

Initial Environmental Examination

Project No. 52174-001
April 2022

Bangladesh: Emergency Assistance Project
Multipurpose cyclone shelters

DRAFT

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Emergency Assistance Project

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

Initial Environmental Examination

Package

BANGLADESH: Emergency Assistance Project - multipurpose cyclone shelters constructed with sex-disaggregated and disable friendly toilets and designated space for women, including pregnant women and lactating mothers

Package No.: EAP/LGED/2a

Implementing Agency

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

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BAN: EMERGENCY ASSISTANCE PROJECT

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ABBREVIATIONS

ADB	Asian Development Bank
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BREB	Bangladesh Rural Electrification Board
DPHE	Department of Public Health Engineering
EAP	Emergency Assistance Project
EARF	Environmental Assessment and Review Framework
ECA	Environmental Conservation Act
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rules
EIA	Environmental Impact Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ETP	Effluent Treatment Plant
GoB	Government of Bangladesh
H&S	Health and Safety
IEE	Initial Environmental Examination
LGED	Local Government Engineering Certificate
MPEMR	Ministry of Power, Energy and Mineral Resources
NFP	National Forest Policy
NOC	No Objection Certificate
RHD	Roads and Highways
RRRC	The Refugee Relief and Repatriation Commission
SPS	Safeguards Policy Statement
SSC	Site Clearance Certificate
ToR	Terms of Reference
UN	United Nations
US EPA	United States Environmental Protection Agency
WB	World Bank

Executive Summary

1 The project is known as the Emergency Assistance Project (EAP). The project will support the Government of Bangladesh in addressing the immediate and urgent needs of the displaced persons from Myanmar in Cox's bazar District, as identified by the United Nations (UN) in its Joint Response Plan (JRP) (displaced persons). The project will mainly support the improvement of water supply and sanitation, disaster risk management, sustainable energy supply, and access roads. The first phase of the project is under implementation and planned to be completed by 2021. Now ADB is planning to grant additional financing and thus some additional subprojects are under formulation to be accomplished by 2024.

2 The project is aligned with the following impact: social recovery of displaced persons in Teknaf and Ukhiya 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. The additional financing planned for EAP is aimed to for the following impact: 'social recovery of displaced persons in Teknaf and Ukhiya camps accelerated'. The outcome of the additional financing is redefined as 'living conditions and resilience of displaced persons improved: people directly benefited: 855,000 displaced persons. People indirectly benefited: 444,000 host communities.

3 Construction of Ten (10) multipurpose cyclone shelters (school cum cyclone shelters) are being implemented and to be completed by 2021 under first phase of the project. Under additional financing additional 14 multipurpose cyclone shelters are proposed. The cyclone shelters are to be constructed in the existing government primary school (GPS) compounds. The list of the schools is given in Table I-1. Currently the proposed list of 14 schools has been grouped into 4 packages. However, package-wise detail design, orientation of the proposed cyclone shelter, soil testing, topographic survey etc. are yet to be performed (further explained in para 84). Therefore, the entire list is considered as sub-project and dealt with in this report.

4 **Objective:** Environmental Assessment is a prerequisite to any construction project in Bangladesh. This Initial Environmental Examination (IEE) has been prepared based on the Environmental Assessment and Review Framework (EARF) developed by the ADB and endorsed by Bangladesh Government. The IEE follows the guidelines of the Department of Environment (DoE) as required by the Environmental Conservation Rule (ECR) 1997 (amended 2002), essentially aligned with the Safeguard Policy Statement 2009 (SPS 2009) of ADB and will be disclosed in the websites of the ADB and the implementing agencies as per requirement of ADB and GoB. This document shall serve as the base of environmental assessment of the proposed sub-project to be implemented by the executing agency and guideline for environmental management activities on-site.

5 **Limitations:** As described in the earlier paragraph (para 80), the proposed 14 multipurpose cyclone shelters are grouped into 4 packages. However, soils test, topographic survey, load test etc leading towards detail design has not been implemented yet. Therefore, development of package specific IEEs, like the previous packages in Phase I, is not practical. Therefore, this IEE study deals with the expertise opinion on the feasibility of the subproject and its possible implementation arrangements from the perspective of environment and experience gained from construction of last 10 multipurpose cyclone shelters being implemented.

6 This report fulfils the requirements of IEE under the provisions of the ECR 1997 and its amendments. The IEE identifies potential environmental and social impacts and issues associated with

undertaking the proposed project. It provides an outline of the potential positive and negative impacts as a result of the Project and proposes suitable mitigation and management measures.

7 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. IEE commenced with the review of legal requirements for the project. In next step, technical details were collected compiled by a discussion with the implementing agency to reconfirm the technical details.

8 The environmental category of the sub-project is not listed in Schedule – 1 of ECR. However, the construction of School cum cyclone shelter is similar to the Item no. 8 of Schedule 1 of ECR and falls in Orange B. The project has been categorized as B for environment under the ADB's Safeguards Policy Statement 2009 (SPS).

9 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.

10 According to the Design and Monitoring Framework (DMF) prepared for Additional Financing, the subproject title reads "14 multipurpose cyclone shelters constructed with sex-disaggregated and disable friendly toilets and designated space for women, including pregnant women and lactating mothers by 2024". The multipurpose cyclone shelters are to be constructed within the boundaries of selected Government Primary Schools (GPS). However, the assessment of whether the existing building to be demolished and construction taking place over it or new building to be constructed has not been done yet. The Implementation Agency (IA) of this subproject, LGED, has devised the 14 sites into 4 packages.

11 The proposed subproject packages are distributed among Ukhiya and Teknaf upazila of Cox's bazar district, as mentioned earlier. Topographically Ukhiya upzaila is hilly with small perennial streams running from uphill during rains. Brown sandy soil and erosion prone hillocks feature the entire region. On the other hand, Teknaf is close to the Bay of Bengal and gently flat towards the shore. The Naf river features the region's hydrology.

12 **Package 06:** This package includes 03 GPSs for multipurpose cyclone shelters: (i) Rajapalong Mohsen Ali Government Primary School; (ii) Harinmara Government Primary School; and (iii) Haji Guramia Government Primary School (Figure III-4 and Figure III-5). All these GPS are located in Ukhiya upazila. Rajapalong Mohsen Ali GPS is located uphill while Harinmara GPS located downhill (Figure III-2). Rajapalong GPS is adjacent to agricultural field and erosion prone steep hillsides. Siting of Harinmara GPS is vulnerable to landslide/mudslide and sedimentation from downhill rainfall-runoff brining eroded hill materials. Canals or streams draining rainwater is not present, only narrow drains created from gully erosion is visible during rains, which sometimes becomes flooded during heavy downpour. Both sites are featured

with dense hill vegetation with combination of agricultural field. Hazi Guramia GPS is located very close to the Chittagong-Dhaka highway. The location is sited on slightly elevated land which is gently sloped towards southwest (Chittagong-Dhaka highway). An agricultural field is also close to the land. Hill erosion at this site is not quite visible due to its gentle slope however, eroded material at the foothills of the site gives the impressions that erosion is taking place at this site slowly.

13 **Package 07:** This package includes 03 GPS for multipurpose cyclone shelters: (i) Inani Government Primary School; (ii) Imamer Deil Government Primary School; (iii) Saleh Bulbul Government Primary School; and (iv) Morichapalong Government Primary School (Figure III-6 and Figure III-7). All the GPS are located in Ukhiya upazila of Cox's Bazar. Topographically all the project sites are flat, gently sloped towards Bay of Bengal. Inani GPS and Imamer Deil GPS are located just outside the boundary of Inani National Park¹, a protected area² declared by the Government of Bangladesh. Both sites are also located in a narrow strip between the Teknaf hills and Bay of Bengal. On the other hand, Saleh Bulbul GPS is located surrounded by agricultural land and dense forest which is flat in nature. No hydrological feature or canals/stream/gully eroded streams were visible nearby. Moricha palong GPS is located in a suburb area in Ukhiya (Figure III-3), located beside a busy highway on one side and agricultural field on the other side. This location is also flat and close to a local canal nearby. Erosional features were not visible.

14 **Package 08:** This package includes 04 GPs which are located in the Whykong union of Teknaf upazila under Cox's Bazar district. The GPSs are: (i) Kharangkhal Government Primary School; (ii) Noa Bazar Government Primary School; (iii) Naikkhongkhali Government Primary School; and (iv) Ulubonia Jaman-Sakhina Government Primary School. Coordinates of two sites are available: Kharangkhal and Naikkhongkhali. Both sites are located within a kilometer of the Naf river and surrounded by an extensive network of irrigation channels connected to the river. Elevation of the sites are inconsistent, although generally flat which can be attributed to the surrounding agricultural field. Vegetation in both sites are common with both natural and homestead species. However, both sites cramp for space and might need clearing of vegetation or agricultural field (Figure III-8).

15 **Package 09:** This package includes 03 GPSs: (i) Kocchopia Government Primary School; (ii) Shah PorirDwip Government Primary School; and (iii) Rangakhali Government Primary School. The project sites are located in Baharchara, Sabrang, Nhilla unions, respectively, lying within Teknaf upazila. Kocchopia and Sahporir Dwip GPS sites are located on flat lands. Kocchopia GPS is sandwiched between Teknaf hills and Bay of Bengal (Figure III-10). Shahpori Dwip is the remotest island located on the most southeastern tip of Bangladesh, with one side facing the Bay of Bengal and other side facing the Naf river (Figure III-10). A hilly stream, which is unnoticeable during dry season, runs through the Kocchopia site. The stream feeds the agricultural lands nearby. However, no stream was found in the Shahporir dwip. The entire site is a narrow strip (approx. 2km) between Bay of Bengal and Naf river. A large pond is found within 100m of the site. The Rangakhali GPs is located on mostly flat land and very close to the Dhaka-Chittagong highway.

16 The shelters to be constructed with the foundation for at least three stories shall have four rooms and ramp facilities up to the first floor. A reasonably sized room should be kept reserved for the disabled &

¹ National Park means comparatively large area of outstanding scenic and natural beauty with the primary object of providing public education, research and recreation and managed for preservation of natural state of flora and fauna and outstanding charming scenery, and which is an area declared as such through official gazette notification under section 17 of the Wildlife (Conservation and Security) Act, 2012

² "Protected area" means all sanctuaries, national parks, community conservation areas, safari parks, eco-parks, botanical gardens notified under the provisions of sections 13, 17, 18 and 19 under Chapter IV and special biodiversity conservation area established under the provisions of section 22 under Chapter V and traditional heritage and kunjaban declared under section 23 in the Wildlife (Conservation and Security) Act, 2012.

the helpless and the rest of the first floor should be kept open for domestic animals. Additionally, rooms for women including pregnant women and lactating mothers will be reserved.

17 Cyclone shelters proposed in this project are likely to follow Option 1 LGED Proto type Multipurpose Cyclone Shelter. Usually this option follow 3 story building (as mentioned earlier) with ground floor being open for entrance. 1st floor is usually kept open but bounded with wall for shelter of cattles. The 2nd floor is designed to be used for class rooms, teacher's room and separate male female toilets with spaces for pregnant women. These spaces are used as shelter during cyclonic storm events. Figure III-12 presents a general drawing arrangements of ground floor for the proposed Multipurpose cyclone Shelters. Figure III-13 presents the drawing for 1st floor and Figure III-14 presents the drawing for 2nd floor.

18 The proposed cyclone shelters have designated roof plan with sloping and storage tanks. The main staircase connects to the roof and the roof is bounded with wall. The entire cyclone shelter cum school will be plastered with anti-salinity and dam proofing admixture. The roof plan is presented in Figure III-15.

19 **Ukhiya upazila:** Ukhiya Upazila is an Upazila under Cox's Bazar District in the Division of Chittagong, Bangladesh. It is located at 21.2833° North, 92.1000° East. **Teknaf upazila:** Teknaf is an Upazila of Cox's Bazar District in the Division of Chittagong, Bangladesh. It forms the southernmost point in mainland Bangladesh (St. Martin's Island is the southernmost point).

20 Landform and Ecology: Teknaf Peninsula (covering Ukhiya and Teknaf upazila) is one of the longest sandy beach ecosystems (80 km) in the world. It represents a transitional ground for the fauna of the Indo-Himalayan and Indo-Malayan ecological sub-regions. Important habitats at the site include mangrove, mudflats, beaches and sand dunes, canals and lagoons and marine habitat. Mangrove forest occurs in Teknaf peninsula both as natural forest with planted stands and mostly distributed in the inter-tidal zone. The Teknaf peninsula mangroves supports the habitat of 161 different species of fish³. Teknaf reserved forest is one of the oldest reserved forests in Bangladesh.

21 Disasters: 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, flash 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.

22 **Geology:** Cox's Bazar-Teknaf area consists of low coastal plain with dunes and hinders land behind the coast consisting of steep but low cliffs. Several beaches and tidal flats developed in this area. The straight coastline and steep cliffs along this coast suggest that it has developed by faulting and down warping.

23 **Temperature:** Generally, maximum temperature in the year reach between the last week of March and end of May. Temperature data is recorded at station Cox's Bazar. As discussed above, Teknaf is a upazila (subdistrict) of the Cox's Bazar zilla (District). The average maximum temperature in Cox's Bazar is 31.28°C in April and minimum is 22.0°C in January (Data from BMD 2016).

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

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

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

26 Land slide is a major problem in the Cox's Bazaar and Teknaf mountain zones, of Bangladesh by killing people every year besides damaging the properties and blocking the public utilities. Rabby and Li (2019)⁴ found that in Cox's bazar District, 124 landslides occurred during the period of 2001-2017.

27 **Faunal Species:** The influx of population have a significant impact on wildlife by shrinking habitats and disruptions in breeding grounds are affecting nocturnal, crepuscular and diurnal wildlife. Apart from the degradation of forest land along region, 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.

28 **Common birds:** Common bird species noted in the subproject area were Asian crow, myna, cuckoo, kingfisher, pigeon and dove satore, drongo, weaver bird choroi, babui, and dahuk (Figure V-16). The mammals include fox, monkey, mongoose, Bengal monitor, various rodents etc (Khan 2019⁵). There are also several species of frog, lizard and snake. Socio-economic and Socio-cultural Environment.

29 There is evidence of presence of elephants in the raw water source area in Nayapara camp area (Figure V-19). Elephants now-a-days rarely visit the waterbody, but it is likely that they will visit frequently in the future when the waterbody will contain plenty of water. Host and Rohingya communities are encroaching on its habitat in the Teknaf Wildlife Sanctuary, and both resident and migratory elephants are facing a continuous shrinkage of their habitat and food supply.

30 Originally designated as Teknaf game reserve in 1983, in December 2009 the Government of Bangladesh enhanced its status to a Wildlife Sanctuary protecting 11,615 hectares. It is located in Teknaf Upazila of Cox's Bazar District, and comprises a range of steep hills aligned north-south and bordered by the Bay of Bengal to the west and a narrow strip of lowlands and settlements along the Naf river to the south and east, and Inani reserve forest to the north.

31 Following the method given in Methodology (Chapter VI, Section B) an impact matrix was developed for the subproject as shown in Table VI-4 below. This matrix serves the basis of the impact assessment and Environmental management plan (EMP).

⁴ Rabby, YW. And Li, Y. (2019) Landslide Inventory (2001–2017) of Chittagong Hilly Areas, Bangladesh. Data 2020, 5(1), 4; <https://doi.org/10.3390/data5010004>.

⁵ Khan, MMH (2015) Ecological Assessment of Some Selected Sites in Ukhia And Teknaf, Cox's Bazar, Bangladesh, Final Report. TA-9546 BAN: Emergency Assistance Project, Asian Development Bank (ADB)

Table Risk Matrix of evaluation of Identified Environmental Impacts and Risks of the proposed subproject

Potential Impacts	Impact Sign (beneficial = +ve Detrimental = -ve)	Magnitude	Likelihood	Risk Score	Impact size	Impact type	Mitigation possible? (y/n)	Residual impact*
Environmental Impacts During Planning phase (if not well planned)								
Permits, clearances, no objection certificate etc.	-	5	4	20	L	D	Y	N
Impacts of Extreme climatic event	-	3	3	9	L	D	Y	N
Protection of Asian elephant	-	5	1	5	R	I	Y	N
Failure to consider site specific hydrological system	-	5	4	20	L	D	Y	N
Loss of structures and existing utilities	-	5	1	9	L	D	Y	N
Sources of materials	-	3	3	9	L	D	Y	N
EMP implementation training	-	4	4	16	L	D	Y	M
Environmental Impacts During Construction Phase								
Damage to physical and Cultural Heritage	-	1	1	1	L	D	Y	N
Removal of forest area/vegetated area	-	3	4	12	L	D	Y	M
Blockage of streams/change hydrological regime	-	4	4	16	L	D	Y	N
Construction work camps and pollute local waterbody/soils	-	3	3	9	L	D	Y	M
Excavations and soil disturbance	-	3	2	6	L	D	Y	N
Access road construction and disturbance local ecology	-	2	2	4	L	D	Y	N
Pile driving generated noise, vibration and soil/water pollution	-	3	5	15	L	D	Y	N
Waste pollution	-	3	4	12	L	D	Y	N
Water quality	-	3	4	12	L	D	Y	N
Air Quality	-	3	4	12	L	D	Y	N
Noise Level	-	3	5	15	L	D	Y	N
Hampering biodiversity protection in the region	-	3	2	6	L	D	Y	N
Socio-economic disturbance	-	2	2	4	L	D	Y	N
Lack of worker facilities	-	3	5	15	L	D	Y	N
Worker health and safety	-	5	5	25	L	D	Y	N
Community health and safety (including school going children)	-	5	5	25	L	D	Y	N
Site reinstatement	-	4	3	12	L	D	Y	N
Employment Generation and Increase in income	+							
Enhancement of Community Development Service	+							
Skill Enhancement	+							

Potential Impacts	Impact Sign (beneficial = +ve Detrimental = -ve)	Magnitude	Likelihood	Risk Score	Impact size ^a	Impact type ^b	Mitigation possible? (y/n)	Residual impact ^c
Environmental Impacts During O&M Phase								
Hill/soil erosion and downhill siltation	-	3	3	9	L	I	Y	M
Site integrity and security risk (i.e. landslide)	-	3	3	9	L	I	Y	N
Water contamination from water usage	-	2	2	4	L	D	Y	N
Sludge management	-	2	2	4	L	D	Y	N
Biodiversity protection	+							
Occupational health and safety	+							
^a Impact Size: L = Local; R = Regional ^b Impact type: D = Direct; I = Indirect ^c Residual impact: H = High; M = Medium, L = Low, N = None								

Impacts during Planning Phase

(a) Site clearance

32 **Potential impacts:** The entire subproject region (Ukhiya and Teknaf) is home to several PAs (see para 181 - 183). Additionally, law of Bangladesh Government requires that any construction needs permission from local authorities prior starting the construction phase. Failure to obtain necessary consents, permits, NOC's can result in design revisions and/or stoppage of the Works. Failure to obtain No Objection Certificate from the local authority can hamper the entire project, even stop the construction project. In this case, the subproject's land is already available to the authority as it is government owned land.

33 **Mitigation measures:** (i) Obtain Environmental Clearance Certificate (ECC) from Department of Environment and NOC from Forest Department for the land; (ii) acknowledge in writing and provide report on compliance all obtained permits, clearance, NOCs, etc.; (iii) collect permission from local upazila parishad prior construction.

(b) Impact of extreme climatic events

34 **Potential impacts:** Ukhiya is located in the hillock areas and prone to landslides/mudslides and erosion. The region is also vulnerable to flash floods during heavy rainfall events. 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.

35 **Mitigation measures:** (i) Ensure adequate water passage under the structure and shape the associated landscape so that water can be drained quickly from the site; (ii) ensure selection of latest weather coated painting and construction materials so that the structures can withstand heavy rainfall and flooding damage; (iii) ensure flood return period and local waterlogging information being considered in the design phase; (iv) ensure that heavy rainfall events can be converted into safe pathogen free water storage

for long-term use considering the modern Rain Water Harvesting (RWH) technologies; (v) include solar panels and energy saving lights in design.

(c) Asian elephants

36 **Potential impacts:** Rare Asian elephants live in the forest of Ukhiya and Teknaf. Large structure can tract elephants and pose threat to human life and structure alike. Additionally, elephants may see the structures as a threat to their habitat which may place the region to additional vulnerability. However, proposed sites are already used as GPS and no reported treat of elephant attacks are reported.

37 **Mitigation measures:** (i) assessment of whether the access roads to the cyclone shelters cross elephant movement path; (ii) if any elephant crossing path is encountered with, post sign boards, declare the area as silent zone.

(d) Failure to consider local hydrological system

38 **Potential impacts:** The region is hilly and landslide, erosion prone. All the sites except Shah Porir Dwip are located close to local perennial stream. The local streams are used for irrigation and drainage purpose. Failure to consider these streams in the siting and design planning may lead to local waterlogging problems associated with lack of irrigation water in the vicinity. Drawing from the previous projects being implemented in the region, the impact is envisaged to be detrimental. Even such hazard may occur during construction when local topography and hydrological system is tampered with.

39 **Mitigation measures:** (i) detail assessment of the microhydrology 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.

Impacts and mitigation measures during Construction Phase

(a) Impacts from inadequate construction planning

40 **Potential impacts:** Inadequate construction planning may lead to local disasters. For example, improper planning sequence may disrupt the continuing education in the GPSs which are expected to be open during construction, if not planned to demolish.

41 **Mitigation measures:** (i) This is of utmost importance to note that this IEE all the 14 proposed cyclone shelter sites and is not site specific since the detail design has not been on board. This IEE actually indicative of what needs to be considered during design and planning phase. Therefore, the Environmental Management Plan (EMP) stipulated in this EMP needs to take as advice for design and to avoid environmental consequence; (ii) To effectively prevent and minimize impacts that could arise during construction, mitigation measures specified in the EMP need to be incorporated in bid documents and contracts, and each contractor must be required to develop a Contractor Environmental Management Plan (CEMP) for each cyclone shelter site reflecting all measures relevant to the contracted work, for approval before construction begins.

(b) Topsoil loss followed by soil erosion

42 **Potential impacts:** For the school cum cyclone shelters, four parameters have been considered for screening of environmental/ecological impacts during construction phase; these include access road, felling of trees, clearing of vegetation, and impact on aquatic (water) habitat. Significant excavation, cut and

fill is expected. 3-story building will also need concrete mixing, although the extent of time may not exceed couple of weeks. Of the proposed sites package 6, 7 and 9 (Kocchopia GPS only) are located on elevated places or foothills and feature hillside water runoff and associated sedimentation. The hills are formed of sandy rocks with somewhat loose formation. All the mentioned areas are show sedimentation brought by water runoff from eroding hills. Impact on air pollution

43 **Potential impacts:** The potential for dust generation during construction is significant for all project sites, given that the amount of rainfall is less in Cox's Bazar (annual average ~1000mm) compared to the national average (annual average ~2155mm) and brown sandy erosion prone soils. Additionally, possible air pollution from activities involved in cyclone shelter construction is likely to be significant since it is close to sensitive receptor like the school complex. The impact of air pollution is expected to be localized since the vehicles and other machineries are expected to be involved in construction on the roadside. 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 at school sites. Significant amounts of dust may also will arise from the roads that materials haulers are likely to use to access the site.

