental and social safeguards for promoting ecologically sustainable development through the conservation and ecologically sustainable use of natural resources. It is not limited to the Environmental conservation law. Rather, other laws, regulations and

policies have also acknowledged related environmental responsibilities. Of the existing legal framework, those most relevant to this subproject are summarized in the Table II.2.

Table II.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	Bangladesh Environment Conservation Act 1995 (amended 2010) & Rules 1997 (amended 2017)	This act is currently the main legislative document relating to environmental protection in Bangladesh, which repealed the earlier environment pollution control ordinance of 1997 and has been promulgated in 1995. The main objectives of ECA 1995 are: (i) Conservation and improvement of environment, and (ii) Control and mitigation of pollution of environment.	According to this law no industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by rules, an Environmental Clearance Certificate from the Director General.	Ministry of Environment and Forests, and Climate Change
4	Environment Conservation Rules, 1997 (Amended in 2002)	The rules outline the processes and requirements of environmental clearances for specific types of projects indicated therein, and stipulates that "no industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by rules, an Environmental Clearance Certificate (ECC) from the Director General" of the Department of the Environment. Schedule 1 of the rules classifies industrial units and projects into four categories according to their site and impact on the environment, namely (i) green, (ii) orange-A, (iii) Orange-B, and (iv) red. The rules specify the procedures for issuing ECC for the various categories of projects.	The Project is categorized as red and requires two stages of clearance, location clearance and environmental clearance. All requisite clearances (LCC and ECC) from the DoE shall be obtained prior to commencement of civil works.	Ministry of Environment and Forests, and Climate Change
5	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
6	The Forest Act (1927) and Forest	An act to control trespassing, illegal resource extraction and provide a framework for the	Requires clearances for any project within forest areas and clearances for any	Department of Forests

No.	Environmental Legislation / Act	Objective	Relevance to the Project	Responsible Institution
	(Amendment) Act (2000)	forestry revenue collection system;	felling, extraction, and transport of forest produce.	
7	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
8	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
9	National Safe Drinking Water Supply and Sanitation Policy of 1998	Ensures access to safe water and sanitation services at an affordable cost	Pourashavas and water sanitation authorities will take actions to prevent wastage of water. They will take necessary steps to increase public awareness to prevent misuse of water. Pourashavas shall be responsible for solid waste collection, disposal and their management	Ministry of Local Government, Rural Development, and Cooperatives
10	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
11	Wetland Protection Act 2000	Advocates protection against degradation and resuscitation of natural water-bodies such as lakes, ponds, beels ⁵ , 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 Naf river, detailed assessment will be done	Ministry of Water Resources
12	Bangladesh Labor Law, 2006	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	Compliance to provisions on employment standards, occupational health and safety, welfare and social protection, labor relations and social dialogue, and enforcement.	Ministry of Labor and Employment

⁵ 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
		company's profits, regulation of safety of dock workers, penalty procedures, administration and inspection. 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	Prohibition of employment of children and adolescents.	
13	Bangladesh Labor Rules, 2015	Includes rules on registration of laborers, misconduct rules, income and benefits, health and fire safety, factory plan	Contractors to implement occupational health and safety measures Contractor will be liable for compensation for work-related injuries	Department of Labor
14	The Pourashava Act 2009 / Ordinance issued for the amendment of local government (municipality) ordinance, 2009 and 2010; The Pourashava Ordinance, 1977; Municipal Administration Ordinance, 1960	Provides guidance for subproject integrated community and workers health and hygiene at the construction and operation and maintenance stages of the project	Coordinate with Pourashava committees on disaster management measures, water and sanitation and waste management	Local Authorities
15	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
16	Building Construction (Amendment) Act and Building Construction Rules, Bangladesh National Building Code	Regulates technical details of building construction and to maintain standards of building construction	Follow specifications to ensure structural integrity of buildings	Ministry of Housing and Public Works
17	Electricity Act, 1910 and Electricity Rules 1937	Requires compensation for any damage, detriment or inconvenience caused by the project; Requires precautionary measures in laying down electricity supply lines near or where any metallic substance or line crosses to avoid electrocution	Secure permission to supply energy and lay down or place electricity supply lines for the conveyance and transmission of electricity from respective authorities prior to any works Give full compensation for any damage, detriment or inconvenience caused by him or by anyone employed by him Take precautions in laying down electricity supply lines near or where any metallic	Ministry of Power, Energy and Mineral Resources

No.	Environmental Legislation / Act	Objective	Relevance to the Project	Responsible Institution
			substance or line crosses in order to avoid electrocution	
18	The National Energy Policy (1996 and Updated 2004)	Ensures environmentally sound sustainable energy development programs causing minimum damage to the environment, to encourage public and private sector participation in the development and management of the energy sector and to bring the entire country under electrification.	Public and private sector participation in the development and management of the energy subprojects. Provides guidelines for renewable energy subprojects	Ministry of Power, Energy and Mineral Resources
19	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

D. Relevant Occupational Health and Safety Laws and Rules

28. During construction, the subproject will conform to the occupational and health related rules as outlined in the Table II.3 below.

Table II.3: occupational and health related rules

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

E. Conventions, Treaties and Protocols

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

Biodiversity convention, Rio-de-Janeiro, 1992, Convention concerning occupational health services, Geneva 1985 etc.

Table II.4: International Environmental Conventions relevant to the project activities

	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

F. Environmental Categorization and Standards

1. Environmental Category: Bangladesh

30. 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 ECR 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.

31. The environmental category of the sub-project is listed in Schedule – 1 of ECR. As per Schedule 1 of ECR, mini piped water supply subproject is likely to be classified as red category (Table II.5). Thus LCC and ECC is required from the DoE prior to commencement of the subproject.

Table II.5: Categorization of Subproject Components

Subproject	Component	Equivalent in Schedule I of ECR	DoE Classification
Construction and operation of mini piped-water supply system	<ul style="list-style-type: none"> Mini piped-water supply system with production tube-wells. Distribution pipe network and stand pipe water distribution points. 	Water, power, and gas distribution line laying/relaying/extension	Red

2. ADB Safeguard Policy (ADB Safeguards Policy Statement, 2009)

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

33. **Screening and Categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of

cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

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

34. **Environmental management plan.** An EMP, which addresses the potential impacts and risks identified by the environmental assessment, shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

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

- (i) for environmental category A projects, draft EIA report at least 120 days before Board consideration;
- (ii) final or updated EIA and/or IEE upon receipt; and
- (iii) environmental monitoring reports submitted by the PMU during project implementation upon receipt.

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

G. Institutional Capacity

37. 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.

38. 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.

III. DESCRIPTION OF THE PROJECT

A. Need for the Subproject

40. REACH worked with the support from UNICEF to provide a baseline on WASH conditions in all recognized Rohingya Refugee Camps. A household survey covering 3,576 refugee households across all 34 recognized Rohingya Refugee Camps was conducted during the driest point of the year in April 2018. Few key findings are as follows:

- (i) Use of unprotected drinking water sources was concentrated in two camps: in all, 27% of respondents in Camp 20 reported using unprotected dug wells, and 14% of respondents in Jadimura reported using surface water.
- (ii) Women and girls are primarily responsible for water collection, with 79% of households reporting women, and 28% reporting girls involved, compared to 23% of men and 16% of boys respectively.
- (iii) Problems with access to water points were reported by 56% of households, and largely related to long distances (43% of all households) and long wait-times (41% of all households).
- (iv) According to survey data, reported volumes of available drinking water storage and amounts of drinking water collected per person per day were both low: only 3% of households reported having 10 liters or more of drinking water storage per person, while 21% of households reported collecting less than the 2.5 liter/person/day.

41. The above mentioned information shows the scarcity and need of fulfilling the demand of water for the refugees which is grave concerns of the respective authority, and the development partners⁶.

42. Ukhia Town lacks piped water supply system. As a result, the local people draw un-treated water by stand-alone means from various sources, including ground water and surface water. Thousands of tube wells were installed to supply water to the refugees, many of which have become non-functional due to lowering of the ground water levels in the area. Fresh water options in the affected area are extremely limited, particularly in Teknaf (Cox's Bazar), where the bedrock surface at 25-30 m below ground levels makes deep tube wells a costly option for the locals. Irrigation wells are slowly drying up as the water table is falling as a result of watershed destruction and significant reduction in the recharge of groundwater reserves. Continued pressure on the aquifer may result in salt water intrusion, rendering it unusable.

43. The provision of a surface water based piped water supply system with treatment and distribution facilities is deemed to be enhance availability of potable water for the refugees and host community (local people and the people lives in Ukhia Town), and encourage growth and investment. This is in line with the Sector Development Plan (SDP) for water supply and sanitation (2011–2025) of Government of Bangladesh, which set a target to serve 90% people with piped water supply by 2025 in all Pourashava Towns.

B. Subproject Scope

44. The name of the subproject is "Construction and operation of mini piped water supply system with production tube well along with pipe network, and stand-pipe water distribution points in camps and adjacent affected villages". However, five nos. of mini piped water supply systems were proposed to be implemented under the contract package for emergency water supply to the refugee camps in Ukhia. Implementation of the system includes installation of (i) tube well and submersible pump (ii) water transmission pipeline (iii) hill top water reservoir (iv) distribution network and (v) public stand points. Each of the water supply system has pump house and solar panel. Installation of test tube well and development & testing of production well are also important part of the total activity. Each of the water supply system has pump house and solar panel. The submersible pump of the tube well is operated by solar energy.

⁶ Wash baseline assessment, REACH, April 2018

C. Location of the Subproject

45. The subproject to be implemented is located displaced persons' mega camp in Ukhia Upazila (Figure III.1) which is situated south of Cox's Bazar and borders with the Rakhine state in Myanmar. Cox's Bazar - Teknaf highway is located to the north of the camp and runs south east. Teknaf Wildlife Sanctuary is west of Kutupalong and encompasses an area of 11,615 hectares.

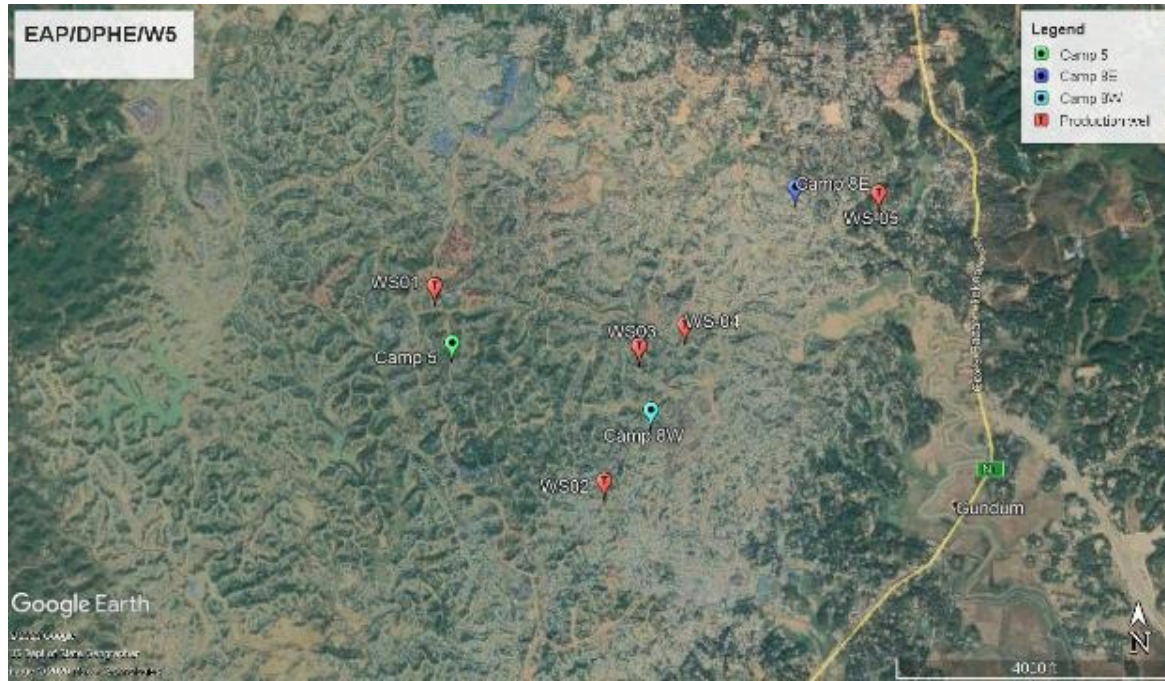


Figure III.1: Location map of the proposed mini pipe water supply system

D. Existing Water Supply System

46. In the proposed subproject area, currently shallow suction hand pumps serve 70% of the population while deep tube wells serve 20%. Based on average discharge each hand-pump can serve up to 250 individuals. Deep hand pumps which can tap water up to depths of 650 to 750 feet (215 – 250m) can serve up to 500 in the dry season.

47. Over 5000 shallow and deep tube-wells (manually) have been drilled in 2017 phase (Figure III.2), most are fitted with hand pumps with 7m max suction head, increasing the risk of many becoming non-functional during the peak of the dry season (Figure III.3).

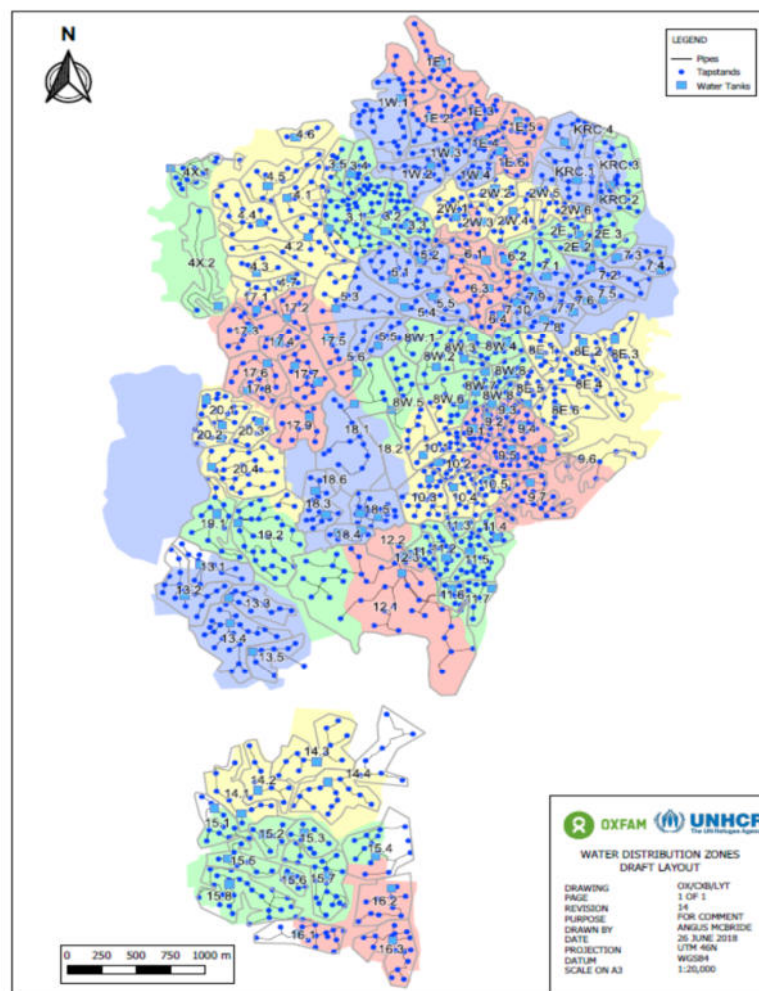


Figure III.2: Water distribution zone in the camp

48. Due to the poor workmanship and indiscriminate siting, sanitary protection is compromised in most sources. Up to 70% of water samples from tube-wells are showing some faecal contamination. There is evidence of wear and tear of spare parts in hand pumps along with the priming of suction pumps increases the risk of contamination and non-functionality.

Table III.1: Details of existing water supply to the camps

	Water trucking	Other Supplies
L/P/D	7.5-10	20
Max queuing	1 hour	30 minutes
Maximum distance to water point	500 meter	200 meter
People / Hand Pump	250 persons/ tap stand	250 persons (STW)/ 500 persons (DTW)

49. In the refugee camps where ground and surface water is not available, water trucking is being implemented especially during dry period and sector partners ensured that such locations receive a minimum of 5-10 liters per person per day. For any type of water trucking, monitoring the source of the water being distributed and chlorination of water before distribution is mandatory. However, DPHE is responsible to conduct water quality surveillance and sanitary survey in the camp.



Figure III.3: Existing water supply system in the subproject area

E. Description of the Proposed Subproject

50. Components of mini piped water supply system that includes the following:

- (i) Construction of Production well: Construction of exploratory drilling (test well),
- (ii) Construction of production well using truck mounted hydraulic rig
- (iii) Construction of production well using mechanical rig
- (iv) Installation of solar pump solution for production well
- (v) Construction of pump houses
- (vi) Construction of reservoirs (10000 liter HDPE)
- (vii) Construction of HDPE Pipe networks (100mm and 75 mm pipeline) using trench
- (viii) Construction of community tap stand
- (ix) 2 years' construction period including O&M of the mini-piped water supply system

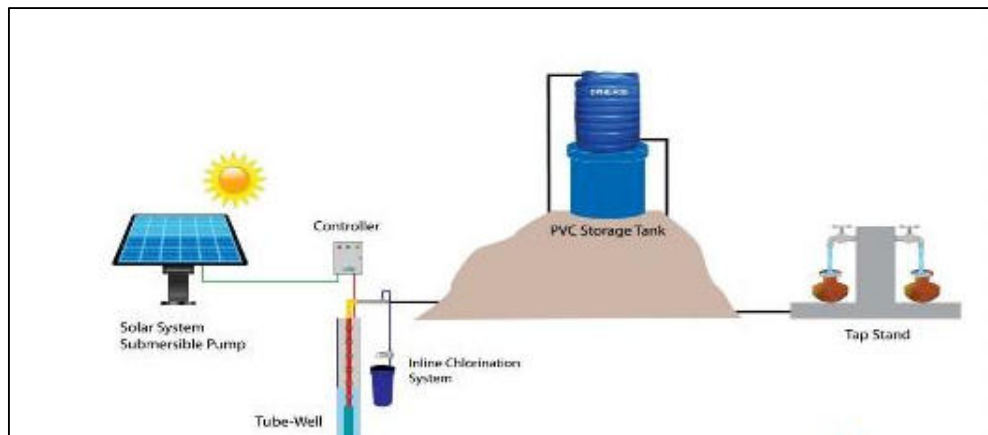


Figure III.4: Schematic diagram of the mini pipe water supply system

1. Production Well

51. Total five production wells of 250m depth and 200 mm dia. will be constructed in the camp. Out of 5 production wells, one will be dug using truck mounted hydraulic rig if the site is accessible and rest 4 nos. of wells are planning to dig using the mechanical rig. Bentonite clay may be used as drilling mud to ensure stability of the borehole. However, 400 mm dia. casing pipe will be installed around the production well and the annular space around the casing pipe will be filled with local clay etc. (Figure III.5). Production wells will be developed by over pumping, surging and backwashing in three stages by using suitable capacity air compressor and submersible pump for removing mud-cakes from borehole wall including supply of development material all complete till water is sand and turbidity free. Finally, the well will be disinfected by introducing a solution of sodium or calcium hypochlorite to establish a free chlorine residual of 30 ppm. The solution will be administered into the well by pouring from top of the well. The chlorine solution will

remain in the well for 24 hours after which the chlorine solution shall be pumped out of the well. The pumping will continue until the water is free from smell of chlorine.

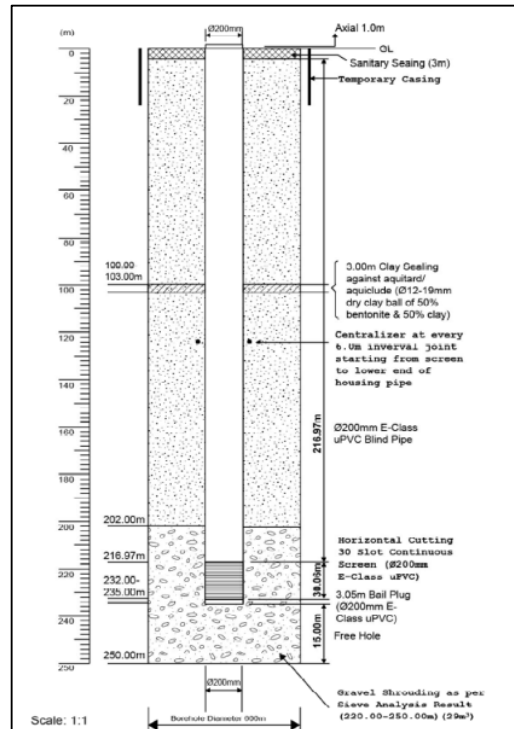


Figure III.5: Design of production well

2. Pumping Facility

52. Five units of submersible pumps with capacity of 175,000 Liters/day at 50 m TDH with solar system will be set up for lifting water from production well. However, the solar panel for pumping solution will be installed to generate 7.5KW for motor and 10 KW for controller. The specification of the Motor: Highly efficient 3-phase AC motor, Motor Capacity: 11Kw, Frequency: 25...52 Hz, Premium materials, stainless steel: AISI 304, No electronics in the motor. Efficiency max. 80 %, Motor speed 750-1525 rpm, Power factor 0.87. The specification of the Pump: End PE C-SJ 42-6, Non-return valve, Premium materials, stainless steel: AISI 304, Optional: dry running protection, Centrifugal pump Efficiency max. 75%. Moreover, total five nos. of pump houses will be built for 5 schemes in the camp.

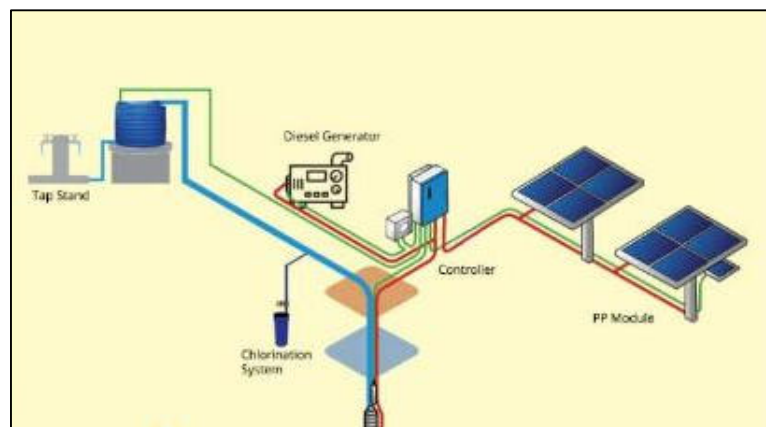


Figure III.6: Solar based pumping system

3. Water Reservoirs

53. Total 30 nos. of HDPE water tanks with capacity of 10 cum each will be installed on the brick and concrete cement basement at different camp locations. Afterward, disinfection will be carried out by filling the reservoir up to the Top Water Level with water containing appropriate strength of chlorine compound (20mg/l approx.), allowing it to stand for 18 to 24 hours. Chlorine addition shall be done by adding hypochlorite solution and shall be applied with mechanically or electrically powered chemical feed pump designed for feeding chlorine solutions. However, if situation demands less time, then the strength of disinfectant may be increased with corresponding lesser contact time.

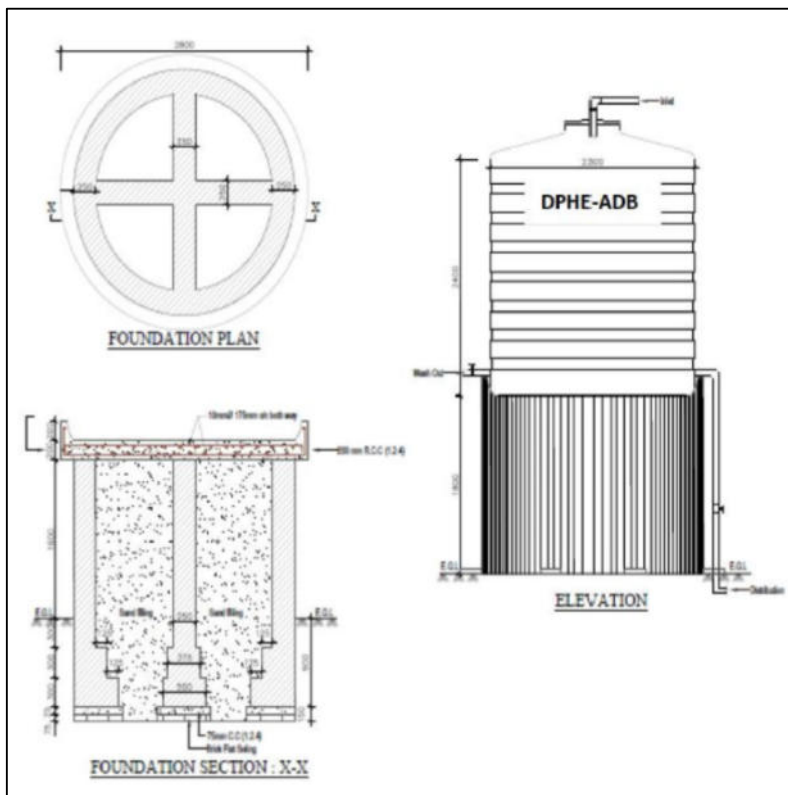


Figure III.7: Foundation plan of water reservoir

4. Pipe Networks for Distribution

54. HDPE pipe network of 10 km will be constructed to distribute the water to the community tap stand. For each scheme, the following breakdown of pipelines in two different sizes will be laid out:

- 100mm pipe, 1 km
- 75 mm pipe, 1 km

55. However, the pipe will rest on a solid and even foundation bedding for the full length of the pipe barrel. The pipe trench will be kept free from water at all times. Where the pipeline passes underneath a trench, ditch or culvert, it should be suitably protected with concrete or other similar material, having a minimum cover of 300mm from the hard cleaned bottom of the ditch or culvert to the top of the pipe. On the other hand, where a pipeline runs parallel to a ditch, the edge of the pipeline trench nearest to the ditch should be kept at a distance from the edge of the ditch at least equal to the depth of the ditch, or the depth of the trench, whichever is the greater. The annular space between the pipe and sleeve shall be cleaned of all loose particles and contamination. If any contamination occurs, shall be removed immediately followed by a thorough washing of the surfaces.

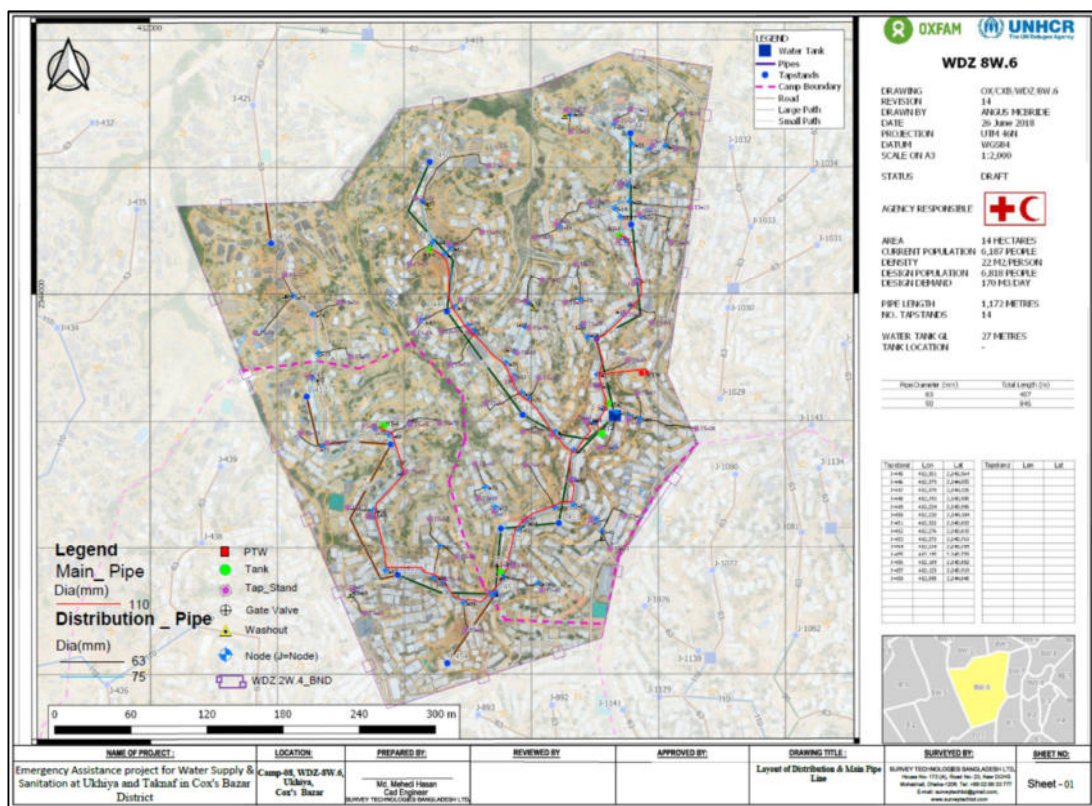


Figure III.8: Layout of distribution and main pipe line

5. Community Tap Stand

56. Three hundred of community tap stands will be constructed (average 60 nos. per scheme) throughout the proposed subproject area.

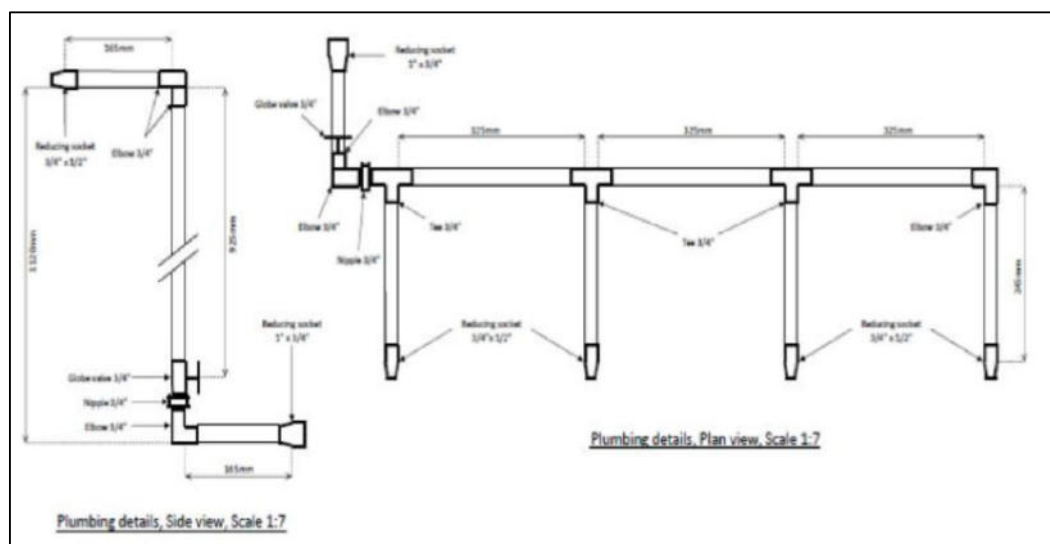


Figure III.9: Plumbing details of community tap stand

6. Operation and Maintenance

57. Operation and maintenance (O&M) will be carried out by the contractor for at least one year after successful commissioning of piped water supply. The content of O&M will be (i) Operator (ii) Chemical (Bleaching powder) and (iii) repair (if requires). This O&M period will be best illustration of the successful

commissioning of the scheme and also a good demonstration for the target community about its operation. The contractor will keep all the records of the operation and obtain certificate from the designated authority; also provide the training to the person identified by the DPHE and WASH partner.

7. Implementation Schedule

58. Substantial time is required spanning the continuum of subproject design & estimate, contract award and contract execution. Efforts needs to be made to meticulously follow the schedule should a timely implementation of work is aimed at.

59. Normally the construction work season in Bangladesh runs from October through May (eight months). Construction works are sometimes impeded for the following reasons.

- (i) Early floods in April/May,
- (ii) Late floods in September/October,
- (iii) Natural calamities (cyclone/tornado, excessive floods) occur in April/May and October/November.
- (iv) Normally, the best construction period is only for 6 months a year (October to March). The construction period is sometimes squeezed to 4 months due to natural calamities.

60. However, sometimes, based on time constraint or exigency, construction work may even need to be carried out in the monsoon. Besides, whenever possible, simultaneousness of activities can be ascertained and cashed in on and consequently, quantum of work can be maximized through efficient planning and adoption of best available practice.

61. However, the implementation sequences are given in the following Table III.2.

Table III.2: Implementation sequences

Sequence of Steps	Description of activities
Step 1	Consultation with community, camp authority and WASH partner to finalize the site of borehole, water reservoir, distribution network, community tap stands.
Step 2	Installation of test boring; Topographic survey for layout plan g pipe network.
Step 3	Construction of Production well and development.
Step 4	Construction of pump house and groundwater reservoir, Construction of Pipeline.
Step 5	Construction of community tap stand.
Step 6	Commissioning of piped water scheme.
Step 7	Operation and maintenance of the scheme.

62. Summing up, over a 24-month period (6 months for construction and 18 months for operation and maintenance), major works are advisable to take place in the second quarter of 2019.

IV. DESCRIPTION OF THE ENVIRONMENT

63. This section discusses the existing conditions within the subproject study area, covering natural environment. The analysis was completed through the use of a combination of secondary data sources in addition to on-ground reconnaissance survey. The assessment is divided into three broad categories:

- Physical Environment;
- Biological Environment; and
- Socio-economic Environment.

A. Physical Environment

1. Location Setting and Extent

64. **Ukhia Upazila:** Ukhia 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. Ukhia 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. Ukhia 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 longitudes⁷. 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 IV.1 for details.

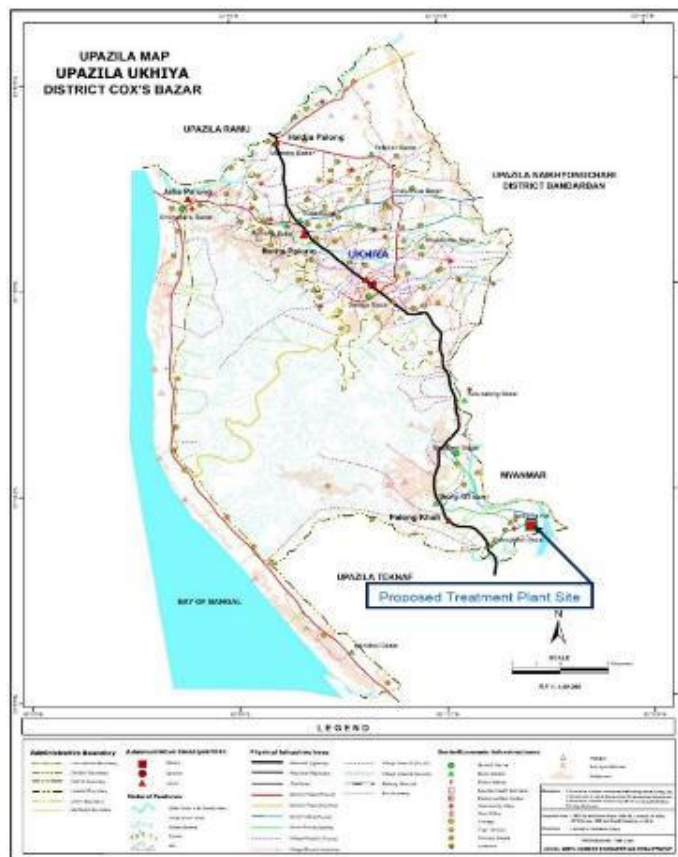


Figure IV.1: Location map of Ukhia Upazila

⁷ <http://en.banglapedia.org/images/e/ee/UkhiaUpazila.jpg>

2. Topography and Landform

65. Ukhia 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.

66. 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 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 hills⁸.