44 **Mitigation measures:** (i) The first task of the contractors to devise the CEMP as instructed earlier and approved by the Environmental specialist from IA and EHSO (contractor) in charge. They will only approve the CEMP when satisfied with safety measures planned for the sites to protect the children and teachers from air pollution ; (ii) contractors should first demarcate the construction site with high plastic/tin made fence so that heavy dust cannot escape from the site; (iii) contractors should suppress dust at the sites and along any unpaved haul road in the vicinity of schools by lightly spraying the road surface with water as needed. The water spraying needs to be frequent so that no dust is visible near the school; (iii) haul truck loads should be tightly covered with tarpaulins and wetted prior to departure; (iv) to prevent undue emissions impacts, contractors should maintain haul trucks and other equipment to a high standard; (v) any borrow pits used by contractors should be well away from school, residential areas or individual residences; (vi) construction equipment, borrow pits, sharp object, harmful chemicals etc should be put away safely from the reach of the children playing within the boundaries of the schools.

(c) Impact on surface water quality

45 **Potential impacts:** The most schools sites are vulnerable to water pollution or contamination from stockpile materials and construction waste. As stated earlier, most of the stream near the proposed sites are perennial and therefore only visible at rains. Construction of structures and putting construction materials on the path of the streams may block the flow and cause flooding and waterlogging. Moreover, hill runoffs may also bring eroded materials and cause sedimentation problem. As most of the sites are gently sloped towards nearby surface waterbody, any poorly managed site, specially where construction materials not kept safely under Tripoline and silt-curtains, may cause surface water pollution. 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. Mismanagement of sediments/silts may lead to surface water pollution in the entire drainage network. Hammering during sit preparation on the hillside roads can lead to localized landslide or accelerate erosion. At hillside Sections there is a potential of erosion due to rainfall-runoff. Earthwork activities during construction at this point may result in drainage congestion. The effects may be short term severe, but manageable by close monitoring and mitigation measures.

46 **Mitigation measures:** Implement eco-friendly waste management system: practice waste minimization, reuse and segregation; provide adequate waste bins, enforce onsite rule of throwing waste

into bins; provide separate storage area for solid waste and hazardous waste to contain spill area; and implement measures to mitigate sedimentation/siltation. In all sites follow a Removed Soil Management Plan linked to the Excavation Segmentation/Management Plan, specifying, e.g., separate areas for stockpiling "reusable soils" & "unsuitable & excess soils" appropriate stockpiling areas, on flat grounds & away from or not obstructing main surface drainage routes disposal of unsuitable & excess soils as soon as possible hauling trucks to be required appropriate cover & min 2 ft freeboard employ any combination of the following measures to prevent stockpiled soils & fine aggregates from being eroded or carried away by wind and rain: silt fences, sediment traps, sandbags, barrier nets, earth bunds, speed stilling humps along surface drainage routes, limiting stockpile to a maximum height of 2 m, &/or diversion drains to reroute surface runoff away from stockpiles, whichever would be appropriate for the site & site conditions. Monitor immediate low areas or valleys for drainage congestion. If drainage congestion seems eminent, excavate or clear excess sediment/wash materials to clear congestion. Install silt protection curtain/steel nets alongside hill side roads. All other effluents not to be disposed of directly into natural waters, but via settling basins to allow suspended sediment to settle out. All earthworks must to be conducted during dry season/dry spell to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low-lying areas. Garbage disposal service to be provided, Concrete refuse reused or disposed of without habitat loss.

(d) Impact on noise

47 **Potential impacts:** The parameters considered for screening of noise impacts during construction phase of a school cum cyclone shelter include intensity of involvement of heavy machineries, type of heavy machineries, type of activities and proximity of the work area to school compound. Construction of the cyclone shelter involves use of equipment/machines producing significant noise (e.g., generators, pile driver). The proposed sites are in the existing school complex. Therefore, noise pollution would be significant (in the absence of mitigation measures). Similarly, use of stone crushers, excavation works, and movement of vehicle would generate air pollution. Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times.

48 **Mitigation measures:** Planning activities in consultation with Local Authority is suggested so that activities with the greatest potential to generate noise are conducted during periods of the day, which will result in least disturbance. Use of high noise generating equipment shall be stopped during nighttime.

(e) Impact on Vegetation and hill erosion

49 **Potential impacts:** The sites are vegetated. It is likely most sites will require vegetation removal up to some extent. School areas are small and government owned. It is expected that the new construction will be built within the boundary of the schools unless land acquisition is absolutely necessary. However, it has been assured by the IAs that no land acquisition will be done. Therefore, it is expected that vegetation removal will take place within the school boundary. On hilltop or elevated sites, vegetation removal has significant negative impact. The hills are made of sandy rocks and thus erosion prone. Vegetation offer a great resistance to the local erosions and thus protects the hills from landslides. Removal of erosion may trigger local hillsides and erosion and also give increase to local sedimentation problems.

50 **Mitigation measures:** (i) Site location needs to carefully chosen so that the least amount of vegetation have to be removed; (ii) in case of absolute necessity, a plan for replantation with native hill grown species needs to be prepared in advance of vegetation removal, which has to be approved by the environmental specialist of IA and EHSO from the contractor; (iii) in case of slope vegetation removal, a protection plan must be devised in advance in combination with steel net, geo-cell, bush planting, RCC

toes, organic matter reinforcement etc.; (iv) devise site-specific plantation plans before the construction starts and update this EMP, identify how many trees are to be planted along with bushes and grass to project hill sides; chose only native species.

(f) Pollution from solid waste and sewage effluent

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

52 The waste stream during construction at most project sites can be expected to consist of (i) process water; (ii) excavated material not used in backfilling; (iii) packaging and containers; (iv) solid waste generated by workers (food and food packaging); (v) sewage from any temporary on-site toilets; and (vi) grey water from any temporary on-site kitchens and wash-up facilities. Based on the limited scale of the proposed buildings and absence of plans for any batch plants, process water is likely to be quite limited. Construction waste should also be quite limited, due to the relatively small footprint of planned buildings and the sandy local soils, which is likely to be appropriate for backfilling.

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

54 **Mitigation measures:** Receptacles for solid waste should be provided for the use of workers, and their contents should be disposed of in officially sanctioned local landfills. Construction waste should also be disposed of in legal local landfills. Clean construction waste such as excess soil or rubble should be used in landscaping on site or given to landowners and developers seeking fill material. As rudimentary standards prevail at local landfills, the contractors should take every opportunity to reduce the amounts of waste generated, and also collect recyclable material for processing by local operators. Grey water from temporary on-site kitchens and wash-up facilities should be directed to a settling basin, which should be filled in upon site closure. With regards to sewage, connections to local sewerage (or septic system in the case of worker camp) should be installed as the first step in the construction process, and temporary toilets connected to it.

(g) Occupational, Health, and Safety Risks

55 **Potential impacts:** Occupational hazards may arise if not properly managed (risk of fall and electrocution, etc). Increase in dust may cause health problems to workers. Insufficient supply and improper use of personal protective equipment (PPE) and lack of safety procedures may cause injuries or fatal

accidents. For safety, there will be a need to interrupt electricity supply to existing businesses while new poles, conductors and other installations are put in place. This needs to be done in a phased manner allowing small sections of lines to be reconnected to the network, keeping down time to a minimum for existing users. Close contact with persons afflicted with diseases and lack of sanitation in workers camps may also pose health risks. Outbreaks of diseases like diphtheria and measles can be avoided by observing proper sanitation facilities and observing good personal hygiene habits.

56 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.

57 **Mitigation measures:** There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in populous areas. Workers need to be mindful of the occupational hazards, which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. The generic measures suggested are as followed: Comply with requirements of Government of Bangladesh Labour Law of 2006 (amended in 2013) and all applicable laws and standards on workers' health and safety (H&S). Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing H&S training for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.

58 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 COVI-19. The Bengali guideline is attached with this IEE as Annex D. A graphical guideline specially prepared for ADB funded project has been prepared in English language and attached with this IEE as Annex E. Text version of the guideline (in English) is also attached as Annex F. 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 G, Annex H and Annex I as a response to COVID-19.

59 **Institutional responsibility:** The Office Refugee Relief and Repatriation Commissioner (RRRC) is acting as the coordinator on behalf the government to execute all interventions. RRRC and ADB are conducting conduct regular coordination meetings involving all EA/IAs, relevant stakeholders including deputy commissioner (DC), Cox's Bazar, other development partners and agencies. ADB has established extended mission office in Cox's Bazar for close coordination, facilitation of sub-projects development and implementation.

60 The Local Government Engineering Department (LGED) is the EA/IA for the Project. The EA/IA will coordinate environment safeguards planning and implementation and ensure that the environmental assessment and review framework is followed during subproject implementation. There is a safeguards focal person in the EA/IA. The EA/IA is assisted by PMCs. Consultants include an Environment Specialist engaged during project implementation.

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

62 Environmental monitoring and inspection will consist of: (i) environmental impact monitoring; and (ii) EMP performance verification (compliance monitoring). Environmental impact monitoring will assess the degree to which the project environmental management and mitigation measures are successful in avoiding impacts to the biophysical environment (soils, air quality, water quality) and the socio-economic environment (livelihoods, quality of life, occupational health and safety, public health and safety) during the project's construction and operation phases. The PMU will engage an environmental specialist for monitoring and reporting. EMP performance verification will assess the performance of design consultants, contractors, facility operators and PMU in complying with, or adhering to, the EMP and CEMPs, beginning with documentary checks, clearances, and specialized implementation plans that must be obtained or developed before construction can begin. Performance verification monitoring will continue through the construction and operation phases. The PMU will conduct performance verification during the pre-construction and construction phases, after which this will become the responsibility of the IAs. Details of the monitoring requirements and tasks covering all sites and all three project implementation phases are compiled in an Environmental Monitoring Table (EMoT), presented in Table VIII-1.

63 Concise quarterly environmental monitoring reports will be composed by the PMU, based on (i) monthly progress reports submitted by the contractors, which will include monitoring data collected by the site EHSOs; (ii) quarterly impact monitoring reports prepared PMU appointed independent environmental specialist; and (iii) its own performance verification activity. The environmental monitoring reports will reference national standards where appropriate (such as for air quality and noise), as well as benchmarks for project compliance and progress.

64 To ensure proper and timely implementation of the EMP and adherence to the agreed environmental covenants, the PMU will submit to ADB semi-annual environmental monitoring reports, based on quarterly progress reports of the PMU. The reports should confirm the project's compliance with the EMP and identify any environment-related implementation issues and necessary corrective actions and reflect these in a corrective action plan. The performance of the contractors will also be reported on with respect to environmental protection and impact mitigation. The operation and performance of the project GRM, as well as environmental institutional strengthening and training, will be included in the annual environmental progress report as well.

65 **Institutional strengthening:** The capacities of the IA and PMU to coordinate environmental management has been strengthened through engagement of national environmental consultants appointed by both PMU and ADB under the grant implementation consultancy. The PMU will lead the implementation of the EMP assisted by the consultants, with responsibility for such key tasks as ensuring project readiness; reviewing and approving designs and plans; ensuring that environmental information in bid documents and environmental clauses in construction contracts are on target; providing training on environmental mitigation measures; supervising and directing environmental monitoring; and providing guidance on environmental matters whenever needed. The work and leadership of the environmental consultants will strengthen environmental management and supervision capacity of the EA, IAs, PMU and contractors, and ensure the project's full compliance with the ADB's SPS.

66 Cost estimates for mitigation measures, environmental monitoring, public consultations, and capacity building are summarized in Table VIII-5 EMP implantation cost. Contractors will bear the

direct costs of all mitigation measures during construction, which will be included in the tender and contract documents; this includes features built into facility designs in order to prevent environmental impacts from arising.

67 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.

68 Stakeholder consultation: Different stakeholders were consulted to give them the opportunity to express their views and concerns. As part of the process, they were also provided with relevant and sufficient information on the project prior to its start-up. These stakeholders include the central and local authorities, as well as the local population to determine their thoughts, opinions and feedback on the impact of the project. Attendees in the consultation meeting were apprised of the processes through which the project was to proceed toward implementation and the environmental impacts to arise out of such processes along with the steps to be taken toward mitigating the impacts. They were told about the impacts all of which could be easily mitigated. The audience expressed satisfaction of such mitigation measures (Figure X-1). The public consultation was held during field visit of 19 August 2020. Representatives of LGED PMU, PIU were also present in the consultation.

69 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.

70 Conclusion and Recommendations: Major negative impacts like disruption of local microhydrological systems, hill erosion, increasing noise level, air and water pollution at the pre-construction and construction phases should be taken care of by taking proper mitigation measures as suggested in the EMP section of this IEE. This IEE is indicative of suggestions to develop detail design. Once details design is done, the site specific EMPs must be developed and this IEE should be updated accordingly. The Site specific EMPs should be verified by the LGED/ADB appointed Environmental Specialist. The EMP and EMP cost must be included in the bid documents prepared by LGED. The contractor needs to prepare the site-specific CEMP prior construction works starts. The CEMP must be approved by PMU and ADB. LGED should get clearance from DoE before start of the construction. This IEE is prepared in the view that this document belongs to LGED and should be used for obtaining ECC from DoE. Any further instruction conveyed from DoE prior obtaining the ECC, LGED is responsible to update this IEE accordingly. An Environmental Specialist should be appointed by LGED prior construction works to develop and update the EMPs.

I. INTRODUCTION

A. Background and need of the project

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

72 The project is known as the Emergency Assistance Project (EAP). The project will support the Government of Bangladesh in addressing the immediate and urgent needs of the displaced persons from Myanmar in Cox's bazar District, as identified by the United Nations (UN) in its Joint Response Plan (JRP) (displaced persons). The project will mainly support the improvement of water supply and sanitation, disaster risk management, sustainable energy supply, and access roads. The first phase of the project is under implementation and planned to be completed by 2021. Now ADB is planning to grant additional financing and thus some additional subprojects are under formulation to be accomplished by 2024.

B. Impact and outcome

73 The project is aligned with the following impact: social recovery of displaced persons in Teknaf and Ukhiya 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. The additional financing planned for EAP is aimed to for the following impact: 'social recovery of displaced persons in Teknaf and Ukhiya camps accelerated'. The outcome of the additional financing is redefined as 'living conditions and resilience of displaced persons improved: people directly benefited: 855,000 displaced persons. People indirectly benefited: 444,000 host communities.

C. Outputs

74 The EAP has the four outputs while the additional financing phase has five. Some of the outputs have been redefined in the additional financing planned to accomplish by 2024 and shown in the following paragraphs:

75 **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) integrated waste management facility with collection system; and (v) small surface

water treatment plants. The additional financing aims to achieve the following outputs by 2024: (i) People directly benefited: 607,000 displaced persons⁶; (ii) People indirectly benefited: 284,000 host communities⁷.

76 **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. The additional financing aims to achieve the following outputs by 2024: (i) People directly benefited: 128,250 displaced persons⁸; (ii) People indirectly benefited: 36,000 host communities⁹.

77 **Output 3: Energy sources provided.** This includes providing the camp areas with (i) retained heat cookers; (ii) stand-alone solar powered streetlights with solar photovoltaic panels, battery boxes, and mini grid-connected streetlights; and (iii) access to electricity by augmenting substations, distribution lines, and transformers. The additional financing aims to achieve the following outputs by 2024: (i) People directly benefited: 750,000 displaced persons. People indirectly benefited: 200,000¹⁰ host communities.

78 **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. The additional financing aims to achieve the following outputs by 2024: (i) People directly benefited: 256,500 displaced persons; (ii) People indirectly benefited: 407,986 host communities).

79 **Output 5: COVID-19 Response.** Output 5 is related to the additional financing planned to respond to the COVID-19 pandemic situation prevailing in the country. This output consists of the following activities: (i) isolation with institutional quarantine facilities; (ii) diagnostic Facility Upgraded/expanded; (iii) emergency equipment and gender responsive personal protective equipment for managing COVID-19 outbreak procured and distributed to the health facilities; (iv) upgradation of emergency operation center; (v) Training of health; and (vi) hygiene kits distributed to women and girls in camps and host community.

D. Sub-project

80 Construction of Ten (10) multipurpose cyclone shelters (school cum cyclone shelters) are being implemented and to be completed by 2021 under first phase of the project. Under additional financing additional 14 multipurpose cyclone shelters are proposed. The cyclone shelters are to be constructed in the existing government primary school (GPS) compounds. The list of the schools is given in Table I-1. Currently the proposed list of 14 schools has been grouped into 4 packages. However, package-wise detail design, orientation of the proposed cyclone shelter, soil testing, topographic survey etc. are yet to be performed (further explained in para 84). Therefore, the entire list is considered as sub-project and dealt with in this report.

⁶ 71% of the uncovered household as per the JRP under WASH indicator

⁷ Population of Teknaf upazila

⁸ 15% of the camp population are covered through 4 e-vouchers shops

⁹ 1,500 people can be supported by each cyclone shelters. For 24 cyclone shelters, 36,000 people will get shelter

¹⁰ 150,000 houses will be supported by solar powered electricity through nano grid

Table I-1 List of cyclone shelters to be constructed under additional financing

District	Upazila	Proposed School for construction of cyclone shelter
Cox's Bazar	Ukhia Upazila	<ol style="list-style-type: none"> 1. Rajapalong Mohsen Ali Government Primary School (GPS) 2. Harinmara GPS 3. Haji Guramia GPS 4. Inani GPS 5. Imamer Deil GPS 6. Saleh Bulbul GPS 7. Morichapalong GPS
	Teknaf Upazila	<ol style="list-style-type: none"> 8. Kharangkhal GPS 9. Noa Bazar GPS 10. Naikkhongkhali GPS 11. Ulubonia Jaman-Sakhina GPS 12. Kocchopia GPS 13. Shah PorirDwip GPS 14. Rangakhali GPS

81 The sub-project consists of construction of 14 multipurpose cyclone shelters with sex-disaggregated and disable friendly toilets and designated space for women, including pregnant women and lactating mothers by 2024. The cyclone shelters are distributed in two upazilas of Cox's Bazar: Ukhia and Teknaf (Figure I-1).

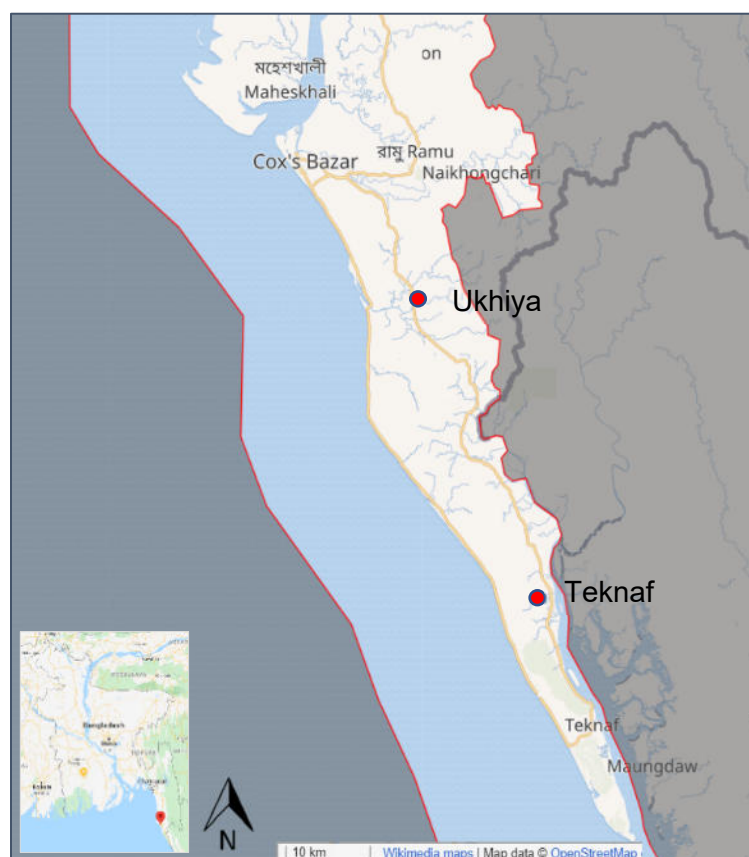


Figure I-1 Location map of the proposed subproject (Cox's Bazar)

E. Objective, purpose and limitations of the report

82 **Objective:** Environmental Assessment is a prerequisite to any construction project in Bangladesh. This Initial Environmental Examination (IEE) has been prepared based on the Environmental Assessment and Review Framework (EARF) developed by the ADB and endorsed by Bangladesh Government. The IEE follows the guidelines of the Department of Environment (DoE) as required by the Environmental Conservation Rule (ECR) 1997 (amended 2002), essentially aligned with the Safeguard Policy Statement 2009 (SPS 2009) of ADB and will be disclosed in the websites of the ADB and the implementing agencies as per requirement of ABD and GoB. This document shall serve as the base of environmental assessment of the proposed sub-project to be implemented by the executing agency and guideline for environmental management activities on-site.

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

84 **Limitations:** As described in the earlier paragraph (para 80), the proposed 14 multipurpose cyclone shelters are grouped into 4 packages. However, soils test, topographic survey, load test etc leading towards detail design has not been implemented yet. Therefore, development of package specific IEEs, like the previous packages in Phase I, is not practical. Therefore, this IEE study deals with the expertise opinion on the feasibility of the subproject and its possible implementation arrangements from the perspective of environment and experience gained from construction of last 10 multipurpose cyclone shelters being implemented. Table I-2 below gives a comparative scenario of availability and lack of information required to develop this IEE.

Table I-2 Availability of information for development of this IEE report

Data available	Data lacks
List of cyclone shelters (14) and their coordinates	Siting and orientation of the proposed cyclone shelters.
Designs/layouts from previous subprojects	Although every design from previous sub-projects vary by dimension, placement, and orientation, site specific design for the proposed cyclone shelters is not available. However, facilities provided at each project site are common and used in the IEE as reference.
	Experience from Phase-I suggest the hydrology of project sites vary widely by topography while ecology is quite similar. Site specific topographic study and hydrological study has not yet been performed due to the preliminary nature of the proposed projects and time constraint.
	Distance between proposed sites and schools, distance and access to toilet and safe water facilities from the proposed site etc. are yet to known make area specific assessment. Exact location of the proposed sites, information of whether demolition required or not etc. are yet to be assessed. During this pandemic condition and given the labour flux for construction, such information can be vital.
Vegetation cover in and around the site known. Erosion prone areas are known. Land slide areas are known.	Information of tree cutting is not available, since orientation and dimensions of the structures are not known. Given the erosion prone nature of the project sites, especially Ukhiya, information of tree removal areas vital.

85 This IEE is indicative in nature given the information lacks as illustrated in Table I-2 and thus intend to be used as environmental advice to the detail design consultants. Once the detail design is done, this IEE needs to be updated with site specific information, environmental plan and mitigation measures.

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

87 Further to the reference of Paragraph 85, this IEE report aims to provide guidance on safeguard screening, assessment, institutional arrangement and process to be followed for components of the project, where design takes place after Boards approval. This IEE:

- (i) describes the project and its components;
- (ii) explains the general anticipated environmental impacts and mitigation measures for the subprojects;
- (iii) specifies the requirements that will be followed in relation to screening and categorization, assessment, and planning, including arrangements for meaningful consultation with affected people and other stakeholders and information disclosure requirements;
- (iv) assesses the capability of the project proponents to implement national laws and ADB's requirements, and identifies needs for capacity building;
- (v) specifies implementation procedures, institutional arrangements, and capacity development requirements; and
- (vi) specifies monitoring and reporting requirements. Moreover, this IEE is to ensure, in line with ADB EARF, that the sub-project, in the entirety of its project cycle, will not deteriorate or interfere with the environmental sensitivity of the project area, but rather improve environmental quality.

F. Scope of this report

88 This report fulfils the requirements of IEE under the provisions of the ECR 1997 and its amendments. The IEE identifies potential environmental and social impacts and issues associated with undertaking the proposed project. It provides an outline of the potential positive and negative impacts as a result of the Project and proposes suitable mitigation and management measures.