67. The study area is under two major physiographic units they are Low hill range and Chittagong coastal plain floodplain. 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-ridge depressions, which are surrounded by sandy beaches. See **Figure IV.3** for morphological cross section⁹ of Cox's Bazar.

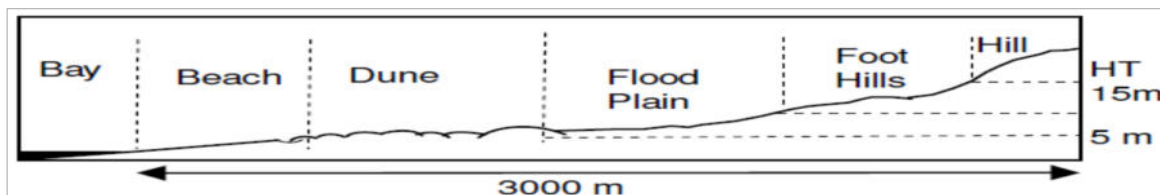


Figure IV.2: Morphological cross section of Cox's Bazar

3. Geology

68. Bengal Basin and the Bay of Bengal tectonically formed during the Tertiary as the late Cretaceous Indian plate broke away from Gondwanaland and collided first with the Eurasian plate during the movement toward the north¹⁰ and afterward with the western part of the Burmese sub-plate. The Eastern Coastal Zone, from the Cox's Bazar in the north to the Teknaf region in the south, is a sequence of anticlines and synclines with a prominent syncline in the Cox's Bazar and an anticline in the Teknaf area¹¹.

69. The unconsolidated alluvial sediments of the coastal plain in Cox's Bazar consist of interbedded sand, silt and clay units, with a dominance of fine-to-coarse sands¹². However, the coastal aquifer system in Bangladesh in general has been divided into three major aquifer units where the aquifers are separated

⁸ 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.)

⁹ 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.

¹⁰ Curry JR, M. D. (1974). Sedimentary and tectonic processes in the Bengal Deep-Sea Fan and geosyncline. *The geology of continental margins*. Springer, New York, pp 617–627.

¹¹ Alam, H. A. (1990). Geological map of Bangladesh. Geological Survey of Bangladesh, Dhaka.

¹² Ravenscroft, P. B. (2005). Arsenic in groundwater of the Bengal Basin, Bangladesh: Distribution, field relations, and hydrogeological setting. *Hydrogeology Journal*, 13(5–6), 727–751.

by leaky and discontinuous aquitards¹³. Layers are laterally discontinuous; thus, correlations are difficult to make. Therefore, sandy layers are assumed to be hydraulically connected.

4. Soil

70. 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. All soils are strongly acid in reaction; 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 sandier 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.

71. 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 IV.4** for details.

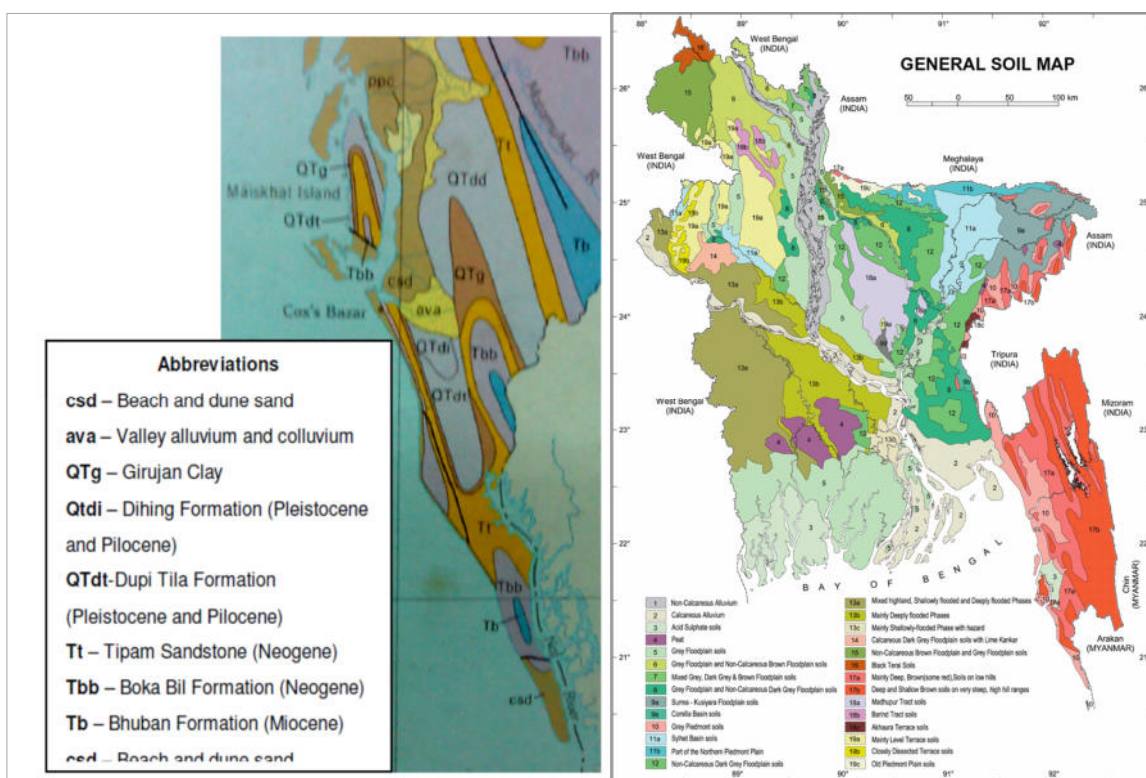


Figure IV.3: Geology of Cox's Bazar (left); General soil map of Bangladesh (right)

5. Climate and Meteorology

72. The climate of the subproject area is tropical and characterized by a change of four, monsoon-related seasons: pre-monsoon (March to May); monsoon (June to September); post-monsoon (October to November); and the dry season (December to February). Meteorological data of Cox's Bazar station is considered for the subproject area as it is located in the close proximity to Cox's Bazar station.

¹³ Ravenscroft. (2004). Mechanism of regional enrichment of groundwater by boron: The examples of Bangladesh and Michigan, USA. Applied Geochemistry, 19(9), 1413–1430.

73. **Temperature** - The temperature of the country is related to the period of rainfall. In general, cool seasons coincide with the period of lowest rainfall. The monthly average maximum and minimum temperature at the Cox's Bazar station are 29.1°C and 19.9°C respectively. Figure IV.2 show average mean, maximum and minimum temperature for the last five years (2008 to 2012) at Cox's Bazar Meteorological station.

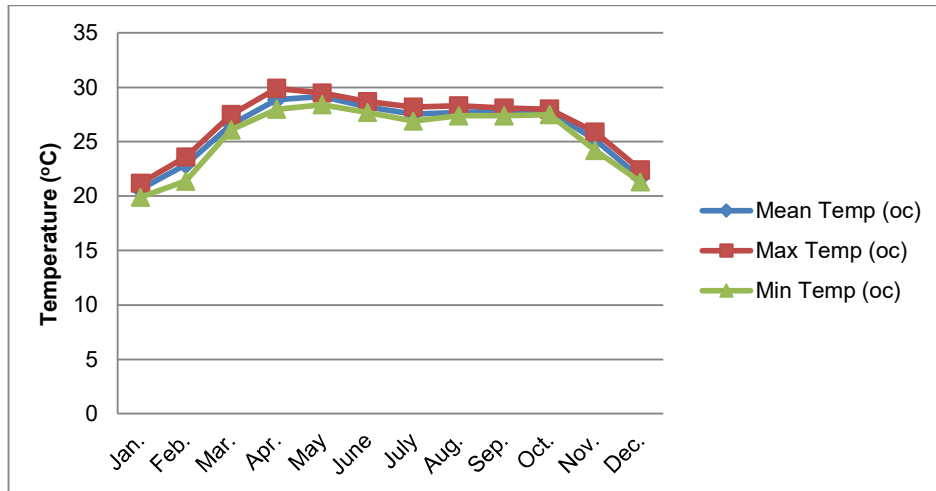


Figure IV.4: Monthly average maximum, minimum and mean temperature

74. **Rainfall** - Rainfall varies considerably from year to year and month to month. The highest rainfall recorded between 2008 and 2012 was in 2012 with peak in June of 1226 mm at Cox's Bazar Station. The average rainfall Cox's Bazar station between 2008 and 2012 was 281.97 mm/month over that five-year period. However, no rainfall was recorded during the month of November, December and January. Figure IV.3 shows the average monthly rainfall over the five-year period along the project corridor, with most of the rainfall between May and August.

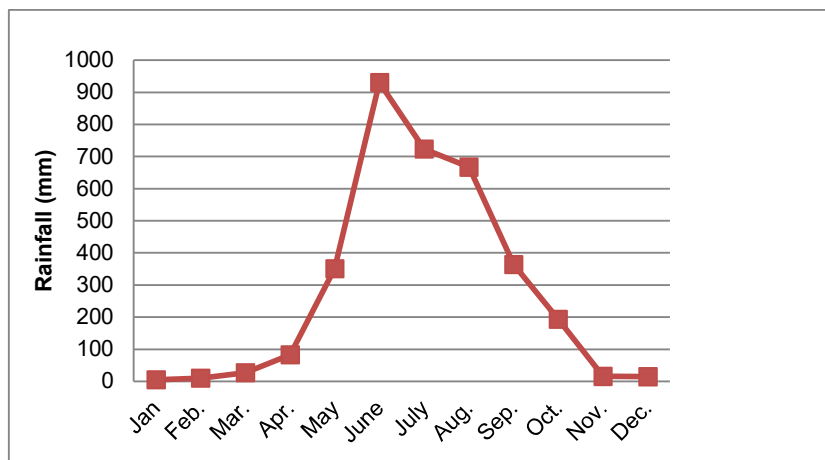


Figure IV.5: Average monthly rainfall

75. **Relative Humidity** - Humidity levels are consistently very high during the monsoon season, and drop significantly for a relatively short period at the end of the dry season. The 5-yearly average maximum relative humidity at Cox's Bazar station was 87% and the average humidity recorded was 77.99%.

76. **Wind Speed and Wind Direction** - Monthly wind data of Cox's Bazar station shows that wind speed is at a maximum in the early part of the monsoon, but drop substantially by the beginning of the dry season. The monthly average wind speed for Cox's Bazar station over the last five years (2008-12) are shown in Figure IV.4, and this pattern is assumed to reflect the conditions of the subproject area.

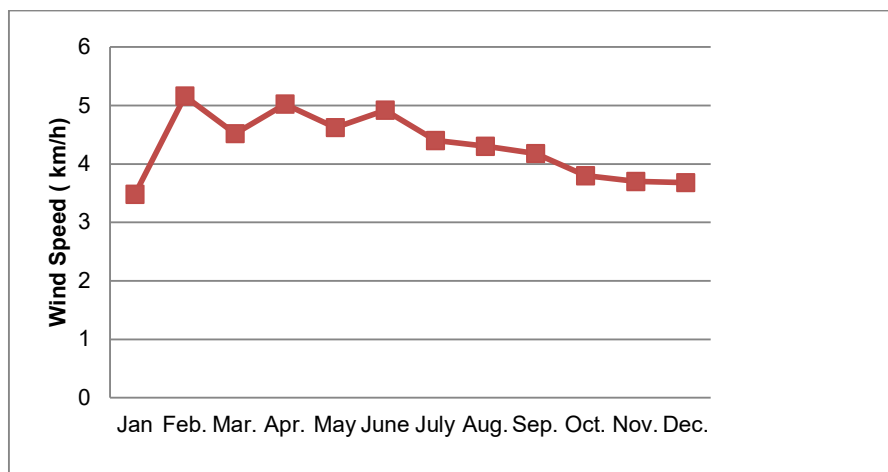


Figure IV.6: Monthly average wind speed

77. Historical wind data (wind speed, wind direction) were collected from Cox's Bazar station which suggested that around 22% of the year, wind blows from East to South with wind speed between 9-12 km/h (13%), 12-15 km/h (7%) and 18-25 km/h (2%). Other 58% of the year, wind blows from south with wind speed between 6-9 km/h (30%), 9-12 km/hr (10%) and 12-15 km/h (2%), wind is highly variable.

6. Natural Disasters

78. 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 riverbanks, thunderstorm, earthquake 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.

79. 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 Moheskhali 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 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.

80. The following areas are identified by the Cox's bazar District Disaster management Plan¹⁴: Under Ukhia-Jaliapalong, Sonarpara, Dailpara, Lamburipara, Sonaichari, Nidania, Inani, Shafir bil, Ruppoti, Bailyakhali, Imamerdail, Sepotkhali, Maderbonia, Monkhali, Nolbila, Balukhali, Goalmara, Thainekhali and Rahmoter bil. Figure IV.7 presents a Hazard Calendar of the Upazila.

81. The Cox's Bazar Bay is the source of salinity at the downstream portion of the Bakkhali River. Salinity intrusion into the aquifer contaminates groundwater resulting in a potable water crisis.

¹⁴ Development of District Disaster Management Plan District: Cox's Bazar, District Disaster Management Committee, Cox's Bazar. August 2014. Government of Bangladesh.

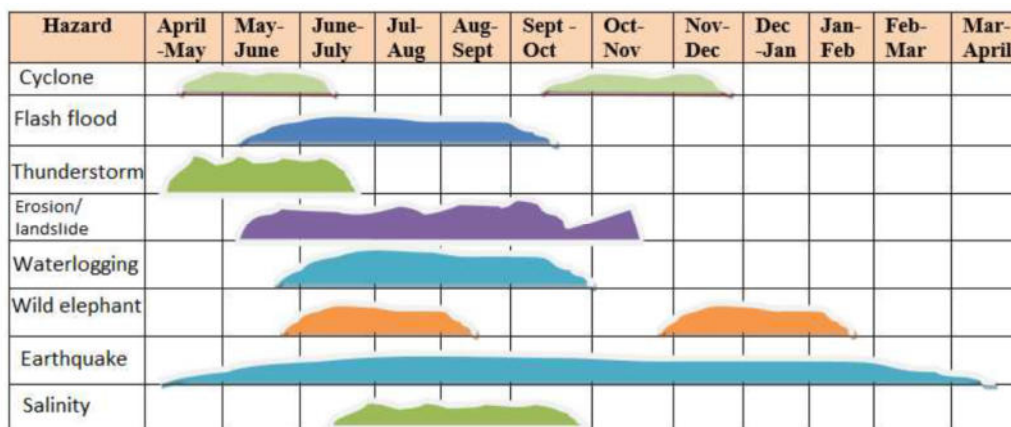


Figure IV.7: Hazard calendar for subproject area

7. Seismicity

82. Seismic activities in history and distinguish the sections that are favorable, unfavorable or dangerous to the project in accordance with the seismic zonation of basic intensity of earthquake, for example, the specific location and activeness of the dam need to be meticulously investigated and professional judgment should be in formulating design criteria.

83. The subproject area is located in a seismic zone II, referred to as the medium risk zone for earthquake in the country (Figure IV.8). Seismic events in Bangladesh are relatively infrequent, but historically, have been severe, such as the earthquakes of 1930, 1950 and 2004. To address any potential impacts due to seismic activities, provisions of the Bangladesh National Building Code (BNBC) 1993 and 2006 shall be strictly followed.

8. Land Slides and Erosion

12 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 IV.8 shows the landslide prone areas around the subproject area.

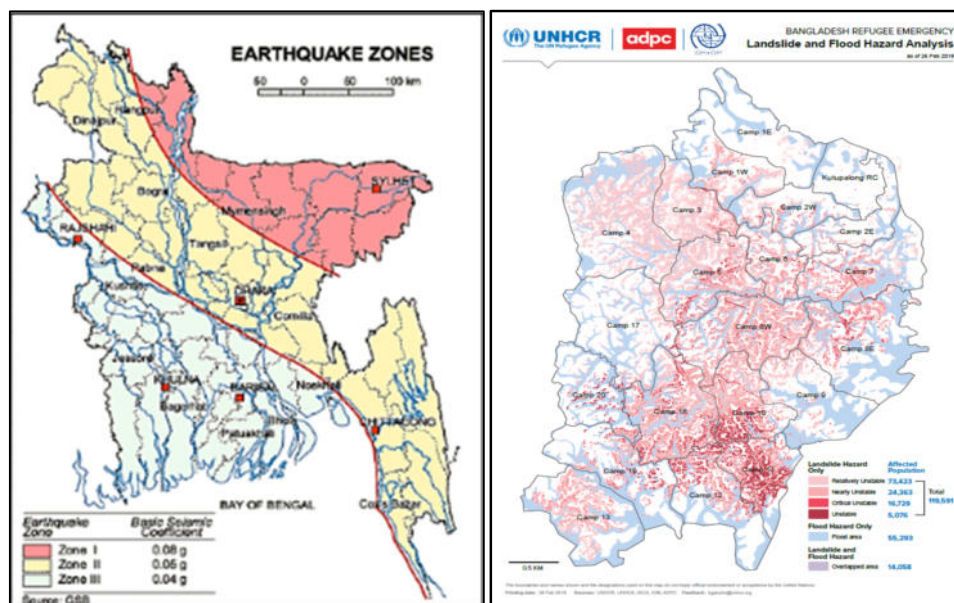


Figure IV.8: Earthquake zone around the subproject (left); Landslide vulnerability areas around the subproject (right)

9. Flooding, Water Logging and Drainage Pattern

84. Cox's Bazar records heavy rains every year and is one of the most flood prone areas of Bangladesh. Flash floods (rapid flooding from heavy rains) are the most common type of floods in hilly southeastern areas of Bangladesh (Shaw et al. 2013). Ramu, Cox's Bazar Sadar, and Chakaria Upazila generally record the highest number of people affected by floods across Cox's Bazar district during the monsoon.

85. Eastern side of the Upazila 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 IV.9¹⁵ shows a flood vulnerability Factor Map of Bangladesh. The study region falls into high vulnerability region (score >9).

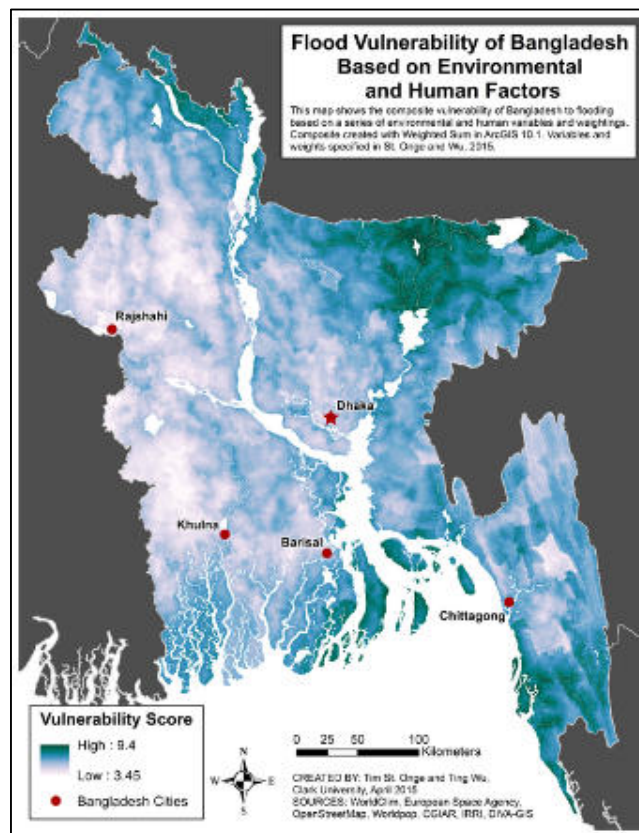


Figure IV.9: Flood vulnerability map of Bangladesh

10. Hydrology and Water Resources

86. 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. Several canals run through the hilly hinterland. In addition, a stream network runs through the study area.

87. **Naf River:** It flows along the southernmost border line of the country. It originates in the northern hills of Myanmar and enters Bangladesh near Palongkhali of Ukhia Upazila of Cox's Bazar district. The

¹⁵ WorldClim, SRTM map by Tim St. Onge and Ting Wu, Clark University, May 2015. URL: <http://timstonge.weebly.com/gis-portfolio.html>, Date accessed: 7 August 2020.

river flows through Ukhia 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.

88. There are 14 canals in the Upazila, which flow throughout the Upazila (Figure IV.10). Reju Canal-starting from Rejur mukh crosses painnasia, sonaichoara, sonarpara, chorpara, jummapara and lamburi para. It has length of 7 kilometres. Monkhal Canal-starting from Monkhal mouth up to Nuton Chaka para. It is 8 kilometres. Sowankhal Canal- it is 8-kilometre-long started from Swankhal area and stretched upto Bay of Bengal. Chepokhal Canal-It is 10 kilometre long started from Madarbonia and arrives to Chepotkhal. 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 Patabari area. Duchori Canal-the canal is 15 kilometre long started from Tuturbil to Madhurghona. Goyalmara Canal-it is 18 kilometre long starting from Tuturbil and upto 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-kilometre-long starting from Achortoli to Naf river crossing through Tarulapara and Fashiakhali. Balukhal Canal: a 6-kilometre-long started from Madhuchara reaches to the Naf river crossing through BGB camp, Chowdhury para and Barua para.

89. **Reju Khal:** The khal has originated from Arakan boarder of Myanmar and Wading hills, it has flowed through Nikhongchoriupazila 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.

90. 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 5-7m¹⁶.

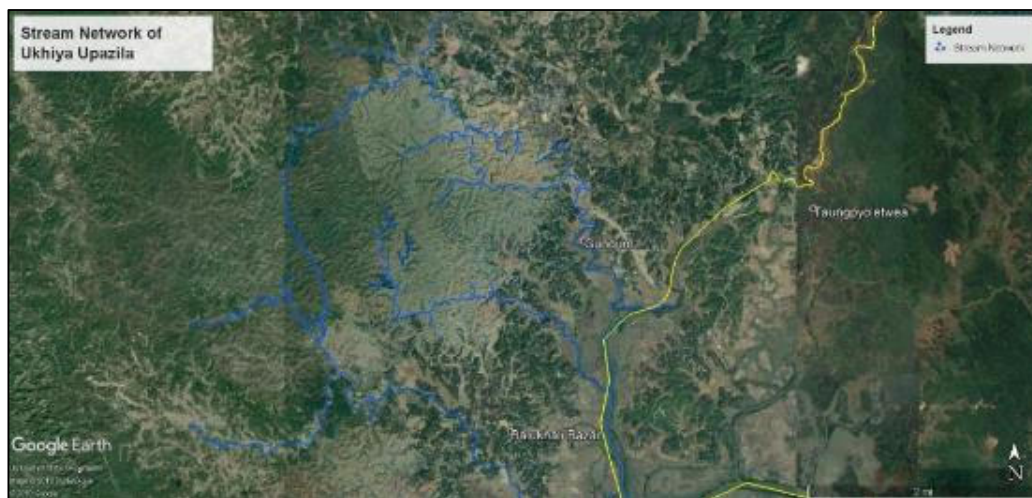


Figure IV.10: Stream network in the subproject area

91. **Groundwater-** In Bangladesh, surface water and groundwater are used for human resources. The availability and restoration of both water systems vary depending on the season¹⁷. There are shallow and deep aquifers on which 97% of the Bangladeshi population depend¹⁸. Smith et al. (2000) mention that inorganic arsenic occurs naturally in Bangladesh's groundwater and poses many threats to the health of humans¹⁹.

¹⁶ BARC, Bangladesh agricultural research council, September 2015. URL: <http://www.barc.gov.bd/>

¹⁷ 2030 WRG. (2015). Consolidation and analysis of information on water resources management in Bangladesh. Dhaka: 2030 WRG.

¹⁸ NERC. (2001). Groundwater quality: Bangladesh. British Geological Survey.

¹⁹ Smith, A. L. (2000). Contamination of drinking-water by arsenic in Bangladesh: a public health emergency. Bulletin of the World Health Organization, 78(9): 1093-1103.

92. Due to the heterogeneous lithology, different hydraulic properties and frequent sea level changes it is always difficult to predict the aquifer system in Cox's Bazar areas. In general, the aquifer containing freshwater is found within the upper 25 m⁶. The regional groundwater flows follow the local topography with a general direction east, north-east to west, southwest²⁰.

11. Environmental Quality

93. No environmental monitoring survey was conducted during design stage, however, the environmental monitoring program developed as part of the environmental management plan (EMP) will require the contractors to establish the baseline environmental conditions prior to commencement of civil works which will be the basis to ensure no degradation will happen during implementation.

94. **Air Quality.** Air is a mixture of gases and small particles which comes from natural sources and from human sources. Air pollution occurs when substances are introduced to the air, in quantities that could harm the comfort or health of humans or animals, or could damage plants or materials. Outdoor air pollution has been shown to have an adverse effect on humans, ecosystems and structures.

95. Within Bangladesh the major sources of outdoor air pollution are industrial emissions and vehicular emissions. Industrial sources include fertilizer factories, mills (sugar, paper, jute and textile) brick kilns, tanneries, chemical and pharmaceutical industries, large scale development project etc. Emissions from these various sources are often responsible for visible smog which regularly shrouds major cities. However, the main sources of outdoor air pollution within rural areas of Bangladesh are brick kilns (Guttikunda, 2009), combustion of wood, coal and biomass for domestic heating and cooking (UNEP, 2002). It is likely in rural areas that the principal air contaminants are particulate matter and volatile organic compounds. Other common sources of rural air pollution include emissions from engine vehicles, and dust during the dry season from construction sites, roads, disturbed areas and cleared agricultural lands.

96. The subproject area in the Rohingya camps is a rural area in nature where ambient air quality is dependent on many factors like air movement, traffic volume, congestion, emissions and suspended dust particles from motor vehicles and other development projects. The proposed sites are visually not found as polluted, therefore, no primary data was collected. However, a continuous monitoring scheme is essential to evaluate air quality and for the development of any plan for mitigation of health risks caused by polluted air. The "criteria pollutants", particulate matter (PM10, PM2.5), CO, SOx, NOx have to be monitored more or less. Hence, to establish the baseline air quality, a primary analysis of air quality is proposed before start of construction. Table IV.1 shows the Bangladesh National Ambient Air Quality Standard.

Table IV.1: Standards of ambient air quality

Air Pollutant	Standards	Averaging Time
Carbon Monoxide (CO)	10 mg/m ³ (9 ppm) ^a	8-hour
	40 mg/m ³ (35 ppm)	1-hour
Lead (Pb)	0.5 µg/m ³	Annual
Oxides of Nitrogen (NOx)	100 µg/m ³ (0.053 ppm)	Annual
Suspended Particulate Matter	200 µg/m ³	8-hour
PM10	50 µg/m ³ ^b	Annual
	150 µg/m ³ ^c	24-hour
PM2.5	15 µg/m ³	Annual
	65 µg/m ³	24-hour
Ozone (O ₃)	235 µg/m ³ (0.12 ppm) ^d	1-hour
	157 µg/m ³ (0.08 ppm)	8-hour

²⁰ Fatema, S. &. (2018). Seawater intrusion caused by unmanaged groundwater uses in a coastal tourist area, Cox's Bazar, Bangladesh. Environmental Earth Sciences.

Air Pollutant	Standards	Averaging Time
Sulfur di Oxide (SO ₂)	80 µg/m ³ (0.03 ppm)	Annual
	365 µg/m ³ (0.14 ppm) ^a	24-hour

Source: DOE. Schedule 2, Rule-12, ECR, 1997. (Bangladesh Gazette, 19 July, 2005).

Abbreviation: ppm: Parts Per Million

Notes: In this schedule Air Quality Standards means Ambient Air Quality Standards

- Not to be exceeded more than once per year
- Annual average value will be less than or equal to 50 microgram/cubic meter
- Average value of 24 hours will be less or equal to 150 microgram/cubic meter for one day each year.
- Maximum average value for every one hour each year will be equal or less than 0.12 ppm.

97. **Noise Level.** Noise is another potentially serious threat to the quality of an environment. Noise levels vary at the given locations according to ambient noise, including movement of road-traffic, industrial noise, general community noise, and noise from birds and insects. The background noise level at the subproject area is low, due to an absence of heavy industries, large urban development and other significant noise sources. Low noise generates in the subproject areas mainly due to movement of road traffics.

98. To establish the baseline noise quality, a primary analysis of noise quality is proposed before start of construction at the proposed site of the subproject. The standard values for noise as per Schedule 4 of the Standards for Sound of Bangladesh Conservation Rules 1997 are shown in the following Table IV.2.

Table IV.2: Standard value (dBA) for noise

Sl. No.	Category of areas	Standards determined at dBA unit	
		Day	Night
a.	Silent zone	50	40
b.	Residential area	55	45
c.	Mixed area (mainly residential area, and also simultaneously used for commercial and industrial purposes)	60	50
d.	Commercial area	70	60
e.	Industrial area	75	70

Source: Bangladesh Noise Control Act, 2006 –Schedule 1

Notes:

- The time from 6 a.m. to 9 p.m. is counted as daytime.
- The time from 9 p.m. to 6 a.m. is counted as night time.
- Area up to a radius of 100 meters around hospitals or educational institutions or special institutions/ establishments identified/to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

Table IV.3: Sound levels and human response

Common Sounds	Noise Level (dB)	Effect
Carrier deck jet operation; Air raid siren	140	Painfully loud
Thunderclap	130	Painfully loud
Jet takeoff (200 feet); Auto horn (3 feet)	120	Maximum vocal effort
Pile driver; Rock concert	110	Extremely loud
Garbage truck; Firecrackers	100	Very loud
Heavy truck (50 feet); City traffic	90	Very annoying Hearing damage (8 hours)
Alarm clock (2 feet); Hair dryer	80	Annoying
Noisy restaurant; Freeway traffic; Business office	70	Telephone use difficult
Air conditioning unit; Conversational speech	60	Intrusive
Light auto traffic (100 feet)	50	Quiet

Source: Davis and Cornwell (1998)

99. **Surface Water.** Surface water sample was collected from the subproject influenced location on 8 May 2019. The parameters measured were pH, Electric Conductivity (EC), Turbidity, Total Suspended

Solid (TSS), Dissolve Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Chloride (Cl-) and Ammonia. The sample was collected and then transferred in 1-liter plastic sampling bottles which was washed by distilled water. The sampling bottles were then kept in an ice cooler. Vest and helmets were used during the sample collection. EZDO 8200 Multimeter was used to conduct the on-site test of pH and EC. Lutron DO-5509 was used to conduct the on-site test of Dissolved Oxygen (DO).

100. The sample was sent to Department of Public Health Engineering (DPHE) Laboratories for testing remaining parameters within 72 hours of being collected. The water quality parameters of the samples are summarized and presented in the Table IV.4 below and the test report are attached in Annex-6.

Table IV.4: Results of surface water quality of Naf river

Parameters	Unit	Canal Water, Camp 8W	Standards for Inland Surface Water* (ECR,1997)	Standards for Project Waste Water* (ECR,1997)
pH	-	7.5	6.5 – 8.5	6-9
Turbidity	NTU	1425	-	NYS
EC	µs/cm	846	2250	1200
Cl ⁻	mg/L	76	-	600
NH ₃ -N	mg/l	5.6	-	75
DO	mg/L	3.8	5 or more	4.5-8
COD	mg/L	119	-	400
BOD ₅	mg/L	24	10 or less	250
TSS	mg/L	46	-	500

*Standards for Inland Surface Water and Project Waste Water is followed Environmental Conservation Rule (ECR)'97, NYS = Not Yet Standardized

101. **pH:** The "desirable" range of pH prescribed by the DOE is between 6.5 and 8.5. This is the range, which provides adequate protection to the life of fresh water fish and bottom dwelling invertebrates. The pH value of the collected sample was within the national standard.

102. **Turbidity:** Turbidity is a measure of the degree to which the water loses its transparency due to the presence of suspended particulates. The more total suspended solids in the water, the murkier it seems and the higher the turbidity. Turbidity is considered as a good measure of the quality of water. Turbidity of the project location was found 1425 NTU.

103. **Electrical Conductivity (EC):** EC stands for electrical conductivity, which measures the potential for a material to conduct electricity. The test results show that EC value was found 846 µs/cm which was within the national standard.

104. **NH₃-N:** Nitrogen is an essential nutrient that is required by all plants and animals for the formation of amino acids. In its molecular form, nitrogen cannot be used by most aquatic plants; therefore, it must be converted to another form. The test results show that the value of NH₃-N was found 5.6 mg/l for the sampling location.

105. **Dissolved Oxygen (DO):** Dissolved oxygen is necessary for many forms of life including fish, invertebrates, bacteria and plants. Decrease in DO values below the critical level of 3 mg/L causes death of most fishes and other aerobic aquatic organisms. The DO value was found 3.8 mg/L for the sampling location which are below the national standard. Rohingya people throw their household and other waste into this canal that polluted the water and decrease the DO level.

106. **Chemical Oxygen Demand (COD):** COD or Chemical Oxygen Demand is the total measurement of all chemicals in the water that can be oxidized. The value of COD was 119 mg/L which is within the national standard according to ECR, 1997.

107. **Biochemical Oxygen Demand (BOD₅):** Biochemical Oxygen Demand is supposed to measure the amount of food (or organic carbons) that bacteria can oxidize. The standard for inland surface water for BOD₅ is 6 or less mg/L. the test results show that, BOD₅ value was 24 mg/L which did not exceed the

national standard. Rohingya people throw their household and other waste into this canal that polluted the water.

108. **Chloride:** Chlorides are important in detecting the contamination of groundwater by sewage. Chlorides are leached from various rocks into soil and water by weathering. The chloride ion is highly mobile and is transported to closed basins or oceans. Chloride occurs in all-natural water in widely varying concentration. The chloride content normally increases as the mineral content increases. The test results show that, Chloride value was 76 mg/L which is within the national standard according to ECR,1997.

109. **Total Suspended Solids (TSS):** Total suspended solids (TSS) are the dry-weight of particles trapped by a filter. The test results show that, TSS value was 46 mg/L which is within the national standard according to ECR,1997.

110. **Groundwater.** Groundwater samples from five test tube-wells have been collected by the contractor in the presence of DPHE representative from July - October 2019 after disinfecting the well. Every possible precaution has been taken to obtain representative samples, which were collected in a polyethylene bottles (PET bottle). The sampling bottles has been labeled, sealed and transported to the DPHE laboratory.

111. A brief discussion on groundwater test results are given below which have been compared with Bangladesh Standard for Drinking Water (Table IV.5). The test reports are enclosed in the Annex-7.

Table IV.5: Groundwater quality within the study area

Water quality parameters	Unit	WS1	WS2	WS3	WS4	WS5	Bangladesh Standard
pH	-	7.3	7.3	7.7	7.7	7.2	6.5-8.5
EC	μS/cm	281	267	265	280	462	-
TDS	mg/l	135	127	131	138	301	1000
Alkalinity	mg/l	110	150	175	160	290	-
Hardness	mg/l	162	215	157	192	20	200-500
Arsenic	mg/l	0.001	0.001	0.001	0.001	<0.001	0.05
Chloride	mg/l	14	12	12	15	24	1 50-600
Iron	mg/l	0.23	0.53	0.49	0.14	0.10	0.3-1
Manganese	mg/l	0.05	0.05	0.09	0.04	<0.05	0.1

112. **pH:** pH is a measure of the hydrogen ion concentration in water and indicates whether the water is acidic or alkaline. The measurement of alkalinity and acidity of pH is required to determine the corrosiveness of the water. It is observed that pH concentration for all the samples are within the permissible limit of national standard (6.5-8.5).

113. **Electrical Conductivity (EC):** The Electrical Conductivity (EC) indicates the concentration of dissolved electrolytes present in water sample, but do not give any idea about the types of ions being present. The electrical conductivity is the measure of capacity of a substance or a solution to carry an electrical current. The concentrations of EC are ranges from 176 to 405μS/cm in the samples collected from the subproject influence area.

114. **Total Dissolve Solid (TDS):** TDS values indicate the general nature of water quality and are usually related to conductivity. However, the values of TDS of all the samples collected throughout the subproject influence area are within the standard limit ranges between 265 and 462mg/L.

115. **Alkalinity:** Alkalinity is a measure of water's ability to neutralize acids. It results primarily from dissolving limestone or dolomite minerals in the aquifer. Water with low levels of alkalinity (less than 150 mg/L) is more likely to be corrosive. High alkalinity water (greater than 150 mg/L) may contribute to scaling. There are no health concerns related to alkalinity. However, the values of alkalinity of all the samples

collected throughout the subproject influence area are within the standard limit ranges between 120 and 225mg/L.

116. **Hardness:** Hardness measures the amount of calcium and magnesium in water. Hardness is primarily caused by water slowly dissolving rocks that contain calcium and magnesium. It is the property of water which prevents the lather formation with soap and increases the boiling points of water. Hardness although have no health effects it can make water unsuitable for domestic and industrial use. Total Hardness of tested water samples are ranges from 110 to 290 mg/L which are within the limit of Bangladesh standard for Drinking Water Quality.

117. **Arsenic (As):** Arsenic is a natural component of the earth's crust and is widely distributed throughout the environment in the air, water and land. It is highly toxic in its inorganic form. The greatest threat to public health from arsenic originates from contaminated groundwater. Inorganic arsenic is naturally present at high levels in the groundwater of Bangladesh. However, the values of Arsenic are found within the standard limit of BD Drinking Water Quality.

118. **Chloride (Cl):** Chloride indicates the general nature of water salinity and it breaks up positively or negatively charged ions. A certain amount of chloride is always present in water; however, excessive amount of chloride has health and other secondary impacts. The concentration of chloride in all tested samples are below than the lower limit 150mg/l according to BD Drinking Water Quality Standards.

119. **Iron (Fe):** Aeration of iron-containing layers in the soil can affect the quality of both drinking water and surface water. If the groundwater table is lowered or nitrate leaching takes place, dissolution of iron can occur as a result of oxidation and decrease in pH. The concentration of iron in the tested samples are within limit (0.3mg/L) of Bangladesh standard for Drinking Water Quality which are recorded from 0.1 to 0.53 mg/L.

120. **Manganese (Mn):** Mn values indicate the general nature of water quality. The values of Mn in all tested water samples are within the Bangladesh Standard for Drinking Water Quality (0.1mg/L).

B. Biological Environment

121. South and Southeast Asian countries are recognized by International Union for Conservation of Nature (IUCN) to be regions of high species diversity. A large number of native plants, including 3,000-4,000 species of woody flora, have been recorded from Bangladesh. The country lies at the meeting point (Eco-tonal region) of several floristic provinces, including the Manipur-Khasia, Bengal and North Burma provinces within the Indo-Malayan realm (IUCN , 2002).

1. Diversity of Floral and Faunal Species

122. **Flora Species-** The forestland in the Ukhia and Teknaf 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 sun-grass, herbs and shrubs. Still, the area houses rich biodiversity, especially within the protected areas (PA). There is a small section of mangrove forest on the coast near Kutupalong which encompasses a diverse ecosystem, including medicinal plants (BCAS, 2008).

123. The plant species found in the subproject are listed in the Annex 4 which are: Akashmoni (*Acacia auriculiformis*), raintree (*Albizia saman*), mango (*Mangifera indica*), jackfruit (*Artocarpus heterophyllus*), boroi (*Ziziphus mauritiana*), mahogany (*Swietenia mahogany*), guava (*Psidium guajava*), banana (*Musa sp.*), segun (*Tectona grandis*) Bokul (*Mimusops elengi*) and Bamboo (*Disambiguation*). 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 (Figure IV.11). Among crop-field vegetation, aman is grown during summer rains and boro (winter rice) cultivated by irrigation in winter.



Figure IV.11: Floral species around the subproject area

124. **Faunal Species-** The Refugee camps have a significant impact on wildlife by shrinking habitats and disruptions in breeding grounds are affecting nocturnal, crepuscular and diurnal wildlife. More than 67% of the mammal wildlife are terrestrial, and of this number, around 63.8% rely on forests as a habitat. Arboreal species are also under severe threat due to the ever-decreasing natural forest area.

125. Apart from the degradation of forest land along the Refugee camps, it 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 Ukhia, Teknaf, Inani and Himchari under Cox's Bazar South Forest Division.

126. Common bird species noted in the subproject area were Asian crow, myna, cuckoo, kingfisher, pigeon and dove satore, drongo, weaver bird choro, babui, and dahuk (Figure IV.12). The mammals include fox, monkey, mongoose, Bengal monitor, various rodents etc. There are also several species of frog, lizard and snake (Annex 3).



Figure IV.12: Faunal species around the subproject area

2. Fisheries

127. A survey of the Fisheries fauna of the Naaf river estuary in the 1990s recorded 123 fish species, 20 species of shrimp and prawns, 3 species of crabs and 2 species of lobster (Islam, 1993). The dominant group was represented by a few small sized fishes. Given the close proximity to the sea and the presence of backwaters, the people in the region are habituated in pisciculture and prawn culture.

128. Major fishes are listed in the subproject area are Telapia, rui, catla, mrigal, ghania, kalbaus, kalia, catfish (boal, pangas, silon, ayeir, and bacha) and snake head (shol, gazar, and taki), freshwater shrimp and several other tropical whitefish species.

3. Asian Elephants

129. The globally endangered Asian Elephant (*Elephas maximus*) is 'critically endangered' in Bangladesh. Host and Rohingya communities are encroaching on its habitat in the Cox's Bazar Forest

Division, and both resident and migratory elephants are facing a continuous shrinkage of their habitat and food supply. There are likely less than 300 animals remaining in the country with about 200 residents (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.

130. There is evidence of presence of elephants in the camp area. This human-elephant conflict has seen 13 refugees killed in elephant attacks since August last year, according to the International Union for Conservation of Nature (IUCN). Figure IV.14 presents a map of recent human-elephant conflicts prepared by the IUCN.

131. The IUCN has conducted a study on such conflict and suggested a few mitigation measures to reduce such conflicts. The IUCN and UNHCR have formed 30 elephant response teams of 10-12 people in the camps. They are also setting up 92 elephant watchtowers, more response teams and training (Figure IV.13).



Figure IV.13: Elephant watchtower in the camp

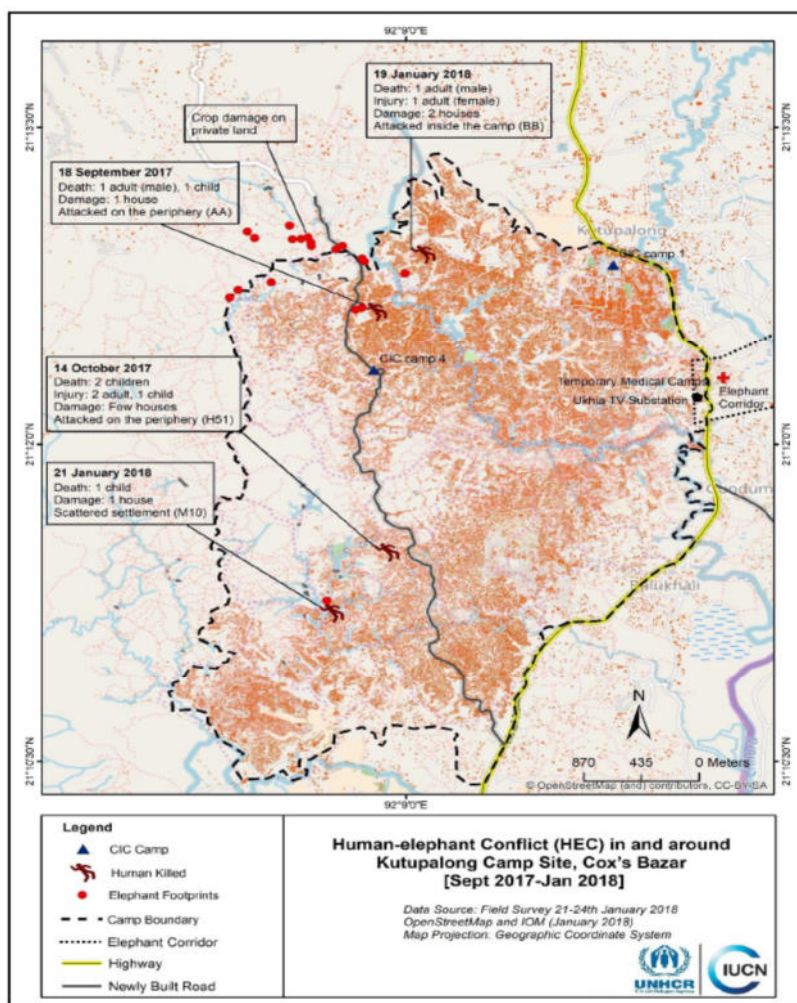


Figure IV.14: Human-elephant conflict map around the subproject area

4. Protected Areas

132. Protected areas (PAs) are “especially dedicated to the protection and maintenance of biological diversity and associated cultural resources, which are managed through legal or other effective means” (IUCN, 1994); “designated or regulated and managed to achieve specific conservation objectives” (Mulongoy & Chape, 2004). Three types of protected areas were defined under the Bangladesh Wildlife Preservation Act, 1973; i.e. National Park, Wildlife Sanctuary and Game Reserve. Himchari National Park is situated 15 km away from the Refugee camp and Teknaf Wildlife Sanctuary is located about 6 km away from the subproject area. Figure IV.15 shows the protected areas of Bangladesh.

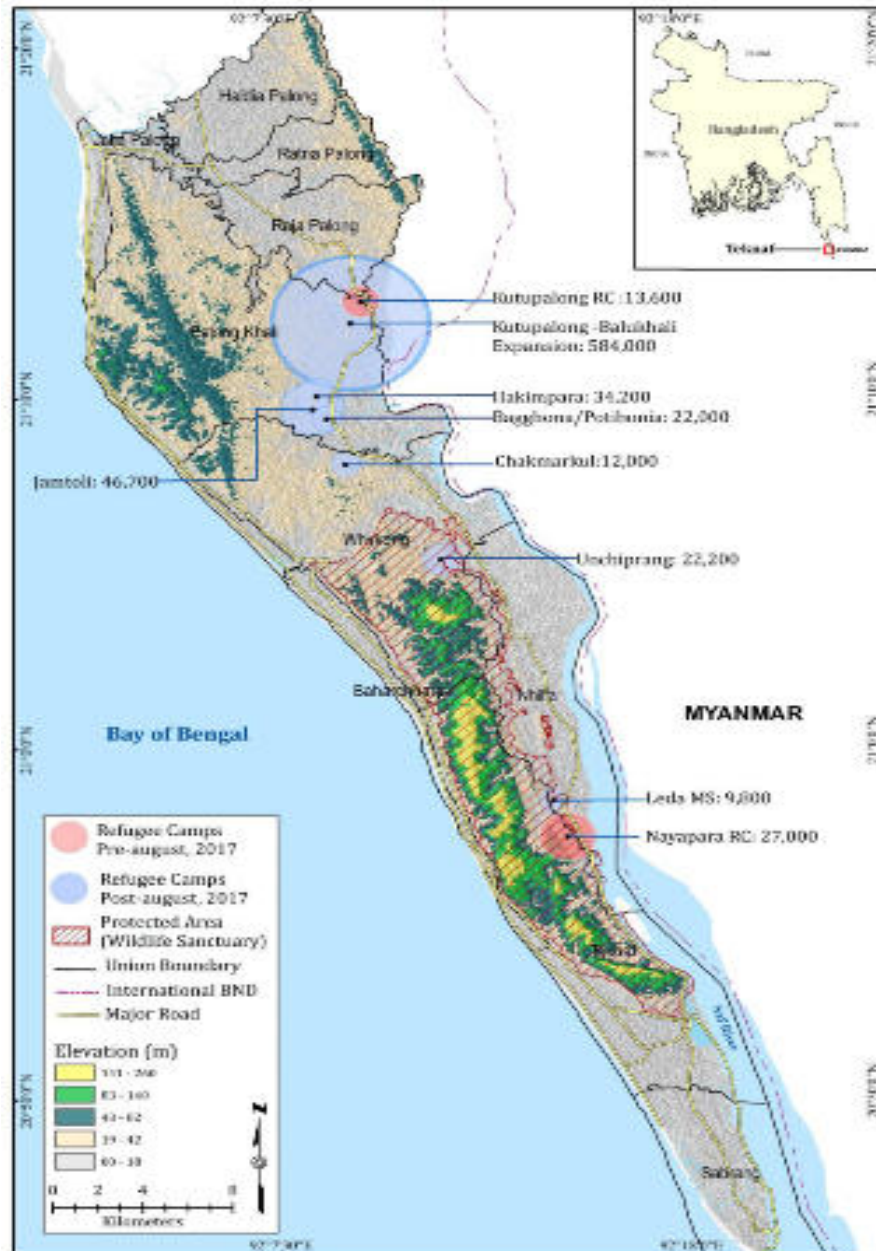


Figure IV.15: Protected areas of Bangladesh

C. Socio-economic Environment

1. Population

133. As of 9 November 2018, the Inter-Sector Coordination Group (ISCG) reported that 620,000¹ Rohingya refugees have entered Bangladesh since the attacks. According to ISCG's rapid needs assessment, 58 per cent of new arrivals are children and 60 per cent are women including a high number of pregnant (3 percent) and lactating women (7 percent). With the new influx, the current total number of Rohingya who have fled from Myanmar into Bangladesh, coupled with the affected population in the communities, has reached a staggering 1.2 million (Figure IV.16). There are 720,000 children among the new arrivals, existing Rohingya populations and vulnerable host communities.

2. Income and Expenditure

134. A guidance recommended by the RRRC is the approach for humanitarian stakeholders working in Rohingya refugee camps and settlements (Table IV.6). This guidance provides a uniform, harmonized approach to definitions of refugee volunteer engagement. There are two main ways in which refugees are engaged in labor the current context: Cash for Work programming, and engaging refugee volunteer labor to achieve set operational objectives (including unskilled, semi-skilled and skilled volunteers).

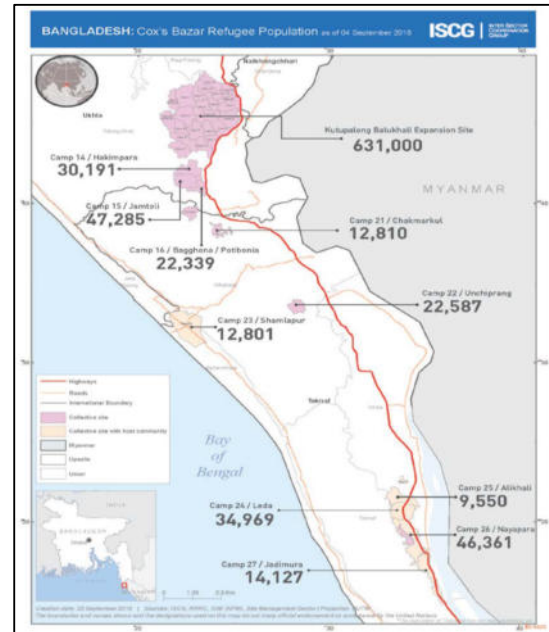


Figure IV.16: Refugee camp sites by population

Table IV.6: Rohingya volunteer incentive rates recommended by RRRC

Category	Criteria and Competencies	Current Rate
Cash-for-Work	Principles of Cash for Work Programming, including: <ul style="list-style-type: none"> Beneficiary selection criteria (usually vulnerability) Days of work predetermined (16 days consecutively, or 32 days scattered over a quarter) Predetermined daily flat rate 	350 BDT/day (Revised April 2018, yet to be endorsed by the HCTT. This amount represents 75% of the Minimum Expenditure Basket)
Unskilled Volunteer	Unskilled labor engaged to meet operational needs: <ul style="list-style-type: none"> Porters Physical/construction laborers Truck loading/unloading Gatekeepers General labor e.g. cleaners 	50 BDT per hour
Semi-skilled Volunteer	Semi-skilled labor engaged to meet operational needs. Requires basic literacy and basic training prior to performing the role. <ul style="list-style-type: none"> Community mobilizers Outreach workers (including community health workers, hygiene promoters) Site management assistants Enumerators/data collectors (generalists) 	Hourly rate (infrequent engagement) BDT 50 ²¹ – BDT 75 per hour Monthly rate (longer term engagement) BDT 7,200 ²² – BDT 12,600 per month (assumption of 7 hours per day, 24 days a month)

²¹ It is noted that the starting incentive for semi-skilled is equivalent to that for unskilled. Unskilled labour is often of a hard, physical and sometimes dangerous nature, which requires fair remuneration, and therefore, this is not deemed to be a flaw in the incentive structure. The upper parameter included in the semi-skilled incentive allow for agencies to pay according to their own determination of complexity and responsibilities.

²² It is noted that the lower end of the band for monthly incentives is lower than the hourly incentive, if multiplied across the same time worked. This acknowledges the additional benefits of predictability of income in a longer-term engagement.

135. The rates will also be applied to the contractors taken on by DPHE as well. The guidance should be incorporated by agencies into contracts at the time they are drawn up.

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

136. Unlike most of Bangladesh, about half of Cox's Bazar district is hilly; on the eastern border with Myanmar are the Arakan hills. The soil in Teknaf and Ukhia, which together make up around 651km², is sandy and not very suitable for agricultural cultivation. In Teknaf, only 5.5% of the land is cultivable with a cropping intensity of 136%, well below the 193% national average. Ukhia is mostly flat lands to medium hills with sandy soils (Akhter et al. 2009).

137. The Naf river, located east of the Upazila and forming a natural border with Myanmar, inundates land close to the river banks during the rainy season (June-September). This land on the riverbanks is mostly used for shrimp cultivation, an important activity in the region and a source of labour income for poorer households (WFP Livelihoods Baseline Study 2017).

138. 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 IV.17).

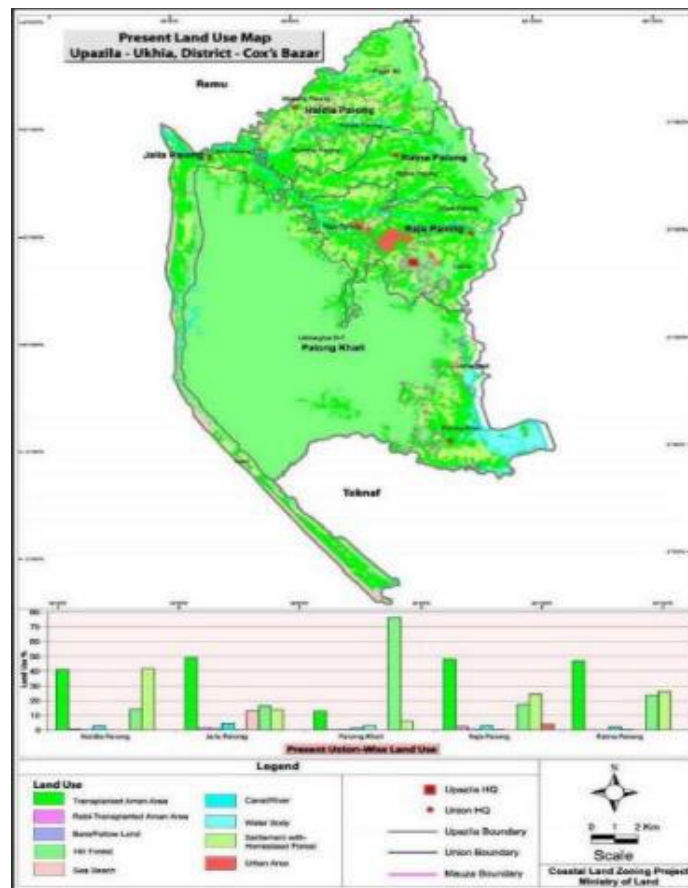


Figure IV.17: Land use map of Ukhia

4. Education

139. UNHCR has been supporting primary and junior secondary education for refugee children born Kutupalong camp since the early 1990s. As of September 2018, 36,834 children (31%) out of 120,000 children and youth targeted by UNHCR's programs were provided access to learning. In order to increase the coverage of refugee education, UNHCR and partners has put in place the following: (1) 316 learning spaces including 5 adolescent clubs set up, (2) 682 teachers (including 329 from host communities)

recruited, trained and deployed, (3) 812 School Management Committee Members mobilised and engaged to enhance community involvement, (4) 35 Early Childhood Development (ECD) centers set up and 79 facilitators recruited for mobile ECD in 316 locations.

5. Healthcare Facility

140. The health sector maintained the up to date dataset of all health facilities within the camps and the surrounding areas, including facilities implemented by NGOs and Government. Currently, there are 278 functional facilities known to the health sector, with a further 37 planned or under construction. Based on the data available, overall coverage meets the minimum requirements. There are an estimated 170 basic health units (1: 7647 people in need); 33 primary health center facilities (1:39394 people in need) and 10 secondary care facilities (1: 130 000 people in need). Approximately 910 hospital beds are available to the people in need, of which 290 are in Government run facilities. Since the beginning of the crisis on 25 August 2018, a total of 1876908 outpatient consultations were reported.

6. Sanitation

141. Over 48,000 emergency pit latrines were installed to quickly meet the needs of the affected population in the camp, out of which an estimated 17% are non-functional. A minimum depth of five feet for latrine pits has not been met, and they are still often built in close proximity to one another. The number of latrines located within 10 meters of a water source was over 30% in December. In addition, latrines are built too close to shelters, on steep slopes, and close to rivers, which are not usable by women, children, elderly people, or people with disabilities. On the other hand, final disposal and treatment of faecal sludge is become a major issue due to scarcity of land in the congested camps.

7. Solid Waste Management

142. Solid waste management refers to the collection, disposal and recycling of solid waste materials. Waste materials need to be separated before they leave the shelter but currently there are neither primary collection centers nor an organized collection center in the camps. Solid waste management will be an issue for as long as the Rohingya remain in the camps. According to the study done by UNDP in 2018, the impact is identified as moderate to severe. Principal waste materials are the polythene bags in which relief provisions are distributed. Other waste materials include kitchen garbage, food packaging materials, batteries and plastic bottles. Of these, recycling efforts are only beginning to get underway for plastic bottles. Due to the scarcity of firewood, some families use plastic as a cooking fuel, a practice which is extremely harmful.

8. Energy

143. Up to now, the dwindling forests around Kutupalong have provided the only source of fuel to cook with for Rohingya refugees. Currently there is a shortage of natural firewood sources due to the increase in camp population. It is estimated that 900,000 Rohingya refugees in the Cox's Bazar area have needed 700 metric tons of wood every day for cooking alone. In the past, there have been initiatives to create alternate energy sources for the camps, but these have been limited to certain areas and are not sufficient for the current numbers. A solar based mini grid system is in place, providing indoor lighting and street lights in different areas. Other alternative fuels which have been used are biogas, compressed rice husk, and kerosene for lamps (UNHCR, 2017). Moreover, currently more than 200,000 refugee households and some Bangladeshi host families were provided liquefied petroleum gas (LPG).

9. Physical and Cultural Heritage

144. 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.

V. ANALYSIS OF ALTERNATIVES

145. An analysis of subproject alternatives is undertaken to determine the best way of achieving the subproject objectives while minimizing environmental and social impacts. The preliminary assessment of the subproject 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 for each option.

A. Discussion of Alternative Solutions

- **Option 1- Shallow Well:** Shallow layers are better around 100ft (30m) ranges found at the subproject area but most of the shallow tube-wells become non-functional during the peak of the dry season (November to March) as the water table goes down on average 45 - 60 feet (15-20 m). Moreover, there is a possibility of contamination in the shallow aquifers due to leakage from thousands of latrines without proper soak pits installed along the contour lines of the hills close to the shelters and very close to water points.
- **Option 2- Deep Well/ Production Well:** Deep aquifer is found between 650 to 750 feet (215 – 250m) at the subproject area which is protected from fecal contamination due to the impermeable layer. Moreover, based on average discharge, each shallow hand-pump can serve up to 250 individuals while deep pumps can serve up to 500 in the dry season.
- **Option 3- Surface Water:** The subproject area has limited sources of surface water. Main water sources such as the Naf River and other big channels are at some distance and are saline and brackish especially in the lower part of the rivers. Fresh water sources are basically pond water and a few small streams originating from the hills. These ponds and streams are not capable of meeting the water needs of the population of the camps.

B. No Project Alternative

146. Compared to the with-project scenario, the no-project scenario would see continued ineffective water supply system, including; water scarcity as well as water contamination. There would be continued high incidence of intestinal disease outbreaks from contaminated water sources. The existing water supply system would increase the water scarcity in the subproject area and health impacts and impact to the environment would continue.

C. Conclusion

147. Option 2 or Production well is the most favorable option among all the alternatives as surface water is limited, the shallow water aquifer is drying up and contamination has been identified in the subproject area. In regards to the option 2, water source mapping and hydrological surveys should be undertaken to facilitate appropriate siting of wells.

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

149. This section identifies the overall impacts of subproject activities on the physical, biological and socio-economic environment of the subproject area. It also narrates the measures that will mitigate the Project's adverse environmental effects.

A. Impact Assessment

1. Methodology

150. The significance of potential impacts was assessed using the risk assessment methodology that considers impact magnitude and sensitivity of receptors, described below.

151. **Impact Magnitude-** The potential impacts of the subproject have been categorized as major, moderate, minor or nominal based on consideration of the parameters such as: i) duration of the impact; ii) spatial extent of the impact; iii) reversibility; iv) likelihood; and v) legal standards and established professional criteria. These magnitude categories are defined in Table VI: 1.

Table VI.1: Parameters for Determining Magnitude

Parameter	Major	Medium/Moderate	Minor	Negligible
Duration of potential impact	Long term (more than 35 years)	Medium Term Lifespan of the project (5 to 15 years)	Limited to construction period	Temporary with no detectable potential impact
Spatial extent of the potential impact	Widespread far beyond project boundaries	Beyond immediate Project components, site boundaries or local area	Within project boundary	Specific location within project component or site boundaries with no detectable potential impact
Reversibility of potential impacts	Potential impact is effectively permanent, requiring considerable intervention to return to baseline	Baseline requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal standards and established professional criteria	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential impacts occurring	Occurs under typical operating or construction conditions (Certain)	Occurs under worst case (negative impact) or best case (positive impact) operating conditions (Likely)	Occurs under abnormal, exceptional or emergency conditions (occasional)	Unlikely to occur

152. **Sensitivity of Receptor-** The sensitivity of a receptor has been determined based on review of the population (including proximity/numbers/vulnerability) and presence of features on the site or the surrounding area. Each detailed assessment has defined sensitivity in relation to the topic. Criteria for determining receptor sensitivity of the subproject's potential impacts are outlined in Table VI: 2.

Table VI.2: Criteria for Determining Sensitivity

Sensitivity Determination	Definition
Very Severe	Vulnerable receptor with little or no capacity to absorb proposed changes
Severe	Vulnerable receptor with little or no capacity to absorb proposed changes or limited opportunities for mitigation.
Mild	Vulnerable receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation

Sensitivity Determination	Definition
Low	Vulnerable receptor with good capacity to absorb proposed changes or/and good opportunities for mitigation

153. **Assigning Significance-** Following the determination of impact magnitude and sensitivity of the receiving environment or potential receptors, the significance of each potential impact has been established using the impact significance matrix shown below in Table VI: 3.

Table VI.3: Significance of Impact Criteria

Magnitude of Potential Impact	Sensitivity of Receptors			
	Very Severe	Severe	Mild	Low
Major	Critical	High	Moderate	Negligible
Medium	High	High	Moderate	Negligible
Minor	Moderate	Moderate	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

2. Summary of Impacts

154. The subproject's potential impacts on the key environmental parameters have been assessed and their significance determined using the methodology described above. A summary of the potential impacts of the subproject on the key environmental parameters and significance of these impacts are presented in Table VI: 4.

Table VI.4: Summary of the potential impacts of the subproject

Potential Impacts	Duration of Impact	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Prior to Mitigation	Significance after Mitigation
Environmental Impacts During Design/Pre-Construction Phase								
Vegetation clearing and landscape	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Existing utilities/services	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Permits, clearances, no objection certificate etc.	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Consideration of extreme climatic events in the design	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Consideration of local hydrological system	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Community awareness program	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
EMP implementation training	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Environmental Impacts During Construction Phase								
Provision for security in the camp	Short term	Local	Yes	Likely	Minor	Low	Moderate	Negligible
Sourcing of materials	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Pipe laying works	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Landslide, soil erosion and disturbance of land	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Handling of flash flood, heavy downpour etc.	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Drainage congestion	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Surface water quality	Short term	Local	Yes	Likely	Medium	Mild	Moderate	Negligible
Groundwater quality	Short term	Local	Yes	Likely	Medium	Mild	Moderate	Negligible
Air and dust pollution	Short term	Local	Yes	Likely	Medium	Mild	Moderate	Negligible
Noise pollution	Short term	Local	Yes	Likely	Medium	Mild	Moderate	Negligible
Waste management	Short term	Local	Yes	Likely	Minor	Mild	Moderate	Negligible
Tree plantation	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Socio-economic status	Short term	Local	Yes	Certain	Minor	Low	Positive	Positive

Potential Impacts	Duration of Impact	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Prior to Mitigation	Significance after Mitigation
Physical and cultural heritage	Short term	Local	Yes	Likely	Minor	Low	Negligible	Negligible
Occupational health and safety	Long term	Local	Yes	Certain	Major	Severe	High	Negligible
Community health and safety	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Site reinstatement	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Environmental Impacts During O&M Phase								
Inadequate operation and maintenance	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Toxic chemical hazard	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Water quality	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible

B. Anticipated Impacts and Mitigation Measures during Planning Phase

1. Vegetation clearing and landscape

155. There will be no major disturbance of vegetation and no cutting of trees in the subproject area but some ground vegetation has to be cleared for the construction of pump house and solar panel structures. Even along the alignments pipe lines cutting of trees will not be involved. Some of the topsoil and vegetation may be lost during pipe laying works.

156. 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: 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).

2. Existing utilities/services

157. Existing facilities such as drains, toilets or any other infrastructure can be disrupted due to laying of pipeline of mini pipe water supply subproject, hence the disturbance will be temporary and minimal. However, locations of existing drains, toilets and any other infrastructure on the way of pipe layout needs to be identified and redesign pipe layout to avoid any damage on such small infrastructure of the camps.

3. Permits, clearances and NOCs

158. Failure to obtain necessary consents, permits, NOC's can result in design revisions and/or stoppage of the works, even stop the construction project. Permission of land needs to be obtained from the RRRC, forest department.

159. Mitigation measures. (i) Obtain Environmental Clearance Certificate (ECC) from Department of Environment and NOC from RRRC, forest department; (ii) acknowledge in writing and provide report on compliance all obtained permits, clearance, NOCs, etc.

4. Consideration of extreme climatic events in the design

160. Heavy rainfall can cause flash flood at the production well site. Poor drainage and unplanned development also contribute to the added vulnerability of structures to extreme climatic events. Failure to address the extreme rainfall events and associated vulnerability/hazards in the designs may lead to damage to the structure and pose threat of nuisance in the locality which may include hydrological hazard, poor structure life etc.

161. The mitigation measures are: (i) Ensure adequate water passage along the pump house and shape the associated landscape so that water can be drained quickly from the site; (ii) Ensure that all the design especially the production well will be constructed with adequate considerations for higher flood frequency due to climate change. (iii) ensure flood return period and local waterlogging information being considered in the design phase; (iv) ensure selection of latest weather coated painting and construction materials so that the structures can withstand heavy rainfall and flooding damage.

5. Failure to consider local hydrological system

162. The region is hilly and landslide, erosion prone. Failure to consider the local hydrology may lead to landslide and water pollution, given the population density in camp area the impact is envisaged to be detrimental. Even such hazard may occur during construction when local topography and hydrological system is tampered with.

163. Mitigation measures: (i) detail assessment of the hydrology and topography of the project site; (ii) design according to the sloping of the project area; (iii) avoid conventional raised plinth design that blocks water runoff, rather design should prioritize structure built on raised columns that can allow water to pass

through; (iv) design can learn and adopt from the local traditional structures on the hill sides; (v) design needs to consider additional drainage facilities and water storage.

6. Update IEE and preparation of SEMP

164. DPHE with support of DMSC will update IEE based on detailed designs, and submitted to ADB for review and clearance, afterwards disclosure prior to commencement of work. However, Contractor shall be primarily responsible for preparing the Site-Specific Environmental Management Plan (SEMP). This shall be based on the subproject's EMP with details on staff, resources, implementation schedules, and monitoring procedures. The agreed SEMP will be the basis for monitoring by PMU and supervision consultant. The SEMP will allow PMU, construction supervision engineer to focus on what are specific items expected from the contractor regarding environmental safeguards on a day-to-day basis. With the SEMP, PMU can easily verify the associated environmental requirements each time the contractor will request approval for work schedules.

7. Community awareness program

165. Without proper interaction with local communities and or with stakeholders may lead to confusion and agitation and non-cooperation of local people. Before start of the project, the local population should be well aware of the upcoming project. There should be regular interaction with the local population and make them understand the project activities.

8. EMP implementation training

166. 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.

C. Anticipated Impacts and Mitigation Measures during Construction Phase

167. In the case of this subproject (i) most of the individual elements are relatively small and involve straightforward construction, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements. There are no impacts that are significant or complex in nature, or that need an in-depth study to assess the impact. Thus, mini pipe water supply system subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with construction activities can be mitigated to acceptable levels with the following mitigation measures.