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

90 In general, this IEE intends to:

- Examine and describe the existing status of the various ecological, physical and human related components surrounding the project area;

- Predict the potential significant impacts of the project on the surrounding environment during the pre-construction, construction, operations and maintenance stages and recommend appropriate mitigation and abatement measures; and
- Identify residual impacts of the project and recommend appropriate short-term and long-term management plans.

G. Approach and methodology

91 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. IEE commenced with the review of legal requirements for the project. In next step, technical details were collected compiled by a discussion with the implementing agency to reconfirm the technical details.

92 Scoping of issues to be addressed in the IEE was conducted early in the assessment process (i.e. Field visit) to collect the appropriate baseline information so that collected and the IEE report/study can focused on the relevant issues needed. Additional tools and methods used in the IEE has been described in relevant sections.

1. Data sources of IEE

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

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

2. Scoping and gathering baseline data

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

95 The objectives of undertaking the scoping activities were:

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

H. Structure of this report

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

Executive Summary

Chapter 1 Introduction provides the background on the project, purpose of this report, approach and methodology

Chapter 2	Policy, Legal, and Administrative Framework presents a review of relevant national laws and policies, international environmental obligations, and ADB's environmental requirements, procedure of environmental clearance, environmental categorization
Chapter 3	Description of the Project provides a brief description of the Project, the location, size and need, description of project components
Chapter 4	Analysis of Alternatives presents the alternatives considered during the feasibility study in order to arrive at the best option.
Chapter 5	Description of the Baseline Environment includes details on the baseline data for environmental conditions in the project area (current features and conditions, pre-project)
Chapter 6	Anticipated Potential Project Impacts identifies the potential environmental, economic and social impacts from pre-construction, construction, and operation phase.
Chapter 7	Environmental Mitigation and Management Plan
Chapter 8	Environmental Monitoring Program and Institutional Responsibilities outlines the environmental monitoring program, institutional responsibilities including the cost of implementing the EMP
Chapter 9	Grievance Redress Mechanism describes the process of addressing complaints
Chapter 10	Stakeholder Consultation and Information Disclosure discusses the issues raised during the consultations, proposed actions to address them, and the information needed to disclose to the public.
Chapter 11	Conclusion and recommendation
Annexes	

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. Introduction

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

B. Environmental Legislation Framework

1. Overview of the project approval process

98 Key legislation governing the environmental approvals process for the proposed Project is the Bangladesh Environmental Conservation Act, 1995 (BECA, 1995)¹¹ and the Environmental Conservation Rules (ECR, 1997)¹²

99 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

100 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

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

- **Project Authorization Letter:** Formal authorization of the Project by the Local Government Engineering Department is required in order for the environmental approvals process to formally commence.
- **No Objection Certificate (NOC):** An NOC must be received from the Deputy Commissioner/upazila parishad 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.

¹¹ The Act was amended by Act Nos 12 of 2000, 9 of 2002, and 50 of 2010.

¹² The ECR was amended in 2002, 2005, 2010 and 2017.

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

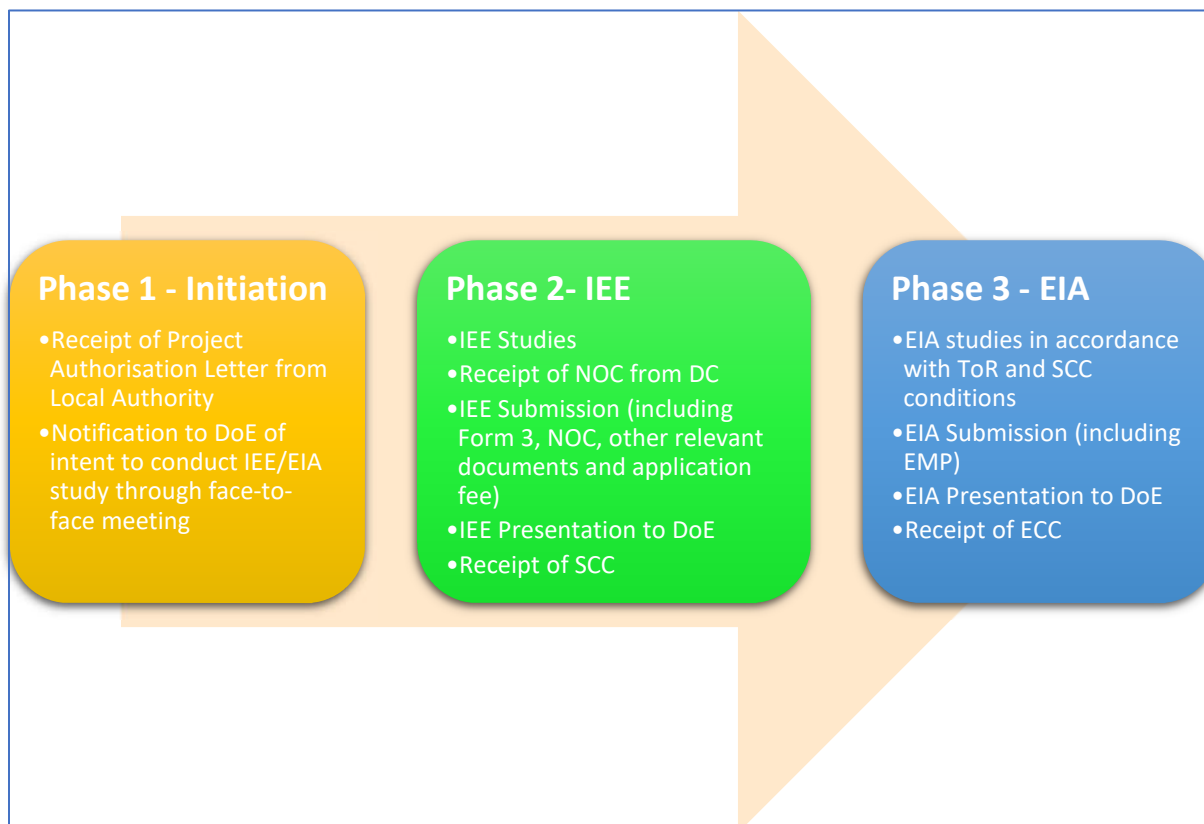


Figure II-1 Environmental approval framework

102 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
Bangladesh Electricity Act (1910) and Regulations	Permission /licence required	Laying down or placement of electricity supply lines.	Rural Electrification Board/Power Development Board

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

Green category projects:

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

Orange-A category projects:

Same requirements as green category projects, plus the following:

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

Orange-B category projects:

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

Red category projects:

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

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

C. National Relevant Policies and Strategies

104 This section summarizes the National Laws and describes the procedure for obtaining environmental permits to allow project implementation. Over the years the Government of Bangladesh has enacted environmental acts, rules, policies and regulation toward imposing restrictions facilitating minimization / mitigation of likely impacts due to development projects. The most important Act is Environmental Conservation Act, 1995 (ECA, 1995) and Environmental Conservation Rules (ECR, 1997).

1. National Environmental Policy 1992

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

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

2. National Water Policy (NWP) 2004

106 The National Water Policy 2004 (NWP) aims for sustainable management of water. The Policy also integrates the environmental impact assessment for water development projects. The policy stresses on issues related to climate change such as:

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

3. National Forest Policy (NFP 1994)

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

4. Bangladesh Climate Change Strategy and Action Plan (BCCSAP 2009)

108 The Bangladesh climate change strategy and action plan were approved in 2009. The climate change plan is built on six pillars namely i) food security, social protection and health; ii) Comprehensive Disaster Management; iii) infrastructure; iv) research and knowledge management; v) Mitigation and low carbon development; and vi) capacity building and institutional. The strategy and action plan emphasize on ensuring existing assets (e.g., coastal and river embankments) are well maintained and fit for purpose and that urgently needed infrastructure is put in place to deal with the likely impacts of climate change. - enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change.

D. Legal Instruments

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

of legal instruments in the form Acts for the protection and conservation of the environment. Table II-2 summarizes the Environmental Legislation applicable to the sub-project.

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	Environment Court Act, 2000 and subsequent amendments in 2003	Establishment of Environment Court for trial of an offence or for compensation under environmental law, such as environment pollution.	Option to affected persons for grievances related to environment safeguards.	Ministry of Environment and Forests, and Climate Change
4	The Forest Act (1927) and Forest (Amendment) Act (2000)	An act to control trespassing, illegal resource extraction and provide a framework for the forestry revenue collection system;	Requires clearances for any project within forest areas and clearances for any felling, extraction, and transport of forest produce.	Department of Forests
5	National Forest Policy (1994)	To conserve existing forests and bring about 20% of the country's land area under the Forestation Programme and increase reserved forests by 10% per year until 2015	Incorporate tree planting in the subproject Clearance for any felling, extraction, and transport of forest produce	Department of Forests
6	The Bangladesh Wildlife (Conservation & Security) Act, 2012	To conserve and protect wildlife in Bangladesh including designation of protected areas. Protection of wildlife is provided with lists of species with four schedules: first, second, third and fourth schedule. The fourth schedule species have the highest level of protection.	Consultation and necessary permits required if the project will pass through the wildlife sanctuaries and other protected areas.	Department of Forests
7	National Safe Drinking Water Supply and Sanitation Policy of 1998	Ensures access to safe water and sanitation services at an affordable cost	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

No.	Environmental Legislation / Act	Objective	Relevance to the Project	Responsible Institution
8	National Water Act 2013	Ensures Bangladesh water sources are free from any type of pollution. Pollution from water in urban outfalls and reservoirs, e.g. lakes, canals, ponds and ditches may result in amenity losses, fisheries depletion, health problems and fish and aquatic species contamination.	Secure clearance certificate on water resource development subprojects	Ministry of Water Resources
9	Wetland Protection Act 2000	Advocates protection against degradation and resuscitation of natural waterbodies such as lakes, ponds, beels ¹³ , 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
10	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 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	Compliance to provisions on employment standards, occupational health and safety, welfare and social protection, labor relations and social dialogue, and enforcement. Prohibition of employment of children and adolescents.	Ministry of Labor and Employment
11	Bangladesh Labor Rules, 2015	Includes rules on registration of laborers, misconduct rules, income and benefits, health and fire safety, factory plan	Contractors to implement occupational health and safety measures Contractor will be liable for compensation for work-related injuries	Department of Labor
12	The Pourashava Act 2009 / Ordinance issued for the amendment of local government (municipality) ordinance, 2009 and 2010; The Pourashava Ordinance, 1977;	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

¹³ 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
	Municipal Administration Ordinance, 1960			
13	Bangladesh Climate Change Strategy and Action Plan of 2009	Enhances the capacity of government ministries, civil society and private sector to meet the challenges of climate change	Integrate adaptation measures for buildings in consideration of extreme climatic events	Ministry of Environment, Forests and Climate Change
14	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
15	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 substance or line crosses in order to avoid electrocution	Ministry of Power, Energy and Mineral Resources
16	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
17	Standing Order on Disaster, 1999 (Updated 2010)	Enhances capacity at all tiers of government administrative and social structures for coping with and recovering from disasters	Geographical information system (GIS) technology will be applied at the planning stage to select location of cyclone shelter considering habitation, communication facilities, distance from the nearest cyclone center, etc Advice from the concerned District Committee should be obtained prior to final decision	Ministry of Disaster Management and Relief

No.	Environmental Legislation / Act	Objective	Relevance to the Project	Responsible Institution
18	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

E. Applicable International Agreements

110 Aside from the legal framework on environment, Bangladesh is also a party to several international conventions, treaties and protocols related to environmental protection. The applicable international conventions, treaties and protocols are described in Table II-3.

Table II-3 Applicable International Conventions, Treaties and Protocols

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

F. Environmental Categorization and standards

1. Environmental Category: Bangladesh

111 For the purpose of issuance of Environmental Clearance Certificate, the industrial units and projects shall, in consideration of their site and impact on the environment, be classified into the following four categories: (a) Green; (b) Orange – A; (c) Orange – B; and (d) Red. The Industries and projects included in the various categories are specified in sub-rule (1) have been described in Schedule – 1. The ECA indicates that all industrial units or projects must obtain a Location Clearance Certificate (LCC) and Environmental Clearance Certificate (ECC) from the Department of Environment (DoE). No industrial unit or project shall be established or undertaken without obtaining environmental clearance from DoE in the manner prescribed by the rules.

112 The environmental category of the sub-project is not listed in Schedule – 1 of ECR. However, the construction of School cum cyclone shelter is similar to the Item no. 8 of Schedule 1 of ECR and falls in Orange B. Table II-4 describes DoE classification for cyclone shelter.

Table II-4 DoE Classification of construction project according to ECR 1997

Sl.No	Components	Items in Schedule-1 of ECR	DOE Classification
1	Hotel, multi-storied commercial and apartment building	No. 8	Orange-B

Source: ECR 1997

G. Relevant Occupational Health and Safety Laws and Rules

113 During construction, the subproject will conform to the occupational and health related rules as outlined in the Table II-5 below.

Table II-5 Occupational and health safety related rules in Bangladesh

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	<ul style="list-style-type: none"> - Compliance to the provisions on employment standards, occupational safety and health, welfare and social protection, labor relations and social dialogue, and enforcement - Prohibition of employment of children and adolescent
The 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 workplace 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.

1. Environmental Category: ADB

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

Category A: Project that is likely to have significant adverse environmental impacts which are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or

facilities subject to physical works. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.

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

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

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

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

H. Institutional Capacity

116 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.

117 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. The project

118 According to the Design and Monitoring Framework (DMF) prepared for Additional Financing, the subproject title reads “14 multipurpose cyclone shelters constructed with sex-disaggregated and disable friendly toilets and designated space for women, including pregnant women and lactating mothers by 2024”. The multipurpose cyclone shelters are to be constructed within the boundaries of selected Government Primary Schools (GPS). However, the assessment of whether the existing building to be demolished and construction taking place over it or new building to be constructed has not been done yet. The Implementation Agency (IA) of this subproject, LGED, has devised the 14 sites into 4 packages as follows (Table III-1):

Table III-1 List proposed packages by LGED under the construction of multipurpose cyclone shelter subprojects

Sl no.	Package no.	List of schools	Upazila	Union	Coordinates
1	P-06	Rajapalong Mohsen Ali Government Primary School	Ukhiya	Raja palong	21.252839, 92.109598
		Harinmara Government Primary School			21.248286, 92.115775
		Haji Guramia Government Primary School		Palong Khali	21.149444, 92.139167
2	P-07	Inani Government Primary School		Jalia Plaong	21.236038, 92.049908
		Imamer Deil Government Primary School			21.146286, 92.077271
		Saleh Bulbul Government Primary School		Holodia Plaong	21.316719, 92.127779
		Morichapalong Government Primary School			21.311327, 92.097221
3	P-08	Kharangkhal Government Primary School	Teknaf	Whykong	21.041513, 92.245770
		Noa Bazar Government Primary School			21.051549, 92.233323
		Naikkhongkhali Government Primary School			21.031992, 92.240707
		Ulubonia Jaman-Sakhina Government Primary School			21.142163, 92.191255
4	P-09	Kocchopia Government Primary School		Baharchhara	20.942108, 92.215709
		Shah Porir Dwip Government Primary School		Sabrang	20.766701, 92.330942
		Rangakhali Government Primary School		Nhilla	21.087302, 92.242219

119 Detailed design will be developed for each proposed cyclone shelter under each package. The packages are distributed in two upazilas of Cox’s Bazar district, namely Ukhiya and Teknaf. The cyclone shelters will be constructed within the boundaries of the GPS listed so that they take place on the government owned land.

B. Study area

120 The proposed subproject packages are distributed among Ukhiya and Teknaf upazila of Cox’s bazar district, as mentioned earlier. Topographically Ukhiya upzaila is hilly with small perennial streams running from uphill during rains. Brown sandy soil and erosion prone hillocks feature the entire region. On

the other hand, Teknaf is close to the Bay of Bengal and gently flat towards the shore. The Naf river features the region's hydrology. All 14 locations which are shown in **Error! Reference source not found.**



Figure III-1 Proposed locations of the cyclone shelters (top) Ukhiya; (bottom) Teknaf

121 The proposed cyclones shelters will be constructed, as described earlier, in two upazilas. Four (04) packages are developed for 14 multipurpose cyclone shelter considering the geographical locations, mostly chosen by nearest neighbor method (Table III-1). The next paragraphs describe the package-wise locations of the proposed sub-project.

122 **Package 06:** This package includes 03 GPSs for multipurpose cyclone shelters: (i) Rajapalong Mohsen Ali Government Primary School; (ii) Harinmara Government Primary School; and (iii) Haji Guramia Government Primary School (Figure III-4 and Figure III-5). All these GPS are located in Ukhiya upazila. Rajapalong Mohsen Ali GPS is located uphill while Harinmara GPS located downhill (Figure III-2). Rajapalong GPS is adjacent to agricultural field and erosion prone steep hillsides. Siting of Harinmara GPS is vulnerable to landslide/mudslide and sedimentation from downhill rainfall-runoff brining eroded hill materials. Canals or streams draining rainwater is not present, only narrow drains created from gully erosion is visible during rains, which sometimes becomes flooded during heavy downpour. Both sites are featured with dense hill vegetation with combination of agricultural field. Hazi Guramia GPS is located very close to the Chittagong-Dhaka highway. The location is sited on slightly elevated land which is gently sloped towards southwest (Chittagong-Dhaka highway). An agricultural field is also close to the land. Hill erosion at this site is not quite visible due to its gentle slope however, eroded material at the foothills of the site gives the impressions that erosion is taking place at this site slowly.



Figure III-2 Siting of the Package-6 GPSs

123 **Package 07:** This package includes 03 GPS for multipurpose cyclone shelters: (i) Inani Government Primary School; (ii) Imamer Deil Government Primary School; (iii) Saleh Bulbul Government Primary School; and (iv) Morichapalong Government Primary School (Figure III-6 and Figure III-7). All the GPS are located in Ukhiya upazila of Cox's Bazar. Topographically all the project sites are flat, gently sloped towards Bay of Bengal. Inani GPS and Imamer Deil GPS are located just outside the boundary of Inani National Park¹⁴, a protected area¹⁵ declared by the Government of Bangladesh. Both sites are also located in a narrow strip between the Teknaf hills and Bay of Bengal. On the other hand, Saleh Bulbul GPS is located surrounded by agricultural land and dense forest which is flat in nature. No hydrological feature or canals/stream/gully eroded streams were visible nearby. Moricha palong GPS is located in a suburb area in Ukhiya (Figure III-3), located beside a busy highway on one side and agricultural field on the other side. This location is also flat and close to a local canal nearby. Erosional features were not visible.



Figure III-3 Siting of the Package-7 GPSs

124 **Package 08:** This package includes 04 GPs which are located in the Whykong union of Teknaf upazila under Cox's Bazar district. The GPSs are: (i) Kharangkhali Government Primary School; (ii) Noa Bazar Government Primary School; (iii) Naikkhongkhali Government Primary School; and (iv) Ulubonia Jaman-Sakhina Government Primary School. Coordinates of two sites are available: Kharangkhali and Naikkhongkhali. Both sites are located within a kilometer of the Naf river and surrounded by an extensive network of irrigation channels connected to the river. Elevation of the sites are inconsistent, although generally flat which can be attributed to the surrounding agricultural field. Vegetation in both sites are common with both natural and homestead species. However, both sites cramp for space and might need clearing of vegetation or agricultural field (Figure III-8 and Figure III-9).

125 **Package 09:** This package includes 03 GPSs: (i) Kocchopia Government Primary School; (ii) Shah PorirDwip Government Primary School; and (iii) Rangakhali Government Primary School. The project sites are located in Baharchara, Sabrang, Nhilla unions, respectively, lying within Teknaf upazila. Kocchopia and Sahporir Dwip GPS sites are located on flat lands. Kocchopia GPS is sandwiched between Teknaf hills and Bay of Bengal (Figure III-10). Shahpori Dwip is the remotest island located on the most southeastern tip of Bangladesh, with one side facing the Bay of Bengal and other side facing the Naf river (Figure III-10 and

¹⁴ National Park means comparatively large area of outstanding scenic and natural beauty with the primary object of providing public education, research and recreation and managed for preservation of natural state of flora and fauna and outstanding charming scenery, and which is an area declared as such through official gazette notification under section 17 of the Wildlife (Conservation and Security) Act, 2012

¹⁵ "Protected area" means all sanctuaries, national parks, community conservation areas, safari parks, eco-parks, botanical gardens notified under the provisions of sections 13, 17, 18 and 19 under Chapter IV and special biodiversity conservation area established under the provisions of section 22 under Chapter V and traditional heritage and kunjaban declared under section 23 in the Wildlife (Conservation and Security) Act, 2012.

Figure III-11). A hilly stream, which is unnoticeable during dry season, runs through the Kocchopia site. The stream feeds the agricultural lands nearby. However, no stream was found in the Shahporir dwip. The entire site is a narrow strip (approx. 2km) between Bay of Bengal and Naf river. A large pond is found within 100m of the site. The Rangakhali GPs is located on mostly flat land and very close to the Dhaka-Chittagong highway.



Figure III-4 Package 06 cyclone shelter siting and physiography, (top) Rajapalong GPS; (bottom) Harinmara GPS.



Figure III-5 Package 06 cyclone shelter siting and physiography, Hazi Guramia GPS

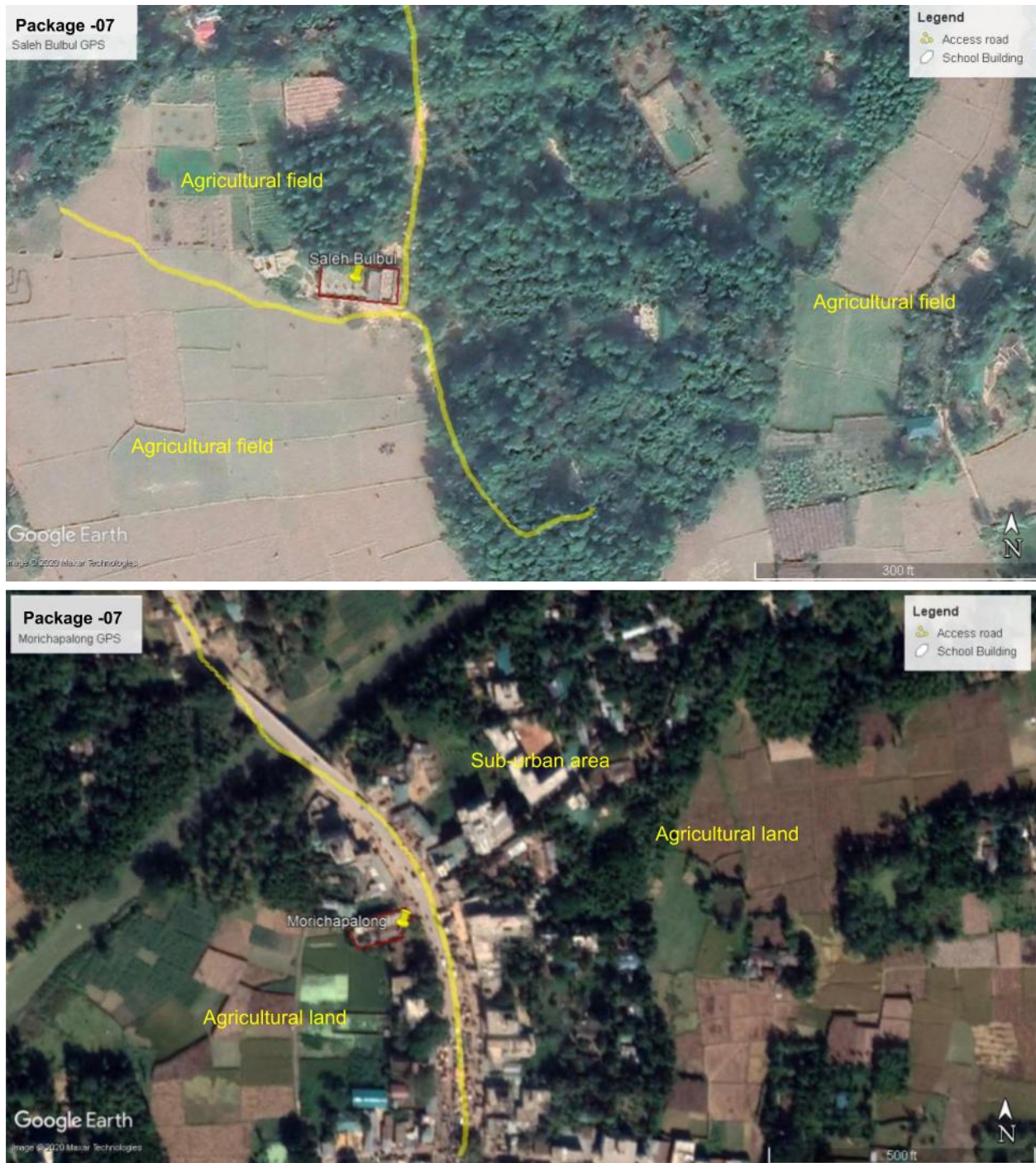


Figure III-6 Package 07 cyclone shelter siting and physiography, (top) Saleh Bulbul GPS; (bottom) Moricha Palong GPS.



Figure III-7 Package 07 cyclone shelter siting and physiography, (top) Inani GPS; (bottom) Imamer Deil GPS.

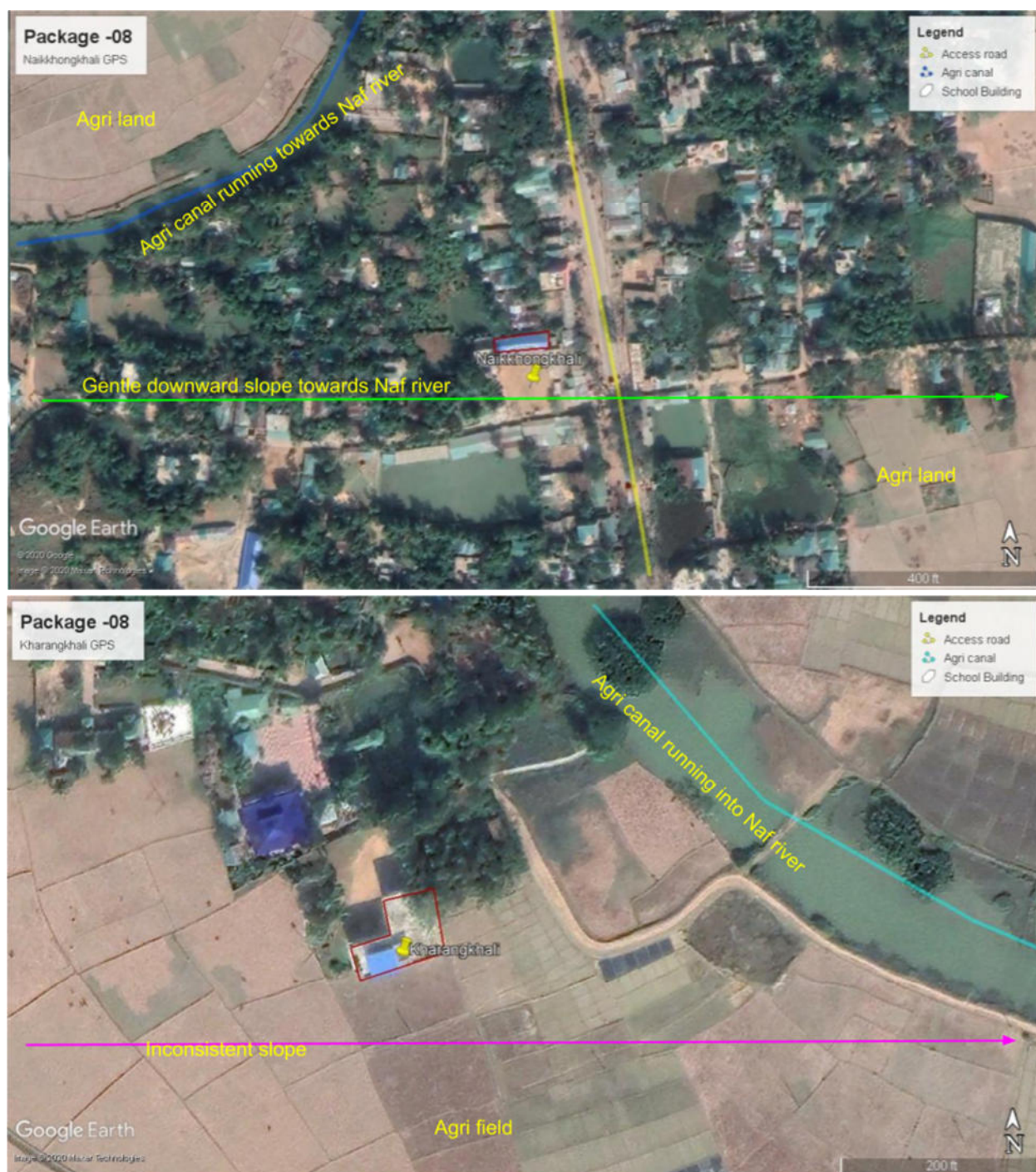


Figure III-8 Package 08 cyclone shelter siting and physiography, (top) Naikkhongkhali GPS; (bottom) Kharangkhali GPS.



Figure III-9 Package 08 cyclone shelter siting and physiography, (top) Noa Bazar GPS; (bottom) Ulubonia Jaman-Sakhina GPS.

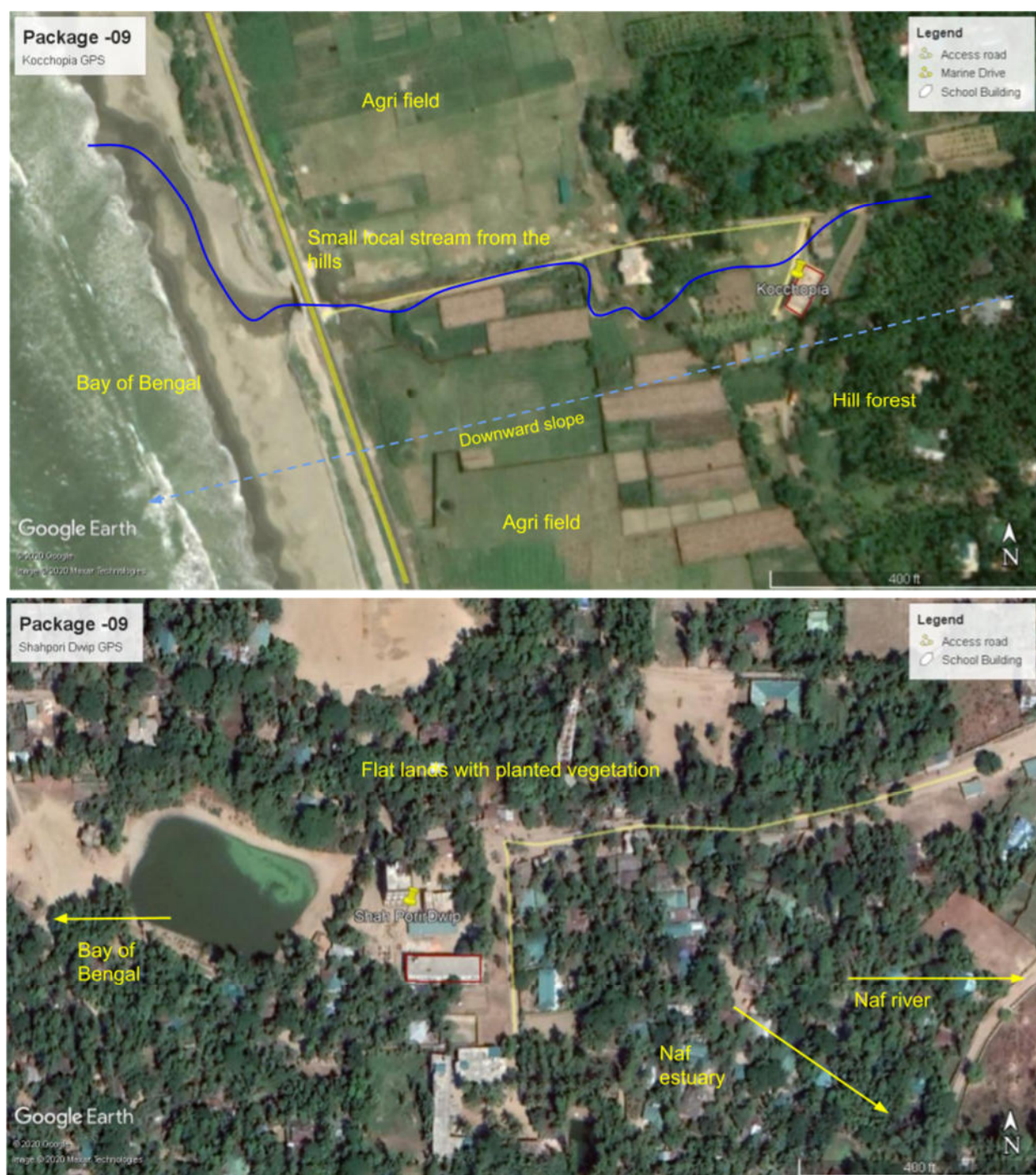


Figure III-10 Package 09 cyclone shelter siting and physiography, (top) Kocchopia GPS; (bottom) Shahpori Dwip GPS.



Figure III-11 Package 09 cyclone shelter siting and physiography, Rangakhali GPS

C. General design arrangements

126 For additional financing, designs from Phase-I are likely to be followed with some site-specific modifications. The tentative designs are discussed in the following paragraphs.

127 Generally, 3 storied buildings are adopted for cyclone shelters. The followings are commonly featured in a typical cyclone shelters designed during Phase-I:

- Open ground floor, plinth area: 220-230 square meter per floor
- Land area: Approximately 10 decimals of an acre
- Capacity: Approximately 800 persons per floor from the second floor
- 3 storied building, large open areas in first floor with tube wells, water taps etc.
- School placed on the second floor
- Roof with rainwater harvesting technologies and solar panel

128 The shelters to be constructed with the foundation for at least three stories shall have four rooms and ramp facilities up to the first floor. A reasonably sized room should be kept reserved for the disabled & the helpless and the rest of the first floor should be kept open for domestic animals. Additionally, rooms for women including pregnant women and lactating mothers will be reserved.

129 The proposed cyclone shelter follows the tentative design of the LGED prototype cyclone shelter cum primary school. However, some design aspects have been adopted to make it area specific. The scope of work of the proposed cyclone shelter is shown in Table III-2 below.

Table III-2 Specification of the proposed EAP-AF Cyclone Shelters sub-project

SI No	Feature	Specification
01	Ground Floor	Floor area ~ 300 Sqm, Ramp area ~50-100 Sqm
		Multiple entries including large ramp for disabled, cattle, each entry with small ramps
		staircase to access 1 st floor
		raised platform with ramp
		Open space with columns
02	1 st floor	Large Ramp from Ground floor to 1 st Floor for disabled persons, cattle
		Two tube wells for water supply
		Large open space
		Water taps, drains
		Staircase
03	2 nd floor	3 classrooms, 1 teacher's room, 1 storage
		1 pregnant woman/lactating mother care room
		Male-female toilet
		1 tube well, wide passage
		Staircase
04	Roof	Staircase
		1000ltr plastic tanks, Rainwater harvesting, solar panels

130 Cyclone shelters proposed in this project are likely to follow Option 1 LGED Proto type Multipurpose Cyclone Shelter. Usually this option follow 3 story building (as mentioned earlier) with ground floor being open for entrance. 1st floor is usually kept open but bounded with wall for shelter of cattles. The 2nd floor is designed to be used for class rooms, teacher's room and separate male female toilets with spaces fro pregnant women. These spaces are used as shelter during cyclonic stom events. Figure III-12 presents a general drawignarrangements of ground floor for the proposed Multipurpose cyclone Shelters. Figure III-13 presents the drawing for 1st floor and Figure III-14 presents the drawing for 2nd floor.

131 The proposed cyclone shelters have designated roof plan with sloping and storage tanks. The main staircase connects to the roof and the roof is bounded with wall. The entire cyclone shelter cum school will be plastered with anti-salinity and dam proofing admixture. The roof plan is presented in Figure III-15.

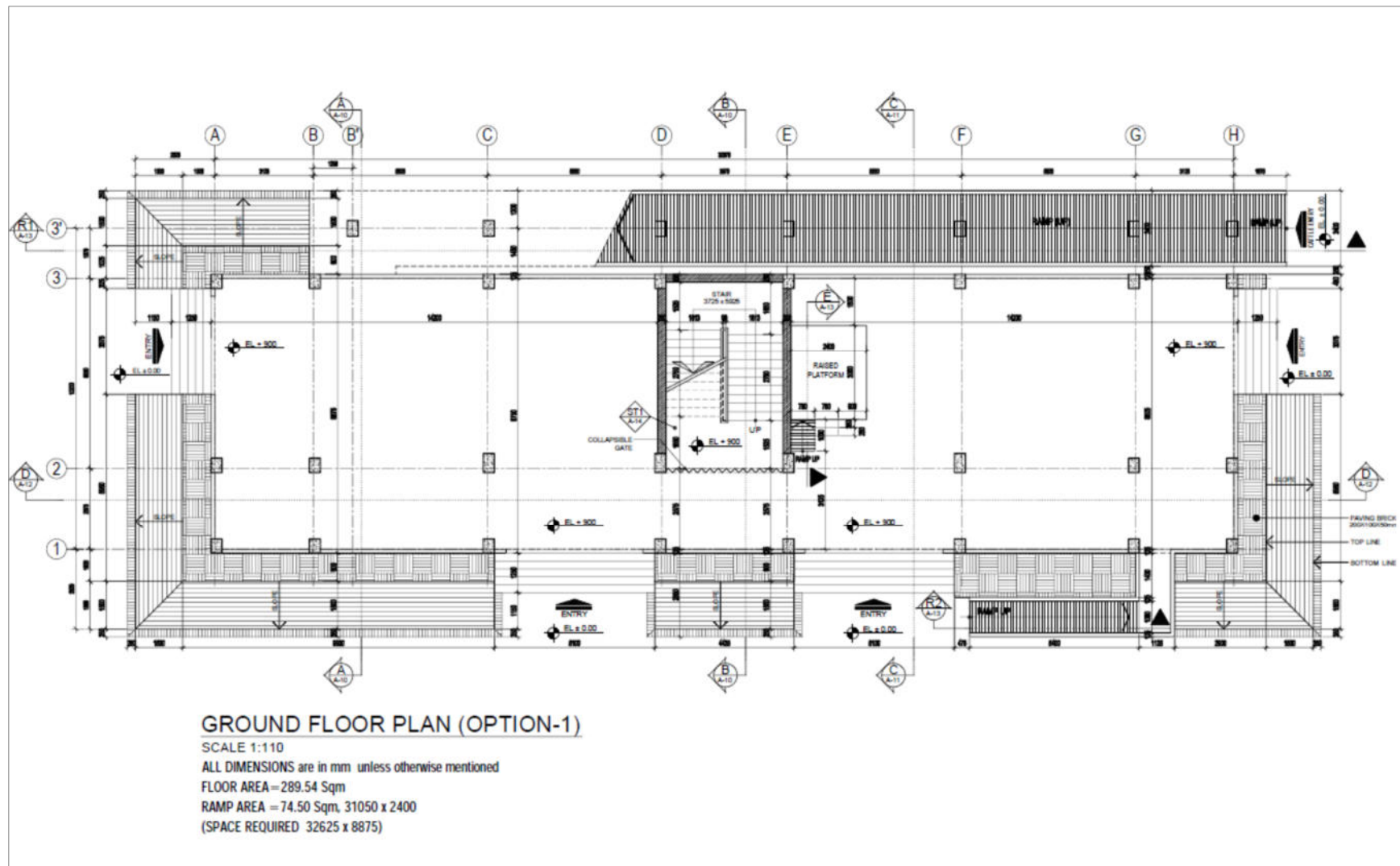
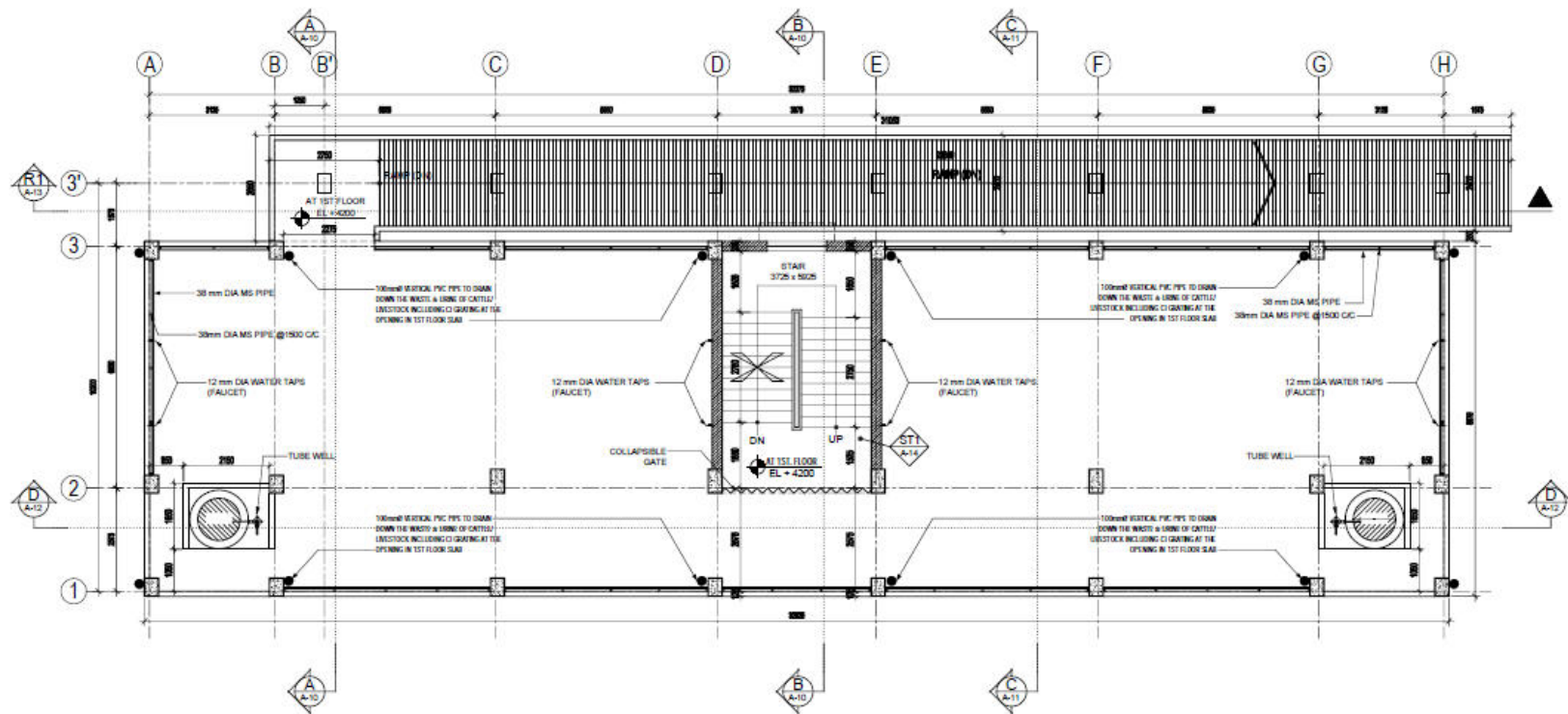


Figure III-12 General arrangements of the ground floor



1ST FLOOR PLAN (OPTION-1)

SCALE 1:110

ALL DIMENSIONS are in mm unless otherwise mentioned

FLOOR AREA=289.54 Sqm

(SPACE REQUIRED 32625 x 8875)