1. Provision for security in the camp

168. **Potential impacts.** Construction works may hamper due to criminal activities at work sites specially in the Rohingya camps. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.

169. **Mitigation measures.** (i) Provide, install and maintain suitable barriers and/or fences to protect the facilities, constructions camp, storage yard, existing facilities and construction and installation operations and to remove same when no longer required by DPHE or at completion of the project. (ii) be responsible for guarding all utilities, plants equipment, material, etc. delivered on sites and for ensuring that all sign, lights, fences, etc. are in their proper place; (iii) follow all necessary occupational health and safety measures during construction.

2. Material sourcing

170. **Potential impacts.** The region is vulnerable to hill erosion and sedimentation. There are a few illegal sand quarries in Ukhia which has left the entire hills vulnerable to landslides and sedimentation.

Moreover, the Department of Environment (DoE) is struggling to stop illegal hill cutting in the region. Several landslides occurred in the region in the recent 5 years claiming human lives which are believed to be caused by illegal hill cutting and sand quarrying triggered by heavy rainfall. Therefore, if sand/silt material used for the construction should not source its materials from this hilly region.

171. Mitigation measures:

- (i) A materials management plan (MMP) will be produced to minimize the use of non-renewable resources and rock-based materials. The MMP will be approved by the engineer and revised as required by the Engineer.
- (ii) The bid documents should put clause on material sourcing that forbids the contractor to source construction materials like sand/silt from local hills and rivers/canals.
- (iii) Prioritize sites which already permitted by the authority.
- (iv) If other sites are necessary, it is contractor's responsibility to verify the suitability of all material sources and to obtain the approval of PMU and consultants.
- (v) If additional quarries will require after construction is started, construction contractor to obtain a written approval from PMU.
- (vi) Hill cutting is strictly prohibited for sourcing of earth materials.
- (vii) Maintain a construction material register at the site.

3. Pipe laying works

172. Potential impacts. Potential erosion, dust generation, traffic congestion, road accident, dropping pedestrians in open trench etc. can cause during pipe laying works in the camps. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.

173. Mitigation measures. (i) All excavations shall be done to the minimum dimension as required for safety and working facility; (ii) the excavation shall be executed in such manner, that the contractor does not damage or interfere with existing services or structures. If damage or interference is so caused the contractor shall make arrangements with the supply and/or building owner to execute the repairs at the contractor's own cost; (iii) all trench and pit excavations and other work shall be carried out during night time at busy road section; (iv) road drains and channels shall be kept free from obstructions at all times; (v) in case of excavation in large roads, the trenches and pits maybe need to be covered by steel plates to allow traffic to pass during non-working periods; (vi) contractor must liaise with the DPHE and the responsible police to familiarize themselves and adhere to such rules; (vii) trench excavation along roads be located in footpaths or adjacent to the road; (viii) trench excavation shall wherever practicable be carried out in such a way that every part of the excavation is at least 0.5 m clear of existing edges of the carriage way; (ix) contractor shall have particular regard to the safety of pedestrian, livestock, and shall ensure that all open excavation, access routes and steep or loose slopes arising from the contractor's operations are adequately fenced and protected.

4. Landslide, soil erosion and disturbance of land

174. Potential impacts. Potential erosion/land slide may occur when moderately to highly sloping terrains are disturbed for the construction of ground reservoir, installation of distribution pipes. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.

175. Mitigation measures. (i) Avoid moderately to highly sloping terrains for excavation; prepare proper protection before such excavation; (ii) Conduct soil stabilization/slope stabilization or hill top stabilization before excavation trenches. (iii) Confining terrain disturbance considering the surface drainage routes and patterns in pipe layout; (iv) Keeping pipe laying works as close as possible to excavation works and vice versa; (v) Stabilizing disturbed slopes immediately after installation and backfill and use erosion control blankets or re-vegetate and use vegetation promotion blankets; (vi) Contractor exercise caution to prevent erosion losses, close excavations rapidly and stabilize soils once the pipeline is in place.

5. Handling of flash flood, heavy downpour etc.

176. **Potential impacts.** Inundation of worksite will damage the machineries and equipment may disrupt the construction works.

177. **Mitigation measures.** (i) Protect the working area including pump house area, solar panel, trenches, materials, machineries and equipment from any damage due to inundation by downpour; (ii) ensure not to make any congestion in the open drains or natural or artificial channels; (iii) take necessary measure to bring the site to the condition prevailing before the downpour without delay; (iv) necessary measure has to be taken so that storm water does not get into the newly installed pipelines. (v) be particular in keeping updated weather forecast and maintain a record book at site in which weather condition is recorded.

6. Drainage congestion

178. **Potential impact.** Construction material getting into surface run off or uncontrolled disposal may cause temporary drainage congestion.

179. **Mitigation measures.** (i) Prepare a program for prevent/avoid standing waters, which Consultant will verify in advance and confirm during implementation; (ii) provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line; (iii) regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem. (iv) establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there; (v) wastes and construction debris will not be disposed in a manner that these would end up in drainage canals. (vi) construct wide drains instead of deep drains to avoid sand deposition in the drains that require frequent cleaning.

7. Impact on surface water quality

180. **Potential impacts.** Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. Bentonite slurry used in drilling works is not properly collected and treated, it will contaminate the adjacent watercourse. Although bentonite is not toxic in term of chemical properties, it is harmful in term of physical properties. The impacts are negative but short term, site-specific within a relatively small area and reversible by mitigation measures.

181. **Mitigation measures.** The Contractor shall undertake at all times to prevent water pollution as a result of his activities, and shall implement the measures to control water pollution that shall include, but not be limited to the followings:

- (i) Prioritize re-use of excess spoils and materials in construction activities. If spoils need to be disposed, consult with PMU and DMSC for disposing at designated disposal areas;
- (ii) All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff;
- (iii) Location for stockyards for construction materials shall be away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (iv) Take all precautions to minimize the wastage of water in the construction activities.
- (v) Take all precautions to prevent entering of wastewater into streams, watercourses;
- (vi) Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas;
- (vii) While working across or close to any water body, the flow of water must not be obstructed. Ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of any watercourse and drainage channels;
- (viii) Monitor water quality according to the environmental management plan.

8. Impact on groundwater resources

182. **Potential impact.** Increased demand for groundwater is anticipated during the construction phase for construction activities and personal consumption by workers. Even a small project can require 100 m³/day of water. Uncontrolled extraction of water may affect availability of water to locals. The area starves in groundwater level. Work camps are likely to sink tube well in the area and contribute to decrease of local groundwater level and increase drawdown. 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).

183. **Mitigation measures.** Mitigation measures will include: (i) Prevent pollutants from contaminating the soil and the groundwater; (ii) All tube wells, test holes, monitoring wells that are no longer in use or needed shall be properly decommissioned; (iii) Storage of lubricants and fuel at least 50 m from water bodies; (iv) Storage of fuel and lubricants in double hulled tanks. (v) Fuel and other petroleum products stored at storage areas away from water drainage and protected by impermeable lining and bunded 110%; (vi) Daily control of machinery and vehicles for leakages; (vii) Collection of waste during construction activities; (viii) Provide uncontaminated water for dust suppression; (ix) Enclose the construction area to prevent unauthorized access.

9. Air and dust pollution

184. **Potential impacts.** If construction equipment is poorly maintained, excessive emissions of pollutants could also be a factor. As such, dust and emissions are significant potential issues in relation to construction works. Significant amounts of dust may also will arise from the roads that materials haulers are likely to use to access the site. The impacts are negative but short-term, site-specific within a relatively small area.

185. **Mitigation measures.** The Contractor shall comply with all applicable regulations concerning the prevention of air pollution, especially those relating to stack emissions. Take every precaution to reduce the levels of dust at construction sites, and not exceeding the pre-project ambient air quality standards. Vehicles travelling to and from the construction site must adhere to speed limits so as to avoid producing excessive dust. Reduce dust by spraying stockpiled soil, excavated materials, and spoils. Cover with tarpaulin vehicles transporting soil and sand. Cover stockpiled construction materials with tarpaulin or plastic sheets. Water spraying to access roads, camp sites and work sites to reduce dust emissions. All vehicles, equipment, and machinery used for construction will be regularly maintained to ensure that pollution emission levels comply with the relevant requirements of DoE. Copies of conformance will be submitted regularly to the DMSC. Monitor air quality according to the environmental monitoring plan.

10. Noise pollution

186. **Potential impacts.** Temporary increase in noise level and vibrations may be caused by site development, excavation, concrete mixing, and operation of generators and proximity of the work area to the nearby inhabitants. The vehicular increase during construction is likely to be limited and may not have any significant contributions to increase in ambient noise level. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.

187. **Mitigation measures.** To reduce the noise impacts off-site at the nearest sensitive receptors, include the following:

- (i) Communicate the construction schedule with the neighboring sensitive receptors before starting works;
- (ii) Generators will be located away from sensitive receivers and will be enclosed;
- (iii) Plant and vehicles shall be started sequentially rather than all together;
- (iv) Maintain maximum sound level not exceeding 80 decibels (dB) when measured at a distance of 10 m or more from the vehicle/s.
- (v) Selecting electrically powered plant that is quieter than diesel or petrol-driven plant, if interchangeable;

- (vi) Use modern vehicles and machinery with standard adaptations to reduce noise and exhaust emissions, and ensure they are maintained to manufacturers' specifications;
- (vii) Noise-generating equipment must be fitted with silencers.
- (viii) Optimize the use of noisy construction equipment and turn off any equipment if not in use;
- (ix) Regular maintenance of all equipment and vehicles;
- (x) Stop all construction activities during at night;
- (xi) Implement a complaints handling system;
- (xii) Measure noise level according to the environmental monitoring plan.

11. Waste management

188. **Potential impact.** The majority of waste generated will include construction wastes (solid wastes: piece of rods, woods, bricks, stones, containers, electric wire, pipes etc. liquid waste: paint, bitumen, oil etc.) and general wastes (solid wastes: papers, plastic containers, residues of food, fruits etc. and liquid waste: from kitchen and bathroom etc.). These wastes will be generated due to construction camps, construction activities and materials used for construction. If inadequate arrangements exist for the disposal of above mentioned wastes, there will be negative impact on the soil, aesthetic beauty of area and workers' health and safety.

189. **Mitigation measures.** The contractor is required to implement the following in relation to resource and waste management during construction:

- (i) The contractor is required to prepare, implement and maintain Waste Management Plan as per Annex-8 throughout construction period.
- (ii) Ensure proper collection and disposal of solid wastes within the construction camps;
- (iii) Insist waste separation by source; organic wastes in one pot and inorganic wastes in another pot at household level
- (iv) The contractor will engage with the supply chain to supply products and materials that use minimal packaging, and segregate packaging for reuse;
- (v) The contractor will record the quantity in tons and types of waste and materials leaving site during the construction phase;
- (vi) Establish waste collection, transportation and disposal systems with the manpower and equipment/vehicles needed;
- (vii) Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector;
- (viii) Dispose organic wastes in a designated safe place on daily basis. At the end of the day cover the organic wastes with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, are not attracted.
- (ix) Prohibit burning of solid waste.
- (x) The construction wastewater and kitchen wastewater will be sent out to two settling pits and once settled the water will be used for watering surrounding plantations.
- (xi) The waste water pit and garbage dumpsite should be totally barricaded.

12. Tree plantation

190. **Potential impacts.** Inappropriate selection of tree species and plantation location may not ensure the inherent objective of the tree plantation plan. Moreover, lack of proper care (e.g. watering, securing with fence) by the respective authority will also hinder the process of proper growth of the planted trees.

191. **Mitigation measures.** (i) A plan for replantation with native species needs to be prepared in advance as per Annex-5 provided in this report, which has to be approved by the environmental specialist of DMSC and EHSO from the contractor. (ii) About 50 nos. of tree saplings shall be planted around the reservoir. Indigenous trees most suited to the tract will be planted; (iii) Early replanting and regular watering of the disturbed areas with local native vegetation should be undertaken to ensure speedy recovery of the cleared vegetation; (iv) No fuel-wood collection and use from forest will be permitted. (v) Provide adequate

knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching.

13. Impacts on socio-economic status

192. Manpower will be required during the construction stage. This can result in generation of temporary employment and increase in local revenue. Thus, potential impact is positive and long-term. The construction contractor will be required to employ local labor force as far as possible.

14. Physical and cultural heritage

193. **Impacts.** There are no physical cultural resources as listed in UNESCO World Heritage list of archaeological sites along the subproject site. There will be some impact as noise and dust pollution on the nearby socio-cultural structures such as mosques and educational institutes as child friendly spaces, schools and madrasas etc. during construction activities. Accessibility to the socio-cultural sites also may be hampered in this phase.

194. **Mitigation measures.** This impact is temporary and minor in nature. Mitigation measures are:

- (i) Facilitating access using alternative routes during construction and timely completion of construction work;
- (ii) Establishment of construction site camp and labor camp maintaining proper distances from the cultural sites;
- (iii) Affecting dust and noise control measures provided in the EMP.

15. Occupational, Health, and Safety Risks

195. **Potential impacts.** Health risks and safety problems for workers are concerns in all construction projects. Safety risks and health issues arise from storage, handling and transport of hazardous construction material. Construction workers are also at risk of accidents due to moving vehicles, and other construction related activities. Workers are also exposed to high level of pollution from dust, exhaust of vehicles and machinery and noise. Further, if workers do not keep to regulated working hours, the risk of accident events will be higher due to fatigue.

196. Given the recent COVID-19 outbreak, it has been a new concern for the work site workers to keep safe health. It is expected that, on peak time there will be 30-40 workers at a time on each site, which can easily trigger COVID-19 human transfers. Such a situation can become disastrous and claim human life. There is also a risk of transmitting COVID-19 to the local residents.

197. **Mitigation measures.** The Contractor shall present a Health and Safety policy for approval by the Engineer prior to commencement of work. This will contain normal internationally accepted procedures in relation to the risks imposed by the nature of the work to be undertaken. The contractor shall ensure all authorized persons present on all sites, be they his own staff, representatives of the implementing agency or the construction Manager, or other visitors, are aware of any site-specific safety requirements and are supplied with hard hats and other protective clothing appropriate for the work being undertaken.

198. The following mitigation measures, however, will be implemented:

- (i) All relevant provisions of the Bangladesh Labor Act, 2006 and relevant WHO guidelines will be adhered to, concerning the provision of adequate measures to avoid contracting and/or spreading diseases during construction phase.
- (ii) Follow international best practices on occupational health and safety such as those in Section 4.2 of World Bank EHS Guidelines on Construction and Decommissioning Activities²³.
- (iii) A proper occupational health and safety plan has to be prepared and will have to be followed to avoid health hazard of the workers.

²³ IFC World Bank Group. 2007. [Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning](#).

- (iv) At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, will be provided as per the factory rules. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital.
- (v) At every workplace and construction camp, equipment and nursing staff will be provided.
- (vi) The contractor will, at his own expense, conform to all disease prevention instructions given to him by the DMSC.
- (vii) Provide regular health check-ups, sanitation and hygiene, health care, and control of epidemic diseases to the workforce.
- (viii) The contractor shall provide at cost all labor and materials and construct/install and maintain site safety, hard barricading, flexible green net, signboards, temporary day/light traffic diversions throughout the construction activities according to the specifications and provide Personal Protective Equipment (PPE) to all the laborers working at the construction site.
- (ix) Launch awareness programs concerning human trafficking and the possibility of spread of sexually transmitted diseases (STDs) and HIV/AIDS using brochures, posters, and signboards.
- (x) Make available first aid kits, ambulance facilities, and fire extinguishers in camp sites.
- (xi) Compensation for the loss of life (a zero tolerance to loss of life policy should be developed and implemented) or for any type of injuries.
- (xii) Provide insurance to the workers. Health and safety training for all site personnel is very important and must be mandatory.

199. Responding to the COVID-19 situation in Bangladesh Government has opened an online platform for all COVID-19 information and guidelines applicable in Bangladesh. The website can be accessed at <https://corona.gov.bd/>. The website also contains a national Guide to combat COVID-19 and a special guideline in Bengali language on preparing worksite in response to COVID-19. The Bengali guideline is attached with this IEE as Annex 9. A graphical guideline specially prepared for ADB funded project has been prepared in English language and attached with this IEE as Annex 10. Text version of the guideline (in English) is also attached as Annex 11. Sample Emergency Team formation at worksites, sample health and safety monitoring plan and sample signboards has also been prepared and attached to this IEE as Annex 12.

16. Community Health and Safety Hazards

200. **Potential impacts:** 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. Also, in case of recently threatening COVID-19, if worksite staff and workers are not restricted from going outside in the local communities, there is a serious threat of spreading the virus among the locals that may claim human lives. The health risk very high within the camps due to high density population and unhygienic living conditions.

201. **Mitigation measures:** Along pipeline routes, warning signs, warning tapes and notices will deter access to trenches. The excavation of trenches ahead of pipe laying and backfilling shall be limited such that the period from the time of opening a trench to temporary reinstatement shall not normally exceed 48 hours unless exceptional circumstances agreed with the Engineer prevail. Work crews on roads shall include flagmen to provide for the safe passage of traffic and all work sites shall be adequately watched and lit during the hours of darkness.

202. The following mitigation measures, however, will be implemented:

- (i) Code of conduct for workers includes restricting workers in designated areas, no open defecation, no littering, no firewood collection, no fire except designated places, no trespassing, no residence at construction sites, and no obligation to potentially dangerous work.

- (ii) Follow International best practices on community health and safety such as those in Section 4.3 of World Bank Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities²⁴.
- (iii) Maintain a complaint logbook in worker's camp and take action promptly of complaints.
- (iv) Schedule transportation activities by avoiding peak traffic periods.
- (v) Clean wheels and undercarriage of haul trucks prior to leaving construction site.
- (vi) Educate drivers: limit speed between 20-25 km/h in settlements and avoid use of horn.
- (vii) Earmark parking place for construction equipment and vehicles when idling; no parking shall be allowed on the roads, that may disturb the traffic movement.
- (viii) Provide prior information to local people about work;
- (ix) No night time construction activities including material/waste haulage near or within residential areas. Construction activities in these areas must be prohibited from 9 pm to 7am.
- (x) Noise barriers must be installed in housing areas to reduce the noise level.

203. Responding to COVID-19 guidelines for worksite has already been prepared for ADB funded projects and attached with this IEE. Restricting workers within the worksite and labour camp and strictly follow the guideline provided by Bangladesh Government and ADB is the key to combat COVID-19 at worksites.

17. Reinstatement of working areas on completion

204. The contractor will reinstate all working areas and access routes as work proceeds during construction. All plant, equipment, materials, temporary infrastructure and vehicles will be removed at the earliest opportunity and the surface of the ground restored as near as practicable to its original condition.

D. Anticipated Impacts and mitigation Measures during Operation Phase

205. Regular operation of mini pipe water supply system involves groundwater abstraction, chlorination, pumping to reservoir tanks and distribution from reservoirs to the community tap stand. Operation also involve laboratory analysis of water supplies. Water supply infrastructure will require repair and maintenance activities like detection and repair of leaks. As these repairs and maintenance work will be infrequent, and will affect individual small locations for short periods only, the impacts should be much less significant thus be negligible. The potential impact that is associated with O&M activities can be mitigated to acceptable levels with the following mitigation measure:

1. Inadequate operation and maintenance

206. Under suboptimal operations, the Project will create hazards in term of the overall delivery of the outputs and safety of the personnel. Under such conditions the existence of the subproject will be at risk. The people consuming water from such sources will be at higher risks as the whole population will be consuming the same water.

207. In order to avoid such a state regular O&M including chlorinators; regular water quality monitoring of water in the distribution system; immediate action in case of water quality problems; and training and operational supervision of system staff will be conducted.

2. Toxic chemical hazard

208. Chlorine and bleaching powder are toxic to humans. Ingestions, inhalations, application to body parts, especially to such parts as eyes, nose and mouth is extremely hazardous. The storage, in handling and dosages of chlorine (bleaching powder) must be addressed and procedures set up and guidelines developed for its handling and first aid measures to be introduced for emergencies and the training and operational supervision of system staff.

²⁴ IFC World Bank Group. 2007. [Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning](#).

3. Water quality

209. Oil/fuel spill from stored oil/fuel for generator, disposal of bleaching powder or improper chlorination, may cause 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 which are:

- (i) Take all precautions to store the oil/fuel properly so that no chance of spill.
- (ii) Proper disposal of excess bleaching powder and care should be taken to follow the appropriate procedure for chlorination.
- (iii) Necessary training is needed for chlorination to those persons who will be in charge of operation and maintenance.

VII. ENVIRONMENTAL MANAGEMENT PLAN

210. Environmental management is a sustainable way of planning, arranging, supervising, organizing, and developing the environment so that the preservation of natural resources can be maintained and impact can be prevented or mitigated. An EMP, also referred to as an impact management plan, is usually prepared as part of EIA or IEE reporting. It translates recommended mitigation and monitoring measures into specific actions that will be carried out by the project proponent. Depending upon particular requirements, the plan may be included in, or appended to, the EIA report or may be a separate document. The EMP will need to be adjusted to the terms and conditions specified in during project approval stage. It will then form the basis for impact management during project construction and operation.

211. On the basis of identification of the environmental impacts and recommended mitigation measures linked with the construction activities of the mini pipe water supply system with production tube well along with pipe network, an EMP has been prepared which will be followed at the pre-construction, construction and operation stages (Table VII.1). A mitigation measure will be considered as successful when it complies with the Environmental Quality Standards (EQS), policies, legal requirements set by ADB SPS, 2009 and DoE environmental guidelines and other relevant GoB legal requirements. In absence of DoE's own EQS, other relevant international or other recognized organization's quality standard will be applied.

A. Objective of the EMP

212. The main objectives of the EMP for the construction and operation of mini piped water supply system are:

- (i) Identification of the environmental impacts and recommended mitigation and enhancement measures;
- (ii) Define the responsibilities of the project proponents in accordance with the three project phases (design, construction and operation);
- (iii) Facilitate the implementation of the mitigation measures by providing the technical details of each project impact;
- (iv) Define a monitoring mechanism and identify monitoring parameters to ensure that all proposed mitigation measures are completely and effectively implemented;
- (v) Identify training requirements at various levels and provide a plan for the implementation of training sessions;
- (vi) Providing a cost estimate for all proposed EMP actions.

B. Environmental Monitoring Plan

213. The environmental monitoring is important for assessing the baseline environmental quality and during the construction and operation of the project. The monitoring plays vital role to assess the deterioration of environmental quality and extent of implementation of the mitigation measure. It plays a judgmental role about the efficacy of the implementation.

214. The main objectives of the pre-construction, construction and operation phase monitoring plans will be to:

- (i) Monitor the actual impact of the works on physical, biological and socioeconomic receptors within the subproject site;
- (ii) Recommend mitigation measures for any unexpected impact or where the impact level exceeds;
- (iii) Ensure compliance with legal and community obligations including safety on construction sites;
- (iv) Monitor the rehabilitation and the restoration of construction campsites as described in the EMP;
- (v) Evaluate the effectiveness of the mitigation measures proposed in the EMP and recommend improvements, if and when, necessary

215. The compliance monitoring will be conducted in accordance with the environmental mitigation measures and monitoring plan provided with this report (Table VII.1). Aspects to be monitored are as follows:

216. **Pre-construction phase:** Compliance monitoring during the pre-construction comprises:

- (i) Checking that the project's design incorporates appropriate measures to avoid or minimize negative impacts.
- (ii) Incorporation of appropriate protective clauses in the contract documents that will be obliged by contractors.

217. **Construction phase:** To ensure environmental safety the following parameters should be observed to ensure the efficiency of mitigation measures:

- (i) Contractor's compliance to the environmental issues in their day-to-day activities.
- (ii) Air quality will be monitored once by direct measurement of sensitive air pollution parameters like particulate matters (PM10, PM2.5), SPM.
- (iii) Noise will be monitored during regular construction procedures. Hearing protection means will be provided to personnel when noise cannot be avoided or controlled.
- (iv) Chemical and microbiological tests will be carried out on surface and groundwater samples to determine the requirement.
- (v) Collection, transportation and disposal of solid waste of construction site and camp will be monitored.
- (vi) Inexperience coupled with unawareness of mechanical and electrical equipment to be used during the construction phase can cause injuries to the workers.
- (vii) Health and safety training program will be developed for the awareness of workers for handling of emergency situations.
- (viii) Provision of first aid facilities and use of personal protection devices like helmets, ear plugs and safety boots will be ensured. Entry of persons not wearing the protection devices within the construction site will not be allowed.

218. **Operation phase:** The contractor for 1st one-year of O&M will compile and maintain the environmental data and records gathered during the construction phase for reference during the operation phase. The contractor will coordinate with DPHE, for monitoring with respect to water quality, effluent quality and sludge quality.

- (i) The contractor in collaboration with the concerned department will organize monitoring of water quality and necessary measures will be taken to keep them within the limits set by government.
- (ii) The contractor will monitor any activity of the nearby residents (such as disposal of waste etc.), which affects the pipe line, will be brought to the knowledge of the competent authority for necessary action.

C. Components to be Monitored

219. Monitoring has two components:

- (i) Compliance monitoring, which checks whether prescribed actions have been carried out, usually by visual observation and by the use of checklists.
- (ii) Effects monitoring which records the beneficial and adverse consequences of activities on the biophysical and social environment. This is often by repeat measurements of a set of objectively verifiable indicators.

220. Monitoring for this project will concentrate on compliance monitoring to ensure that measures are being implemented on time and according to sound environmental principles.

D. Site Specific Environmental Management Plan

221. The contractor will be primarily responsible for preparing the Site Specific Environmental Management Plan (SEMP). During construction, contractor will be guided by the SEMP. This shall be based on the subproject's EMP with details on staff, resources, implementation schedules, and monitoring procedures. The agreed SEMP will be the basis for monitoring by PMU and supervision consultant. Inclusion in construction contract documents the provisions requiring the contractor to submit a SEMP is important since the contractor will be legally required to allocate a budget for mitigation measures implementation. The SEMP will allow PMU, construction supervision engineer to focus on what are specific items expected from the contractor regarding environmental safeguards on a day-to-day basis. With the SEMP, PMU can easily verify the associated environmental requirements each time the contractor will request approval for work schedules.

Table VII.1: Environmental Management and Monitoring Plan – Prior, During, and Post Construction Phase

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
1. Pre-Construction Phase							
1.1 Vegetation clearing and landscape	No major disturbance of vegetation and trees in the subproject area is expected but some ground vegetation has to be cleared for the construction of pump house and solar panel structures.	<ul style="list-style-type: none">• 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">(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)	<ul style="list-style-type: none">• PMU to report in writing the number of trees to be cut;• Tree plantation programme as per Annex-5.	Visual inspection weekly basis during tree removal.	Included in civil works contract	Contractor, Consultant	PMU
1.2 Existing utilities/services	Disruption of services.	Identify and include locations of existing drains, toilets and any other infrastructure on the way of pipe layout and redesign pipe layout to avoid any damage on such small infrastructure of the camps.	List of affected utilities and small infrastructures;	Before start of construction	No cost required.	Consultant	PMU
1.3 Permits, clearances, no objection certificate (NOC) etc.	Failure to obtain necessary permits and NOCs, etc. can result to design revisions and/or stoppage of works.	<ul style="list-style-type: none">• Obtain Environmental Clearance Certificate (ECC) from Department of Environment and NOC from RRRRC and FD.• Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction.• Acknowledge in writing and provide report on compliance all obtained permits, clearance, NOCs, etc.	All applicable and permits approvals	Prior to award of contract and as necessary	No additional cost required	Contractor, Consultant	PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> A copy of the updated IEE/site specific EMP (SEMP) must be kept on-site. 					
1.4 Consideration of extreme climatic events in the design	Failure to address the extreme rainfall events and associated vulnerability/hazards in the designs may lead to damage to the structure and pose threat of nuisance in the locality which may include hydrological hazard, poor structure life etc.	<ul style="list-style-type: none"> Ensure adequate water passage along the pump house and shape the associated landscape so that water can be drained quickly from the site; Ensure that all the design especially the production well will be constructed with adequate considerations for higher flood frequency due to climate change; Ensure flood return period and local waterlogging information being considered in the design phase; Ensure selection of latest weather coated painting and construction materials so that the structures can withstand heavy rainfall and flooding damage. 	Final design drawings	Prior to award of contract	No additional cost required	Consultant	PMU
1.5 Consideration of local hydrological system	Failure to consider the local hydrology may lead to landslide and water pollution.	<ul style="list-style-type: none"> Detail assessment of the hydrology and topography of the project site; Design according to the sloping of the project area; Avoid conventional raised plinth design that blocks water runoff, rather design should prioritize structure built on raised columns that can allow water to pass through; Design can learn and adopt from the local traditional structures on the hill sides; Design needs to consider additional drainage facilities and water storage. 	Final design drawings	Prior to award of contract	No additional cost required	Consultant	PMU
1.6 Testing of environmental quality (air, noise, water quality)	To generate the baseline data to protect the environment of the subproject area.	<ul style="list-style-type: none"> Undertake baseline quality tests of air, noise, water in the subproject site to serve as benchmark for subsequent monitoring. 	<ul style="list-style-type: none"> Air quality- PM10, PM2.5, COx, NOx, SOx. Noise level in Leq (dB). Surface water quality Test 	Prior to start of works	Included in civil works contract	Contractor through a nationally recognized laboratory	PMU, Consultant

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
			Report (pH, Turbidity, Total Hardness, Total Alkalinity, EC, Salinity, TSS, DO, BOD, COD, Sulphate, Total N, Total P, TC, FC). • Groundwater quality Test Report (pH, salinity, TDS, Chloride, As, Fe, Mn, S, TC, FC).				
1.7 Community awareness program	Without proper interaction with local communities and or with stakeholders may lead to confusion and agitation and non-cooperation of local people.	Before start of the project, the local population should be well aware of the upcoming project. There should be regular interaction with the local population and make them understand the project activities.	• Record of attendees list; • Photo log.	Every six months	Included in civil works contract	Contractor	Consultant, PMU
1.8 Update IEE and preparation of SEMP	Expecting minor impacts, during construction period only and mitigation measures are addressed.	• Update IEE based on detailed designs, and submitted to ADB for review, approval, and disclosure prior to commencement of work. • Formulate SEMP during implementation and get approval from the PD. • Relevant information disclosed.	• Final IEE and EMP reviewed, approved and disclosed • Posting of SEMP at worksites	Upon completion of layout plan by contractor	No additional cost required	Contractor, Consultant	PMU
1.9 EMP implementation training	Irreversible impact to the environment, workers, and community	Project manager and all key workers of contractors will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for construction works; health and safety (H&S), core labor laws, applicable environmental laws, etc.	(i) Proof of completion (Safeguards Compliance Orientation) (ii) Posting of EMP at worksites	Before start of construction	Cost of EMP Implementation Orientation Training to contractor is responsibility of PMU and Consultant.	Consultant	PMU
2. Construction Phase							

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
2.1 Provision for security of the sites	Construction works may hamper due to criminal activities at work sites specially in the Rohingya camps. 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"> • Be responsible for guarding all utilities, plants equipment, material, etc. delivered on sites and for ensuring that all sign, lights, fences, etc. are in their proper place. • Provide, install and maintain suitable barriers and/or fences to protect the facilities, constructions camp, storage yard, existing facilities and construction and installation operations and to remove same when no longer required by DPHE or at completion of the project. • Follow all necessary occupational health and safety measures during construction. 	<ul style="list-style-type: none"> • Program of Performance; • Signs and barriers; • Security measures in place. 	<ul style="list-style-type: none"> • Prior to start of civil works • During pipe laying • As work progresses 	Included in civil works contract	Contractor	Consultant, PMU
2.2 Sourcing of materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	<ul style="list-style-type: none"> • A materials management plan (MMP) will be produced to minimize the use of non-renewable resources and rock-based materials. The MMP will be approved by the engineer and revised as required by the Engineer. • Prioritize sites which already permitted by the authority. • If other sites are necessary, it is contractor's responsibility to verify the suitability of all material sources and to obtain the approval of PMU and consultants. • If additional quarries will require after construction is started, construction contractor to obtain a written approval from PMU. • Hill cutting is strictly prohibited for sourcing of earth materials. • Maintain a construction material register at the site. 	<ul style="list-style-type: none"> • List of approved quarry sites and sources of materials; • Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary. 	During implementation phase, as necessary with discussion with PMU, Consultant	No additional cost required	Contractor	PMU, Consultant
2.3 Pipe laying works	Potential erosion, dust generation, traffic congestion, road accident, dropping pedestrians in open trench etc. The impacts are negative	<ul style="list-style-type: none"> • All excavations shall be done to the minimum dimension as required for safety and working facility. • The excavation shall be executed in such manner, that the contractor does 	<ul style="list-style-type: none"> • Contractor's safety and security program; • Location of stockpiles; 	Inspection on monthly basis	Included in civil works contract	Contractor	Consultant, PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
	but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<p>not damage or interfere with existing services or structures. If damage or interference is so caused the contractor shall make arrangements with the supply and/or building owner to execute the repairs at the contractor's own cost.</p> <ul style="list-style-type: none"> • All trench and pit excavations and other work shall be carried out during night time at busy road section. • Road drains and channels shall be kept free from obstructions at all times. • In case of excavation in busy roads, the trenches and pits maybe need to be covered by steel plates to allow traffic to pass during non-working periods. • The contractor must liaise with the DPHE and the responsible police to familiarize themselves and adhere to such rules. • Trench excavation along roads be located in footpaths or adjacent to the road. Trench excavation shall wherever practicable be carried out in such a way that every part of the excavation is at least 0.5m clear of existing edges of the carriage way. • The contractor shall have particular regard to the safety of pedestrian, livestock, and shall ensure that all open excavation, access routes and steep or loose slopes arising from the contractor's operations are adequately fenced and protected. 	Number of complaints from stakeholders.				
2.4 Landslide, soil erosion and disturbance of land	Potential erosion/land slide may occur when moderately to highly sloping terrains are disturbed for the construction of ground reservoir, installation of distribution pipes. The impacts are	<ul style="list-style-type: none"> • Avoid moderately to highly sloping terrains for excavation; prepare proper protection before such excavation; • Conduct soil stabilization/slope stabilization or hill top stabilization before excavation trenches. 	<ul style="list-style-type: none"> • Status of debris and quarries, no of trenches, date of trenching and backfilling; • Number of complaints from 	Once prior to trenching and once after backfilling; Once in a week during construction	Included in civil works contract	Contractor	Consultant, PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
	negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> • Confining terrain disturbance considering the surface drainage routes and patterns in pipe layout; • Keeping pipe laying works as close as possible to excavation works and vice versa; • Stabilizing disturbed slopes immediately after installation and backfill and use erosion control blankets or re-vegetate and use vegetation promotion blankets; • Contractor exercise caution to prevent erosion losses, close excavations rapidly and stabilize soils once the pipeline is in place. 	stakeholders regarding access; <ul style="list-style-type: none"> • Record of watering schedule; • Implementation of waste management plan 				
2.5 Handling of flash flood, heavy downpour etc.	Inundation of worksite will damage the machineries and equipment may disrupt the construction works.	<ul style="list-style-type: none"> • Protect the working area including pump house, solar panel, trenches, materials, machineries and equipment from any damage due to inundation by downpour. • Ensure not to make any congestion in the open drains or natural or artificial channels. • Take necessary measure to bring the site to the condition prevailing before the downpour without delay. • Necessary measure has to be taken so that storm water does not get into the newly installed pipelines. • Be particular in keeping updated weather forecast and maintain a record book at site in which weather condition is recorded. 	<ul style="list-style-type: none"> • Program of performance; • On-site record book. 	As work progresses	Included in civil works contract	Contractor	Consultant, PMU
2.6 Drainage congestion	Construction material getting into surface run off or uncontrolled disposal may cause temporary drainage congestion.	<ul style="list-style-type: none"> • Prepare a program for prevent/avoid standing waters, which Consultant will verify in advance and confirm during implementation; • Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line; 	<ul style="list-style-type: none"> • Number of complaints; • Status of debris and quarries, no of trenches, date of trenching and backfilling; 	Once in a week during construction	Included in civil works contract	Contractor	Consultant, PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> Regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem. Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there; Wastes and construction debris will not be disposed in a manner that these would end up in drainage canals. Construct wide drains instead of deep drains to avoid sand deposition in the drains that require frequent cleaning. 	<ul style="list-style-type: none"> Implementation of waste management plan 				
2.7 Surface water quality	Trenching and excavation, run-off from stockpiled materials, and chemical contamination from fuels and lubricants may result to silt-laden runoff during rainfall which may cause siltation and reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> Prioritize re-use of excess spoils and materials in construction activities. If spoils need to be disposed, consult with PMU and Consultant for disposing at designated disposal areas; All earthworks must to be conducted during dry season to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff; Location for stockyards for construction materials shall be away from watercourses. Place storage areas for fuels and lubricants away from any drainage leading to water bodies; Take all precautions to minimize the wastage of water in the construction activities. Take all precautions to prevent entering of wastewater into streams, watercourses; Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low lying areas; While working across or close to any water body, the flow of water must not 	<ul style="list-style-type: none"> Areas for stockpiles, storage of fuels and lubricants and waste materials; Records of water quality inspection; For surface water quality: pH, Turbidity, Total Hardness, Total Alkalinity, EC, Salinity, TSS, DO, BOD, COD, Sulphate, Total N, Total P, TC, FC. No visible degradation to nearby drainages, <i>khals</i> or water bodies due to construction activities. 	Water quality test once in construction period	Included in Civil works contract	Contractor through a nationally recognized laboratory	Consultant, PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
		<p>be obstructed. Ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of any watercourse and drainage channels;</p> <ul style="list-style-type: none"> Monitor water quality according to the environmental management plan. 					
2.8 Groundwater quality	Impacts on the Quality of Groundwater Resource caused by the use of dirty or contaminated drilling equipment. The impacts are negative but short-term, site-specific within a relatively small area.	<ul style="list-style-type: none"> Prevent pollutants from contaminating the soil and the groundwater; All tube wells, test holes, monitoring wells that are no longer in use or needed shall be properly decommissioned; Storage of lubricants and fuel at least 50 m from water bodies; Storage of fuel and lubricants in double hulled tanks. Fuel and other petroleum products stored at storage areas away from water drainage and protected by impermeable lining and bunded 110%; Daily control of machinery and vehicles for leakages; Collection of waste during construction activities; Provide uncontaminated water for dust suppression; Enclose the construction area to prevent unauthorized access. 	<ul style="list-style-type: none"> Complaints from community; Areas for stockpiles, storage of fuels and lubricants and waste materials; Records of water quality inspection; Ground water quality: pH, salinity, TDS, Chloride, As, Fe, Mn, S, TC, FC. 	Water quality test once in construction period	Included in Civil works contract	Contractor through a nationally recognized laboratory	Consultant, PMU
2.9 Air and dust pollution	Air pollution due to construction activities. The impacts are negative but short-term, site-specific within a relatively small area.	<ul style="list-style-type: none"> Take every precaution to reduce the levels of dust at construction sites, and not exceeding the pre-project ambient air quality standards. Vehicles travelling to and from the construction site must adhere to speed limits so as to avoid producing excessive dust. Reduce dust by spraying stockpiled soil, excavated materials, and spoils. 	<ul style="list-style-type: none"> Location of stockpiles; Number of complaints from stakeholders; Records of air quality monitoring; Air quality test report (PM10 PM2.5, NOx, COx and SO2) 	Air quality test once in construction period.	Included in civil works contract	Contractor through a nationally recognized laboratory	Consultant, PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> • Cover with tarpaulin vehicles transporting soil and sand. • Cover stockpiled construction materials with tarpaulin or plastic sheets. • Water spraying to access roads, camp sites and work sites to reduce dust emissions. • All vehicles, equipment, and machinery used for construction will be regularly maintained to ensure that pollution emission levels comply with the relevant requirements of DoE. • Copies of conformance will be submitted regularly to the DMSC. • Monitor air quality according to the environmental monitoring plan. 					
2.10 Noise pollution	Construction activities will be on settlements. Temporary increase in noise level may be caused by excavation equipment, and the transportation of equipment, materials and people. The impact is short-term and within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> • Communicate the construction schedule with the neighboring sensitive receptors before starting works; • Generators will be located away from sensitive receivers and will be enclosed; • Plant and vehicles shall be started sequentially rather than all together; • Maintain maximum sound level not exceeding 80 decibels (dB) when measured at a distance of 10 m or more from the vehicle/s. • Selecting electrically powered plant that is quieter than diesel or petrol-driven plant, if interchangeable; • Use modern vehicles and machinery with standard adaptations to reduce noise and exhaust emissions, and ensure they are maintained to manufacturers' specifications; • Noise-generating equipment must be fitted with silencers. • Optimize the use of noisy construction equipment and turn off any equipment if not in use; 	<ul style="list-style-type: none"> • Number of complaints from stakeholders; Use of silencers in noise-producing equipment and sound barriers; • Noise Quality, Equivalent Sound Pressure Level 	Inspection by on monthly basis;	Included in civil works contract	Contractor through a nationally recognized laboratory	Consultant, PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> Regular maintenance of all equipment and vehicles; Stop all construction activities during at night; Implement a complaints handling system; Measure noise level according to the environmental monitoring plan. 					
2.11 Waste management	Waste generates due to construction activities at construction sites and contractor's camp site which could result in unhygienic conditions, health risk to work force and general public. 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"> The contractor is required to prepare, implement and maintain Waste Management Plan as per Annex-7 throughout construction period. Ensure proper collection and disposal of solid wastes within the construction camps; Insist waste separation by source; organic wastes in one pot and inorganic wastes in another pot at household level The contractor will engage with the supply chain to supply products and materials that use minimal packaging, and segregate packaging for reuse; The contractor will record the quantity in tons and types of waste and materials leaving site during the construction phase; Establish waste collection, transportation and disposal systems with the manpower and equipment/vehicles needed; Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector; Dispose organic wastes in a designated safe place on daily basis. At the end of the day cover the organic wastes with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, are not attracted. Prohibit burning of solid waste. 	<ul style="list-style-type: none"> Complaints from community; Regular inspection of waste management activity; Waste disposal record. 	Once in a week during construction	Included in civil works contract	Contractor	Consultant, PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> The construction wastewater and kitchen wastewater will be sent out to two settling pits and once settled the water will be used for watering surrounding plantations. The waste water pit and garbage dumpsite should be totally barricaded. 					
2.12 Tree plantation	<ul style="list-style-type: none"> Inappropriate selection of tree species and plantation location may not ensure the inherent objective of the tree plantation. Lack of proper care (e.g. watering, securing with fence) by the respective authority will hinder the process of proper growth of the planted trees. 	<ul style="list-style-type: none"> A plan for replantation with native species needs to be prepared in advance as per Annex-5 provided in this report, which has to be approved by the environmental specialist of DMSC and EHSO from the contractor. About 50 nos. of tree saplings shall be planted around the reservoir. Indigenous trees most suited to the tract will be planted; Early replanting and regular watering of the disturbed areas with local native vegetation should be undertaken to ensure speedy recovery of the cleared vegetation; No fuel-wood collection and use from forest will be permitted. Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching. 	<ul style="list-style-type: none"> PMU to report in writing the number of trees cut; Number of complaints from stakeholders on disturbance of vegetation. 	Visual inspection on monthly basis.	Included in civil works contract	Contractor	Consultant, PMU
2.13 Impacts on socio-economic status	Manpower will be employed from local community during construction and operation stage. Thus potential impact is positive and long-term.	<ul style="list-style-type: none"> Employ at least 50% of labour force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation. Secure construction materials from local market. 	<ul style="list-style-type: none"> Employment records; Records of compliance to Bangladesh Labour Law and other applicable standards. 	Visual inspection on monthly basis	Included in civil works contract	Contractor	Consultant, PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
2.14 Physical and cultural heritage	Socio-cultural structures such as mosques and educational institutes as schools, madrasa and colleges may have affected from noise and dust pollution. Accessibility to the socio-cultural sites also may be hampered in this phase.	<ul style="list-style-type: none"> Facilitating access using alternative routes during construction and timely completion of construction work; Establishment of construction site camp and labor camp maintaining proper distances from the cultural sites; Affecting dust and noise control measures provided in the EMP. 	Records of chance finds	Visual inspection by on monthly basis	Included in civil works contract	Contractor	Consultant, PMU
2.15 Occupational health and safety	Impact on health of workers, including risk of diseases (malaria, dengue fever, HIV Aids) and physical injury from any form of force majeure.	<ul style="list-style-type: none"> All relevant provisions of the Bangladesh Labour Act, 2006 and relevant WHO guidelines will be adhered to, concerning the provision of adequate measures to avoid contracting and/or spreading diseases during construction phase. Follow international best practices on occupational health and safety such as those in Section 4.2 of World Bank EHS Guidelines²⁵ on Construction and Decommissioning Activities. A proper occupational health and safety plan has to be prepared and will have to be followed to avoid health hazard of the workers. At every workplace, a readily available first aid unit, including an adequate supply of sterilized dressing material and appliances, will be provided as per the factory rules. Suitable transport will be provided to facilitate the transfer of injured or ill persons to the nearest hospital. At every workplace and construction camp, equipment and nursing staff will be provided. The contractor will, at his own expense, conform to all disease prevention 	<ul style="list-style-type: none"> Site-specific H&S Plan Equipped first-aid stations Insurance coverage for workers Number of accidents Records of supply of uncontaminated water. Condition of eating areas of workers Record of H&S orientation trainings Use of PPE; % of moving equipment outfitted with audible back-up alarms Permanent sign boards for hazardous areas 	Visual inspection on regular basis	Included in civil works contract	Contractor	Consultant, PMU

²⁵ IFC World Bank Group. 2007. [Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning](#).

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
		<p>instructions given to him by the Consultant.</p> <ul style="list-style-type: none"> • Provide regular health check-ups, sanitation and hygiene, health care, and control of epidemic diseases to the workforce. • The contractor shall provide at cost all labor and materials and construct/install and maintain site safety, hard barricading, flexible green net, signboards, temporary day/light traffic diversions throughout the construction activities according to the specifications and provide Personal Protective Equipment (PPE) to all the laborers working at the construction site. • Launch awareness programs concerning human trafficking and the possibility of spread of sexually transmitted diseases (STDs) and HIV/AIDS using brochures, posters, and signboards. • Make available first aid kits, ambulance facilities, and fire extinguishers in camp sites. • Compensation for the loss of life (a zero tolerance to loss of life policy should be developed and implemented) or for any type of injuries. • Provide insurance to the workers. Health and safety training for all site personnel is very important and must be mandatory. 	<ul style="list-style-type: none"> • Signage for storage and disposal areas • Condition of sanitation facilities for workers 				
2.16 Community health and safety	Construction works will impede the access of residents and businesses in limited cases. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	<ul style="list-style-type: none"> • Follow International best practices on community health and safety such as those in Section 4.3 of World Bank Environmental Health and Safety (EHS) 	<ul style="list-style-type: none"> • Number of permanent signage, barricades and flagmen on worksite as per Traffic 	Visual inspection on monthly basis	Included in civil works contract	Contractor	Consultant, PMU

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
		<p>Guidelines²⁶ on Construction and Decommissioning Activities.</p> <ul style="list-style-type: none"> • Contractor's activities and movement of staff will be restricted to designated construction areas. • 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. • 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. • 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; (v) 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 	<p>Management Plan;</p> <ul style="list-style-type: none"> • On-site record book • Complaints from stakeholders • GRM records 				

²⁶ IFC World Bank Group. 2007. [Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning](#).

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
		<p>environment management specialist within 48 hours of receipt of such complaint/grievance.</p> <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. 					
2.17 EMP implementation report	Unsatisfactory compliance to EMP	<ul style="list-style-type: none"> Appointment of contractor's supervisor to ensure SEMP implementation. Timely submission of monitoring reports including photo-log. 	<ul style="list-style-type: none"> Availability and competency of appointed supervisor by contractor; Monthly report by contractor and consultant. 	Monthly monitoring report to be submitted by contractor to consultant and consultant to PMU; PMU to submit semi-annual monitoring report to ADB.	Included in civil works contract	Contractor	Consultant, PMU
2.18 Site reinstatement	Damage due to debris, spoils, excess construction materials. Potential impacts are negative and long-term but reversible by mitigation measures.	<ul style="list-style-type: none"> Remove all spoils wreckage, rubbish, or temporary structures; All affected structures rehabilitated/compensated; The area that previously housed the construction worker shed is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. 	<p>PMU report in writing that:</p> <ul style="list-style-type: none"> Worksite is restored to original conditions; Worker shed has been vacated and restored to pre-project conditions; All construction related structures not relevant to O&M are removed; and Worksite clean-up is satisfactory. 	Prior to turn-over of completed works	Included in civil works contract	Contractor	Consultant, PMU
3. Operation and Maintenance (O&M) Phase							

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
3.1 Inadequate operation and maintenance	Under suboptimal operations, the subproject will create hazards in term of the overall delivery of the outputs and safety of the personnel.	<ul style="list-style-type: none"> Regular O&M including chlorinators; Regular water quality monitoring of water in the distribution system; Immediate action in case of water quality problems; Training and operational supervision of system staff will be conducted. 	<ul style="list-style-type: none"> Regular inspection and testing of all safety features and hazard control measures and personal protective features; Ensure proper training of newly deployed worker. Record of regular health check-up for the epidemic disease and illness of related workers. 	Weekly monitoring	Included in O&M cost	Contractor	DPHE
3.2 Toxic chemical hazard	Chlorine and bleaching powder are toxic to humans. Ingestions, inhalations, application to body parts, especially to such parts as eyes, nose and mouth is extremely hazardous.	<p>Provide the following measure at the chemical dosing unit:</p> <ul style="list-style-type: none"> Proper ventilation, lighting, entry and exit facilities. Facility for isolation in the event of major chemical leakage (if needed). Personal protection and safety equipment for the operators in the chemical dosing unit. Provide training to the staff in safe handling and application of chemical; this shall be included in the contract of Chemical supplier. Supplier of chemical dosing equipment shall provide standard operating manual for safe operation and as well as maintenance and repairs; Preferably these shall be provided both in English and Bangla Languages. 	<ul style="list-style-type: none"> Ensure proper training of newly deployed worker. Record of regular health check-up for the epidemic disease and illness of related workers. 	Weekly monitoring	Included in O&M cost	Contractor	DPHE

Project Activity/ Field	Impacts	Mitigation Measures	Monitoring Indicator	Frequency of Monitoring	Cost and Source of Funds	Responsibility	
						Implementation	Supervision
3.3 Water Quality	Oil/fuel spill from stored oil/fuel for generator, disposal of bleaching powder or improper chlorination, may cause reduction in the quality of adjacent bodies of water. The impacts are negative but short-term, site-specific within a relatively small area.	<ul style="list-style-type: none"> • Take all precautions to store the oil/fuel properly so that no chance of spill; • Proper disposal of excess bleaching powder and care should be taken to follow the appropriate procedure for chlorination; • Necessary training is needed for chlorination to those persons who will be in charge of operation and maintenance. 	Visible degradation to nearby drainages, <i>khals</i> or water bodies; Records of surface and groundwater quality inspection (nearby O&M); Water Quality Test (National Drinking Water Quality Standard Parameters)	Water quality test once in every year.	Included in O&M cost	Contractor through a nationally recognized laboratory	DPHE

Table VII.2: Site Specific Environmental Management Plan for Mini Pipe Water Supply System (DPHE/W5)

Site	Issue	Impacts	Mitigation Measures
WS-01 in Camp 5	Drainage congestion	The proposed site for WS-01 in camp 5 is situated in the low-lying area and a storm drainage canal runs along the production well site which might impede due to construction activity.	<ul style="list-style-type: none"> The flow of the water must not be obstructed and ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of the watercourse and drainage channel. Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in the low-lying area. Take all precautions to prevent entering of wastewater into the watercourse. Monitor water quality according to the environmental management plan.
	Soil and water pollution	Since the selected site in camp 5 is located along the storm drainage canal, thus soil and water pollution may be resulted due to discharge of drilling mud, fuel, lubricants and construction wastes in the watercourse and siltation of water bodies due to spillage of construction wastes.	<ul style="list-style-type: none"> The fuel storage area will be stationed such that runoff from the site does not drain into water bodies/ponds abutting the construction sites. Oil interceptors will be provided at construction areas ensuring that all wastewater flows into the interceptor prior to its discharge. Silt fencing will be provided at all water bodies near construction sites to prevent sediments from construction sites entering adjoining water bodies. Discharge standards for waste from industrial units or projects waste will be strictly adhered to. The work site will be cleaned and restored to pre-project conditions.
	Construction activities near educational institutions, religious, sensitive structures	WS01 site is located adjacent to the child friendly spaces along with playground which might be directly and indirectly affected due to the construction activities.	<ul style="list-style-type: none"> Provision should be made for the barriers between the construction site and the child friendly spaces and playground, so that children cannot enter the active working site. Community consultation should be carried out frequently so that compliant regarding project activities can mediate immediately. Grievance redress mechanism should be established and contact information will be disseminated at the sensitive locations.
	Community Health and Safety	The pipe line and reservoir tanks are located in the densely populated area in the camp where dropping small children in open trench for pipe line and foundation pit for solar panel may happen.	<ul style="list-style-type: none"> Construction site should be confined to ensure community safety. Place safety signage in the active working site. Keep distances from the sensitive receptor; Confined the noise source with efficient mufflers and use well-maintained equipment that emit least noise; Minimizing drop heights when loading and unloading coarse aggregates. Community consultation should be carried out frequently so that compliant regarding project activities can mediate immediately.
WS-02, WS-03 and WS-04 in Camp 8W	Land slide hazard	The proposed sites for WS02 and WS03 are located in camp 8W along the steep slope where potential erosion/land slide may occur when the terrain is disturbed for the construction of bore hole/ production well, installation of solar panel and distribution pipes.	<ul style="list-style-type: none"> Fencing is required at the edge of the work site where steep slopes start and put proper signboards around the fencing. Construct guide walls for stabilizing the downhill slope. Use of steel nets on the steeper slopes will prevent local soil erosion. Plant native deep rooted plants on the slopes where possible. Choose less stepper slopes for plantation.

Site	Issue	Impacts	Mitigation Measures
			<ul style="list-style-type: none"> • Aware the plantation worker on steeper slopes. Provide necessary safety equipment such as ropes, safety guards, boots etc.
	Site clearances	WS03 is situated in the kitchen garden cultivated by the camp dwellers which will be damaged due to construction activities.	<ul style="list-style-type: none"> • DPHE will negotiate with the affected persons for compensation for the damaged vegetables. • Appoint the affected person in the construction activity in line with their skill following the guidance of the RRRC.
	Construction activities near educational institutions, religious, sensitive structures	WS03 site in camp 8W is located adjacent to the school which will be directly and indirectly affected from the construction activities.	<ul style="list-style-type: none"> • Provision should be made for the barriers between the construction site and the school, so that children cannot enter inside the active working site. • Community consultation should be carried out frequently so that compliant regarding project activities can mediate immediately. • Grievance redress mechanism should be formed and contact information will be disseminated at the sensitive locations. • Place safety signage in the active working site. • Confined the noise source with efficient mufflers; • Use well-maintained equipment that emit least noise;
	Drainage congestion	The proposed site for WS-02 is situated adjacent to a drainage channel which might impede due to construction activity.	<ul style="list-style-type: none"> • The flow of the water must not be obstructed and ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of the watercourse and drainage channel. • Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line; • Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in the low-lying area. • Take all precautions to prevent entering of wastewater into the watercourse. • Monitor water quality according to the environmental management plan.
	Disposal of construction waste	Excavation for distribution network and borehole need for disposal of earth material which may result in damage of existing infrastructure, including access roads, tube wells, kitchen gardens etc.	<ul style="list-style-type: none"> • The contractor shall provide sediment and erosion control measures; • Excavation material shall be removed from the trench as the work progresses which can be used as filling material. • The contractor shall supply portable mud tanks or construct temporary mud pits to contain excess drill fluids during construction. Spent drilling fluids and cuttings shall be confined to the entrance and exit pits. • The contractor shall take all necessary precautions to minimize the damage to the adjacent properties. Any drilling fluid that enters the pipe shall be removed by flushing or other suitable methods. • The contractor shall be responsible for cleanup and restoration. • Pits excavated to permit connection of bored pipe shall be backfilled, and disturbed areas shall be restored to their original state or better.
	Pipe laying work	Internal road excavation is required for all the sites due to pipe laying work which may result: <ul style="list-style-type: none"> • Blockage of access; 	<ul style="list-style-type: none"> • Provide access by bridging trenches; • Store bedding materials outside of trafficked areas. • Cover materials and/or suppress dust with water;

Site	Issue	Impacts	Mitigation Measures
		<ul style="list-style-type: none"> • Dust hazard; • Drainage congestion; • Accident/ dropping small children on open trench. 	<ul style="list-style-type: none"> • Contractor will prepare and implement a Waste Management Plan approved by PMU.
WS-05 in Camp 8E	Site clearances	WS05 is situated in the kitchen garden farmed by the camp dwellers which will be damaged due to construction activities.	<ul style="list-style-type: none"> • DPHE will negotiate with the affected gardeners for compensation for the damaged vegetables. • Appoint the affected person in the construction activity in line with their skill following the guidance recommended by the RRRC.
	Drainage congestion	The proposed site for WS-05 is situated adjacent to a drainage channel which might impede due to construction activity.	<ul style="list-style-type: none"> • The flow of the water must not be obstructed and ensure no construction materials like earth, stone, or appendage are disposed of in a manner that may block the flow of water of the watercourse and drainage channel. • Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line; • Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in the low-lying area. • Take all precautions to prevent entering of wastewater into the watercourse. • Monitor water quality according to the environmental management plan
	Soil and water pollution	Since the selected site in camp 8E is located along the storm drainage canal, thus soil and water pollution may be resulted due to discharge of fuel, lubricants and construction wastes in the watercourse and siltation of water bodies due to spillage of construction wastes.	<ul style="list-style-type: none"> • The contractor shall supply portable mud tanks or construct temporary mud pits to contain excess drill fluids during construction. Spent drilling fluids and cuttings shall be confined to the entrance and exit pits. • The contractor shall take all necessary precautions to minimize the damage to the adjacent properties. Any drilling fluid that enters the pipe shall be removed by flushing or other suitable methods. • The fuel storage area will be stationed such that runoff from the site does not drain into water bodies/ponds abutting the construction sites. • Oil interceptors will be provided at construction areas and workshops ensuring that all wastewater flows into the interceptor prior to its discharge. • Silt fencing will be provided at all water bodies near construction sites to prevent sediments from construction sites entering adjoining water bodies. • Discharge standards for waste from industrial units or projects waste will be strictly adhered to. • The work site will be cleaned and restored to pre-project conditions.

E. Institutional Arrangement and Responsibilities

1. Oversight Body

222. 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 executing and implementing agencies, relevant stakeholders including deputy commissioner of Cox's bazar, other development partners and agencies. ADB established an extended mission office in Cox's bazar for close coordination, facilitation of sub-projects development and implementation.

223. 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.

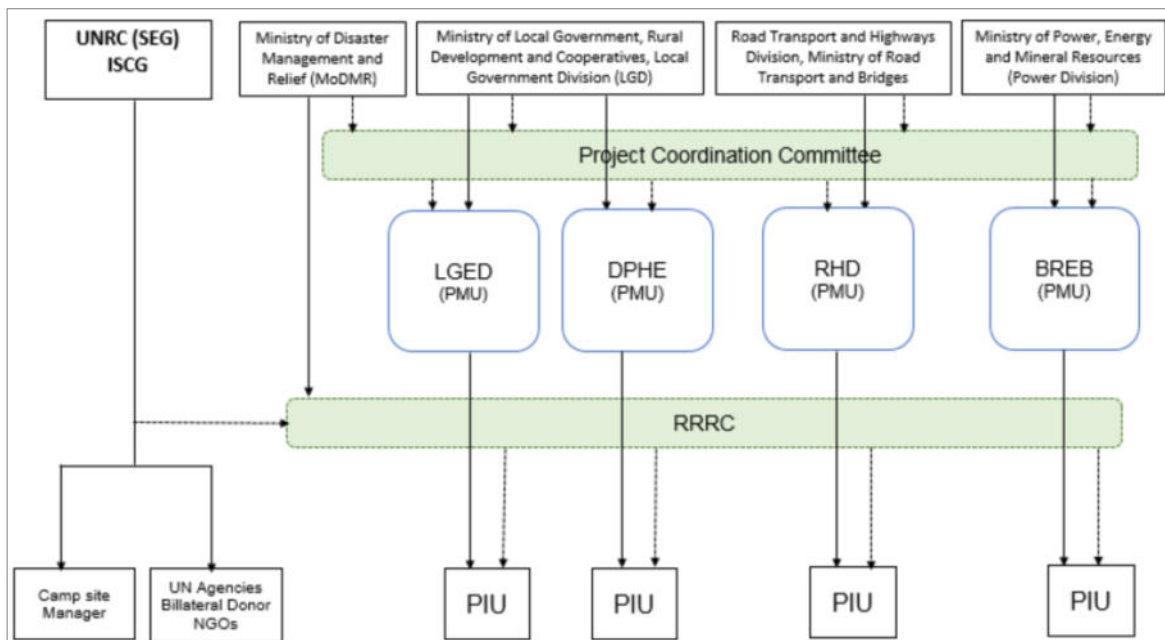


Figure VII.1: Project organizational structure

2. Executing and Implementing Agencies

224. The Department of Public Health Engineering (DPHE), under the Local Government Division (LGD) of the Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C), having extensive experience in managing urban and water supply projects financed by ADB, will be the both executing and implementing agency of Emergency Assistance Project. Ministry of Finance, Economic Relations Division has signed the grant agreement with ADB for funding of the implementation of project. Ministry of Disaster Management and Relief will facilitate establishing a project coordination committee and provide guidance and supervision of project activities.

3. Project Management Unit and Project Implementation Unit

225. A PMU will be established at Dhaka for the overall management of the project. The PMU will be headed by Project Director (PD) supported by officials. A Project Implementation Unit (PIU) will be established at Cox's Bazar under DPHE. A team of Individual Consultant led by Project Management Specialist/TL and a consulting firm led by Team Leader/Sr Water Supply and Sanitation Engineer will be recruited to support PMU and PIU in implementing the project activities at Cox's Bazar, Ukhiya and Teknaf.

4. Design and Supervision Consultants (DSC)

226. 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.

227. 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.

5. Civil Works Contracts and Contractors

228. EMPs are to be included in bidding and contract documents and verified by the PMU. The contractor will be required to designate an environmental supervisor to (i) coordinate with Consultant on updating the IEE/EMP if necessary, and (ii) ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract.

F. Capacity Building

229. A training program on environmental assessment, implementation and reporting will be developed to build the capability of PMU. This will be conducted by the Consultants. The PMU, consultants and contractors of on-going contracts will attend a one-day ADB SPS induction workshop provided by ADB safeguard specialist at BRM. Salient features of ADB SPS, policy triggers, safeguard requirements on environment, resettlement and indigenous peoples, and construction best practices.

230. PMU will organize an induction course for the training of contractors, preparing them on: (i) EMP implementation, including environmental monitoring requirements related to mitigation measures; and (ii) taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation. The contractor will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The suggested outline of the training program is presented in Table VII.3.

Table VII.3: Indicative Capacity Building and Training Program on EMP

Description	Contents	Schedule	Participants
Program 1 Orientation workshop	Module 1 – Orientation ADB Safeguards Policy Statement Bangladeshi Environmental Laws and Regulations Module 2 – Environmental Assessment Process ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements Review of environmental assessment report to comply with ADB requirements Incorporation of EMP into the project design and contracts	1 day	DPHE officials involved in the project implementation PMU

Description	Contents	Schedule	Participants
Program 2 Orientation program/ workshop for contractors and supervisory staff	Environmental issues during construction Implementation of EMP Monitoring of EMP implementation Reporting requirements	1 day	PMU contractors
Program 3 Experiences and best practices sharing	Experiences on EMP implementation – issues and challenges - Water use efficiency Best practices followed	1 day on a regular period to be determined by PMU and Consultant	PMU Consultant Contractors Local community representative

G. Environmental Costs

231. The contractor's cost for site establishment, preliminary activities, construction, defect liability activities, and environmental mitigation measures related to EMP implementation before construction and construction are to be incorporated into the contractual agreements and engineer's costs, which will be binding on him for implementation. The survey will be conducted by the contractor.

232. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of the implementing agency (DPHE). At least one-year O & M will be done by contractor and rest period will be done by local personnel involve in O & M and/or camp in charge (such as UNHCR/IMO or other organization responsible for O & M) or any other mechanism identified by ADB.

233. The activities identified in the EMP mainly include site inspections and informal discussions with workers and local community, and this will be the responsibility of PMU with the assistance of Consultant, costs of which are part of project management. Table VII.4 presents the estimated cost to implement the EMP.

Table VII.4: Cost Estimates to Implement the EMP

	Particulars	Stages	Unit	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
A. Capacity building							
1	Program 1 Orientation Workshop Program 2 Orientation program/workshop for contractors and supervisory staff Program 3 Experiences and best practices sharing	Pre-construction	Three modules, 1 day per module	Covered under consultancy			
2	Training for contractor's staff and labour on Health, safety and environment and construction practice	During construction	Two modules, 1 day per module	2	25,000.0	50,000.0	Civil Works Contract
Sub Total (A. Capacity building)						50,000.0	
B. Mitigation measures							
1.	Compensatory plantation measures (payment is to be made only when trees are fully grown)	Construction	Per tree	50	200.0	10,000.0	Civil works contract
2.	Site safety and security	Construction	Per site	5	10,000.0	50,000.0	Civil works contract

	Particulars	Stages	Unit	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
3.	Dust suppression measures at work sites twice per day over construction period, and noise & water pollution control measure	Construction	Per site	5	10,000.0	50,000.0	Civil works contract
4.	Worker health and safety (safety gears and first aid facility at work site, water quality at labour camp, solid waste management at labour camp etc.)	Construction	Per site	5	10,000.0	50,000.0	Civil works contract
Sub Total (B. Mitigation measures)						160,000.0	
C. Monitoring parameter for establishing baseline during pre-construction							
1.	Ambient air quality monitoring at work site and nearby sensitive receptor; (PM10, PM2.5, SOx, NOx, COx)	Before construction	Per contract package	1	20,000	20,000.0	Civil works contractor
2.	Noise level (LAeq in dB during day and night period at work site and nearby sensitive receptor)	Before construction	Per contract package	5	2,000	10,000.0	Civil works contractor
3.	Surface water quality monitoring at nearby water body; (pH, EC, Turbidity, TSS, DO, BOD, COD, Cl, Ammonia)	Before construction	Per contract package	1	20,000	20,000.0	Civil works contractor
4	Groundwater quality monitoring at nearby Tube-well; (pH, EC, TDS, Cl, Mn, Fe, As, TC, FC)	Before construction	Per contract package	1	20,000	20,000.0	Civil works contractor
Sub Total (C. Monitoring parameter during pre-construction)						70,000.00	
D. Monitoring parameter during construction							
1.	Ambient air quality monitoring at work site and nearby sensitive receptor; (PM10, PM2.5, SOx, NOx, COx)	Construction	Per contract package	2	20,000	40,000.0	Civil works Contract
2.	Noise level (LAeq in dB during day and night period at work site and nearby sensitive receptor)	Construction	Per contract package	5	2,000	10,000.0	Civil work contractor
3.	Surface water quality monitoring at nearby water body; (pH, EC, Turbidity, TSS, DO, BOD, COD, Cl, Ammonia)	Construction	Per contract package	1	20,000	20,000.0	Civil work Contractor
4.	Groundwater quality monitoring at nearby Tube-well; (pH, EC, TDS, Cl, Mn, Fe, As, TC, FC)	Construction	Per contract package	1	20,000	20,000.0	Civil work Contractor
Sub Total (D. Monitoring parameter during construction)						90,000.00	

	Particulars	Stages	Unit	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
E. Monitoring Parameter during operation							
1.	Surface water quality monitoring at nearby water body; (pH, EC, Turbidity, TSS, DO, BOD, COD, Cl, Ammonia)	Once in 1 st year during operation	Per package	1	20,000	20,000.0	Civil work Contractor for 1 st year; DPHE as per ADB identified mechanism for operation for rest period
2.	Groundwater quality monitoring at nearby Tube-well; (pH, EC, TDS, Cl, Mn, Fe, As, TC, FC)		Per contract package	1	20,000	20,000.0	
Sub Total (E. Monitoring parameter during operation)						40,000.00	
Grand Total for EMP Monitoring (A+B+C+D+E)						410,000.00	

234. The EMP implementation cost stands at BDT 410,000.00

H. Monitoring and Reporting

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

236. Contractor will submit report to Consultant and Consultant will submit monthly monitoring and implementation reports to PMU, who will take follow-up actions, if necessary. PMU will submit semi-annual monitoring reports to ADB. Subproject budgets will reflect the costs of monitoring and reporting requirements.

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

- (i) conduct periodic site visits for projects with adverse environmental or social impacts;
- (ii) conduct supervision missions with detailed review by ADB's safeguard specialists/officers or consultants for projects with significant adverse social or environmental impacts;
- (iii) review the periodic monitoring reports submitted by EAs to ensure that adverse impacts and risks are mitigated, as planned and as agreed with ADB;
- (iv) work with EAs to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the legal agreements, and exercise remedies to re-establish compliance as appropriate; and
- (v) prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.

VIII. GRIEVENCE REDRESS MACHANISM

238. 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:

A. First Level of GRM

239. 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.