Figure III-13 General arrangements of the 1st floor

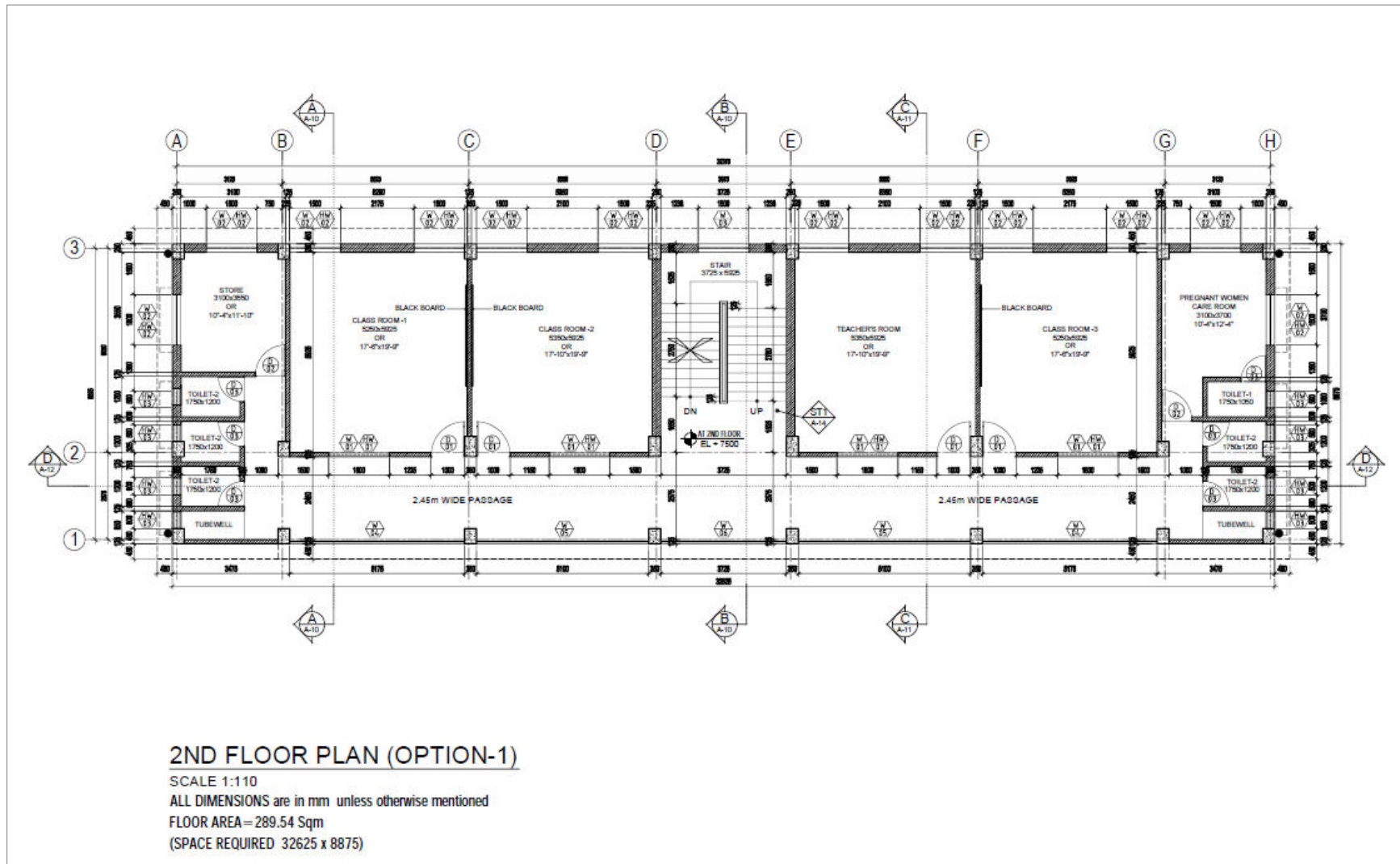


Figure III-14 General arrangements of the 2nd floor

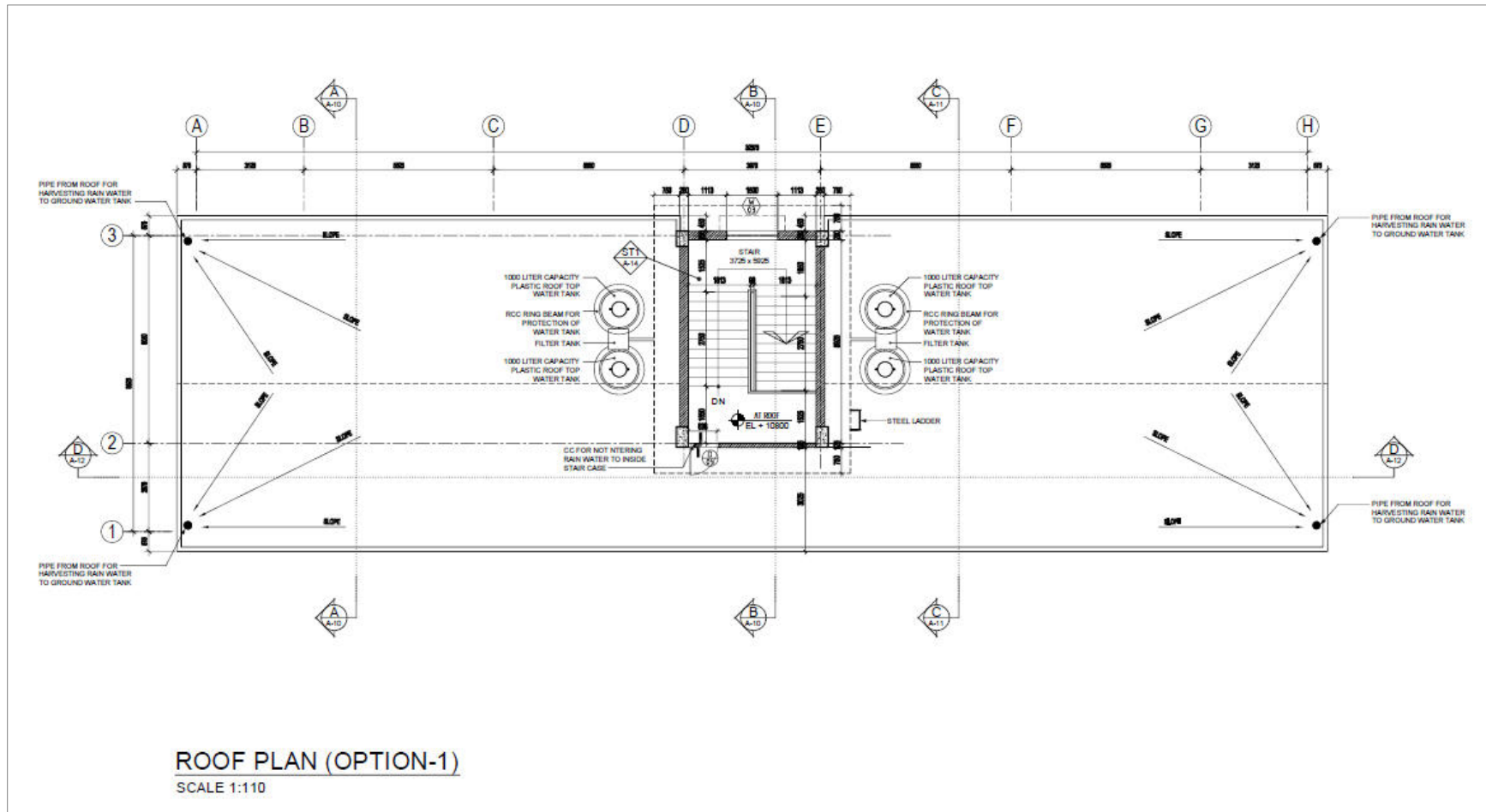


Figure III-15 General arrangements of the roof

IV. ANALYSIS OF ALTERNATIVES

A. Prelude

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

B. Current proposal

133 The proposed sites are in the existing Government Primary schools. Most school compounds have ample space for constructing another building so that the existing structure do not have to be demolished. However, in some sites there is cramped space and some tree removal might be required. Based on the Rapid Environmental Assessment (REA) Checklist provided in the Environmental Assessment and Review Framework (EARF) of ADB for this Emergency Assistance Project (EAP), it was found that the current proposal will have the minimal effect on environment and society. Summary of the impacts of current proposal is given in Table IV-1.

Table IV-1 Negative impact of current proposal on environment and society

Sector	Impact
Presence Important features along the route	No
Land (Government-owned land are to be given priority)	Yes (proposed cyclone shelter will be built on the existing primary school area)
Presence Agricultural/cropped land	Close by, no impact will occur if EMP is followed
Village affected	No
Families affected	No
Loss of structures	No
Impact on Common properties	No
Trees to be chopped down	No
Presence of sensitive ecosystem	No
Presence of waterbody	Some hilly streams are present in some sites
Tribal population affected	No

134 With the current option it has been estimated that: people indirectly benefited from construction of cyclone shelters are 36,000 host communities)¹⁶. Moreover, construction of school cum cyclone shelter is expected to trigger and increase in number of schools going children in the host community.

C. ‘Do Nothing’ option

135 The “do nothing” or “without the project” option is not viable since the consultant learned from the school authorities and school going children that the current school facilities are not enough to accommodate the current number of students. Furthermore, there is no cyclone shelter nearby that can be used in time of disaster.

¹⁶ 1,500 people can be supported by each cyclone shelters. For 24 cyclone shelters, 36,000 people will get shelter

V. DESCRIPTION OF BASELINE ENVIRONMENT

A. Location setting and extent

136 **Ukhiya upazila:** Ukhiya Upazila is an Upazila under Cox's Bazar District in the Division of Chittagong, Bangladesh. It is located at 21.2833° North, 92.1000° East. It is bounded by Ramu on the north, Myanmar and Naikhongchhari on the east, Teknaf on the south, the Bay of Bengal on the west. Ukhiya thana was established in 1926 and was promoted into an upazila in 1983. The upazila is consisted of five Union Parishads: (i) Halda Palong; (ii) Ranta Palong; (iii) Raja Palong; (iv) Jalia Palong and (v) Palong Khali. Ukhiya Upazila covers an area of 261.8 sq km, located in between 21°08' and 21°21' north latitudes and in between 92°03' and 92°12' east longitudes (Banglapedia 2018). The area is bounded by Ramu upazila on the north, Teknaf upazila on the south, Arakan state of Myanmar and Naikhongchhari upazila on the east, the Bay of Bengal on the west. See Figure V-1 for details. More than half of the upazila is under Ukhiarghat protected forest. The refugee camp situated in Ukhiya is within the protected forest.



Figure V-1 Location map of Ukhiya upazila

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

137 **Teknaf upazila:** Teknaf is an Upazila of Cox's Bazar District in the Division of Chittagong, Bangladesh. It forms the southernmost point in mainland Bangladesh (St. Martin's Island is the southernmost point). The name of the region comes from the Naf River which forms the Eastern boundary of the upazila¹⁷. It shares the border with Myanmar. Teknaf Upazila with area of 388.68 sq km, is located in between 20°23' and 21°09' north latitudes and in between 92°05' and 92°23' east longitudes. It is bounded by ukhia upazila on the north, the Bay of Bengal on the south, arakan state of Myanmar on the east, the Bay of Bengal on the west. Teknaf upazila, located on the south east extremity of Bangladesh, is 86 km on the south of Cox's Bazar Town. See Figure V-2 for details.



Figure V-2 Location map of Teknaf upazila

Source: http://en.banglapedia.org/index.php?title=Teknaf_Upazila

¹⁷ Wikipedia (undated), URL: https://en.wikipedia.org/wiki/Teknaf_Upazila. Date accessed: 8 August 6, 2020

B. Physical Environment

1. Landform and ecology

138 Teknaf Peninsula (covering Ukhiya and Teknaf upazila) is one of the longest sandy beach ecosystems (80 km) in the world. It represents a transitional ground for the fauna of the Indo-Himalayan and Indo-Malayan ecological sub-regions. Important habitats at the site include mangrove, mudflats, beaches and sand dunes, canals and lagoons and marine habitat. Mangrove forest occurs in Teknaf peninsula both as natural forest with planted stands and mostly distributed in the inter-tidal zone. The Teknaf peninsula mangroves supports the habitat of 161 different species of fish¹⁸. Teknaf reserved forest is one of the oldest reserved forests in Bangladesh.

139 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 hills¹⁹.

140 Historically, the main uses of the land of the region were small-scale agricultural crop production, betel nut/leaf cultivation and another homestead agroforestry (UNDP 2018)²⁰. Along with settlement, the clearing of the native vegetation has had one of the greatest impacts on the natural reserve forests in this region. Currently, the

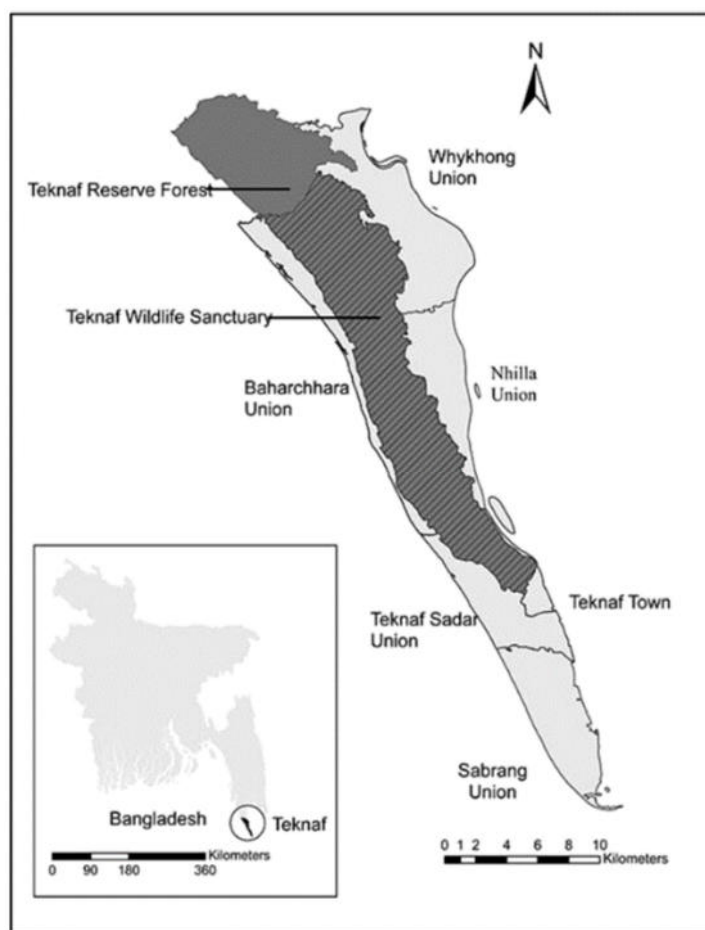


Figure V-3 Ecologically critical areas around Teknaf

Source: Tani M and Rahman MA (2017) *Chapter 1 Introduction*, in Teknaf in Deforestation in the Teknaf Peninsula of Bangladesh, Masakazu Tani and Md. Abiar Rahman (eds.)

¹⁸ Chowdhury, N. Shah Nawaz; Hossain, M. Shahadat; Das, Nani Gopal; Barua, Prabal (2010). "Environmental variables and fisheries diversity of the Naaf River Estuary, Bangladesh". *Journal of Coastal Conservation*. 15 (1): 163–180. doi:10.1007/s11852-010-0130-3

¹⁹ 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.)

²⁰ UNDP Bangladesh and UN WOMEN Bangladesh 2018. Report on Environmental Impact of Rohingya Influx. Dhaka, Bangladesh, p 106. Springer.

main use of the land includes site for the construction of hotels and resorts, the development of urban and tourism facilities, agriculture, aquaculture and salt farming, human settlement, shrimp hatcheries, fishing and dry fish processing.

141 The region, now a degraded forest land, includes three Ecologically Critical Areas (ECAs)—the western, coastal zone of Teknaf Peninsula, St Martin’s Island, and Sonadia Island, and two Protected Areas (PA) – the Himchari National Park and the Teknaf Wildlife Sanctuary (TWS). The Inani National Park, proposed as a protected area but not officially established as one, is considered a key biodiversity area and should be treated as a critical habitat. Figure V-3 presents the ecologically critical and conserved areas around the region.

2. Disasters

142 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.

143 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 Moheskhal 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.

144 The following areas are identified by the Cox’s bazar District Disaster management Plan²¹: 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 V-4 presents a Hazard Calendar of the upazila.

²¹ Development of District Disaster Management Plan District: Cox’s Bazar, District Disaster Management Committee, Cox’s Bazar. August 2014. Government of Bangladesh.

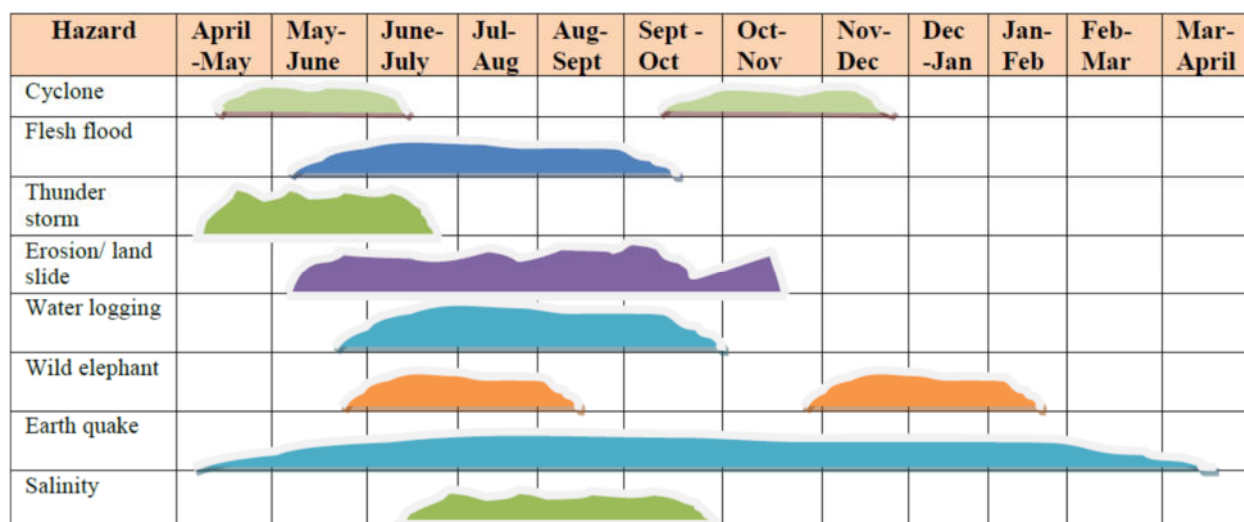


Figure V-4 Hazard Calendar of the Upazila

3. Geology, Topography, and Soils

145 **Geology:** Cox's Bazar-Teknaf area consists of low coastal plain with dunes and hinders land behind the coast consisting of steep but low cliffs (Figure V-5). Several beaches and tidal flats developed in this area. The straight coastline and steep cliffs along this coast suggest that it has developed by faulting and down warping. This coast has modified by in different times with response to tectonic and marine transgression and regression. The beach morphology is another decisive factor which also related to the development of the coast. The beach slope of Cox's Bazar to Teknaf varies from 2 ° to 9 ° and surf zone varies from 70 to 215 meter. In some cases, the morphology of this coast favors the formation of high velocity longshore current (Ahsan and Rashid, 2016²²). There is a very narrow strip of less than 100-meter beach from Cox's

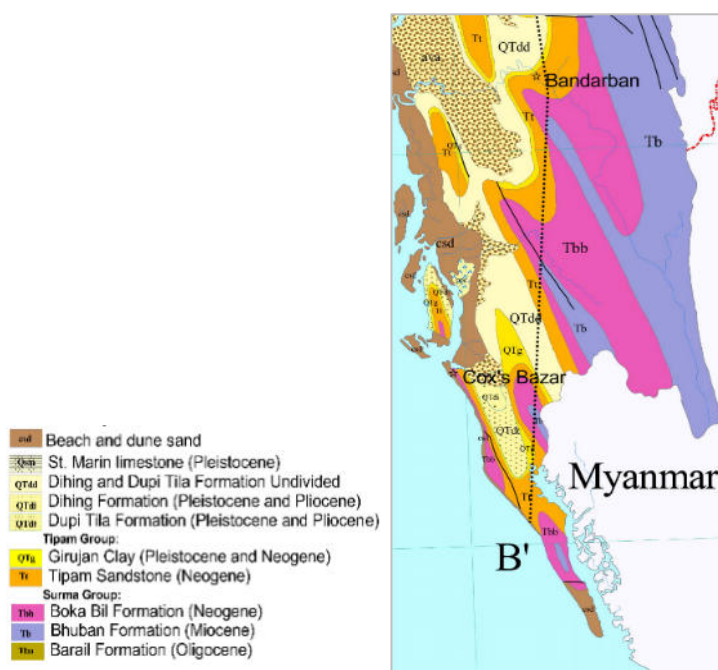


Figure V-5 Geological formation of Teknaf region (adopted from GSB 2001)

²² Ahsan, K. and Rashid, MB. (2016) Coastal Process in the Cox's Bazar-Teknaf Area of the Eastern Coast of Bangladesh, In book: Book of Abstracts (IX PIANC - COPEDEC - 2016 Ninth International Conference on Coastal and Port Engineering in Developing Countries) Chapter: Coastal Zone and Coastal Risk Management, Publisher: PIANC COPEDEC IX 2016

Bazar to Teknaf, between the hills and the Bay of Bengal (GSB, 2001²³).

146 **Teknaf piedmont:** The Teknaf piedmont plain is situated alongside the hills, mainly on their western side, but is found sporadically on the eastern and south sides of the hills (Figure V-5). Sea level fluctuations with eustatic changes of sea level have also an effect on the coastal morphology of this coast. Erosion takes place mainly monsoon time when sea level rises about 1m in comparison with the post monsoon. Seasonal rise of sea level combined with relative sea level rise produce high waves which occasionally erode the base of Tertiary hills in this coast that facing the open sea. Frequent low to moderate earthquake events of about 4 to 6 Mb in recent years and other signatures like uplifted paleo-beach, wave cut platform, bioturbated boulder, river terraces etc. attest to neo-tectonic activities in Cox's Bazar-Teknaf area which also plays a vital role for the development of this coast.

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

148 **Dakhin Nhila structure:** Dakhin Nhila structure lies under Teknaf upazila of Cox's Bazar district and bounded by latitude 20°52' to 21°07'N and longitude 92°08' to 92°18'E and is situated at extreme south east of Bangladesh territory. The maximum elevation is about 266m above mean sea level. The northern pitch is represented by low relief due to saddle separating from Inani anticline, whereas southern pitch abruptly merges with the plain land (Banglapedia, undated²⁴).

149 **Soils:** 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 more sandy and silty deposit near the foot of the hills and along the course of rivers and streams which cross the plains. Near the coast, some of these soils become saline at the end of the dry seasons; IV) The tidal mangrove swamps are most extensive at the mouth of the Matamuhuri River. Here the soils are grey clay flooded twice daily by saline water and unsuitable for agriculture.

150 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 V-6 for details.

²³ Geological Survey of Bangladesh (GSB) (2001) Original Geological Map by Md. Khurshid Alam, A.K.M. Shahidul Hasan, and Mujibur Rahman Khan, (Geological Survey of Bangladesh), and John W. Whitney, (United States Geological Survey) 1990, Digitally compiled by F.M. Persits, C.J. Wandrey, R.C. Milici, (USGS), and Abdullah Manwar, (Director General, Geological Survey of Bangladesh).

²⁴ Banglapedia (undated) Geological Structure. Banglapedia. National Encyclopedia of Bangladesh. URL: http://en.banglapedia.org/index.php?title=Geological_Structure Date Accessed: 14 May 2020.

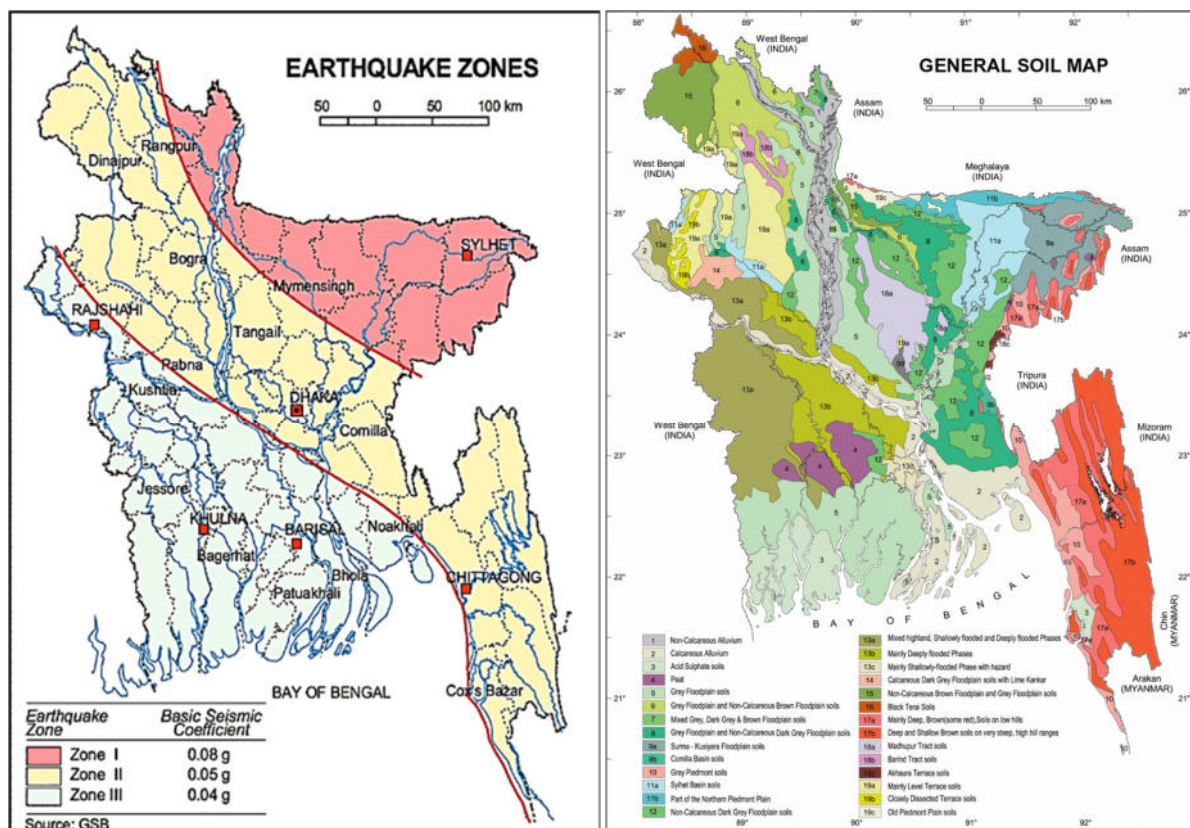


Figure V-6 Earthquake zone and general soil map of Bangladesh

151 **Seismicity:** In the earthquake zoning map (Figure V-7) Geological Survey of Bangladesh, 26 percent of Bangladesh falls in high risk, 38 percent moderate and 36 percent in low risk zone in terms of earthquake vulnerability. The distribution of recorded earthquakes indicates a major clustering of seismicity around the Dauki Fault and scattering of other events along other major fault systems of Bangladesh. The magnitude of the earthquakes is moderate (4-6, magnitude in Richter scale) and majority of them are shallow depth. According to Geological Survey Bangladesh (GSB, undated²⁵) Teknaf falls in medium intensity seismic zone (Zone-II, Basic Seismic Coefficient 0.05g).

²⁵ Geological Survey of Bangladesh (GSB) (undated) Earthquake Zones of Bangladesh. Publication type: Map. Available at: <http://www.gsb.gov.bd/site/view/commondoc/Geo-scientific%20Map/>, date accessed: 15 May 2020.

152 Again, according to the Bangladesh National Building Code (2010)²⁶, Bangladesh has been divided into 4 category of earthquake zone (Figure V-7) and Teknaf falls into Zone 3 ($Z = 0.28$). Teknaf has both sandy coast and hilly region, a combination of alluvial flood plain and sandy sea-shore area. Although the hilly region is less susceptible to liquefaction, it is formed by sandy and clayey soil and the area bottom of the hill

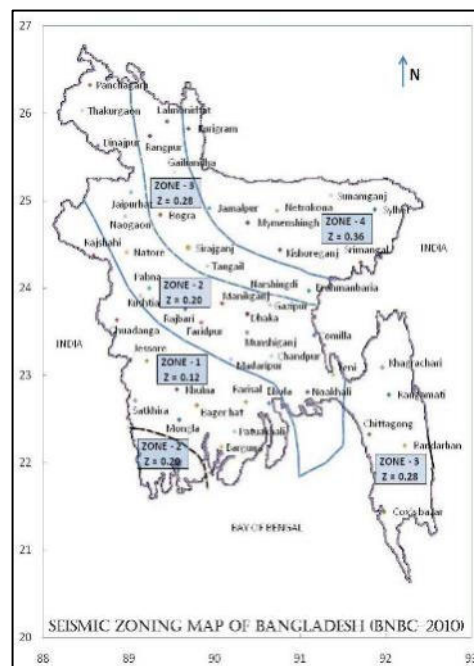
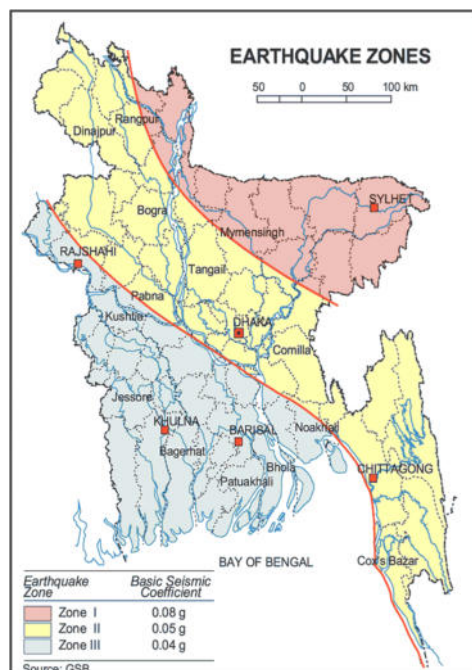


Figure V-7 Earthquake zonation map of Bangladesh, by GSB (undated) and **BNBC (2010)**

also liquefy if the intensity of shaking is high, which may cause landslide in the highly region. On the other hand, flood plains and seashore areas consisting of fine sand and silt deposit with shallow water table in most of the places, which may liquefy during a strong earthquake.

4. Climate and Meteorology

153 **Temperature:** Generally, maximum temperature in the year reach between the last week of March and end of May. Temperature data is recorded at station Cox's Bazar. As dis discussed above, Teknaf is a upazila (subdistrict) of the Cox's Bazar zilla (District). The average maximum temperature in Cox's Bazar is 31.28°C in April and minimum is 22.0°C in January (Data from BMD 2016). See Figure V-8 for details²⁷.

²⁶ Bangladesh National Building Code (BNBC) (2010) Bangladesh National Building Code (BNBC), Housing and Building Research Institute, Dhaka, Bangladesh.

²⁷ Source: <https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,cox-s-bazar,Bangladesh>, Date Accessed: 7 August 2020.

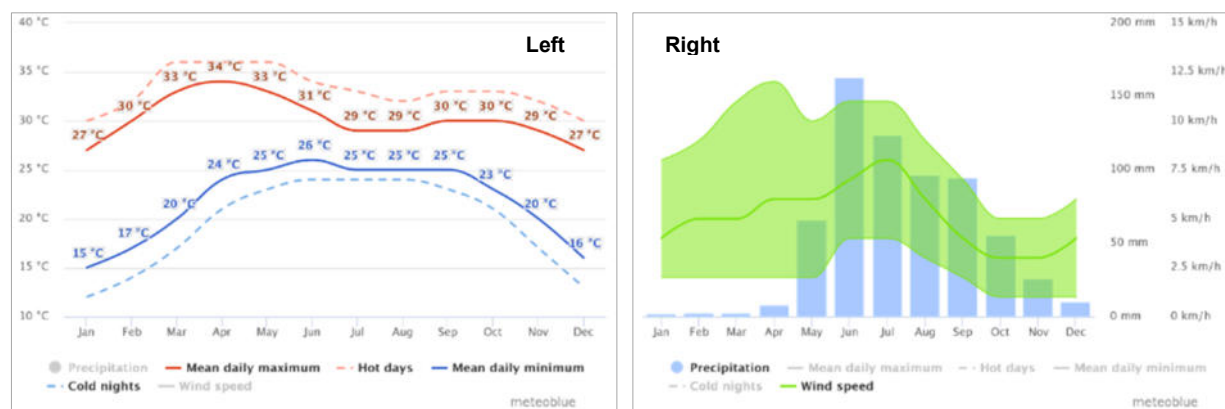


Figure V-8 Left: Temperature pattern in Cox's Bazar; Right: Rainfall pattern in Cox's Bazar

154 **Rainfall:** The trend of rainfall of Cox's Bazar district was as usual and normal before 1991, however, radical changes have been observed in the recent years, in particularly after the year 2000. Once, the rainfall and its continuation were steady according to the seasons of the year. Interest, 1994 a remarkable change in rainfall has observed. In general, there was no much rain during the month of January to April, and it happened during from April to June of the year. On the contrary, sometime rainfall occurs during the month of December which creates flooding. The variation in the precipitation between the driest and wettest months is 401 mm. See Figure V-9 for details²⁸.

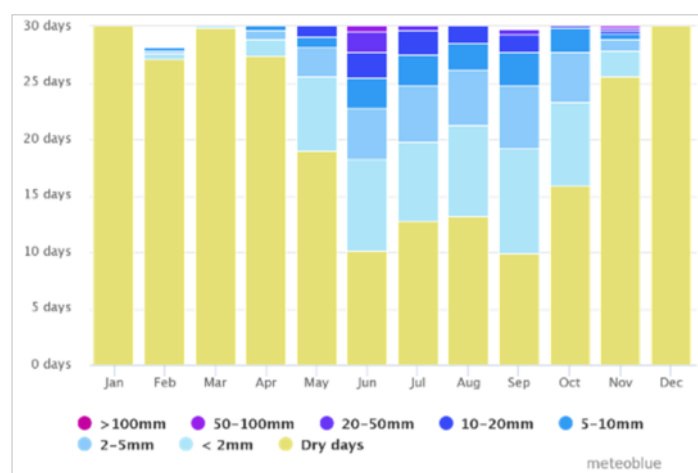


Figure V-9 Rainfall analysis (amount) for Cox's Bazar station

155 The seasonal variation of the rainfall is shown in Figure V-10. The wet season is starting around April and ending in October (7 months). This leaves the months November to March as the dry season (5 months).

²⁸ Source: <https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,cox-s-bazar,Bangladesh> Date Accessed: 7 August 2020..

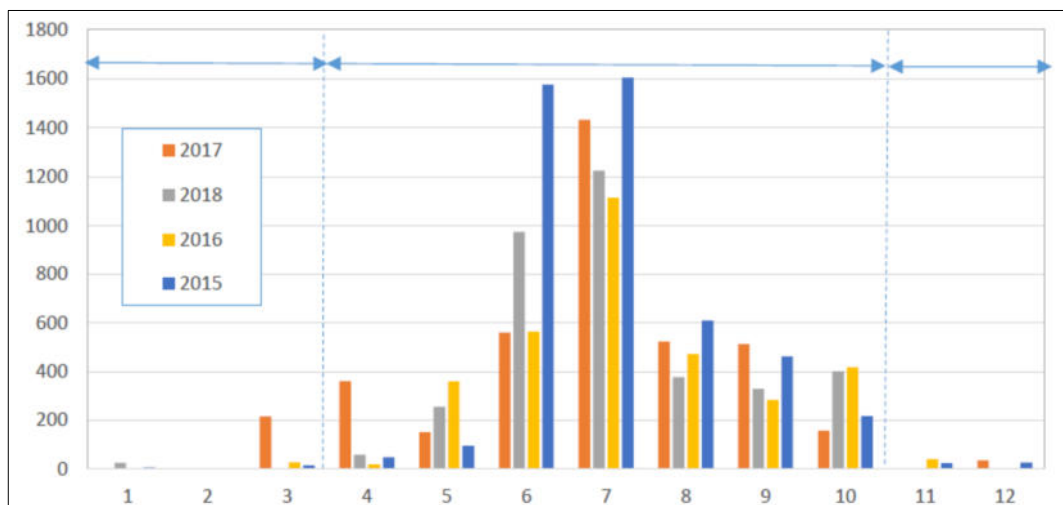


Figure V-10 Monthly precipitation in Cox's Bazar from 2015 to 2018 (Source: BMD, Cox's Bazar) indicating dry season, pre-monsoon, monsoon, and post-monsoon.

156 **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% respectively and the average humidity recorded was 77.99%.

157 **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 V-11²⁹, and this pattern is assumed to reflect the conditions of the subproject area.

5. Hydrology (Surface Water and Ground water)

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

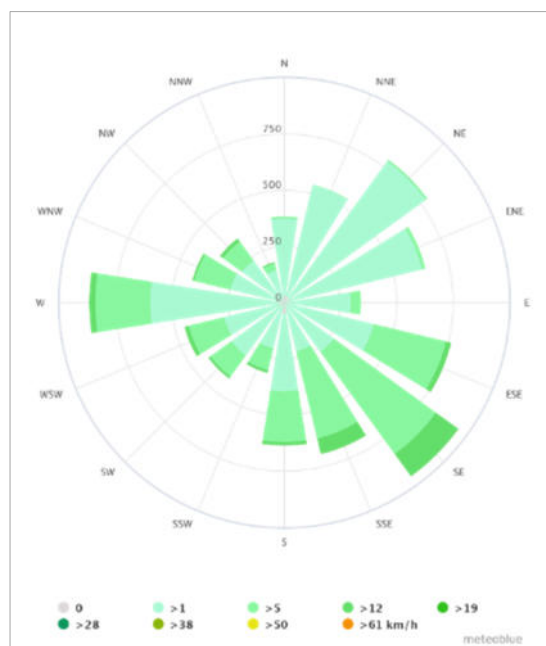


Figure V-11 Windrose diagram of Cox's Bazar (Source: BMD, data modelled by meteoblue.com)

²⁹ URL: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/cox%27s-bazar-airport_bangladesh_6301081, date accessed: 7 August 2020.

159 **Naf river:** It flows along the southernmost border line of the country. It originates in the northern hills of Myanmar and enters Bangladesh near Palong Khali of Ukhia upazila of Cox's Bazar district. The 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.

160 There are 14 canals in the Upazila, which flow throughout the Upazila. Reju Canal-starting from Rejur mukh crosses painnasia, sonaichoara, sonarpara, chorpara, jummapara and lamburi para. It has length of 7 kilometres. Monkhali Canal-starting from Monkhali mouth up to Nuton Chaka para. It is 8 kilometres. Sowankhali Canal- it is 8-kilometre-long started from Swankhali area and stretched upto Bay of Bengal. Chepokhali Canal-It is 10 kilometre long started from Madarbonia and arrives to Chepotkhali. Inani Canal-it is 15 kilometre long started from Chenchuli to Inani. Inani Choto Canal-It is 20 kilometre long started from Chenchuli to Inani. Paglir Canal- 8-kilometre-long canal started from Guarerdeep and stretches to 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. Palongkhali Canal- This is 14-kilometre-long starting from Nojumora falls into Naf river crossing different parts of Ukhia and Teknaf Upazila. Balukhali Canal: a 6-kilometre-long started from Madhuchara reaches to the Naf river crossing through BGB camp, Chowdhur para and Barua para. Figure V-12 represents the stream network in the region.

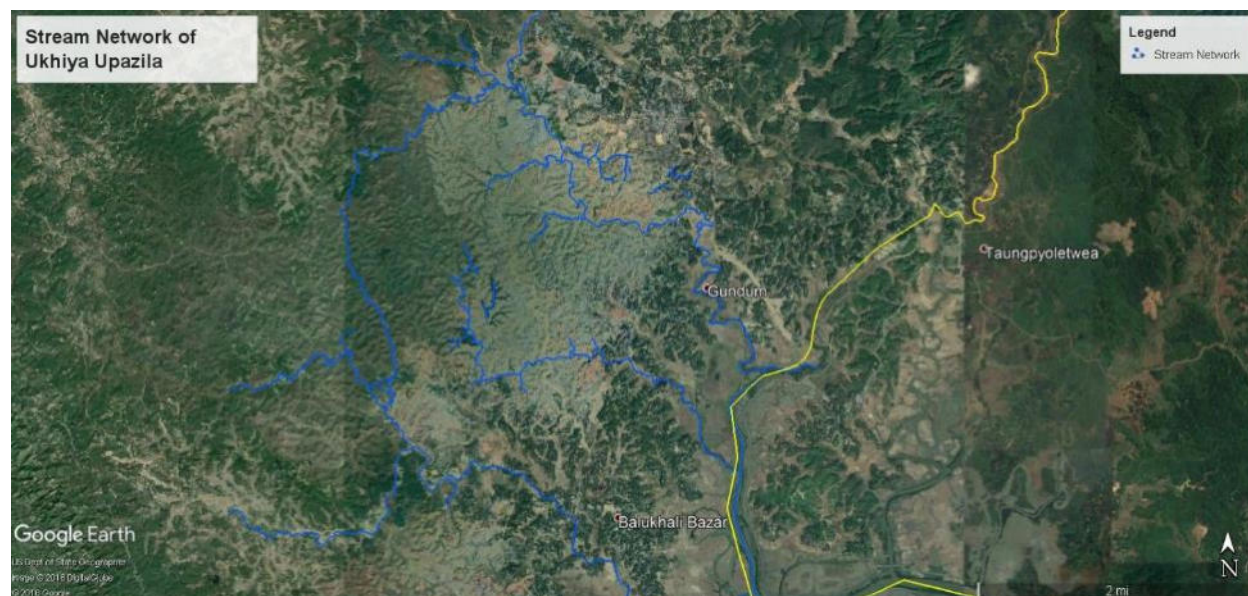


Figure V-12 Stream network in the Sub-project area

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

162 **Ground water:** 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 5-7m³⁰.

163 Ground water information of Ukhiya upazila is unavailable, however some information of Teknaf is accessible. In general, Teknaf is covered with alluvium and sedimentary bedrock (Rahman and Woobaidullah 2020³¹). These deposits have a low transmissivity of 400 sqm/day. These deposits are not favourable aquifers for extensive withdrawal. Aquifer material is covered with 25-30 m thick zone of silt and clay. Clay thickness gradually increases towards the Bar. Sandy materials are predominantly medium to coarse (Alam et al. 2003³²). A shallow aquifer of about 20-50m thickness exists near the surface. Main aquifer is deep seated whose nature and extent are not known. Shallow aquifer exists at a depth of about 50m the depth to the main aquifer is not precisely known. Aquifers are semi-confined to confine in nature (Figure V-13³³).

164 The Teknaf area belongs to a zone where complex groundwater condition exists and is unsuitable for tube wells (UNDP 1982³⁴). The entire Teknaf peninsula falls into a zone which characterized by a complex geology of folded tertiary sediments with very low potential for large-scale groundwater development (UNDP 1982). Despite of an annual rainfall estimated to be around 4000mm according BMD data, most of the precipitated water flows to the Bay of Bengal as runoff due to absence of significant water-bearing formations, i.e., aquifers in the study area (Rahman and Woobaidullah 2020). There are some localized occurrences of low-yielding water bearing formations at a depth around 10 m at certain locations in Taknaf which can house the low-yielding dug wells (large-diameter wells).

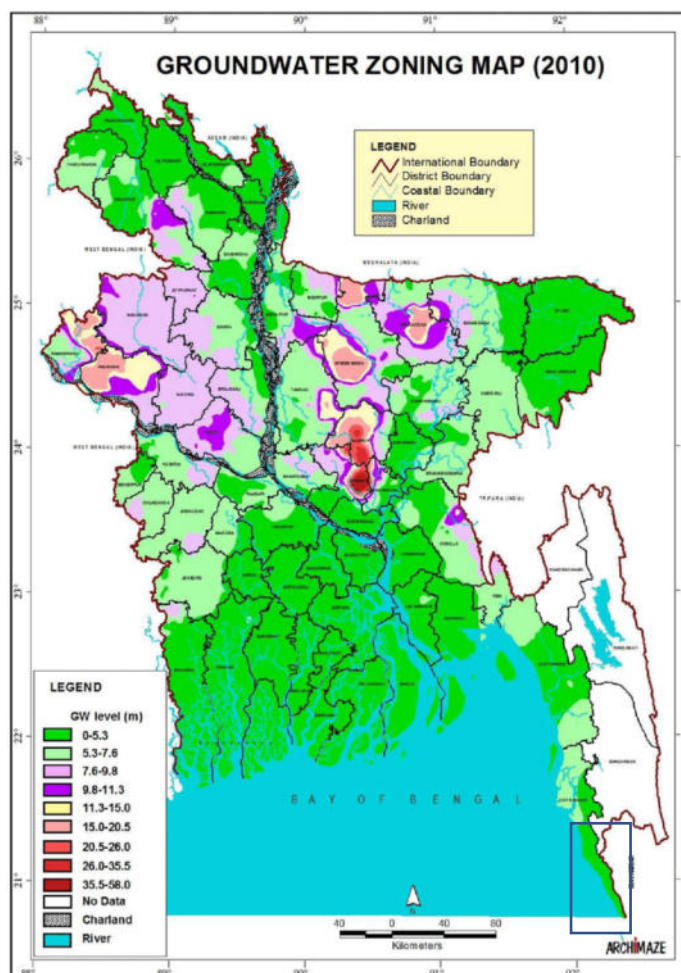


Figure V-13 Groundwater zonation map of Bangladesh (Source: BARC 2015). Blue rectangle represents project area

³⁰ BARC, Bangladesh agricultural research council, September 2015. URL: <http://www.barc.gov.bd/>

³¹ Rahman, MM. and Woobaidullah, ASM. (2020) Groundwater resources exploration in a Hillock Valley at Lada refugee camp, Teknaf using electrical resistivity soundings. Arabian Journal of Geosciences (2020) 13:90 <https://doi.org/10.1007/s12517-020-5056-y>

³² Alam M, Alam MM, Curray JR, Rahman MLC, Gani MR (2003) An overview of the sedimentary geology of the Bengal Basin in relation to the regional tectonic framework and basin-fill history. Sediment, Geology 155:179–208

³³ BARC (2015) Bangladesh agricultural research council, September 2015. URL <http://www.barc.gov.bd/>, date accessed: 15 May 2020.

³⁴ UNDP Bangladesh and UN WOMEN Bangladesh 2018. Report on Environmental Impact of Rohingya Influx. Dhaka, Bangladesh, p 106 (including cover).

6. Flooding, Water Logging and Drainage Pattern

165 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 V-14³⁵ shows a flood vulnerability Factor Map of Bangladesh. The study region falls into high vulnerability region (score >9).

7. Land Slides and erosion

166 The two main streamlets, Kalatali Chara and Reju Khal, cut the cliff into three sections: Bahar Chara-Kalatali Chara (BK), Kalatali Chara-Reju Khal (KR), and Reju Khal-Boro Inani Khal (RI). The distance between the coastline and the base of the cliff at the Bahar chara area is about 200 m and decreases southward to 10 m at Boro Inani khal (Rahman and Khan. 1995)³⁶. The cliff slope angle varies from place to place. In the northern part, from Bahar chara to Kalatali chara (section BK), the slope angle varies from 30 ° to 40 °, but from Kalatali to Reju khal (section KR) it ranges between 35 ° to 60 °. In the southern part, from Reju khal to Boro Inani khal (section RI), the slope angle varies from 50 ° to 70 °. In the section BK, from Bahar chara to Kalatali chara, landslide activity was not noticeable. Landslide activity causes several slope failures in the section KR and it increases towards the south in the section RI. Most landslides are shallow failures occurring along a plane parallel to the slope surface (Rahman and Khan, 1995).

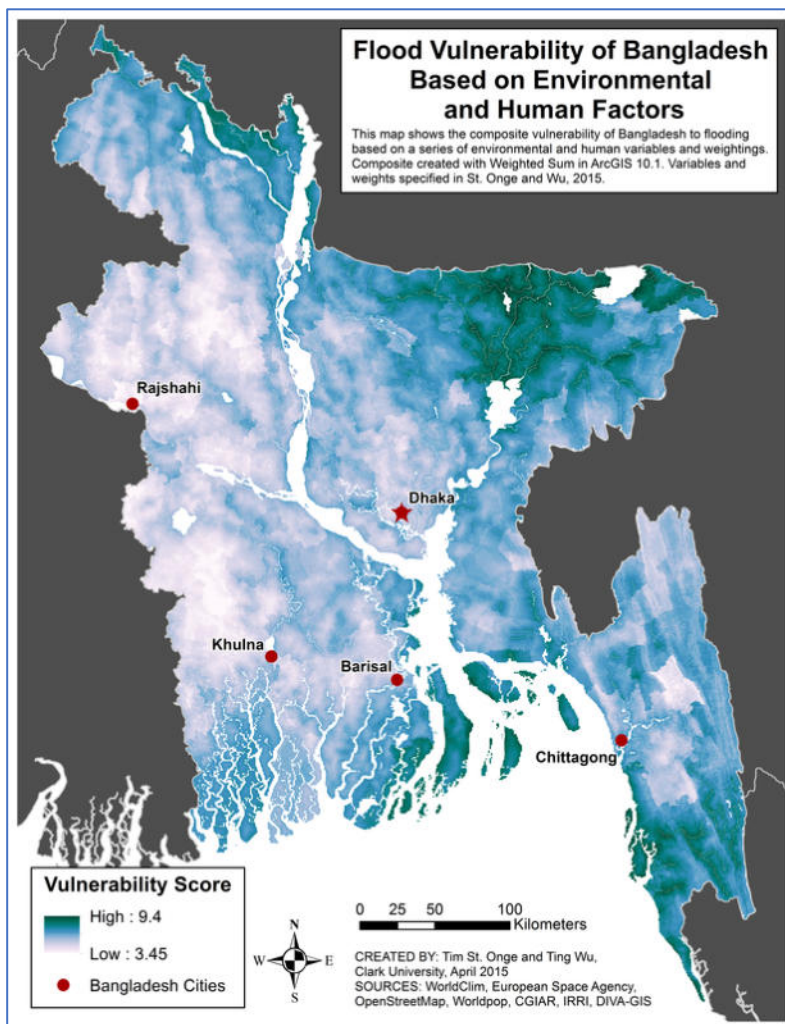


Figure V-14 Flood vulnerability map of Bangladesh

³⁵ 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.