B. Second Level of GRM

240. 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.

C. Third Level of GRM

241. 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

242. 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).

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

244. 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). ADB's Accountability Mechanism, including information on how to file a complaint, will also be explained to affected households.

245. The grievance redress mechanism and procedure are depicted in Figure VIII.1.

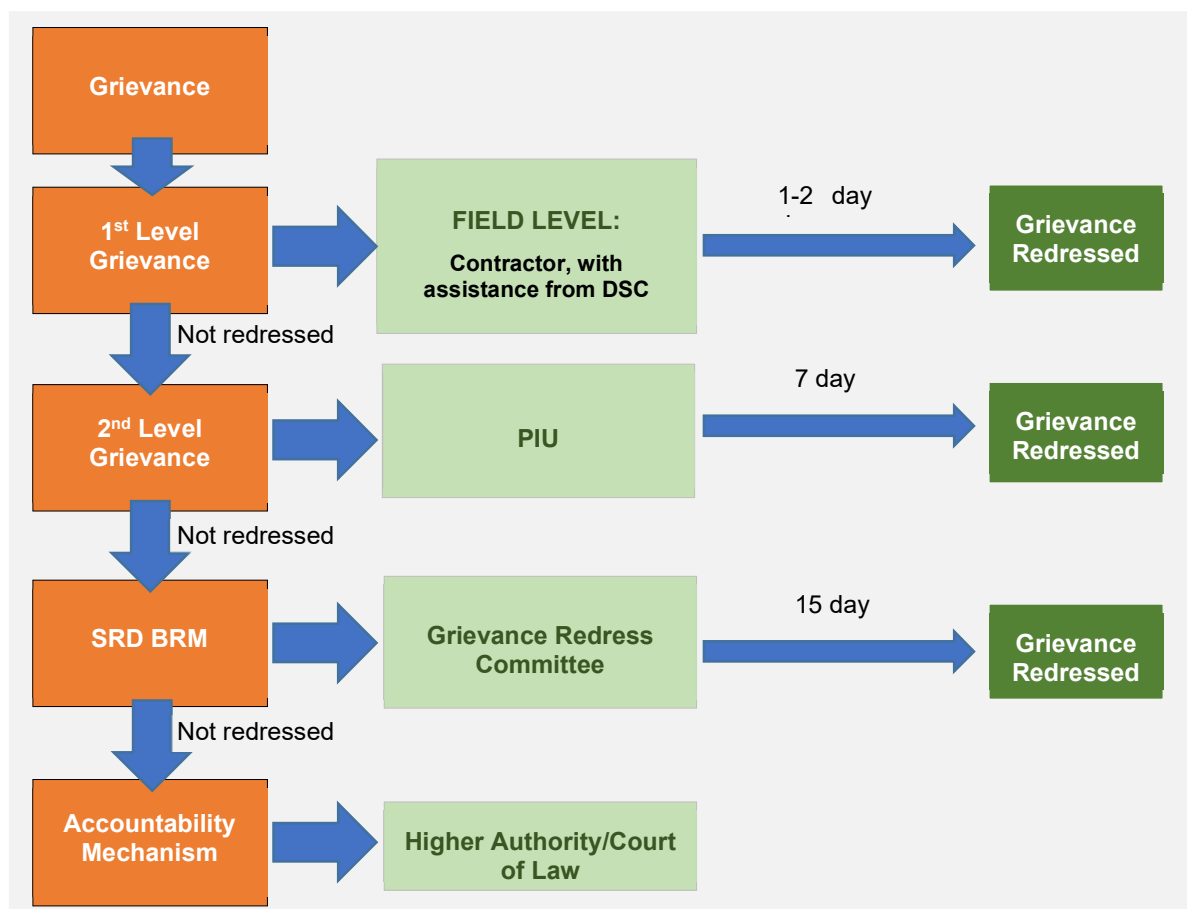


Figure VIII.1: Grievance redress process

IX. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Stakeholder Consultation

247. 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.

248. 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.

B. Stakeholder Consultation Strategy for Emergency Assistance Project

249. 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.

C. Key Target Stakeholders

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

- Beneficiaries;
- Elected representatives, community leaders, religious leaders and representatives of community based organizations;
- Local non-government organizations (NGOs);
- 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;
- Residents, shopkeepers, business persons, and farmers who live and work alongside transport and education/district infrastructure which will be rehabilitated;
- Executing agency, implementing agency, PIU, staff and consultants; and
- ADB and Government.

D. Consultation and Disclosure to Date

251. Public consultation was held during field visit on 4 December 2018 at the Camp 8 where the attendees were 11 (Figure IX.1). The attendees list is attached in Annex 2. Some informal discussion was held with the local people during site visit. Main topics of discussions were:

- (i) Awareness and extent of the subproject components
- (ii) Benefits of the subproject for the betterment of camp dwellers
- (iii) Labour availability in the subproject area
- (iv) Local disturbances due to subproject construction work
- (v) Water logging and drainage problem
- (vi) Air and noise pollution due to subproject construction work
- (vii) Movement of construction vehicle within the camp



Figure IX.1: Public consultation held at camp 8W

E. Findings of the Public Consultation

252. Camp dwellers are very much interested on the subproject and they will help the authorities in all aspects. However, mitigation measures will be required at construction sites to minimize the impact on environment. The major outcomes from the public consultation were related to drainage congestion, traffic interference during construction and the possible dust and noise problems during constructional phase. Moreover, people were interested to know the possibility of employment in the construction activity. Summary of the consultation outcomes is presented in Table IX.1.

Table IX.1: Summary of consultation outcomes

Sl.	Issues	Response
01	Does the local person support the proposed subproject?	All participants pledged to give their full support for the said subproject for everybody's welfare.
02	Any critical issue or concern by the local people regarding the subproject?	No issues or concerns.
03	Will the subproject require any land for implementation?	No land acquisition is required. Moreover, the contractor will survey the location prior to the construction activity so that the existing facility will not be affected.
04	Will the subproject construction activity adversely affect drainage management?	Necessary provisions will be provided to avoid the drainage congestion during the construction.
05	Will the subproject construction activity adversely affect the air and noise level?	Sprinkling of water at frequent intervals will avoid and curtail the dust emission. Good constructional practices and proper work timings shall avoid noise disturbances to the neighborhood.
06	During labour recruitment, should the camp dwellers including women be given priority during construction?	This largely depends on the types of job and will be assessed on a case-to-case basis by the contractor according to needs.

F. Future Stakeholder Consultation

253. The contractor will consult with the targeted stakeholders prior to the implementation of work, during implementation and prior to operation and maintenance. Contractor will also consult with the camp authority and working WASH partner. The consultation is very important to finalise the site of all components. The contractor will coordinate with WASH working group through DPHE. Under the guidance of WASH working group, different NGOs are working for the task of community consultation and motivation. The WASH working group will define the concern NGOs and the contractor will finance the NGO from the contract provision for carrying out the project specific task, in consultation with DPHE.

G. Information Disclosure

254. 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:

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

255. 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.

X. CONCLUSION AND RECOMMENDATION

257. The process described in this document has assessed the environmental impacts of all elements of mini piped water supply facility. All potential impacts were identified in relation to design and location, construction, and operation phases. Planning principles and design considerations are reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the subproject design or location are not significant.

258. Most of the individual elements of the subproject are relatively small and involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant. Most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving trenching and other excavation. However, the routine nature of the impacts means that most can be easily mitigated. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

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

260. A copy of the EMP/SEMP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

261. DPHE (Executive Agency) have fully endorsed the EMP and is committed to implement all the mitigation measures. DPHE will also ensure that the work is carried out in an environmentally acceptable manner and the monitoring and reporting are completed in a compliant and timely fashion, acceptable to ADB. If the subproject is developed following the suggestions given in the EMP of this IEE, it is expected that there will be no negative impacts to deter the development of the subproject.

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ANNEX 1: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST (WATER SUPPLY AND SANITATION)

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (SDES) for endorsement by the Director, SDES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and on tribes, minor races, ethnic sects and communities;²⁷ (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

G0582-BAN: Emergency Assistance Project

Sector Division:

Urban Infrastructure

Subproject Name – Construction and operation of mini piped water supply system (10 schemes): Package 3 (EAP/DPHE/W3)

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA...			
▪ DENSELY POPULATED?	✓		The population distribution shows that the project area is densely populated as high as 125000 per sq km.
▪ HEAVY WITH DEVELOPMENT ACTIVITIES?		✓	
▪ ADJACENT TO OR WITHIN ANY ENVIRONMENTALLY SENSITIVE AREAS?		✓	There are no sensitive ecological and cultural sites in the project area.
• CULTURAL HERITAGE SITE		✓	
• PROTECTED AREA		✓	
• WETLAND		✓	
• MANGROVE		✓	
• ESTUARINE		✓	
• BUFFER ZONE OF PROTECTED AREA		✓	
• SPECIAL AREA FOR PROTECTING BIODIVERSITY		✓	
• BAY		✓	
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE...			
• pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		✓	Source of water supply is groundwater. No industrial establishment in the Camp.
• impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	There are no cultural heritage sites/monuments of prominence.

²⁷ Groups or population identified as Indigenous Peoples within the context of ADB's Safeguard Policy Statement will be referred to in this document as *tribes, minor races, ethnic sects and communities* (following the request of the Government of Bangladesh).

Screening Questions	Yes	No	Remarks
• hazard of land subsidence caused by excessive ground water pumping?		✓	
• social conflicts arising from displacement of communities?		✓	
• conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		✓	
• unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		✓	All water supply to comply with the National Drinking Water Quality Standard.
• delivery of unsafe water to distribution system?		✓	
• inadequate protection of intake works or wells, leading to pollution of water supply?		✓	
• over pumping of ground water, leading to salinization and ground subsidence?		✓	
• excessive algal growth in storage reservoir?		✓	
• increase in production of sewage beyond capabilities of community facilities?		✓	
• inadequate disposal of sludge from water treatment plants?		✓	
• inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		✓	
• impairments associated with transmission lines and access roads?		✓	
• health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		✓	
• health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?		✓	Personal protective equipment will be provided to the workers.
• dislocation or involuntary resettlement of people?		✓	No displacement of communities.
• disproportionate impacts on the poor, women and children, tribes, minor races, ethnic sects and communities or other vulnerable groups?		✓	
• noise and dust from construction activities?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate the impacts.
• increased road traffic due to interference of construction activities?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts.
• continuing soil erosion/silt runoff from construction operations?		✓	
• delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?		✓	
• delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		✓	Not anticipated. Water quality will be regularly monitored.
• accidental leakage of chlorine gas?		✓	Not anticipated.
• excessive abstraction of water affecting downstream water users?		✓	Not anticipated.
• competing uses of water?		✓	Not anticipated.
• increased sewage flow due to increased water supply		✓	
• increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant		✓	
• large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Not anticipated.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> • social conflicts if workers from other regions or countries are hired? 	✓		Priority in employment will be given to local residents.
<ul style="list-style-type: none"> • risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction? 		✓	Not applicable. Trenching will be done manually. Construction will not involve use of explosives.
<ul style="list-style-type: none"> • community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		✓	Operational area will be clearly demarcated and access will be controlled.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: G0582-BAN: Emergency Assistance Project

Sector: Urban Infrastructure

Subsector: Water supply and sanitation

Division/Department: DPHE

Screening Questions		Score	Remarks
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	1	Little chance to be affected by storms and landslide as reservoir will be located at the hill top, however, proper protection will be taken.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2




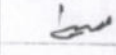



Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a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

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

ANNEX 2: LIST OF ATTENDEES OF THE PUBLIC CONSULTATION**Public Consultation Meeting**

Emergency Assistance Project

Venue: Camp 8Date: / Time: 09/12/2018 (Mini pipe water supply system)**Attendance Sheet**

Sl. No.	Name	Occupation	Address	Phone No	Signature
1	Abdul Hashem	Farmer/donor	Camp 8	-	
2	Md. Jubayyir	Laborer	Camp 8	01641535253	
3	Abdul Hamid	Laborer	Camp 8	01866872910	
4	Md. Hossen	Laborer	Camp 8	01849535257	
5	Md. Salim	Laborer	Camp 8	-	
6	Md. Manjur	Laborer	Camp 8	01880026156	
7	Md. Khairul Islam	Laborer	Camp 8	01953619184	
8	Abdul Hamid	Laborer	Camp 8	01833706763	
9	Soleman	Laborer	Camp 8	-	
10	Omar Ali	Laborer	Camp 8	01852566101	
11	Md. Usman	Laborer	Camp 8	-	

ANNEX 3: LIST OF WILDLIFE (MAMMALS, BIRDS, REPTILES AND AMPHIBIANS) RECORDED IN THE SUBPROJECT AREA

MAMMALS:

SL	Scientific Name	English Name	Family
01	<i>Bandicota bengalensis</i>	Lesser Bandicoot Rat	Muridae
02	<i>Mus musculus</i>	Eastern House Mouse	Muridae
03	<i>Rattus rattus</i>	House Rat	Muridae
04	<i>Vandeleuria oleracea</i>	Asiatic Long-tailed Climbing Mouse	Muridae
05	<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	Viverridae
06	<i>Viverra zibetha</i>	Large Indian Civet	Viverridae
07	<i>Felis chaus</i>	Jungle Cat	Felidae
08	<i>Herpestes auropunctatus</i>	Small Indian Mongoose	Herpestidae
09	<i>Canis aureus</i>	Golden Jackal	Canidae
10	<i>Suncus murinus</i>	Asian House Shrew	Soricidae
11	<i>Cynopterus sphinx</i>	Greater Short-nosed Fruit Bat	Pteropodidae
12	<i>Pteropus giganteus</i>	Indian Flying Fox	Pteropodidae
13	<i>Megaderma lyra</i>	Greater False Vampire Bat	Megadermatidae
14	<i>Pipistrellus tenuis</i>	Least Pipistrelle	Vespertilionidae
15	<i>Scotophilus heathi</i>	Greater Asiatic Yellow Bat	Vespertilionidae
16	<i>Scotophilus kuhlii</i>	Lesser Asiatic Yellow Bat	Vespertilionidae

BIRDS:

SL	Scientific Name	English Name	Family
01	<i>Columba livia</i>	Rock Pigeon	Columbidae
02	<i>Spilopelia suratensis</i>	Western Spotted Dove	Columbidae
03	<i>Streptopelia decaocto</i>	Eurasian Collared-dove	Columbidae
04	<i>Streptopelia tranquebarica</i>	Red Turtle-dove	Columbidae
05	<i>Treron phoenicopterus</i>	Yellow-footed Green pigeon	Columbidae
06	<i>Caprimulgus macrurus</i>	Large-tailed Nightjar	Caprimulgidae
07	<i>Cypsiurus balasiensis</i>	Asian Palm-swift	Apodidae
08	<i>Cacomantis merulinus</i>	Plaintive Cuckoo	Cuculidae
09	<i>Clamator jacobinus</i>	Jacobin Cuckoo	Cuculidae
10	<i>Cuculus micropterus</i>	Indian Cuckoo	Cuculidae
11	<i>Eudynamys scolopaceus</i>	Western Koel	Cuculidae
12	<i>Hierococcyx varius</i>	Common Hawk-cuckoo	Cuculidae
13	<i>Ardeola grayii</i>	Indian Pond-heron	Ardeidae
14	<i>Bubulcus ibis</i>	Cattle Egret	Ardeidae
15	<i>Egretta garzetta</i>	Little Egret	Ardeidae
16	<i>Tyto alba Common</i>	Barn-owl	Tytonidae
17	<i>Merops orientalis</i>	Asian Green Bee-eater	Meropidae
18	<i>Dendrocopos macei</i>	Fulvous-breasted Woodpecker	Picidae
19	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Dicruridae

SL	Scientific Name	English Name	Family
20	<i>Dicrurus macrocercus</i>	Black Drongo	Dicruridae
21	<i>Corvus macrorhynchos</i>	Large-billed Crow	Corvidae
22	<i>Corvus splendens</i>	House Crow	Corvidae
23	<i>Acrocephalus dumetorum</i>	Blyth's Reed-warbler	Acrocephalidae
24	<i>Hirundo rustica</i>	Barn Swallow	Hirundinidae
25	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Pycnonotidae
26	<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul	Pycnonotidae
27	<i>Acridotheres fuscus</i>	Jungle Myna	Sturnidae
28	<i>Acridotheres tristis</i>	Common Myna	Sturnidae
29	<i>Copsychus saularis</i>	Oriental Magpie-robin	Muscicapidae
30	<i>Motacilla alba</i>	White Wagtail	Motacillidae

REPTILES:

SL	Scientific Name	English Name	Family
01	<i>Calotes emma</i>	Forest Crested Lizard	Agamidae
02	<i>Calotes versicolor</i>	Common Garden Lizard	Agamidae
03	<i>Gekko gekko</i>	Tokay Gecko	Gekkonidae
04	<i>Hemidactylus frenatus</i>	Common House Gecko	Gekkonidae
05	<i>Eutropis carinata</i>	Keeled Grass Skink	Scincidae
06	<i>Eutropis macularia</i>	Bronze Grass Skink	Scincidae
07	<i>Sphenomorphus maculatus</i>	Spotted Litter Skink	Scincidae
08	<i>Varanus bengalensis</i>	Bengal Monitor	Varanidae
09	<i>Amphotyphlops braminus</i>	Common Blind Snake	Typhlopidae
10	<i>Lycodon aulicus</i>	Common Wolf Snake	Colubridae
11	<i>Xenochrophis piscator</i>	Checkered Keelback	Colubridae
12	<i>Naja naja</i>	Spectacled Cobra	Elapidae
13	<i>Duttaphrynus melanostictus</i>	Common Toad	Bufonidae
14	<i>Microhyla berdmorei</i>	Berdmore's Microhylid Frog	Microhylidae
15	<i>Euphlyctis cyanophlyctis</i>	Common Skipper Frog	Dicroglossidae
16	<i>Hoplobatrachus tigerinus</i>	Indian Bull Frog	Dicroglossidae
17	<i>Polypedates leucomystax</i>	Common Tree Frog	Rhacophoridae

ANNEX 4: LIST OF HIGHER PLANTS (MAMMALS, BIRDS, REPTILES AND AMPHIBIANS) RECORDED IN THE SUBPROJECT AREA

SL	Scientific Name	English Name	Family
01	<i>Pteris vittata</i>	Fern	Pteridaceae
02	<i>Microlepia speluncae</i>	Lacy Fern	Dennstaedtiaceae
03	<i>Thunbergia grandiflora</i>	Black Clock Vine	Acanthaceae
04	<i>Achyranthes aspera</i>	Prickly Chaff-flower	Amaranthaceae
05	<i>Alternanthera philoxeroides</i>	Alligator Weed	Amaranthaceae
06	<i>Amaranthus spinosus</i>	Spiny Amaranth	Amaranthaceae
07	<i>Centella asiatica</i>	Indian Pennywort	Apiaceae
08	<i>Calotropis gigantea</i>	Crown Flower	Asclepiadaceae
09	<i>Ageratum conyzoides</i>	Billy Goat Weed	Asteraceae
10	<i>Chromolaena odorata</i>	Triffid Weed	Asteraceae
11	<i>Crassocephalum crepidioides</i>	Redflower Rag leaf	Asteraceae
12	<i>Eclipta alba</i>	False Daisy	Asteraceae
13	<i>Sphaeranthus indicus</i>	East Indian Globe-thistle	Asteraceae
14	<i>Tridax procumbens</i>	Coat Button	Asteraceae
15	<i>Vernonia cinerea</i>	Little Ironweed	Asteraceae
16	<i>Bombax ceiba</i>	Red Silk Cotton Tree	Bombacaceae
17	<i>Heliotropium indicum</i>	Indian Heliotrop	Boraginaceae
18	<i>Senna occidentalis</i>	Coffee Senna	Caesalpiniaceae
19	<i>Tamarindus indica</i>	Tamarind	Caesalpiniaceae
20	<i>Carica papaya</i>	Papaya	Caricaceae
21	<i>Terminalia catappa</i>	Indian Almond	Combretaceae
22	<i>Ipomoea aquatica</i>	Swamp Cabbage	Convolvulaceae
23	<i>Coccinia grandis</i>	Ivy Gourd	Cucurbitaceae
24	<i>Thladiantha cordifolia</i>	Golden Creeper	Cucurbitaceae
25	<i>Dipterocarpus turbinatus</i>	Garjan-oil Tree	Dipterocarpaceae
26	<i>Croton bonplandianus</i>	Bonplant's Croton	Euphorbiaceae
27	<i>Euphorbia hirta</i>	Snake Weed	Euphorbiaceae
28	<i>Phyllanthus reticulatus</i>	Reticulated Leaf-flaver	Euphorbiaceae
29	<i>Desmodium triflorum</i>	-	Fabaceae
30	<i>Leucas aspera</i>	-	Lamiaceae
31	<i>Abutilon Indicum</i>	Indian Mallow	Malvaceae
32	<i>Hibiscus rosa-sinensis</i>	China Rose	Malvaceae
33	<i>Malvastrum coromandelianum</i>	Coromandel Malva	Malvaceae
34	<i>Acacia auriculiformes</i>	Ear-pod Wattle	Mimosaceae
35	<i>Albizia lebbek</i>	Siris Tree	Mimosaceae
36	<i>Mimosa pudica</i>	Sensitive Plant	Mimosaceae
37	<i>Artocarpus heterophyllus</i>	Jackfruit	Moraceae
38	<i>Ficus benghalensis</i>	Banyan Tree	Moraceae
39	<i>Psidium guajava</i>	Guava	Myrtaceae
40	<i>Syzygium cumini</i>	Black Berry	Myrtaceae

SL	Scientific Name	English Name	Family
41	<i>Oxalis corniculata</i>	Indian Sorrel	Oxalidaceae
42	<i>Piper betle</i>	Betel	Piperaceae
43	<i>Persicaria lapathifolia</i>	Green Smartweed	Polygonaceae
44	<i>Citrus aurantifolia</i>	Common Lime	Rutaceae
45	<i>Citrus maxima</i>	Pummelo	Rutaceae
46	<i>Laportea interrupta</i>	-	Urticaceae
47	<i>Phyla nodiflora</i>	Cape-weed	Verbenaceae
48	<i>Areca catechu</i>	Betel-nut Palm	Araceae
49	<i>Cocos nucifera</i>	Coconut Palm	Araceae
50	<i>Commelina benghalensis</i>	Blue Commelina	Commelinaceae
51	<i>Cyperus compressus</i>	Poorland Flat-sedge	Cyperaceae
52	<i>Cyperus difformis</i>	Small Flower Umbrella Plant	Cyperaceae
53	<i>Lemna perpusilla</i>	Minute Duckweed	Lemnaceae
54	<i>Bambusa balcooa</i>	Bhalku Bamboo	Poaceae
55	<i>Bambusa tulda</i>	Tulda Bamboo	Poaceae
56	<i>Chrysopogon aciculatus</i>	Love Grass	Poaceae
57	<i>Cynodon dactylon</i>	Bahama Grass	Poaceae

ANNEX 5: IUCN GUIDELINE FOR PLANTATION IN THE CAMP

This guideline has been prepared by the International Union of Nature Conservation (IUCN) in collaboration with UNHCR. IUCN carried out a study in August 2018 in Camp 4 of Kutupalong Extension Camp to identify suitable places for plantation, to select suitable species for plantation, and to outline management options for this plantation. Although the plantation guideline is intended for Camp 04, the generalized plantation process can be applied to other camp areas.

The following sections of this study draws the generalized plantation recommendation from the IUCN study. The original study should be cited as:

UNHCR & IUCN. 2018. Plantation and Management Plan for Camp 4, Cox's Bazar. UNHCR, IUCN (International Union for Conservation of Nature), Dhaka, Bangladesh. The report is available at: https://www.iucn.org/sites/dev/files/content/documents/plantation_and_management_plan_for_camp_4_iucn-unhcr.pdf (Accessed: November 26, 2018).

A. Site preparation

Since the best time to plant is in August, the site should be well-prepared immediately for the plantations.

- The fallow forest sites with bushes of coppice shoots and weeds/grasses, shall be lightly slush, but the coppice shoots of native tree species, for example Puti jam, Kharullah, Suregada, Chatian, and Dumur should be left alone.
- Predetermine the planting position with appropriate spacing and stacking with bamboo sticks.
- On hills/hillocks, make stacking across the slopes for minimizing soil erosion.
- After stacking, make planting pit/hole of 30 cm x 30 cm x 30 cm dimension. Care should be taken to make pits in steep slopes for avoiding soil erosion and land slide. Augur may be use in those areas for making the pits.
- Put handful of decomposed cow dung and 20 g of TSP in each pit, mix well with top soil before planting the seedlings.
- For soil conservation and stabilization, only line planting of Vetiver/ Phuljaru/ Arahar should be done for minimal soil disturbance.

B. Planting Techniques

B 1 Spacing

- Long-, medium- and short-rotation forest trees: 2 m x 2 m
- Shed trees: 4 m x 4 m or depending on suitable lands around homesteads
- Plants for soil stabilization with Vetiver, Phuljaru, Arahar: 40 cm x 40 cm
- Bamboo offset/seedlings/cuttings along creeks/chhara: 5 m x 5 m in alternate position

B 2 Plantation of seedlings

- Distribute the seedlings according to the design of the plantations (short-, medium and long-rotation).
- Short-rotation, fast-growing species shall be planted in mix on the hill-tops.
- Slow-growing, long-rotation species shall be planted at the hill bottom and mid slope.
- Cut polybag with a sharp knife and remove it carefully so that the ball of earth does not break.
- Place the seedling with the ball of earth in the pit/ hole. Take proper care so that roots do not curl or bend in the holes.

- Make sure that root-collar region of the seedling is just below the soil surface. Tighten the soil by tramping with feet/hand around the seedlings, so that there does not remain any air-space inside the planting hole.
- In the low-lying areas, ensure that no water can stand at the root-collar zone. This may be achieved by slightly raising the soil surface in the seedling region.

C. Post-plantation management and maintenance

C1 Weeding

Weeding schedule is given below:

- 3 weeding in 1st year (August, October & April-May of next year).
- 2 weeding in 2nd year (July-August and May-June).
- 1 weeding in 3rd year (May-June depending on rainfall & severity of weed growth).

Note: Weeding pattern shall be circular (50 cm around the seedling/sapling) or line (50 cm all along). Complete weeding is not recommended for halting the soil erosion.

C2 Vacancy filling

- If any vacancy occurs, have to fill it up at the end of the plantation programme (if rain exists).
- Priority shall be given for the same species for vacancy filling.

C3 Fertilizations

- If the soil of the plantation area is fertile, generally fertilization is not essential.
- Since the camp plantation site is degraded, it needs adequate fertilizer application: Urea 30 g, TSP 20 g with a basal doze of 20 kg/ha of MP.
- Thoroughly mix full doze of TSP and half of urea with the soil of planting hole/pit.
- Apply the rest half of urea after 30-40 days of planting the seedlings (if drought starts, be careful about the application of urea).

C4 Watering/ Irrigation

- If watering/ irrigation is possible, seedlings must be benefited and growth will be enhanced.

C5 Mulching

Mulching is useful to conserve soil moisture for the seedlings during the dry period and release nutrients after gradual decomposition.

- Mulching helps to conserve 20–25% soil moisture, thus helps the seedling further growth during dry period.
- Kitchen waste (biodegradable) and leaf-litter/grass may be used for mulching in the camp site.
- About 2" thick mulching may be given from 1-2" distance from the seedling.

D. Records, Monitoring, and Evaluation

- Make a register/plantation Journal for each site, indicating the details of plantation activities.
- Make a detailed map of the plantation indicating the ordinates, plantation type and species with topography of the site.

- Keep record of all activities, e.g. nursery raising, purchase of seedlings (species, prices and average height), field preparation and out-planting etc.
- Record the silvicultural treatments, e.g. weeding, cleaning, vacancy filling, mulching, irrigation and any damages, if happened, etc.
- Take photographs of the activities (before, during and after planting activities).
- Record the survival, height growth and diameter of the seedlings planted at each site.

ANNEX 6: TEST RESULTS FOR SURFACE WATER QUALITY



Multidisciplinary Development Consultants

Name of the Project	Construction & Operation of Mini Piped Water Supply System (5 Schemes), Package 5 (EAP/DPHE/WS)
Description of Sample	Surface Water Quality
Sample Collector	Collected by DSCL Personnel
Sampling Date	8 May 2019

Test Result of Surface Water Quality Analysis

Parameters	Unit	Concentration Present	Standards for Inland Surface Water* (ECR,1997)	Standards for Project Waste Water* (ECR,1997)	Analysis Method
		WDZ-8W.4E, Ukhiya Mega Camp, Cox's Bazar EAP/DPHE/WS/SW_01 21.211887°N 92.143304°E			
pH*	-	7.5	6-9	6-9	Multimeter
Electrical Conductivity (EC)*	us/cm	846	1200	1200	Multimeter
Dissolved Oxygen (DO)*	mg/l	3.8	4.5-8	4.5-8	DO Meter

Standards for Inland Surface Water and Project Waste Water is followed Environmental Conservation Rule (ECR) '87
* On-site Test Result

Description of the Surrounding Environment

Sample Location and ID	Sample Site Description
WDZ-8W.4E, Ukhiya Mega Camp, Cox's Bazar (EAP/DPHE/WS/SW_01)	<ul style="list-style-type: none"> ➤ Rain water drains in the canal. ➤ Water is using for bathing purposes ➤ Water is slightly polluted ➤ Water remains all around the year



Test Performed By:
Saiful Islam Imran
Jr. Environmental Specialist



Checked By:
Tonmoy Pandit
Deputy Manager

Development Solutions Consultant Ltd.

House# 734 (5 B), Road# 10, Avenue# C4
DOHA Mirpur, Dhaka-1216, Bangladesh. Tel: +8801822857548
Email: dscl@dsclbd.com Web: www.dsclbd.com

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmsc_central_lab@yahoo.com	
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Lab Memo: 309/CC, DPHE, CL, Dhaka.

Date: 14/05/2019

Physical /Chemical/ Bacteriological Analysis of Water Sample



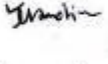
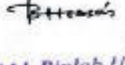
Sample Id.: CEN2019050569	Sample Receiving Date: 05/05/2019
Ref. Memo No: DSCL/2019/Nil & Dated: 14-05-2019	Sample Source: Surface Water
Sent by: Saiful Islam Imran, Junior Environmental Specialist, DSCL, Mirpur DOHS, Dhaka-1216	Dist: Cox's Bazar; Upz: Uchhiya
Care Taken: EA/DPHE/W5/SW_01	Union: Nil; Uchhiya mega camp
Sample Collection date: 06/05/2019	Date of Testing: 09/05/2019-14-05-2019

LABORATORY TEST RESULTS:



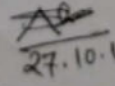

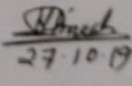
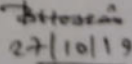
Sl. #	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Ammonia	0.5	5.6	mg/L	UVS	0.1
2	Biochemical Oxygen Demand (BOD ₅)	0.2	24	mg/l	5 days Incubation	0.1
3	Chemical Oxygen Demand (COD)	4.0	119	mg/L	CRM	-
4	Total Suspended Solid (TSS)	10	46	mg/l	Gravimetric	-
5	Turbidity	10	1425	NTU	Turbidity meter	-
6	Chloride	600	76	mg/l	Titrimetric	-



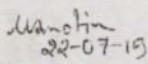
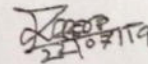
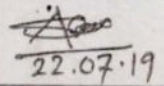
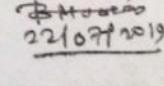
Comments: Sample was collected & Supplied by client.



N.B: UVS- UV-Visible Spectrophotometer, CRM-Closed Reflex Methods, LOQ - Limit of Quantitation.



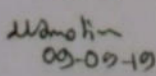
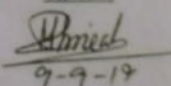
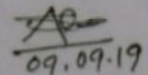
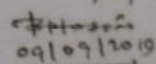
Test Performed by: 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer  2.) Name: Taslima Akhter Designation: Sample Analyzer 	Countersigned/Approved by: 1.) Name: Md. Zahidul Islam Miah Designation: Senior Chemist  2.) Name: Md. Biplab Hossain Designation: Chief Chemist  Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka.
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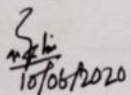
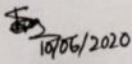
ANNEX 7 TEST RESULTS FOR GROUNDWATER QUALITY

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmac_central_lab@yahoo.com					
Lab Memo: 368/ CC, DPHE, CL, Dhaka.		Date: 27-10-2019				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2019100220		Sample Receiving date: 14-10-2019				
Ref. Memo No: 46.03.2294.301.16.049.18-267 & Dated: 09-10-2019		Sample Source: Test Tube Well				
Sent by: Sub-asst. Engineer, DPHE, Ukhiya Upazila, Cox's Bazar.		Dist: Cox's Bazar, Upa: Ukhiya Upazila				
Care Taker: M/s. MT & SS Consortium		Union: Vill.: Ukhiya Camp-05, WDZ: 5.03, TTW-07				
Sample Collection date:		Date of Testing: 14/10/2019-22/10/2019				
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Alkalinity	-	110	mg/L	Titrimetic	-
2	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
3	Chloride	150-600	14	mg/L	Titrimetic	-
4	EC	-	281	µS/cm	Multimeter	-
5	Hardness	200-500	162	mg/L	Titrimetic	-
6	Iron (Fe)	0.3-1	0.23	mg/L	AAS	0.05
7	Manganese (Mn)	0.1	0.05	mg/L	AAS	0.03
8	pH	6.5-8.5	7.3	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	135	mg/L	Multimeter	-
Comments: Sample was collected & Supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, LOQ - Limit of Quantitation.						
Test Performed by: 1.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer Signature:  27.10.19 2.) Name: Taslima Akhter Designation: Sample Analyzer Signature:  27.10.19		Countersigned/Approved by: 1.) Name: Md. Zahidul Islam Miah Designation: Senior Chemist Signature:  27.10.19 2.) Name: Md. Biplob Hossain Designation: Chief Chemist Signature:  27.10.19 M.T.E. Biplob Hossain Chief Chemist Department of Public Health Engineering Central Laboratory, Mohakhali, Dhaka				

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Lab Memo: 068/CC, DPHE, CL, Dhaka.		Date: 22-07-2019					
Physical /Chemical/ Bacteriological Analysis of Water Sample							
Sample ID: CEN2019070154		Sample Receiving date: 11-07-2019					
Ref. Memo No: 46.03.2294.301.16.015.18-206 & Dated: 07-07-2019		Sample Source: Test Tube Well					
Sent by: Md. Ibrahim Kheri, Sub-asst. Engineer, DPHE, Ukhia Upazila, Cox's Bazar.		Dist: Cox's Bazar Upazila Ukhia Upazila					
Care Taker: DPHE, Ukhia Upazila, Cox's Bazar (TTW-9)		Union: Vill.: Ukhia Camp-8W-06					
Sample Collection date:		Date of Testing: 11/07/2019-20/07/2019					
LABORATORY TEST RESULTS:							
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ	
1	Alkalinity	-	150	mg/L	Titrimetic	-	
2	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001	
3	Chloride	150-800	12	mg/L	Titrimetic	-	
4	EC	-	267	µS/cm	Multimeter	-	
5	Hardness	200-500	215	mg/L	Titrimetic	-	
6	Iron (Fe)	0.3-1	0.53	mg/L	AAS	0.05	
7	Manganese (Mn)	0.1	0.05	mg/L	AAS	0.03	
8	pH	6.5-8.5	7.3	-	pH Meter	-	
9	Total Dissolved Solid (TDS)	1000	127	mg/L	Multimeter	-	
Comments: Sample was collected & Supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, LOQ - Limit of Quantitation.							
Test Performed by:		Signature		Countersigned/Approved by:		Signature	
1.) Name: Mahabuba Sabina Molin		 22-07-19		1.) Name: Mita Sarker		 22-07-19	
Designation: Sample Analyzer				Designation: Senior Chemist			
2.) Name: Md. Saiful Alam Khosru		 22.07.19		2.) Name: Md. Biplab Hossain		 22/07/2019	
Designation: Sample Analyzer				Designation: Chief Chemist			

	Government of the People's Republic of Bangladesh Office of the Chief Chemist Department of Public Health Engineering Central Lab, 38-39, Mohakhali C/A, Dhaka-1212 <small>Phone: 88-02-9881927, Fax: 88-02-9882003, Email: wqmac_central_lab@yahoo.com</small>					
Lab Memo: 174/ CC, DPHE, CL, Dhaka.		Date: 09-09-2019				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2019080065	Sample Receiving date: 18-08-2019					
Ref. Memo No: 46.03.2294.301.16.015.18-227 & Dated: 07-08-2019	Sample Source: Test Tube Well					
Sent by: Md. Ibrahim Khalil, Sub-asst. Engineer, DPHE, Ukhia Upazila, Cox's Bazar.	Dist Cox's Bazar, Upa.Ukhia Upazila					
Care Taker: DPHE, Ukhia Upazila, Cox's Bazar. (TTW-04)	Union, Vill: <i>2704 Ept</i>					
Sample Collection date:	Date of Testing: 18/08/2019-08/09/2019					
LABORATORY TEST RESULTS:						
SI.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Alkalinity	-	175	mg/L	Titrimetic	-
2	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
3	Chloride	150-600	12	mg/L	Titrimetic	-
4	EC	-	265	µS/cm	Multimeter	-
5	Hardness	200-500	157	mg/L	Titrimetic	-
6	Iron (Fe)	0.3-1	0.49	mg/L	AAS	0.05
7	Manganese (Mn)	0.1	0.09	mg/L	AAS	0.03
8	pH	6.5-8.5	7.7	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	131	mg/L	Multimeter	-
Comments: Sample was collected & Supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.						
Test Performed by:		Countersigned/Approved by:				
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer		<i>[Signature]</i> 09-09-19		1.) Name: Md. Zahidul Islam Miah Designation: Senior Chemist		
2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer		<i>[Signature]</i> 09.09.19		2.) Name: Md. Biplab Hossain Designation: Chief Chemist		
				<i>[Signature]</i> 09/09/2019 Md. Biplab Hossain Chief Chemist Department of Public Health Engineering Central Laboratory Mohakhali, Dhaka.		

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Lab Memo: 174/CC, DPHE, CL, Dhaka.		Date: 09-09-2019				
Physical /Chemical/ Bacteriological Analysis of Water Sample						
Sample ID: CEN2019080064		Sample Receiving date: 18-08-2019				
Ref. Memo No: 46.03.2294.301.15.015.18-227 & Dated: 07-08-2019		Sample Source: Test Tube Well				
Sent by Md. Ibrahim Khali, Sub-asst. Engineer, DPHE, Ukhia Upazila, Cox's Bazar.		Dist Cox's Bazar, Upa: Ukhia Upazila				
Care Taker: DPHE, Ukhia Upazila, Cox's Bazar. (TTW-03) ৪৭-০৩		Union, Vill:				
Sample Collection date:		Date of Testing: 18/08/2019-08/09/2019				
LABORATORY TEST RESULTS:						
Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Alkalinity	-	160	mg/L	Titrimetic	-
2	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
3	Chloride	150-600	15	mg/L	Titrimetic	-
4	EC	-	280	µS/cm	Multimeter	-
5	Hardness	200-500	192	mg/L	Titrimetic	-
6	Iron (Fe)	0.3-1	0.14	mg/L	AAS	0.05
7	Manganese (Mn)	0.1	0.04	mg/L	AAS	0.03
8	pH	6.5-8.5	7.7	-	pH Meter	-
9	Total Dissolved Solid (TDS)	1000	138	mg/L	Multimeter	-
Comments: Sample was collected & Supplied by client. N.B: AAS - Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.						
Test Performed by:		Signature		Countersigned/Approved by:		Signature
1.) Name: Mahabuba Sabina Motin		 09-09-19		1.) Name: Md. Zahidul Islam Miah		 9-9-19
Designation: Sample Analyzer				Designation: Senior Chemist		
2.) Name: Md. Saiful Alam Khosru		 09.09.19		2.) Name: Md. Biplob Hossain		 09/09/2019 Md. Biplob Hossain Chief Chemist Department of Public Health Engineering Central Laboratory, Mohakhali, Dhaka.
Designation: Sample Analyzer				Designation: Chief Chemist		

	<p>Government of the People's Republic of Bangladesh Department of Public Health Engineering Water Testing Laboratory, Cox's Bazar. E-mail: wqmsc.coxbazarlab@gmail.com</p>	 <div style="border: 1px solid black; padding: 2px; text-align: left; margin-top: 5px;"> শেখ হাসিনার মুদ্রা গ্রাম শহরের উন্নতি </div>										
Memo: 302		Date: 10/06/2020										
Physical/Chemical/Bacteriological Analysis of Water Sample												
Sample ID: 4418-4419-02		Sample Submission Date: 02/06/2020.										
Sent by: Md. Al-Amin Biswas, SAE, DPHE, Ukhiya, Cox's Bazar.		Sample Source: Ground Water.										
Ref. Memo No: 46.03.2284.301.16.049.18-540	Date: 01/06/2020.	Dist: Cox'sbazar Upazila: Ukhiya										
Sample Collection Date:		Date Testing: 02/06/2020 to 10/06/2020.										
Laboratory Test Results												
Sl.	Caretaker / Location	Camp/Block	pH BDS:6.5-8.5	Chloride (mg/L) BDS:150-600	E. Conductivity (μs/cm)	TDS (mg/L) BDS:1000	Alkalinity (mg/L)	Total Hardness (mg/L) BDS:200-500	Mn (mg/L) BDS:0.1	Arsenic (mg/L) BDS:0.05	Iron (mg/L) BDS:0.3-1	Remarks
4418	Water Distribution Zone- BE.3	Camp-BE Block-B70	7.2	24	462	301	290	20	<0.05	<0.001	0.10	
4419	Water Distribution Zone- 20.06	Camp-20 Block-M27	7.2	18	355	231	200	20	<0.05	<0.001	0.13	
Note: Samples tested as per collected & Supplied by client. Lab ID: 214.												
Test Performed by:						Counter Signed by:						
Name: Md. Abdus Selim Designation: Sample Analyzer						Name: Md. Shamim Akter Designation: Junior Chemist						
 10/06/2020						 10/06/2020						

ANNEX 8: WASTE MANAGEMENT PLAN (WMP)

1. GENERAL

Considerable quantities of wastes (general & construction) will be generated due to the 1.5 years' construction of the project road. Two types of wastes will be generated during construction:

- a. General Waste:
 - Organic waste (foods, fruits, tree leaves etc.); and
 - Inorganic (such as papers, plastic and glass bottles & containers, polythene etc.); and
- b. Construction Waste:
 - Construction wastes are: construction materials such as sand, piece of rocks, bricks, rods, geotextiles, remaining concrete & bentonite waste.

2. OBJECTIVES

The main objective of the WMP is to organize disposal of all wastes generated during construction in an environmentally acceptable manner specially consider the following:

- Health hazards of the project personnel as well as community people should not be occurred;
- Manage the wastes in such a way that environment (specially air, soil, water etc.,) will not be polluted;
- Odor means bad smell should not be generated;
- Always friendly environment at the construction sites and construction camps;
- Any waste should not be disposed into the river and any water bodies to avoid water pollution;
- Any waste should not be burnt; and
- Any waste should not be placed in earth holes/chambers.

3. POTENTIAL ENVIRONMENTAL IMPACTS

Major potential environmental impacts due to the lack of waste management are:

- All types of environmental pollutions such as air, soils, water (surface & ground) pollutions;
- Generation of odor;
- Increase of flies, mosquitoes, insects etc.,
- Health hazards; and
- Environmental nuisance at the project sites

4. STRATEGIES TO ADOPT

The following strategies need to be adopt for appropriate soil waste collection system to be functioned properly:

- a. Setting waste collection bins (not permanent structure, movable high quality movable plastic bins; See Figure 1) in strategic points of the construction camp and work sites.
- b. Introduce solid waste bins for organic and non-organic waste.
- c. Coordinate with the municipalities waste collection system so that the waste can be collected at midnight when the road transports are minimum.

- d. Wash liquids needs to be drained out though the functioning drains. The liquid waste needs to be treated with bleaching power every evening before draining so that the waste water cannot create nuisance and local pollution.

The other strategies that might be adopted are explained in later paragraphs.



Figure: High quality plastic bins for solid waste

5. METHOD OF DISPOSAL OF WASTES

The Contractor will collect the general wastes in separate waste bin at sources (means organic waste in one bin & inorganic waste in another bin) and dumped at the designated waste disposal site. The contractor will construct concrete waste disposal site; means concrete floor and wall and covered by shed to avoid, air, bad smell, soil and ground water pollutions. Based on the quantity of general waste (organic & inorganic waste), the following two chambers (rooms) of the concrete disposal site will be constructed by Contractor:

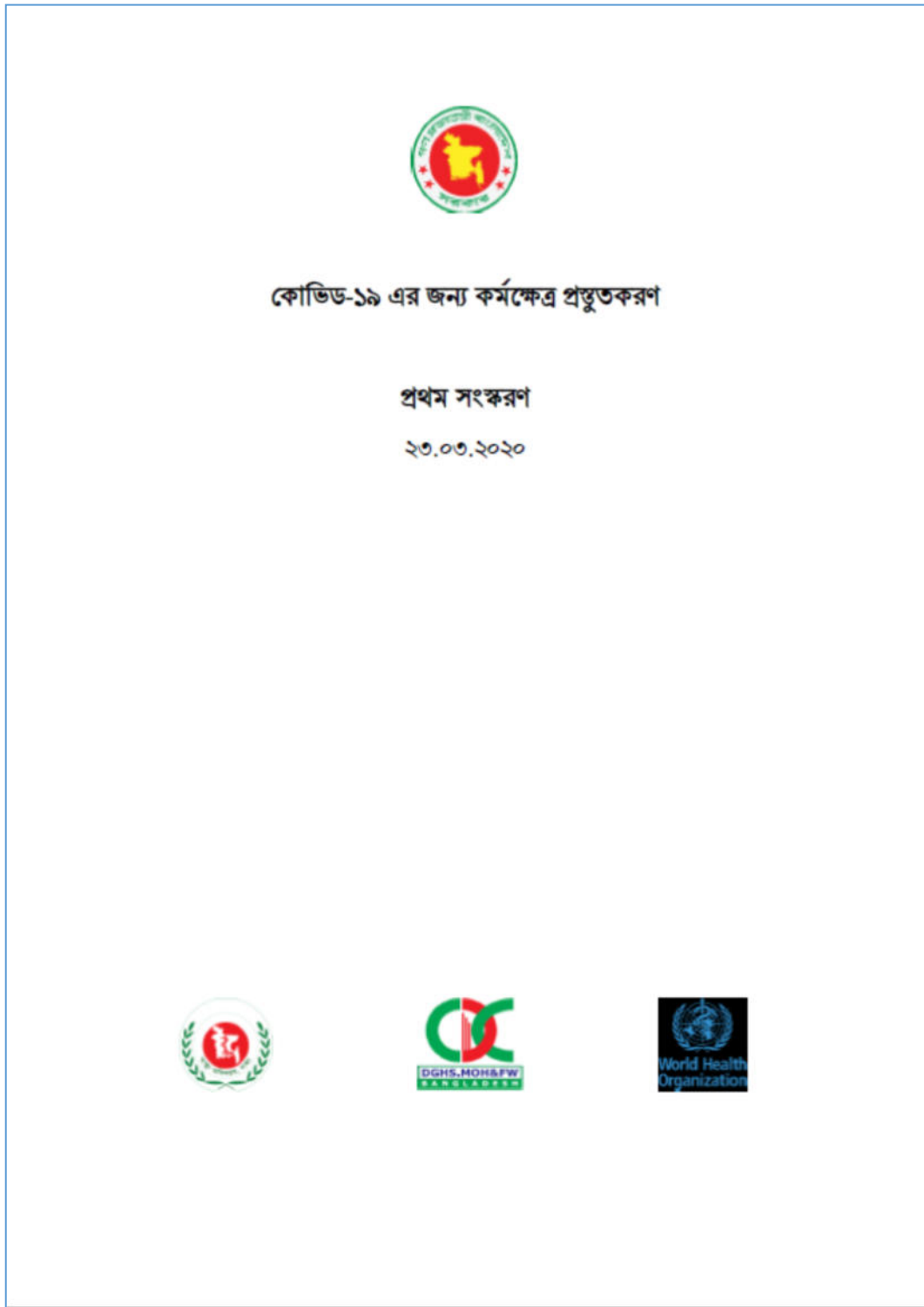
Just after filling one chamber (say after 6 months) by organic waste through pocket gate, it should be covered by earth (soils) properly & keeps it for about 6 months for converting organic fertilizer for the agricultural lands. After filling 1st chamber by organic waste, disposing of waste will be started for 2nd chamber. The inorganic waste will be collected in the waste collection bins. Just after filling, these inorganic wastes can be given to the vender free of cost.

The Contractor will collect construction waste as mentioned above separately and dump in to the designated room at the construction camp. Just after filling the room, Contractor will sale these waste to the vender for re-cyclic. The Contractor will maintain log book for the measurement of quantity of the wastes (especially hazardous wastes) disposed every day.

6. INSTITUTIONAL ARRANGEMENT

Contractor is mainly responsible for design, construction, maintenance as well as environmental monitoring for the disposal of waste. Environmental Specialist of the DMSC is responsible for monitoring of the disposal. The PIU of the RHD will setup a 'Waste Management Committee' with the representatives of the DMSC and contractor to effectively disposing the wastes and distribution of organic fertilizer to the farmers and inorganic wastes to the venders. The committee is also responsible for monitoring procedure for the collection and carrying of wastes without causing any environmental hazards.

ANNEX 9: BANGLADESH GOVERNMENT GUIDELINE IN RESPONSE TO COVID-19 IN WORKSITES



কোভিড-১৯ এর জন্য কর্মক্ষেত্র প্রস্তুতকরণ

২০২০ সালের জানুয়ারি মাসে বিশ্ব স্বাস্থ্য সংস্থা (WHO) একটি নতুন ধরনের করোনা ভাইরাস জনিত রোগের প্রাদুর্ভাব ঘোষণা করে, যার সূচনা হয় চীনের হবেই প্রদেশে। বিশ্ব স্বাস্থ্য সংস্থা (WHO) এর বিবৃতি অনুযায়ী করোনা ভাইরাস রোগটি (কোভিড-১৯) বিশ্বের অন্যান্য দেশে ছড়িয়ে পড়ার একটি উচ্চ ঝুঁকি রয়েছে।

বিশ্ব স্বাস্থ্য সংস্থা (WHO) এবং জনস্বাস্থ্য কর্তৃপক্ষ বিশ্বব্যাপী কোভিড-১৯ এর প্রাদুর্ভাব নিয়ন্ত্রণের জন্য কাজ করছে। তবে দীর্ঘমেয়াদী সাক্ষ্য এখন পর্যন্ত অর্জিত হয়নি। এই রোগের বিস্তার রোধ করতে হলে ব্যবসায়ী, চাকুরীজীবীসহ সমাজের সর্বস্তরের মানুষকে অবশ্যই কার্যকরী ভূমিকা পালন করতে হবে।

কোভিড-১৯ যেভাবে ছড়ায়

কোভিড-১৯ আক্রান্ত রোগীর হাঁচি, কাশির মাধ্যমে রোগটি সংক্রমিত হয়ে থাকে। হাঁচি, কাশির মাধ্যমে রোগটির জীবাণু নিকটবর্তী বস্তুর পৃষ্ঠতল - যেমন ডেস্ক, টেবিল বা টেলিফোন/মোবাইল ইত্যাদির উপর পড়ে যা সহজেই মানুষের হাতের সংস্পর্শে আসে, পরবর্তীতে এই জীবাণু যুক্ত হাত দ্বারা চোখ, নাক বা মুখ স্পর্শ করার মাধ্যমে তারা আক্রান্ত হতে পারে। আবার যারা কোভিড-১৯ আক্রান্ত ব্যক্তির এক মিটারের মধ্যে অবস্থান করে, তারাও হাঁচি-কাশি হতে ডিটকে আসা ক্ষুদ্র কণার সাথে মিশ্রিত জীবাণু দ্বারা আক্রান্ত হতে পারে। কোভিড-১৯ এ সংক্রমিত হলে বেশিরভাগ ব্যক্তি হালকা/সাধারণ লক্ষণগুলি অনুভব করে এবং নিজ থেকেই সুস্থ হয়ে যায়। কিছু রোগীর ক্ষেত্রে গুরুতর অসুস্থতা লক্ষ্য করা যায় এবং হাসপাতালে নেওয়ার প্রয়োজন হতে পারে। সাধারণত ৪০ বা তদোর্ধ্ব বয়সী রোগী, রোগ প্রতিরোধ ক্ষমতা কম এমন ব্যক্তির (যেমন- ব্যালার, ডায়াবেটিস, হৃদরোগ এবং ফুসফুসের রোগে আক্রান্ত ব্যক্তি) ক্ষেত্রে ঝুঁকির মাত্রা বেশী।

আমরা এখানে যা জানব-

১. কর্মক্ষেত্রে কোভিড-১৯ এর বিস্তার রোধ করার সহজ উপায়।
২. সভা, সমাবেশ এবং জনসমাগমে কোভিড-১৯ এর ঝুঁকিগুলি এড়িয়ে চলার উপায়।
৩. কর্তৃপক্ষ ও কর্মীগণের ভ্রমণকালীন সময়ে সাবধানতা।
৪. কোভিড-১৯ ছড়িয়ে পড়লে কর্মক্ষেত্র প্রস্তুতকরণ।

১. কর্মক্ষেত্রে কোভিড-১৯ এর বিস্তার রোধ করার সহজ উপায়

যে সকল কর্মক্ষেত্রে কোভিড-১৯ এর সংক্রমণ ছড়িয়ে পড়েনি সেখানকার দায়িত্বপ্রাপ্ত কর্মকর্তাগণ তাদের নিজ কর্মক্ষেত্রে নিম্নোক্ত বিষয়গুলো নিশ্চিত করবেন-

- কর্মস্থল পরিষ্কার-পরিচ্ছন্ন এবং স্বাস্থ্যকর কিনা তা নিশ্চিতকরণঃ জীবাণুনাশক দিয়ে ডেস্ক ও টেবিলের পৃষ্ঠতল এবং নিত্য ব্যবহার্য বস্তু (যেমন- টেলিফোন, কীবোর্ড) নিয়মিত মুছতে হবে। কারন পৃষ্ঠতলে থাকা জীবাণু দ্বারা সহজে সংক্রমণের সম্ভাবনা থাকে।
- কর্মচারী, ঠিকাদার এবং গ্রাহকদের নিয়মিত এবং যথাযথভাবে হাত ধোয়ার অভ্যাস করানোঃ সাবান-পানি দিয়ে হাত ধোয়া, কেননা সাবান দিয়ে হাত পরিষ্কার করলে ভাইরাস ধ্বংস হয় এবং কোভিড-১৯ এর বিস্তারে বাধা সৃষ্টি হয়।

- কর্মক্ষেত্রের প্রবেশপথে বা আশেপাশে সহজে দৃষ্টিগোচর হয় এমন স্থানে হ্যান্ড স্যানিটাইজার রাখার ব্যবস্থা করা।
- সঠিকভাবে হাত ধোয়ার নির্দেশনা সম্বলিত পোস্টার দৃষ্টিগোচর স্থানে প্রদর্শন করা এবং স্থানীয় জনস্বাস্থ্য কর্তৃপক্ষের সাহায্য নিন।
- হাত ধোয়ার ব্যাপারে উৎসাহিত করার জন্য পেশাদার জনস্বাস্থ্য কর্মকর্তার দিকনির্দেশনা, বিভিন্ন সভায় প্রদত্ত সচেতনতামূলক বার্তা এবং ইন্টারনেটে ব্যবহৃত গ্রহনযোগ্য এবং বিশ্বাসযোগ্য তথ্যাদি ব্যবহার করা।
- কর্মী, ঠিকাদার এবং গ্রাহকদের সাবান ও পানি দিয়ে হাত ধোয়ার ব্যবস্থা নিশ্চিত করা।
- কর্মক্ষেত্রে শ্বাস-প্রশ্বাস জনিত স্বাস্থ্যবিধি প্রচার করা-
 - ✓ শ্বাস প্রশ্বাসজনিত পরিচ্ছন্নতার ব্যাপারে পোস্টার প্রদর্শন। কেননা, শ্বাস প্রশ্বাসের পরিচ্ছন্নতা কোভিড-১৯ সংক্রমণ রোধ করে।
 - ✓ শ্বাস প্রশ্বাসজনিত পরিচ্ছন্নতায় উৎসাহিত করার জন্য কর্মক্ষেত্রে পেশাদার জনস্বাস্থ্য কর্মকর্তার দিকনির্দেশনা, বিভিন্ন সভায় প্রদত্ত সচেতনতামূলক বার্তা এবং ইন্টারনেটে ব্যবহৃত গ্রহনযোগ্য এবং বিশ্বাসযোগ্য তথ্যাদি ব্যবহার করা।
 - ✓ কর্মস্থলে কর্মচারীদের বিশেষ করে যাদের সর্দি বা কাশি আছে তাদের জন্য ফেস মাস্ক/কাগজের টিস্যু/বুমাল সংজ্ঞালতা করা ও তাদের ব্যবহৃত ফেস মাস্ক/কাগজের টিস্যু/বুমালের যথাযথ ব্যবস্থাপনা এবং ধ্বংস করা নিশ্চিত করা।
- জরুরী পেশাদারী কাজে ভ্রমণে যাওয়ার আগে কর্মচারী এবং ঠিকাদারদের “ভ্রমণ সম্পর্কিত জাতীয় নির্দেশনা” জেনে নেওয়ার পরামর্শ দেয়া।
- কর্মচারী, ঠিকাদার এবং সেবা গ্রহণকারীদের এই মর্মে অবহিত করা যে, যদি কোনভাবে কোভিড-১৯ তাদের নিজ নিজ এলাকায় ছড়িয়ে পড়তে শুরু করে (হালকা কাশি বা স্রল জর ৯৯ ডিগ্রি ফারেনহাইট বা তার সামান্য বেশি হয়) তাহলে তাদেরকে বাড়িতেই থাকতে হবে বা বাড়িতে থেকেই কাজ করতে হবে। এসময় চিকিৎসকের পরামর্শ অনুযায়ী সাধারণ ঔষধ যেমন প্যারাসিটামল, আইবুপ্রোফেন বা অ্যাসপিরিন ইত্যাদি ঔষধগুলি গ্রহণ করা যেতে পারে।
- যদি কারো কোভিড-১৯ এর খুব সাধারণ লক্ষণও দেখা দেয় তাহলে তাকে অবশ্যই সার্বক্ষণিক ঘরের মধ্যে থাকতে হবে। একথা দৃঢ়ভাবে প্রচার করতে হবে।
- কর্মস্থলে উপরোক্ত বার্তা সম্বলিত পোস্টার প্রদর্শন করুন এবং অন্যান্য মাধ্যমে যেমন স্থানীয় যোগাযোগের চ্যানেলগুলিতে (ক্যাবল অপারেটর/কমিউনিটি রেডিও) প্রচার করুন।
- স্থানীয় জনস্বাস্থ্য কর্তৃপক্ষ কর্তৃক অনুমোদিত এবং প্রতুতকৃত বার্তা প্রচারের সামগ্রীসমূহের ব্যবহার নিশ্চিত করুন।
- সংবেদনশীল এই সময়ে, কর্মীদের অসুস্থতাজনিত ছুটির অনুমোদন নিশ্চিত করতে হবে।

উপরে উল্লেখিত ব্যবস্থা গ্রহণের মাধ্যমে কোভিড-১৯ এর বিস্তার রোধ করা সম্ভব।

২. সভা, সমাবেশ ও জনসমাগমে কোভিড-১৯ এর সম্ভাব্য ঝুঁকিগুলি এড়িয়ে চলার উপায়

সভা এবং সমাবেশ আয়োজকদের কোভিড-১৯ এর সম্ভাব্য ঝুঁকি নিয়ে ভাবতে হবে কারণ-

- সভায় বা সমাবেশে উপস্থিত অনেকেই অজান্তে এই ভাইরাস বহন করতে পারে যার ফলে অন্যরা তাদের সংস্পর্শে এসে কোভিড-১৯ এ সংক্রমিত হতে পারে।
- অধিকাংশ মানুষের জন্য কোভিড-১৯ মারাত্মক না হলেও অনেকের জন্য এটা মারাত্মক ও জীবনঘাতী হতে পারে। প্রতি ৫ জনের ১ জন কোভিড-১৯ আক্রান্ত রোগীর হাসপাতালে চিকিৎসা প্রয়োজন।

কোভিড-১৯ ঝুঁকি প্রতিরোধ বা হ্রাস করার জন্য বিবেচিত মূল বিষয়গুলি নিম্নরূপঃ

ক) সভা বা অনুষ্ঠানের পূর্বে-

- কোন সভা করার পূর্বে সভা স্থানের যথাযথ কর্তৃপক্ষের পরামর্শ মোতাবেক ব্যবস্থা গ্রহণ করা।
- সভা বা অনুষ্ঠানে সংক্রমণ প্রতিরোধের জন্য একটি প্রত্নতি পরিকল্পনা গ্রহণ করা।
- সকলের উপস্থিতিতে সভা বা অনুষ্ঠান আয়োজনের প্রয়োজন কিনা তা বিবেচনা করা। টেলিফোনকোনে বা ইন্টারনেটের মাধ্যমে অনলাইনে সভা আয়োজন করা সম্ভব কিনা তা যাচাই করে দেখা।
- সভা বা অনুষ্ঠানটি ছোট পরিসরে করা যেতে পারে কি না সেটি বিবেচনা করা যাতে লোক সমাগম কম হয়।
- জনস্বাস্থ্য এবং স্বাস্থ্যসেবা কর্তৃপক্ষের সাথে আগেই যোগাযোগ করা এবং তাদের সকল রকম তথ্য দিয়ে সহযোগিতা করা। তাদের পরামর্শ ও সুপারিশ মেনে চলতে হবে।
- সভায় কোভিড-১৯ এর সংক্রমণ প্রতিরোধের যথাযথ ব্যবস্থাপনার নিমিত্তে সকলের জন্যে টিসু, সাবান এবং হ্যান্ড স্যানিটাইজারসহ সকল প্রয়োজনীয় সামগ্রীর পর্যাপ্ত সরবরাহ নিশ্চিত করা। প্রয়োজনে উপকরণগুলোর প্রি-অর্ডার করা।
- স্বাস্থ্যতন্ত্রের সমস্যার উপসর্গ কারো মাঝে দেখা দিলে তার জন্য মেডিক্যাল/সার্জিক্যাল মাস্ক সরবরাহের ব্যবস্থা রাখতে হবে।
- যেখানে কোভিড-১৯ ভাইরাস বিস্তার লাভ করছে সেখানে সক্রিয় পর্যবেক্ষণ নিশ্চিত করতে হবে। সভায় অংশগ্রহণকারীদের আগাম পরামর্শ দিতে হবে যে, যদি তাদের কারো মধ্যে কোভিড-১৯ সংক্রমণের এর কোন লক্ষণ দেখা যায় বা কেউ যদি অসুস্থতা বোধ করেন তাহলে সভায় তাদের উপস্থিতি হওয়া কাম্য নয়।
- সভা/ অনুষ্ঠানের আয়োজক অবশ্যই অংশগ্রহণকারী, খাবার পরিবাহনকারী এবং দর্শকদের মোবাইল/ টেলিফোন নম্বর, ই-মেইল ও তাদের বাসস্থানের বিস্তারিত তথ্য সংগ্রহ করবেন। যদি কোন অংশগ্রহণকারী সন্দেহজনক সংক্রামক ব্যাধিতে আক্রান্ত হয়ে থাকেন তাহলে তার সকল তথ্য স্থানীয় জনস্বাস্থ্য কর্তৃপক্ষকে সরবরাহ করতে হবে এবং তথ্য প্রদান নিশ্চিত করবেন। কোন অংশগ্রহণকারী তার কোন তথ্য স্থানীয় জনস্বাস্থ্য কর্তৃপক্ষকে প্রদানে অস্বীকৃতি জানালে তিনি ঐ অনুষ্ঠান বা সভায় অংশগ্রহণ করতে পারবে না।
- সভায় অংশগ্রহণকারী কারো মধ্যে কোভিড-১৯ সংক্রান্ত যে কোন ধরনের উপসর্গ (শুকনো কাশি, জ্বর, অসুস্থতা) দেখা দিলে নিম্নোক্ত ব্যবস্থা গ্রহণ করতে হবে-
 - অসুস্থ বোধ করছে বা লক্ষণ রয়েছে এমন ব্যক্তিকে জনসমাগম হতে বিচ্ছিন্ন করে নিরাপদে রাখার জন্য একটি কক্ষ বা অঞ্চল চিহ্নিত করতে হবে।
 - সেখান থেকে অসুস্থ ব্যক্তিকে কিভাবে নিরাপদে স্বাস্থ্যকেন্দ্রে/হাসপাতালে স্থানান্তরিত করা যায় তার পরিকল্পনা থাকতে হবে।
 - যদি সভায় বা অনুষ্ঠানে অংশগ্রহণকারী কোন সদস্য, কর্মী বা পরিষেবা প্রদানকারীর কোভিড-১৯ টেস্টের ফল পজিটিভ হয় সেক্ষেত্রে কি করণীয় তা পূর্বেই ঠিক করে রাখতে হবে।

- কর্মক্ষেত্রের স্বাস্থ্যসেবা প্রদানকারী অথবা জনস্বাস্থ্য কর্তৃপক্ষ অথবা স্বাস্থ্য বিভাগকে গৃহীত সকল পরিকল্পনাগুলো সম্পর্কে পূর্বেই অবহিত করতে হবে।

খ) সভা বা অনুষ্ঠান চলাকালীন সময়ে -

- আয়োজিত সভা বা অনুষ্ঠানে অংশগ্রহণকারীদেরকে মৌখিক বা লিখিত ভাবে কোভিড-১৯ সংক্রান্ত সকল তথ্য প্রদান করতে হবে। অনুষ্ঠানের নিরাপত্তার স্বার্থে আয়োজক কর্তৃক গৃহীত পদক্ষেপ সম্পর্কে অংশগ্রহণকারীদের অবহিত করতে হবে।
- স্পর্শহীন সোধোনের উপায়গুলি প্রচার ও অনুশীলন করতে হবে এবং অন্যের সংস্পর্শ যথাসম্ভব পরিহার করতে হবে।
- সভায় অংশগ্রহণকারীদের নিয়মিত হাত ধোয়া বা হ্যান্ড রাব বা অ্যালকোহল সমৃদ্ধ হ্যান্ড-স্যানিটাইজার ব্যবহারে উৎসাহিত করতে হবে।
- অংশগ্রহণকারীরা যেন হাঁচি বা কাশি দেয়ার সময় টিস্যু ব্যবহার করে অথবা কনুইয়ের ভাঁজে হাঁচি-কাশি দেয় সে বিষয়ে বারবার অবহিত করতে হবে এবং পরবর্তীতে সেই টিস্যু বা কাপড় যেন ঢাকনা যুক্ত পাত্রে ফেলে দিতে পারে সেই ব্যবস্থা করতে হবে।
- জ্বরুরি অবস্থায় যোগাযোগের জন্য অংশগ্রহণকারীদের একটি ঠিকানা অথবা হটলাইন নম্বর সরবরাহ করতে হবে যাতে তারা পরামর্শের জন্য যোগাযোগ করতে পারে বা কোন তথ্য দিতে পারে।
- অনুষ্ঠানের ডেনুটিতে সহজে দৃশ্যমান হয় এমন একাধিক আয়তায় অ্যালকোহল সমৃদ্ধ স্যানিটাইজার বা হ্যান্ড রাব রাখার ব্যবস্থা করতে হবে।
- আসনগুলো এমনভাবে সাজাতে হবে যাতে অংশগ্রহণকারীরা পরস্পরের থেকে কমপক্ষে এক মিটার দূরে অবস্থান করতে পারে।
- পর্যাপ্ত বাতাস চলাচলের সুব্যবস্থা নিশ্চিত করার জন্য যখনই সম্ভব ডেনুর জানালা এবং দরজা খুলে রাখতে হবে।
- যদি কেউ অসুস্থতা অনুভব করে তবে পূর্বপরিকল্পিত প্রকৃতি অনুসরণ করুন বা জ্বরুরি নাথারে যোগাযোগ করুন।
- সভাস্থলের আঞ্চলিক পরিস্থিতি বা অংশগ্রহণকারীদের সাম্প্রতিক ভ্রমণের উপর নির্ভর করে অসুস্থতাবোধ করা ব্যক্তিকে একটি সম্পূর্ণ বিচ্ছিন্ন কক্ষে রাখতে হবে। তাকে একটি মাস্ক সরবরাহ করুন যাতে বাড়ি ফিরাতে পথের অন্য কাউকে সংক্রমিত না করে। অন্যথায় পূর্বনির্ধারিত সনাক্তকরণ কেন্দ্রে নিয়ে যান।
- সকল অংশগ্রহণকারীকে তাদের সহযোগিতার জন্য ধন্যবাদ জ্ঞাপন করতে হবে।