³⁶ Rahman, H. and Khan, YA. (1995) Landslides and stability of coastal cliffs of Cox's Bazar area, Bangladesh. Natural Hazards 12(2):101-118, DOI: 10.1007/BF00613071

167 Land slide is a major problem in the Cox's Bazaar and Teknaf mountain zones, of Bangladesh by killing people every year besides damaging the properties and blocking the public utilities. Rabby and Li (2019)³⁷ found that in Cox's bazar District, 124 landslides occurred during the period of 2001-2017. A landslide Hazard zonation map is produced by CDMP in 2012 (Figure V-15³⁸). The highest risk is posed in the Rohingya Refugee Camp in Teknaf, north-western side of the upazila. In Hill cutting and the clearing of vegetation cover increased the risk of hill and land slide at the time of monsoon rains. As denuded hills become dry and usually generate cracks, and in the rainy season there is more chance that water will enter into the denuded hills through the cracks. As a result, there is a high risk of local landslides which could cause the destruction of the shelters and potential casualties (UNDP/UNWOMEN 2018)³⁹.

8. Air Quality and Dust

168 Baseline data on air quality for the subproject area is not available. In accordance to the camp inhabitants, they suffer from the dust generated from the loose soil when strong winds blow; serious dust pollution during stormy winds is an issue. From a health point of view, this should not be a great concern as the size of the dust particles does not allow them to penetrate into the respiratory tract.

169 Indoor air pollution in the camp areas from cooking is a serious concern especially for women and children and has been identified as having a severe impact. All cooking is carried out inside the poorly ventilated shelters (the only opening in an 8/8 sq. ft. space is a door at the front) and the firewood which is used as fuel produces large quantities of smoke that stays in the air long after the fire has been extinguished. Burning firewood releases particulate matters, CO, CO₂, and Sulphur oxide which are extremely dangerous.

9. Noise Level

170 Noise level data is not available for the region. The major causes for noise in the subproject area are the vehicle movement (motorcycles, pick-up, mini-trucks, CNG rickshaw and auto-rickshaws), playing of loud-speaker and mass people gathering (for advertising of products and political, social and religious

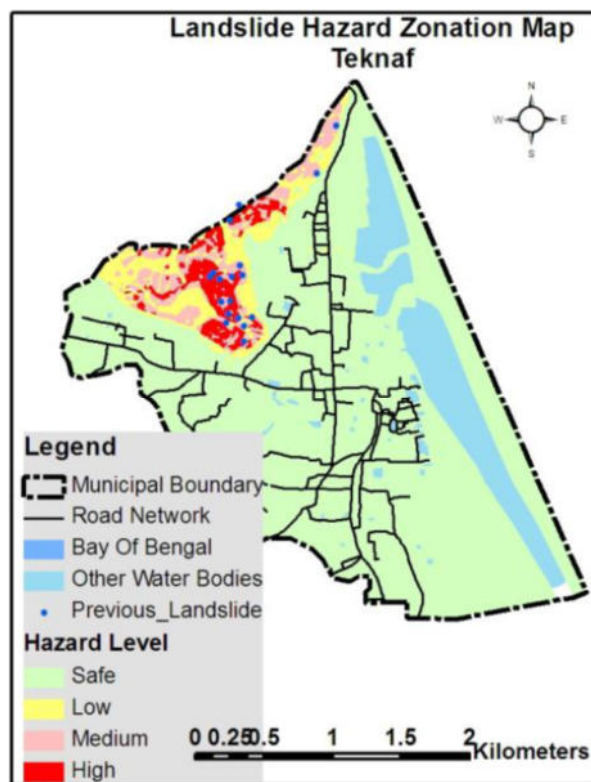


Figure V-15 Landslide zonation map of Teknaf (CDMP 2012)

³⁷ Rabby, YW. And Li, Y. (2019) Landslide Inventory (2001–2017) of Chittagong Hilly Areas, Bangladesh. Data 2020, 5(1), 4; <https://doi.org/10.3390/data5010004>.

³⁸ Comprehensive Disaster Management Programme (CDMP) (2012) Report on the Landslide Hazard Zonation mapping at Cox's Bazaar and Teknaf in Bangladesh. Comprehensive Disaster Management Programme (CDMP-II), Ministry of Food and Disaster Management (MoFDM), Disaster Management and Relief Division (DMRD), Government of the People's Republic of Bangladesh, April 2012. Prepared by Data Experts Ltd. and ADPC.

³⁹ UNDP Bangladesh and UN WOMEN Bangladesh 2018. Report on Environmental Impact of Rohingya Influx. Dhaka, Bangladesh, p 106 (including cover).

aspects) and local market. This is a common experience of the peri-urban population that noise poses a threat to the ill / physically weak people health and nerves.

10. Health and Sanitation

171 No reliable data available on health and sanitation.

11. Solid Waste Management

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

C. Biotic Environment

1. Terrestrial Faunal and Floral Species

173 **Faunal Species:** The influx of population have a significant impact on wildlife by shrinking habitats and disruptions in breeding grounds are affecting nocturnal, crepuscular and diurnal wildlife. Apart from the degradation of forest land along region, 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 Ukhiya, Teknaf, Inani and Himchari under Cox's Bazar South Forest Division.

174 **Common birds:** Common bird species noted in the subproject area were Asian crow, myna, cuckoo, kingfisher, pigeon and dove satore, drongo, weaver bird choroi, babui, and dahuk (Figure V-16). The mammals include fox, monkey, mongoose, Bengal monitor, various rodents etc (Khan 2019⁴⁰). There are also several species of frog, lizard and snake. Socio-economic and Socio-cultural Environment.

⁴⁰ Khan, MMH (2015) Ecological Assessment of Some Selected Sites in Ukhiya And Teknaf, Cox's Bazar, Bangladesh, Final Report. TA-9546 BAN: Emergency Assistance Project, Asian Development Bank (ADB)



Figure V-16 Terrestrial fauna of Cox's bazar

175 Flora Species: The forestland in the 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 Teknaf Wildlife Sanctuary. The sanctuary is rich in flora and contains several different ecosystems including hill forest, mangrove formation and sand-dune (Uddin et al. 2013). Feeroz (2013) recorded a total of 538 plant species under 102 families and 370 genera from TWS.

176 The plant species found in Cox's Bazar are: Coconut (*Cocos nucifera*), Betel nut (*Areca catechu*), 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 V-17). Among crop-field vegetation, aman is grown during summer rains and boro (winter rice) cultivated by irrigation in winter. For a complete list of wildlife in the subproject area see Annex A.



Figure V-17 Terrestrial flora of Cox's bazar

2. Aquatic species

177 There was very little water (mostly polluted) in the waterbody during the survey, so no fish species was recorded. However, the water was found poor in plankton content indicating poor quality of water. The phytoplankton content was found at 2,532 per litre and zooplankton content 200 per litre. A total of 6 species of phytoplankton (*Cyclotella* sp. – 196 per litre, *Monoraphidium griffithii* – 762 per litre, *Navicula placentula* – 585 per litre, *Peridinium* sp. – 204 per litre, *Stauroneis anceps* – 585 per litre and *Strombomonas verrucosa* – 200 per litre) and 2 species of zooplankton (*Chromogaster* sp. – 103 per litre and *Prorodon* sp. – 97 per litre) were recorded (Figure V-18).

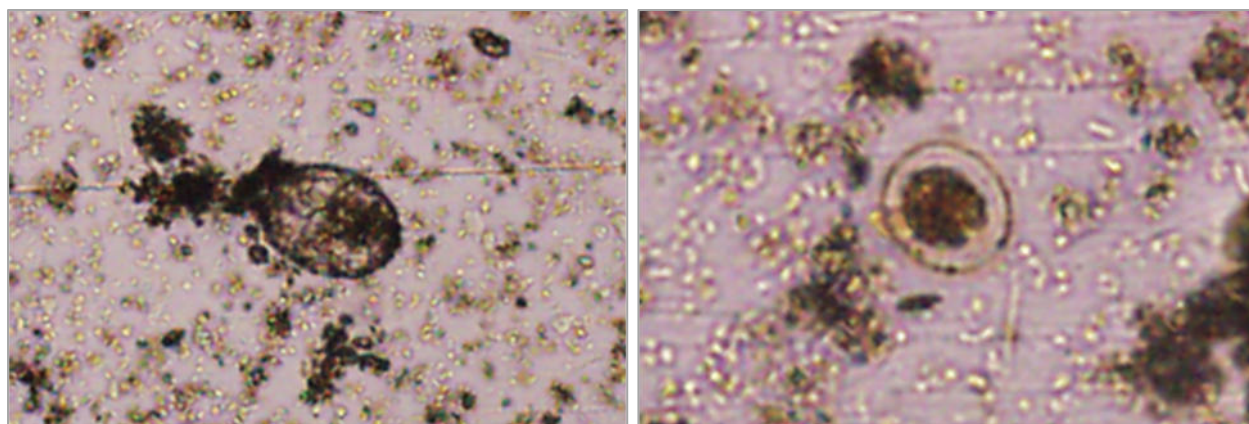


Figure V-18 Microscopic photos of some planktons found in the waterbody (Source: Khan 2019)

3. Asian elephants

178 The globally endangered Asian Elephant (*Elephas maximus*) is 'critically endangered' in Bangladesh. 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.



Figure V-19 Asian elephants found in Cox's Bazar (Source: Khan 2015)

179 There is evidence of presence of elephants in the raw water source area in Nayapara camp area (Figure V-19). Elephants now-a-days rarely visit the waterbody, but it is likely that they will visit frequently in the future when the waterbody will contain plenty of water. Host and Rohingya communities are encroaching on its habitat in the Teknaf Wildlife Sanctuary, and both resident and migratory elephants are facing a continuous shrinkage of their habitat and food supply. This human-elephant conflict has seen 13 refugees killed in elephant attacks since August last year (2019), according to the International Union

for Conservation of Nature (IUCN)⁴¹. Notably, majority of the Rohingya camps are prone to elephant attacks. A team of IUCN-Bangladesh is working in and around Rohingya camps from the very beginning and has been highly appreciated for the flagship work on reducing conflicts between Rohingyas and elephants. The current mean elephant number in five Forest Ranges in and around Kutupalong Camp is 38, which ranges from 31 to 45. Surveys and maps revealed that elephant movement was frequent along the north-western and western boarder of the Camp, specifically Camps 1, 3, 4, 17, 19 (currently not inhabited), 18, 20, 13, 14, 15, and 16. There are a number of points through which elephants could enter into the Camp, as the whole area is now barren due to high rate of deforestation. Such exposure to elephant interaction and elephant entry is expected to increase in the coming days⁴². Mukul *et al.* (2019) mentioned that the extension of the old Kutupalong Camp has blocked the only corridor used by elephants as a migration route and trapped about 45 elephants in the western side of the camp, with 13 human casualties so far.

180 The proposed GPSs are located far from the camp boundaries and has been in the exiting locations for more than five years. No elephant attack has been recorded in and around the proposed sites. Locals were also consulted during public field visit to learn about any human-elephant conflict in the past. They informed that they have seen the proposed locations free of human-elephant over last 15 years. The schools with children are functioning well without any incidents.

⁴¹ Khan, MMH (2015) Ecological Assessment of Some Selected Sites in Ukhiya And Teknaf, Cox's Bazar, Bangladesh, Final Report. TA-9546 BAN: Emergency Assistance Project, Asian Development Bank (ADB)

⁴² IUCN and UNHCR (2018) Survey Report on Elephant Movement, Human-Elephant Conflict Situation, and Possible Intervention Sites in and around Kutupalong Camp, Cox's Bazar. 'Biodiversity Conflict Mitigation around the Refugee Camp of Cox's Bazar District' Project. IUCN Country office, Dhaka, Bangladesh. pp.27.

4. Protected Areas (PAs)

181 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. Figure V-20 shows the ECA areas of Cox’s bazar, while Figure V-21 shows the protected areas of Cox’s bazar.

182 Originally designated as Teknaf game reserve in 1983, in December 2009 the Government of Bangladesh enhanced its status to a Wildlife Sanctuary protecting 11,615 hectares. It is located in Teknaf Upazila of Cox’s Bazar District, and comprises a range of steep hills aligned north-south and bordered by the Bay of Bengal to the west and a narrow strip of lowlands and settlements along the Naf river to the south and east, and Inani reserve forest to the north.

183 The sanctuary is comprised of 10 forest beats under three forest ranges of Cox’s Bazar (south) Forest Division. It is a hilly mixed-evergreen sub-tropical forest with secondary plantations and covers an area of 11,615ha with a length of 32km (north-south) and width of 5km at the north end and 3km at the south end. The area consists of intervals of steep hills and valleys. The moist sub-tropical maritime climate of the sanctuary has three seasons: spring (March to

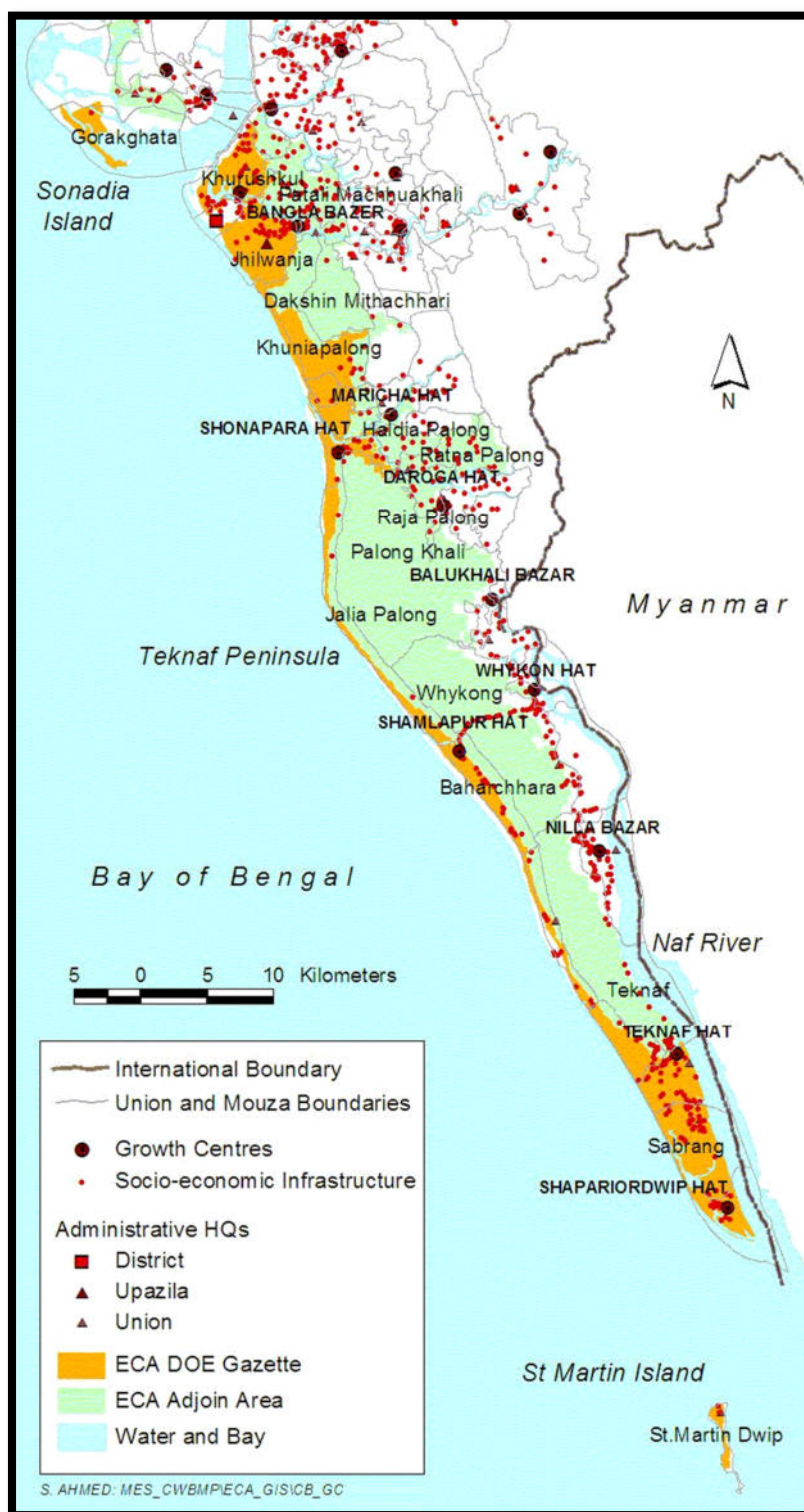


Figure V-20 ECAs in Cox's Bazar

April), monsoon (May to October) and winter (November to February; Bari & Dutta 2004). The sanctuary is rich in flora and contains several different ecosystems including hill forest, mangrove formation and sand-dune (Uddin et al. 2013).

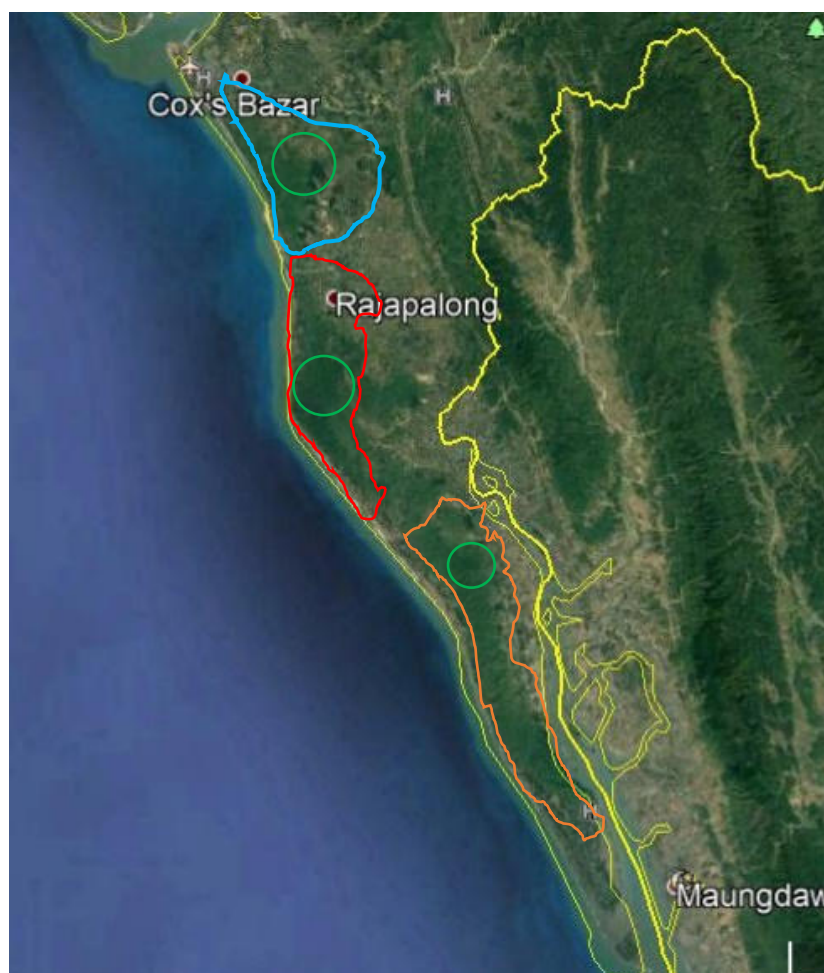


Figure V-21 Biodiversity rich areas in Ukhiya and Teknaf under three protected areas (Himchari National Park – blue border, Sheikh Jamal Inani Wildlife Sanctuary – red border, and Teknaf Wildlife Sanctuary – orange border) showing the best remaining habitats in green circle.

D. Socio-economic environment

1. Population

184 As of the 2011 Bangladesh census, Ukhiya has a population of 207,379. Males constitute 51.45% of the population, and females 48.55%. This Upazila's eighteen up population is 51749. Ukhiya has an average literacy rate of 16.8% (7+ years), and the national average of 32.4% literate⁴³. According to the 2011 Bangladesh census, Teknaf had a population of 200,607. Males constituted 51.81% of the population,

⁴³ "Population Census Wing, BBS". 2011. Data accessed August 7, 2020

and females 48.19%. The population aged 18 or over was 64,417. Teknaf had an average literacy rate of ~26% (7+ years), against the national average of 32.4%⁴⁴.

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

185 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 V-22). Unlike most of Bangladesh, about half of Cox's Bazar district is hilly; on the eastern border with Myanmar are the Arakan hills. Due to sandy soil, agricultural cultivation is not very suitable in Teknaf. In Teknaf, only 5.5% of the land is cultivable with a cropping intensity of 136%, well below the 193% national average. Most of Teknaf consists of highlands. The rest is tidal floodplain (19.57%) with high salinity and piedmont plain (9.03%). 39% of Teknaf comprises of forests (Masakazu and Tani, 2017). The Naf river, located east of the Upazila and forming a natural border with Myanmar, inundates land close to the riverbanks 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 labor income for poorer households (WFP, 2017).

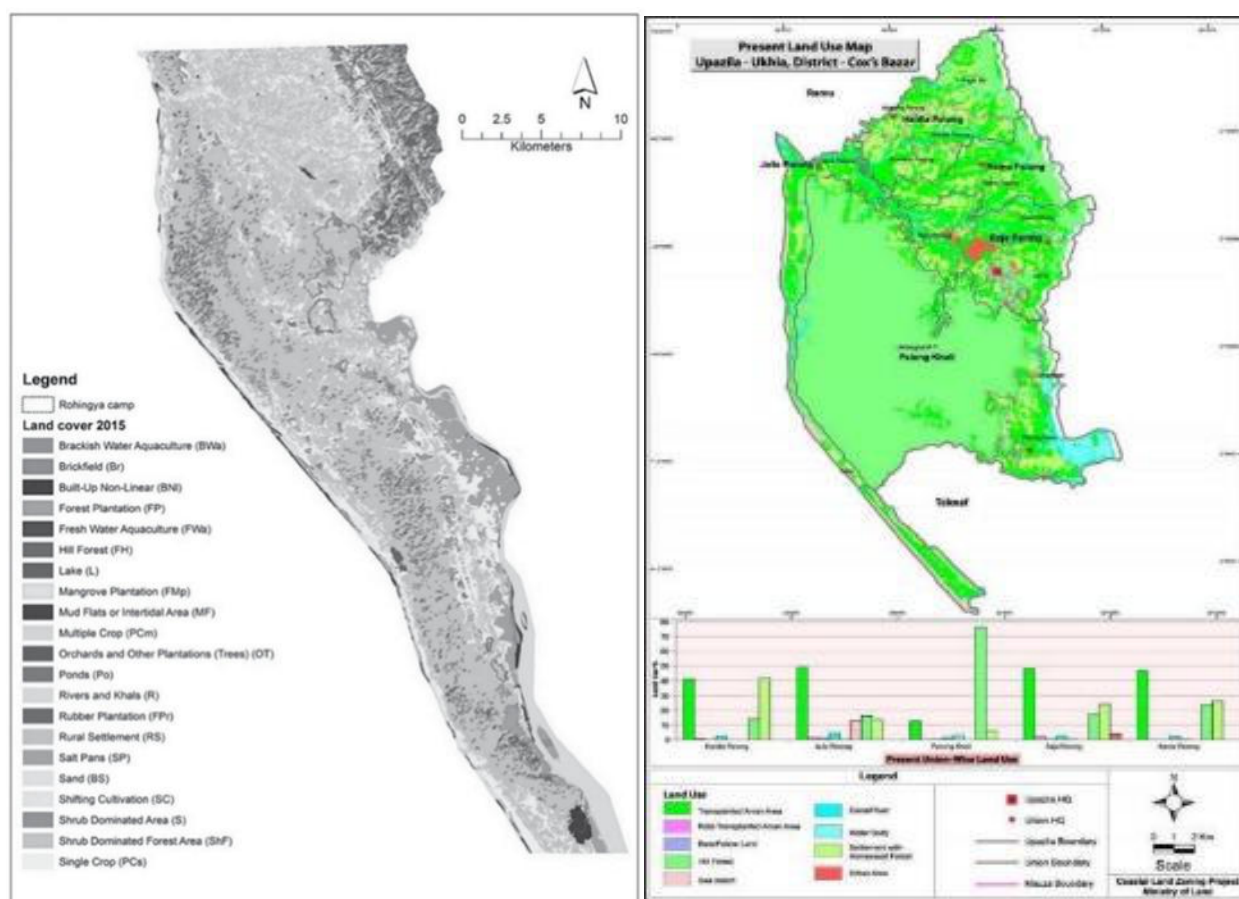


Figure V-22 **Land use map of Teknaf and Ukhiya**

⁴⁴ http://en.banglapedia.org/index.php?title=Teknaf_Upazila, date accessed: 7 August 2020

3. Income source

186 **Teknaf:** Main sources of income Agriculture 44.95%, non-agricultural labourer 6.51%, commerce 21.88%, transport and communication 1.96%, service 4.27%, construction 0.79%, religious service 0.36%, rent and remittance 2.46% and others 16.82%. Ownership of agricultural land Landowner 27.34%, landless 72.66%; agricultural landowner: urban 18.86% and rural 29.28%⁴⁵.