গ) সভা বা অনুষ্ঠান পরবর্তী করণীয় -

- কমপক্ষে এক মাসের জন্য সমস্ত অংশগ্রহণকারীদের নাম এবং যোগাযোগের ঠিকানা সংগ্রহে রাখুন। যাতে অনুষ্ঠান পরবর্তীতে অসুস্থ হয়ে পড়া যে কোন অংশগ্রহণকারীকে জনস্বাস্থ্য কর্তৃপক্ষ সহজেই খুঁজে বের করতে পারে।
- যদি সভা বা অনুষ্ঠানে কোন সন্দেহভাজন কোভিড-১৯ রোগীকে পাওয়া যায় তবে তাকে আলাদা করতে হবে। অন্যান্য অংশগ্রহণকারীদের এ বিষয়ে জানাতে হবে এবং তাদেরকে পরবর্তী ১৪ দিন পর্যন্ত কোন ধরনের লক্ষণ দেখা যায় কিনা তা প্রতিদিন পর্যবেক্ষণ করার ও দিনে দু'বার করে দেহের তাপমাত্রা পরিমাপের পরামর্শ দিতে হবে।

- যদি তাদের কারো হালকা কাশি বা জ্বর (যেমন ৩৭.৩ ডিগ্রি সেন্টিগ্রেড/ ৯৯.২ ডিগ্রী ফারেনহাইট বা তার বেশি) হয় তবে তাদেরকে বাড়িতে থাকা এবং পরিবার হতে সাময়িকভাবে বিচ্ছিন্ন থাকার পরামর্শকরণে হবে। এর অর্থ হল পরিবারের সদস্যসহ অন্যান্য ব্যক্তিবর্গের সাথে ঘনিষ্ঠ যোগাযোগ (কমপক্ষে ১ মিটার দূরত্ব) এড়িয়ে চলতে হবে।
- স্থানীয় জনস্বাস্থ্য কর্তৃপক্ষকে সভায় অংশগ্রহণকারীদের সাম্প্রতিক ভ্রমণ এবং উপসর্গের বিশদ তথ্য প্রদান করতে হবে।
- সকল অংশগ্রহণকারীকে তাদের সহযোগিতার জন্য ধন্যবাদ জ্ঞাপন করতে হবে।

৩. কর্তৃপক্ষ ও কর্মীগণের ভ্রমণকালীন সময়ে সাবধানতাঃ

ক) ভ্রমণের আগে-

- কোভিড-১৯ সংক্রমিত এলাকার সর্বশেষ পরিস্থিতি সম্পর্কে সংশ্লিষ্ট সংস্থার কর্মকর্তা এবং কর্মচারীদের অবশ্যই জেনে নিতে হবে।
- সর্বশেষ তথ্যের ভিত্তিতে সংস্থার কর্মকর্তা-কর্মচারীদের আসন্ন ভ্রমণ পরিকল্পনা সম্পর্কিত সুযোগ সুবিধা এবং ঝুঁকিগুলো মূল্যায়ন করতে হবে।
- কোভিড-১৯ ছড়িয়ে পড়া এলাকায় অসুস্থ এবং ঝুঁকিতে থাকা কর্মচারীদের প্রেরণ করা যথাসম্ভব এড়িয়ে চলতে হবে।
- কোভিড-১৯ আক্রান্ত এলাকায় ভ্রমণের পূর্বে সংশ্লিষ্ট কর্মচারীদেরকে কোভিড-১৯ সম্পর্কে বিজ্ঞ এবং উপযুক্ত কোন ব্যক্তি (যেমন- সংস্থার স্বাস্থ্যসেবা প্রদানকারী, স্থানীয় জনস্বাস্থ্য কর্তৃপক্ষ) দ্বারা ঐ স্থানের সুযোগ সুবিধা সম্পর্কে অবহিত করতে হবে।
- ভ্রমণ করতে যাওয়া কর্মচারীদের হ্যান্ড রাব / হ্যান্ড স্যানিটাইজার এর ছোট বোতল (১০০ মিলি এর নীচে) সরবরাহ করতে হবে যাতে তারা নিয়মিত হাত পরিষ্কার রাখতে পারে।

খ) ভ্রমণের সময়:

- বারবার হাত ধোয়ার বিষয়ে উৎসাহিত করতে হবে এবং হাঁচি-কাশি আছে এমন লোকদের কাছ থেকে কমপক্ষে এক মিটার/তিন ফুটের অধিক দূরে থাকতে সংশ্লিষ্ট কর্মকর্তা-কর্মচারীদের নির্দেশ দিতে হবে।
- ভ্রমণের সময় কর্মচারীদের কেউ অসুস্থ বোধ করলে তার জন্য করণীয় এবং কার সাথে যোগাযোগ করবেন তা জানিয়ে দিতে হবে।
- কর্মকর্তা-কর্মচারীরা যেখানে ভ্রমণ করবেন সেখানকার স্থানীয় কর্তৃপক্ষের নির্দেশাবলী মেনে সঠিকভাবে মেনে চলে সেটা নিশ্চিত করতে হবে যেমন- যদি স্থানীয় কর্তৃপক্ষ তাকে কোন জায়গায় যেতে নিষেধ করেন তাহলে সেখানে না যাওয়া। কর্মকর্তা-কর্মচারীদের স্থানীয় ভ্রমণ, চলাচল বা বড় সমাবেশ সম্পর্কিত বিধিনিষেধ মেনে চলতে হবে।

গ) ভ্রমণ থেকে ফিরে আসলে:

- কোভিড-১৯ ছড়িয়ে পড়া এলাকা থেকে ফিরে আসা কর্মচারীদের কোভিড-১৯ এর উপসর্গ পর্যবেক্ষণের জন্য ১৪ দিনের নজরদারিতে (কোয়ারেন্টাইনে) রাখতে হবে। তাদের শরীরের তাপমাত্রা দিনে দুবার করে মাপতে হবে। এসময় তারা বাড়িতেই অবস্থান করবে।

- যদি তাদের হালকা কাশি বা সামান্য জ্বর হয়ে থাকে (যেমন- তাপমাত্রা ৯৯.২ ডিগ্রি ফারেনহাইট বা তার বেশি) তবে তাদের বাড়িতে থাকা পরিবারের সদস্যসহ অন্যান্য লোক হতে বিচ্ছিন্ন হতে হবে। এর অর্থ পরিবারসহ অন্যান্য লোকের সংস্পর্শ এড়িয়ে চলতে হবে (কমপক্ষে এক মিটার দূরত্ব বজায় রাখতে হবে)।
- টেলিফোনের মাধ্যমে স্বাস্থ্যসেবা প্রদানকারী বা স্থানীয় জনস্বাস্থ্য বিভাগকে তাদের সাম্প্রতিক ভ্রমণ এবং রোগের লক্ষণগুলি সম্পর্কে বিশদ তথ্য প্রদান করতে হবে।

৪. কোভিড-১৯ ছড়িয়ে পড়লে কর্মক্ষেত্রে প্রত্যুত্তরকরণঃ

কর্মক্ষেত্রে কোন কোভিড-১৯ এ আক্রান্ত সন্দেহভাজন ব্যক্তি অসুস্থ হয়ে পড়লে কি করণীয় তার একটি পরিকল্পনা তৈরি করতে হবে।

• কর্মস্থলে-

- ✓ অসুস্থ ব্যক্তিকে এমন কোন স্থানে রাখতে হবে যেখানে তারা অন্যদের থেকে বিচ্ছিন্ন (Isolated) থাকবে। সেই সাথে অসুস্থ ব্যক্তির সাথে যথাসম্ভব কম সংখ্যক মানুষ যেন যোগাযোগ করে নিশ্চিত করতে হবে এবং স্থানীয় স্বাস্থ্যসেবা প্রদানকারী কর্তৃপক্ষের সাথে যোগাযোগ করতে হবে।
- ✓ কর্মস্থলে অন্যান্য ঝুঁকিপূর্ণ ব্যক্তিদের কীভাবে চিহ্নিত করা যায় তা বিবেচনা করতে হবে। লক্ষ্য রাখতে হবে যেন কেউ নিগ্রহ বা বৈষম্যের শিকার না হয়। সম্প্রতি কোভিড-১৯ আক্রান্ত অঞ্চল ভ্রমণ করেছেন এমন কর্মীদের মধ্যে যারা অন্যান্য গুরুতর অসুস্থ হওয়ার ঝুঁকিতে রয়েছে (যেমন-ডায়াবেটিস, হৃদরোগ, ফুসফুসের রোগ এবং বেশি বয়স) তাদেরকে উচ্চঝুঁকিপূর্ণ হিসেবে অগ্রাধিকার দিতে হবে।
- ✓ কোভিড-১৯ প্রতিরোধে আপনার করা পরিকল্পনাটি সম্পর্কে স্থানীয় জনস্বাস্থ্য কর্তৃপক্ষকে জানাতে হবে এবং প্রয়োজনে তাদের মতামত গ্রহণ করতে হবে।
- দপ্তর বা সংস্থায় নিয়মিত টেলিযোগাযোগের মাধ্যমে কর্ম সম্পাদনের ব্যবস্থা করতে হবে। কোভিড-১৯ এর প্রাদুর্ভাব ঘটলে স্বাস্থ্য কর্তৃপক্ষ গণপরিবহন এবং জনসমাগম এড়াতে জনগণকে পরামর্শ দিতে পারে; সেক্ষেত্রে টেলিযোগাযোগ কর্মীদের নিরাপত্তা নিশ্চিত করার পাশাপাশি ব্যবসা বা কর্মক্ষেত্রে সচল রাখতে সহায়তা করবে।
- কোন সংস্থা বা প্রতিষ্ঠান যে এলাকায় অবস্থিত সেখানে কোভিড-১৯ এর প্রাদুর্ভাব ঘটলে তার জন্য একটি দুর্যোগকালীন ব্যবস্থাপনার পরিকল্পনা তৈরি করতে হবে যা-
 - ✓ প্রনয়নকৃত দুর্যোগকালীন ব্যবস্থাপনার পরিকল্পনা সংশ্লিষ্ট সংস্থাকে সমাজ বা কর্মক্ষেত্রে ছড়িয়ে পড়া কোভিড-১৯ মোকাবেলার সামর্থ্য করবে। অন্যান্য জরুরী স্বাস্থ্যসেবা প্রদানকারী সংস্থার ক্ষেত্রেও এই পরিকল্পনা প্রযোজ্য।
 - ✓ পরিকল্পনাটি এমন হতে হবে যেন অসুস্থতা বা স্থানীয় চলাচলে প্রতিবন্ধকতার জন্য উল্লেখযোগ্য সংখ্যক কর্মী, ঠিকাদার এবং সরবরাহকারীর অনুপস্থিতিতেও প্রতিষ্ঠানটি সচল থাকে।
 - ✓ পরিকল্পনাটির বিষয়ে আপনার কর্মকর্তা-কর্মচারী ও ঠিকাদারদের জানাতে হবে এবং দুর্যোগকালে তারা কি করবে আর কি করবে না তা তাদেরকে অবহিত করতে হবে। এক্ষেত্রে মূল বিষয়গুলোর উপরে অধিক গুরুত্ব আরোপ করতে হবে।
 - ✓ পরিকল্পনাটিতে যেন কোভিড-১৯ আক্রান্তের মানসিক স্বাস্থ্য ও সামাজিক উপর কি প্রভাব পরে সে বিষয়টি আলোচিত হয় তা লক্ষ্য রাখতে হবে। কোভিড-১৯ সম্পর্কিত সঠিক তথ্য প্রাপ্তি এবং সহায়তা প্রদান নিশ্চিত করতে হবে।

- ✓ যেসব ক্ষুদ্র ও মাঝারী ব্যবসা প্রতিষ্ঠানগুলো জরুরীক্ষেত্রে নিজস্ব কর্মীদের স্বাস্থ্য ও কল্যাণের বিষয় নিশ্চিত করতে সমর্থ নয় তাদেরকে আগ্রিম স্থানীয় স্বাস্থ্যসেবা প্রদানকারীদের সাথে যৌথ পারস্পরিক সহযোগিতার পরিকল্পনা করতে হবে।
- ✓ এই পরিকল্পনা তৈরির জন্য স্থানীয় ও জাতীয় পর্যায়ে জনস্বাস্থ্য কর্তৃপক্ষ সহযোগিতা প্রদানেরও প্রত্যাব দিতে পারে।

মনে রাখা জরুরী:

কোভিড-১৯ এর জন্য প্রস্তুত হওয়ার সময় এখনই। এক্ষেত্রে সাধারণ সতর্কতা এবং সঠিক পরিকল্পনা গ্রহণ কোভিড-১৯ প্রতিরোধে বড় ভূমিকা রাখতে পারে। অবিলম্বে নেয়া সঠিক পদক্ষেপ আপনার কর্মক্ষেত্র ও কর্মচারীদের রক্ষা করতে সহায়তা করবে।

ANNEX 10: COVID-19 HEALTH AND SAFETY GUIDANCE FOR THE CONSTRUCTION WORKFORCE

COVID-19 Health and Safety Guidance for the Construction Workforce

INSTRUCTIONS

Contractors are required to ensure health and safety of the workers and employees in accordance with environmental health and safety (EHS) provisions of the contract which is in line with ADB SPS 2009 and Bangladesh Labor Law 2006 (Chapter VIII). A supplementary EHS guidelines was prepared to ensure that workers and employees are safe from Pandemic COVID-19 infection while working at the construction sites. This guideline should be used as a supplement to the project's Environmental Health and Safety (EHS) guidelines for the workers. Contractors are encouraged to prepare a site-specific Environmental Health and Safety (EHS) guidelines for reopening the sites and mobilizing labor and resources and get it approved by Executing Agency. The EHS guidelines and COVID-19 EHS guidelines should be available at worksite all the time with no exception.

Prerequisites for Reopening Worksite

1. Consider reopening at limited scale by identifying and engaging essential labor force
2. Avoid worker intensive works as much as possible; encourage use of equipment
3. Engage fulltime EHS professional to oversee the implementation of EHS guidelines
4. Engage a medical professional to prepare health record of the workers and daily health checkup
5. Ensure coverall Personal Protective Equipment (PPE) for medical professional
6. Prepare a list of equipment and vehicles to be used frequently and ensure routine disinfection
7. Make available thermometer, soap, hand sanitizer, disinfectant, and PPE (mask, gloves, boot) at worksite and camp
8. Place adequate number of washbasins, disinfectant tub, dispenser for sanitizer
9. Establish electronic payment system (e.g., BKash, Nagad, Rocket) to pay the daily wage
10. Follow the guidance as provided below.



Locate the closest medical facility equipped with COVID-19 and contact them.



Place washbasins and disinfectant tub for shoes.



Engage EHS professional. Engage Medical professional (fulltime/ part-time).



Place a few COVID-19 signed covered trash bin for disposal of used PPEs.



Supply soap and sanitizer to labor and staff for after office for disinfection.

Worksite Entrance Protocol



Everyone entering the worksite must wear a mask and gloves.



During worksite entry que, maintain physical distance of minimum 1m (3ft).



Every personnel should wash their hands with soap for 20 seconds. Display hand washing protocol at entrance.



Spray bottom of shoes of every personnel entering worksite/campsite with disinfectant. Disinfect all vehicles entering site.



use thermometer gun to check temperature. If body temperature found > 37°C send to the designated medical facility.

Worksite Management



Frequently clean and disinfect highly used tools, machineries and surfaces (e.g. tables, toilets) by workers.



Mandatory morning briefing on COVID awareness at site maintaining physical distance.




Use alcohol-based wipe to clean tools, equipment, vehicle before and after use.



Discourage gathering at site. Discourage unnecessary entrance and exit at site.

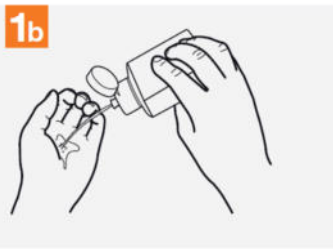
How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

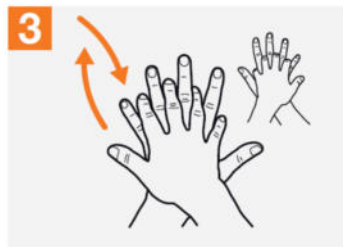
 **Duration of the entire procedure: 20-30 seconds**



Apply a palmful of the product in a cupped hand, covering all surfaces;



Rub hands palm to palm;



Right palm over left dorsum with interlaced fingers and vice versa;



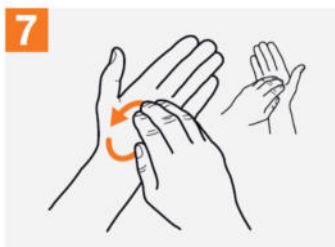
Palm to palm with fingers interlaced;



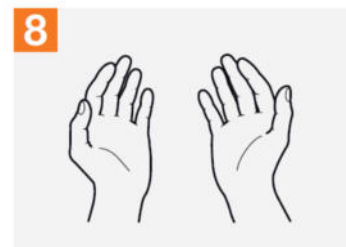
Backs of fingers to opposing palms with fingers interlocked;



Rotational rubbing of left thumb clasped in right palm and vice versa;



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



Once dry, your hands are safe.



World Health Organization

Patient Safety

A World Alliance for Safer Health Care

SAVE LIVES

Clean Your Hands

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Together we can help **stop** **COVID -19** and stay healthy

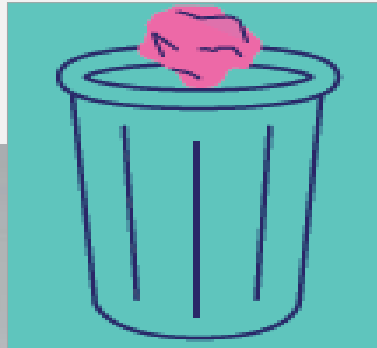
Cover your nose while
coughing or sneezing



Wash your hands with
soap for 20 sec



Use wastepaper basket
more often!



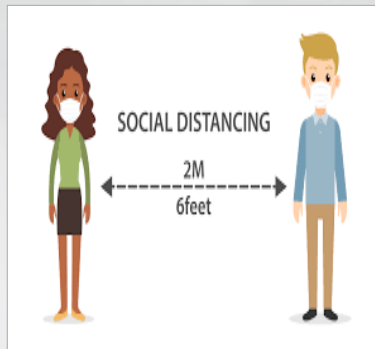
Disinfect bottom of your
shoes



Disinfect yours tools
frequentlv



Maintain at least 6ft
distance from each other



ANNEX 11: COVID-19 HEALTH AND SAFETY GUIDANCE FOR THE CONSTRUCTION WORKFORCE

COVID-19 Health and Safety Guidance for the Construction Workforce

Section 1: Pre-requisite for reopening/opening worksite/campsite:

USE OF THIS DOCUMENT

This document should be used as a supplement to the Environmental Health and Safety (EHS) Manual for the workers. Make all the documents available at site all the time. Executing Agencies (EAs) are responsible for providing both documents to the contractors. Contractors should provide both documents at site. The current document should be used in conjunction with ESH manual. Consider this document as 'live document' which should be updated as new information available. A site-specific version of this document should be adopted for specific project sites.

1. Plan to open/reopen worksite at limited scale (i.e. only essential works at worksite). Map essential/unavoidable works that must be attended at this moment. Identify and engage essential labor force initially. Increase labor force step by step as necessary. Do not engage labor until necessary preparation is done as stipulated in the next paragraphs.
2. Locate the closest medical establishment equipped with COVID -19 response facilities. Establish contact with the medical facility and make agreements with them for cases of potential COVID patient from the work site.
3. Engage a full time EHS professional at site. Also engage a part-time/fulltime medical professional based on the workforce and project size/type.
4. Prepare list of potential workforce/labors. With the help of the EHS/medical professional prepare health records of the labors to be engaged. Seek assistance from registered medical centers if required. Keep the record at site office.
5. Purchase thermometer gun, soap, hand sanitizer, disinfectants and PPEs (mask, hand gloves, hard shoes etc.) and keep it at worksite office. Disinfectants can be diluted bleaching power as directed by Environmental Protection Agency (EPA).
6. Establish site entrance protocol as depicted in **Section 2** below. Redesign the site safety notices/signboards/protocol according to the guidelines provided in this document.
7. Arrange washbasin, soap and clean water at the entrance of every worksite/campsite. Also keep either a disinfectant tub for shoes or keep disinfectant spray that must be sprayed under the boots/hard shoes of the persons entering worksite. Put signboard/poster in front of the washbasin instructing the workers/staff/site visitors to wash both hands for 20 seconds. The board/poster should also display proper hand washing techniques as per WHO guidelines.

8. Provide every personnel working in the site with mask, hand gloves and hard shoes for their personal use. Strictly follow the HSE manual at site. The contractor must have a copy of the HSE manual at site. For assistance contact with relevant EAs.
9. Identify and note a list of commonly used machines/tools and surfaces (e.g. tables, doorknobs, handrail etc.) by workers and camp site dwellers.
10. Make arrangements of electronic payment system affordable for the workers (e.g. bKash, Nogod, Rocket etc.). Update company policies of paid sick leave, medical allowance and medical insurance.

Section 2: Worksite entrance protocol

1. Everyone entering the worksite must wear a mask, gloves and hard shoes. Strictly follow and implement the EHS manual at worksite.
2. At the entrance of the worksite/camp site every personnel must wash their hands for 20 second with maintaining a distance of at least 1m (3 ft) from each other. At this rate 180 person can enter the site in an hour. Depending on this calculation (hourly rate 180pax per washbasin) the contractor can calculate the number of washbasins he/she needs to provide. The wash basins should maintain at least 1.5m distance from each other and the entrance que must maintain 1m distance from each other.
3. Spray bottom of shoes of every personnel entering worksite/campsite with disinfectant or provide shoe storage for worker storing shoe in poly bag before entering the worksite.
4. Procure and use a thermometer gun to check temperature of everyone entering the site. If body temperature is found > 37 degrees, send this person to the designated medical facility for further examination and follow instruction of the medical person in-charge.
5. Prepare disinfectant using ICCDR, B or EPA registered household disinfectant formula (e.g. diluted bleaching powder) and disinfect vehicles upon entry to the worksite/campsite.

Section 3: Daily worksite protocols

6. A designated EHS and medical person should stay all time during work. The EHS/Medical person should also monitor campsite. He/she will be in charge of ensuring physical distances (minimum 1m) among workers, disinfecting surfaces that are commonly used and investigate workers/site personnel health and safety.
7. The designated EHS/medical person (or assistant) must frequently clean and disinfect highly used tools and machineries by workers and surfaces including doorknobs, handrails, toilets, work surfaces, and common areas such as tables, assembly place etc.
8. At the start and end of the day disinfect the total worksite. For campsite, disinfect the total area before the workers/camp dwellers are back from site.
9. Always check if the stock of disinfectant, PPEs, medical supplies are sufficient.
10. Encourage site personnel/camp dwellers to not touch their eyes, mouth or nose if not washed thoroughly with soap recently. Also discourage hand shaking or hugs.
11. Arrange a mandatory site brief on COVID awareness in the morning. The session must be conducted by the EHS/medical professional.
12. Encourage workers/site personnel/camp dwellers to inform the designated ESH/Medical personnel immediately if any colleague starts showing the symptoms of COVID-19.
13. While worksites are commonly well ventilated (if not make sure the work sites are well ventilated), ensure that the camp sites including the rooms designated for the camp dwellers are well ventilated and spacious.
14. Before sharing common tools/machines at worksite, ensure to disinfect.
15. Discourage site personnel to gather and gossip at any time, rather encourage physical distance while chatting/discussing.

16. Keep the day-to-day toolbox meetings as short as possible. Ensure physical distance during meetings.
17. Increase use for internet/phone-based meetings/site visits as much as possible to avoid travelling and physical communication.
18. Restrict worksite personnel to go outside unnecessarily. Also restrict campsite personnel to go outside without any valid cause.
19. If any person related at worksite/campsite fall victim to COVID-19 or being kept isolated for pre-caution, consider paid leave with no exception allowed.

Section 4: Everyday training

20. Train workers on how to properly put on, use/wear, and take off protective clothing and equipment. The on-site EHS/Medical person should be in-charge of these trainings. These trainings must maintain the WHO's social distancing protocol. Make these trainings mandatory at worksites. Provide 10-15 minutes of a workday for such 'training and encouragement' activities.
21. Encourage respiratory etiquette, including covering coughs and sneezes. Train the site personnel as needed.
22. Contact with EAs/ADB designated professional for any help with training material/knowledge/miscellaneous.

Section 5: Campsite management

23. Ensure sufficient stock of soap, sanitizer, washing facility and safe water at the workers' dwelling (both camp site and home). Encourage frequent hand washing and social distancing at campsite.
24. Ensure a separate covered bin in place at every campsite/worker's dwelling for disposal of used PPEs.
25. Check and ensure if camps are well ventilated and protected against heat, cold, damp, noise, fire, and disease-carrying animals.
26. Maintain good housekeeping and social distancing in kitchens, meal rooms, canteens and toilets. Make sure campsites are using sanitary toilets.
27. Ensure personal distance at least 1 meter (3 feet), preferably 2m (6ft) during lunch, dinner and prayer.

Section 6: Knowledge management and documentation

28. During COVID-19 outbreak new information is coming everyday as the science develops. Site management needs to evolve as new information/current protocol emerges. It is difficult for site medical/EHS professional to keep up with the new knowledge/information that is coming every day in absence of fast internet. Hence, he/she should keep in close contact with the designated EAs/ADB professional for updated information and protocol. This documents also needs to be considered as live document and should be updated as necessary.

ANNEX 12: EMERGENCY RESPONSE TEAM (COVID-19)

EMERGENCY/CRISIS RESPONSE TEAM

(Roles and Responsibilities)

A. Overview

An integrated approach to emergency response involves a range of stakeholders, including the primary responder (i.e. the contractor), supervision consultants, the secondary responder (i.e. EA/IAs) and the tertiary responder (i.e. Donor agencies (e.g. ADB)) along with the local authorities, regulatory agencies and the general public. Such a system therefore requires robust processes regarding information dissemination, training, and designation of responsibility, management actions, monitoring, control, and corrective actions. The Emergency/Crisis Response Team therefore needs to be fully equipped and well communicated.

B. Organization chart of crisis response team

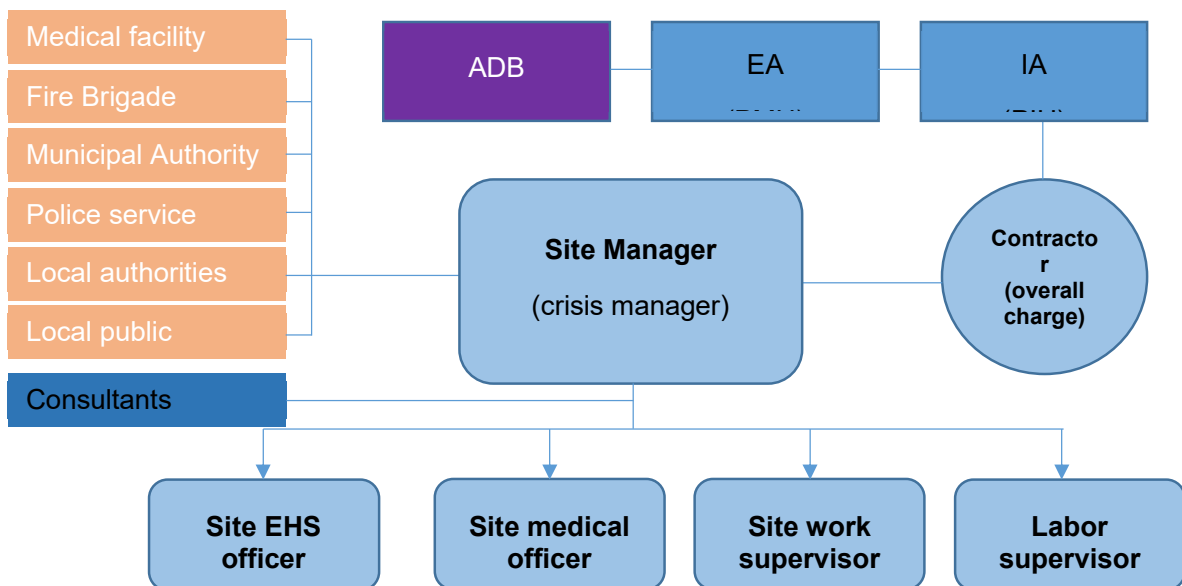


Figure: Organization chart of the crisis management team

Explanation of color code:

Work site body
Executive body
Donor body
External services team
Consultants

Table: Crisis response team

No.	Name	Designation	Mobile no.
1		Site Manager	
2		EHS officer	
3		Medical officer	
4		Worksite supervisor	
5		Labor supervisor	
6		Contractor	
7		Local hospital	
8		Local police station	
9		Local fire brigade	
..			

ANNEX 13: SAMPLE MONITORING SHEET FOR CONTRACTOR**A. Checklist for Environmental Inspection at Work Sites**

Date:

Subproject:	
Inspection Date:	Weather Condition:
Work Status:	

SL.	Issues	Location	Compliance Status ²⁸			Remarks/Notes
			C	PC	NC	
A. Construction Camp and Site Office						
1.	Locate construction camps at environmental and socially acceptable area					
2.	Environment, Health and Safety Officer designated					
3.	Site Specific Environmental Management Plan (SEMP) in site office					
4.	Health and Safety Plan in site office					
5.	First aid box with first aiding agents in site office					
6.	Fire extinguisher/ protective arrangements					
7.	Emergency contacts in case of any incident					
8.	Incident register book					
9.	Complain/ visitor's comment book					
10.	Installation of materials and equipment storage					
11.	Separate storage of fuel and lubricant					
12.	Installation of safety signboards					
13.	Installation of fences to restrict public access into the camp					
B. Labor Shed						
1.	Establishment of labor shed					
2.	Hygiene and sanitation facilities					
3.	Bin for collecting garbage and food waste					
4.	Wastewater disposal system					
5.	Special facilities for female labor (dress-up, breast feeding, etc.)					
6.	Measures against mosquito, insects, snakes etc.					
C. Roads Safety and Traffic Management						
1.	Implementation of traffic management plan approved by PD					
2.	Consult with community on schedule of construction activity					
3.	Observation of traffic regulations, installation of traffic signs along the construction sites					

²⁸ C- Compliance, PC- Partially Compliance, NC- Non Compliance

SL.	Issues	Location	Compliance Status ²⁸			Remarks/Notes
			C	PC	NC	
4.	Install bold diversion signs to be visible even at night, and provide flag persons to warn of dangerous conditions (24 hours/as necessary)					
5.	Provide sufficient lighting at night within and in the vicinity of construction sites					
D. Occupational Health and Safety						
1.	Implementation of H&S plan					
2.	PPEs (safety boots, helmets, gloves, protective clothing, breathing mask, goggles and ear protection)					
3.	Fall prevention and protection measures to prevent the hazard of falling more than 2 meters					
4.	Ensure no involvement of child labour					
5.	Installation of safety signboards at the sites					
6.	Installation of reversing signals on the construction vehicles					
7.	Confined the construction sites to restrict public access					
8.	Accident/ Incident records and steps taken					
9.	Tool box meeting on OHS, PPE and others before starting construction					
E. Environmental Quality						
1.	All site personnel have a basic level of environmental awareness training					
2.	Implementation of waste management plan approved by Consultant/PMU					
3.	Measures for construction waste/ debris management					
4.	Undertake housekeeping at all sites and camps to ensure cleanliness					
5.	Prohibit burning of any kind of waste					
6.	Air quality monitoring and dust controlling measures					
7.	Noise level monitoring and controlling measures					
8.	Water quality monitoring and pollution controlling measures					
9.	Effluents not to be disposed of directly into natural waters, but via settling basins to allow suspended sediment to settle out					
10.	Management of excavated soil					
11.	Restoration of any utility services					
12.	Any private property damage					
F. Protection for Biodiversity						
1.	Awareness raising program for managing biodiversity (flora and fauna)					
2.	Conduct fish survey					
3.	Removal of trees require prior approval of PMU/Consultant/FD etc.					
4.	Supply gas for cooking to avoid tree felling					
G. COVID-19 Response						
18	Are COVID-19 awareness/protocol posters are showing all visible corners of the site?					
19	Entrance protocol (e.g. Is the COVID-19 worksite entrance protocol been followed as stipulated in the COVID -19 response guidance? Are adequate soaps, water					

SL.	Issues	Location	Compliance Status ²⁸			Remarks/Notes
			C	PC	NC	
	has been kept at site entry? Are workers at entrance que using mask, hand gloves and hard shoes? Are disinfectant spray kept at site entry to disinfect underneath the boots of entering persons?)					
20	Vehicle entry protocol (e.g. has the vehicle disinfection protocol has been initiated?)					
21	Social distancing (e.g. are the workers maintaining social distancing all the time?)					
22	Sharing tools/machineries (e.g. are the tools and machineries are wiped to disinfect before sharing/working?)					
23	Disinfecting work area (e.g. is the worksite/ common surfaces, toilets etc. are disinfected before worksite opened in the morning? Has record being kept? Has the worksite been disinfected yesterday after closing for the day?)					
24	Restriction on worksite entry and exit (e.g. has workers being discouraged to travel frequently out of worksite or entering? Has records being kept?)					
25	Stock of disinfectant (e.g. is the stock of disinfectants, soap, PPEs are adequate at worksite?)					

Collected by

Name:
 Designation:
 Signature:
 Date:

Reviewed by

Name:
 Designation:
 Signature:
 Date:

B. Accident/ Incident Investigation Report

Class of Incident		Reported	
<input type="checkbox"/> Injure	<input type="checkbox"/> Property/ Plant Damage	Yes <input type="checkbox"/> No <input type="checkbox"/> Details:	
<input type="checkbox"/> Near Miss	<input type="checkbox"/> Environmental	Further Action Required	
		<input type="checkbox"/> Report to Authorities <input type="checkbox"/> Other	
Details of Incident			
Date of Incident		Time of Incident	am <input type="checkbox"/> pm <input type="checkbox"/>
Witness Name		Witness Contact	
Nature of Incident			
Location of Incident			
Description of Incident			
Details of damage to equipment/property			
Injured Person/s (if applicable)			
Name			
Address			
Date of Birth			
Occupation		Employer	
Referred/transferred to			
Recommended Preventive Action			
Details			
Completed by			
Name		Position	
Signature		Date	

ANNEX 14: SAMPLE SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

I. INTRODUCTION

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

No.	Subproject Name	Status of Subproject				List of Works	Progress of Works
		Design	Pre-Construction	Construction	Operational Phase		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Compliance status with National/ State/ Local statutory environmental requirements

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

Compliance status with environmental loan covenants

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

II. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.

- There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:
 - a. What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries?
 - b. If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;

- c. Adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;
- d. Are there designated areas for concrete works, and re-fueling?
- e. Are there spill kits on site and if there are site procedure for handling emergencies;
- f. Is there any chemical stored on site and what is the storage condition?
- g. Is there any dewatering activities if yes, where is the water being discharged;
- h. How are the stockpiles being managed?
- i. How is solid and liquid waste being handled on site?
- j. Review of the complaint management system;
- k. Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with CEMP/ EMP

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

III. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

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

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

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

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		

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

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dBA) (Government Standard)	
			Day Time	Night Time

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

IV. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

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

V. APPENDIXES

Photos
Summary of consultations
Copies of environmental clearances and permits
Sample of environmental site inspection report
Others