187 **Ukhiya:** Main sources of income Agriculture 54.40%, non-agricultural labourer 10.61%, industry 0.36%, commerce 15.05%, transport and communication 3.40%, service 0.34%, construction 1.45%, religious service 0.34%, rent and remittance 1.46% and others 12.95%⁴⁶.

4. Access to electricity and sanitation

188 **Teknaf:** Access to electricity - All the wards and unions of the upazila are under rural electrification network. However, 17.91% of the dwelling households have access to electricity. Sources of drinking water - Tube-well 81.78%, tap 0.96%, pond 9.61% and others 7.65%. Sanitation - 36.15% (rural 29.20% and urban 66.44%) of dwelling households of the upazila use sanitary latrines and 38.95% (rural 43.83% and urban 17.68%) of dwelling households use non-sanitary latrines; 24.90% of households do not have latrine facilities.

189 **Ukhiya:** Access to electricity - All the unions of the upazila are under rural electrification network. However, 19.03% of the dwelling households have access to electricity. Sources of drinking water - Tube-well 81.92%, tap 0.47%, pond 3.26% and others 11.34%. Sanitation - 31.27% (rural 28.70% and urban 50.34%) of dwelling households of the upazila use sanitary latrines and 43.66% (rural 45.42% and urban 30.60%) of dwelling households use non-sanitary latrines; 25.07% of households do not have latrine facilities.

⁴⁵ http://en.banglapedia.org/index.php?title=Teknaf_Upazila, date accessed: 7 August 2020

⁴⁶ http://en.banglapedia.org/index.php?title=Ukhia_Upazila, date accessed: 7 August 2020

VI. ANTICIPATED IMPACTS AND MITIGATION MEASURES

A. Introduction

190 An environmental impact is defined as any change to an existing condition of the environment. Findings of the assessment are presented according to pre-construction, construction and operational periods. The impacts will be determined as significant, positive or negative, direct or indirect, long term or short term. The magnitudes of environmental effects have been expressed quantitatively where possible, but in most cases qualitative evaluations are made based on past experience. This Chapter of the Environmental Impact Assessment Report describes the probable environmental effects resulting from the implementation the Project during the preconstruction, construction and operating period.

B. Impact assessment method

1. Scope of assessment

191 The scope of the assessment captures the understanding on the envisaged risks and impacts assessed during the scoping exercise of this impact assessment study as well as the risks identified during baseline assessment and impact evaluation process. The key environmental and social issues identified are further elaborated in the following sections.

(h) Spatial scope of assessment

192 The ADB SPS stipulates that the spatial scope of impact analysis should be shaped by consideration of the project's area of influence. The area of influence for a project is defined in the SPS (p.06) as follows:

“Impacts and risks will be analyzed in the context of the project's area of influence. This area of influence encompasses (i) the primary project site(s) and related facilities that the borrower/client (including its contractors) develops or controls, such as power transmission corridors, pipelines, canals, tunnels, access roads, borrow pits and disposal areas, and construction camps; (ii) associated facilities that are not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project; (iii) areas and communities potentially affected by cumulative impacts from further planned development of the project, other sources of similar impacts in the geographical area, any existing project or condition, and other project-related developments that are realistically defined at the time the assessment is undertaken; and (iv) areas and communities potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location. The area of influence does not include potential impacts that might occur without the project or independently of the project. Environmental impacts and risks will also be analyzed for all relevant stages of the project cycle, including preconstruction, construction, operations, decommissioning, and postclosure activities such as rehabilitation or restoration.”

193 Given the scale and context of the present project, the focus of impact analysis is squarely on the first of the above categories, the primary project sites. As noted in the project description earlier in this report, the project does not have any associated facilities as defined by the ADB SPS. With regards to potential cumulative impacts, there are no other developments planned in the vicinity of the package sites. However, given the absence of many significant receptors, remote locations devoid of human settlements in most cases and the fact that the facilities being constructed under this project at these locations are partly replacements for very similar components and are to be built within the same multipurpose cyclone shelter

footprint, a cumulative effect would be difficult to discern. Finally, the project facilities are so limited in scale that their construction and operation do not seem likely to directly or indirectly cause other future developments of any significance.

194 With regards to the primary project sites and their access roads and possible borrow pits, the analysis of impacts in this report takes into account potential impact receptors located within 150-200 m of the sites. This is a standard rule of thumb based on the assumption that impacts such as noise, dust and disruptions would not be experienced strongly beyond that distance, except in extreme or special circumstances. Within that general zone, primary consideration is given to receptors situated closest.

(i) Temporal scope of assessment

195 Analysis of impacts and definition of suitable mitigation measures should take in all phases of the project's evolution. Impacts may arise most obviously and visibly during construction, but the impacts of design and siting decisions made in the preconstruction phase, as well as the effects of intended and unintended activity at facility sites over the entire duration of the infrastructure's operating period, also need to be considered.

196 **Pre-construction phase (design impacts):** The design process offers considerable opportunities to reduce environmental impacts, through appropriate choice of materials, systems, work processes and equipment. For example, equipment and climate-control systems with the lowest associated greenhouse gas emissions (e.g., high-efficiency heating equipment, electric motors and lighting), as well as energy saving features (e.g., extra insulation, double-glazed windows, passive solar heat capture) should be incorporated in the designs to the greatest extent feasible. Incorporating such elements will help to maximize climate change mitigation as a feature of the project.

197 **Pre-construction phase (siting impacts):** The selection of a facility site has the potential to generate environmental impacts based on:

- (i) the physical characteristics of the site itself (e.g., topography, soils, drainage, exposure to natural hazards, past and present land uses);
- (ii) the proximity of the site to impact receptors (e.g., water bodies, sensitive habitats, residences, schools, hospitals, public spaces);
- (iii) the amount and type of work required to connect the facility to transport networks and service infrastructure; and
- (iv) the distance between the facility and other facilities to which it is functionally linked.

198 **Construction phase impacts:** Impacts likely to arise during the construction phase relate to the physical activities that take place both at construction sites and at locations where related activity occurs, such as access roads, haul roads, and any borrow pits, quarries or spoil dumps established specifically to support construction of the site or sites in question. Although infrastructure construction is an inherently disruptive activity, many impacts of construction activity are well understood and amenable to minimization with appropriate construction site management.

199 **Operation phase impacts:** Impacts during use of infrastructure are generally of lesser magnitude and severity than construction impacts, and arise from regular operations and maintenance activity, but also from things that go wrong with these activities, such as accidents, fires, explosions and releases of harmful substances. Proper preparation and use of operations and maintenance manuals and protocols, as well as training of personnel and regular monitoring, are key means of preventing and minimizing operation phase impacts.

2. Assessment methods

200 Potential impacts were initially identified through a screening checklist (Annex B). Some common indicators used to define impact are its duration, its spatial effect, ability to prevent or reverse negative effects and mitigation measure effectiveness. In practice, each planned activity under the Project works was checked for its potentials to cause negative and positive impacts on the social, economic, physical and ecological environments. Environmental impacts were grouped according the Project stage when they are likely to occur, namely the pre-construction, construction and operation phases of the Project's development. The significance of impacts was defined according to their severity extent and duration using the adjectives, low, moderate high, significant, positive or negative; direct, indirect and cumulative during Pre-construction, Construction and Operation periods of the Project alignment. The definition of these terms as applied to the Project are as follows:

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

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

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

(a) Risk Assessment Matrix

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

204 The 'magnitude of impact' is a 5-point based scale set by expert's judgement. The scale and its explanation are given in Table VI-1.

Table VI-1 Explanation and assignment of scores to 'magnitude of impact'

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

		or environmental media	environmental media		
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205 The 'likelihood' is also a 5-point based scale set by expert's judgement. The scale and its explanation are given in Table VI-2.

Table VI-2 Explanation and assignment of scores to 'likelihood'

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

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

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

207 The score of 'Risk' ranges from 1 to 25. The score is classified in 3 classes. The explanation is given in

208 Table VI-3. The score matrix for risk assessment has been used to identify the priority environmental impact and their mitigation plan.

Table VI-3 Two-dimensional risk assessment matrix

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

(b) Identification of activities and receptors

209 Analysis is shaped by an understanding of impacts as a function of two factors: (i) the nature of project activities; and (ii) the characteristics of impact receptors, i.e., the people and ecosystems that experience the effects of a project activity. The significance of a particular impact is determined by both.

Impact significance has been weighed for each of the project's infrastructure components based on information about the planned facilities and their likely modes of construction and operation, as well as knowledge of the human and environmental receptors in the vicinity of each site.

(c) Objectives of mitigative measures

210 The central goal of impact assessment is to determine how best to mitigate (make less serious, severe, or damaging) potential negative effects before they arise. As outlined in the SPS, proactive measures to mitigate impacts fall into three categories: (i) measures aimed at preventing an impact from developing at all; (ii) measures to reduce the occurrence or minimize the severity of impacts that cannot be fully prevented; and (iii) measures to compensate for damage caused by impacts that cannot be prevented or minimized to acceptable levels. This prevent-minimize-compensate framework is understood as a hierarchy, with impact prevention being the most desirable mode of mitigation, and compensation being considered as a last resort and only in the case of impacts that cannot be adequately addressed through design changes or application of effective minimization.

C. Risk assessment

211 **Subprojects setting:** As discussed earlier, the cyclone shelters proposed for construction will be constructed within the GPS boundaries. However, whether the existing buildings needed to be demolished or the facilities will be constructed away from the existing GPSs are yet to know. In such cases, where existing facilities are to be expanded, the ADB SPS (2009) stipulates the following:

“When the project involves existing activities or facilities, relevant external experts will perform environmental audits to determine the existence of any areas where the project may cause or is causing environmental risks or impacts. If the project does not foresee any new major expansion, the audit constitutes the environmental assessment for the project. A typical environmental audit report includes the following major elements: (i) executive summary; (ii) facilities description, including both past and current activities; (iii) summary of national, local, and any other applicable environmental laws, regulations, and standards; (iv) audit and site investigation procedure; (v) findings and areas of concern; and (vi) corrective action plan that provides the appropriate corrective actions for each area of concern, including costs and schedule.”

212 Since several subprojects have been implemented under the first phase of EAP in the surrounding vicinity of the proposed subproject areas, the following documents have been consulted as ‘audit reports’: (i) Emergency Assistance Project: Palongkhali Substations (Package EAP/BREB/W2) Initial Environmental Examination (URL: <https://www.adb.org/projects/documents/ban-52174-001-iee-0>); (ii) Emergency Assistance Project: Ukhiya School-cum-Cyclone Shelter (Package EAP/BREB/W8) Initial Environmental Examination (URL: <https://www.adb.org/projects/documents/ban-52174-001-iee-2>); (iii) Emergency Assistance Project: Ecological Assessment Report (URL: <https://www.adb.org/projects/documents/ban-52174-001-emr-3>); (iv) Emergency Assistance Project: Environmental Monitoring Report (January-June 2020) (URL: <https://www.adb.org/projects/documents/ban-52174-001-emr-2>). All these reports are published on ADB website. The ecological report was prepared as an primary assessment of the local ecology and the projects impact which has been used as the base of the ecological assessment in the IEE.

213 Following the method given in Methodology (Chapter VI, Section B) an impact matrix was developed for the subproject as shown in Table VI-4 below. This matrix serves the basis of the impact assessment and Environmental management plan (EMP).

Table VI-4 Risk Matrix of evaluation of Identified Environmental Impacts and Risks of the proposed subproject

Potential Impacts	Impact Sign (beneficial = +ve Detrimental = -ve)	Magnitude	Likelihood	Risk Score	Impact sizeα	Impact typeβ	Mitigation possible? (y/n)	Residual impact*
Environmental Impacts During Planning phase (if not well planned)								
Permits, clearances, no objection certificate etc.	-	5	4	20	L	D	Y	N
Impacts of Extreme climatic event	-	3	3	9	L	D	Y	N
Protection of Asian elephant	-	5	1	5	R	I	Y	N
Failure to consider site specific hydrological system	-	5	4	20	L	D	Y	N
Loss of structures and existing utilities	-	5	1	9	L	D	Y	N
Sources of materials	-	3	3	9	L	D	Y	N
EMP implementation training	-	4	4	16	L	D	Y	M
Environmental Impacts During Construction Phase								
Damage to physical and Cultural Heritage	-	1	1	1	L	D	Y	N
Removal of forest area/vegetated area	-	3	4	12	L	D	Y	M
Blockage of streams/change hydrological regime	-	4	4	16	L	D	Y	N
Construction work camps and pollute local waterbody/soils	-	3	3	9	L	D	Y	M
Excavations and soil disturbance	-	3	2	6	L	D	Y	N
Access road construction and disturbance local ecology	-	2	2	4	L	D	Y	N
Pile driving generated noise, vibration and soil/water pollution	-	3	5	15	L	D	Y	N
Waste pollution	-	3	4	12	L	D	Y	N
Water quality	-	3	4	12	L	D	Y	N
Air Quality	-	3	4	12	L	D	Y	N
Noise Level	-	3	5	15	L	D	Y	N
Hampering biodiversity protection in the region	-	3	2	6	L	D	Y	N
Socio-economic disturbance	-	2	2	4	L	D	Y	N
Lack of worker facilities	-	3	5	15	L	D	Y	N
Worker health and safety	-	5	5	25	L	D	Y	N
Community health and safety (including school going children)	-	5	5	25	L	D	Y	N
Site reinstatement	-	4	3	12	L	D	Y	N
Employment Generation and Increase in income	+							
Enhancement of Community Development Service	+							
Skill Enhancement	+							

Potential Impacts	Impact Sign (beneficial = +ve Detrimental = -ve)	Magnitude	Likelihood	Risk Score	Impact size ^a	Impact type ^b	Mitigation possible? (y/n)	Residual impact ^c
Environmental Impacts During O&M Phase								
Hill/soil erosion and downhill siltation	-	3	3	9	L	I	Y	M
Site integrity and security risk (i.e. landslide)	-	3	3	9	L	I	Y	N
Water contamination from water usage	-	2	2	4	L	D	Y	N
Sludge management	-	2	2	4	L	D	Y	N
^a Impact Size: L = Local; R = Regional ^b Impact type: D = Direct; I = Indirect ^c Residual impact: H = High; M = Medium, L = Low, N = None								

D. Discussions of potential impacts and suggested mitigation measures

214 Discussions made in the following paragraphs are based on the risk matrix evaluated and presented in Table VI-4.

1. Impacts during Planning Phase

(a) Site clearance

215 **Potential impacts:** The entire subproject region (Ukhiya and Teknaf) is home to several PAs (see para 181 - 183). Additionally, law of Bangladesh Government requires that any construction needs permission from local authorities prior starting the construction phase. Failure to obtain necessary consents, permits, NOC's can result in design revisions and/or stoppage of the Works. Failure to obtain No Objection Certificate from the local authority can hamper the entire project, even stop the construction project. In this case, the subproject's land is already available to the authority as it is government owned land.

216 **Mitigation measures:** (i) Obtain Environmental Clearance Certificate (ECC) from Department of Environment and NOC from Forest Department for the land; (ii) acknowledge in writing and provide report on compliance all obtained permits, clearance, NOCs, etc.; (iii) collect permission from local upazila parishad prior construction.

(b) Impact of extreme climatic events

217 **Potential impacts:** Ukhiya is located in the hillock areas and prone to landslides/mudslides and erosion. The region is also vulnerable to flash floods during heavy rainfall events. 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.

218 **Mitigation measures:** (i) Ensure adequate water passage under the structure and shape the associated landscape so that water can be drained quickly from the site; (ii) ensure selection of latest weather coated painting and construction materials so that the structures can withstand heavy rainfall and flooding damage; (iii) ensure flood return period and local waterlogging information being considered in the

design phase; (iv) ensure that heavy rainfall events can be converted into safe pathogen free water storage for long-term use considering the modern Rain Water Harvesting (RWH) technologies; (v) include solar panels and energy saving lights in design.

(c) Asian elephants

219 **Potential impacts:** Rare Asian elephants live in the forest of Ukhiya and Teknaf. Large structure can tract elephants and pose threat to human life and structure alike. Additionally, elephants may see the structures as a threat to their habitat which may place the region to additional vulnerability. However, proposed sites are already used as GPS and no reported threat of elephant attacks are reported.

220 **Mitigation measures:** (i) assessment of whether the access roads to the cyclone shelters cross elephant movement path; (ii) if any elephant crossing path is encountered with, post sign boards, declare the area as silent zone.

(d) Failure to consider local hydrological system

221 **Potential impacts:** The region is hilly and landslide, erosion prone. All the sites except Shah Porir Dwip are located close to local perennial stream. The local streams are used for irrigation and drainage purpose. Failure to consider these streams in the siting and design planning may lead to local waterlogging problems associated with lack of irrigation water in the vicinity. Drawing from the previous projects being implemented in the region, the impact is envisaged to be detrimental. Even such hazard may occur during construction when local topography and hydrological system is tampered with.

222 **Mitigation measures:** (i) detail assessment of the microhydrology 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

(e) Landscape and existing utilities

223 **Potential impacts:** Often construction of structure may disrupt the existing utilities installed underneath the soils. In this case, the proposed structures are within the existing building complex. It is possible that the new construction will interrupt the existing utilities.

224 **Mitigation measures:** (i) Investigation before construction and formulation of plan of restoration of existing utilities within shortest time is recommended. The plan must be formulated with coordination with LGED, contractor and the field level construction supervisor. The plan must be shared with the school committees and approved by them.

(f) Material sourcing

225 **Potential impacts:** The region is vulnerable to hill erosion and sedimentation. There are a few illegal sand quarries in Ukhiya 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.

226 **Mitigation measures:** 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.

(g) EMP implementation training

227 **Potential impacts:** 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.

228 **Mitigation measures:** (i) conduct daylong EMP training with the engineers and workers for each project site; (ii) follow up with toolbox trainings and environmental management specific trainings; (iii) arrange regional training for contractors and implementing LGED engineers.

2. Impacts and mitigation measures during Construction Phase

(h) Impacts from inadequate construction planning

229 **Potential impacts:** Inadequate construction planning may lead to local disasters. For example, improper planning sequence may disrupt the continuing education in the GPSs which are expected to be open during construction, if not planned to demolish. It has been experienced often that toilets or water sources has been demolished during construction and reinstated at the end period of construction, which deprived the school children, staff and locals to access the toilet and water facilities. Therefore, if the implementation of site-specific mitigation measures is not properly planned - including the clear and agreed assignment of responsibility - then it is probable that little appropriate action will be taken by construction contractors to prevent and minimize the environmental impacts of their activities. The construction is to be done near the primary school buildings where children with max age 14 tend to play around. Un attended equipment, burrow pits, sharp objects etc may be of a major threat for them, even cause injuries.

230 **Mitigation measures:** (i) This is of utmost importance to note that this IEE all the 14 proposed cyclone shelter sites and is not site specific since the detail design has not been on board. This IEE actually indicative of what needs to be considered during design and planning phase. Therefore, the Environmental Management Plan (EMP) stipulated in this EMP needs to take as advice for design and to avoid environmental consequence; (ii) To effectively prevent and minimize impacts that could arise during construction, mitigation measures specified in the EMP need to be incorporated in bid documents and contracts, and each contractor must be required to develop a Contractor Environmental Management Plan (CEMP) for each cyclone shelter site reflecting all measures relevant to the contracted work, for approval before construction begins. CEMPs should include measures and sub-plans dedicated to waste management, soil protection, traffic management, wastewater management, environmental health and safety, and emergency response (relating to both accidents and spills). Additionally, CEMP should also include a plan for removal and disposal of existing waste tanks/demolished garbage (if any); including management of contaminated soil around them (which will be identified by pre-construction surveys conducted by the IAs). The contractors should also be required to produce a site-specific Environmental Health and Safety Plan (EHSP) for each of the sites under their control. Well before construction begins, each contractor should designate an Environmental Health and Safety Officer (EHSO) to manage implementation of the CEMP and EHSP.

231 Before construction can begin, each site must undergo a Site-specific Environmental Impact Assessment (SEIA) to be conducted by the IA. Construction planning must address any conditions stipulated in the SEIA report. The construction should start after the SEIA is approved by the DoE.

232 **Training:** Prior to the start of construction, training should be provided to relevant staff of contractors (including EHSOs) and IAs on the rationale for and implementation of the EMP, CEMPs, EHSPs and

specific mitigation measures, to enhance general understanding and clarify responsibilities with regard to implementation, including monitoring and reporting.

(i) Topsoil loss followed by soil erosion

233 Potential impacts: For the school cum cyclone shelters, four parameters have been considered for screening of environmental/ecological impacts during construction phase; these include access road, felling of trees, clearing of vegetation, and impact on aquatic (water) habitat. Significant excavation, cut and fill is expected. 3-story building will also need concrete mixing, although the extent of time may not exceed couple of weeks. Of the proposed sites package 6, 7 and 9 (Kocchopia GPS only) are located on elevated places or foothills and feature hillside water runoff and associated sedimentation. The hills are formed of sandy rocks with somewhat loose formation. All the mentioned areas are show sedimentation brought by water runoff from eroding hills. However, somewhat waterlogging is evident in Teknaf school sites. Most of the proposed construction of a school cum cyclone shelter would involve felling/clearing of trees/vegetation. There are water bodies (e.g., khal, pond) located close to the most proposed cyclone shelter location, so construction of the cyclone shelter is expected to generate adverse impact (e.g., through discharge of waste/ wastewater from sub-project activities, spills and leaks of oil/ chemical) on the aquatic habitat (in the absence of any mitigation/management). Moreover, except 2 sites located near to Naf rivers, all the sites are gently sloped towards nearest waterbody, which pose threat of waterlogging and flooding. Associated soil contamination is also a risk during construction at all sites, if equipment is poorly maintained (fluid leaks) or refueling and servicing are improperly carried out (spills). Both erosion and soil contamination are also risk at any local borrow pits used by the contractors.

234 Mitigation measures: (i) At the sloped sites, temporary slope protection measures such as swales and berms should be used to slow overland flows, promote infiltration, and direct runoff away from active work areas. Protective ground coverings, such as mulch, can also be used to protect areas of exposed soil from heavy rainfall and runoff; (ii) adequate water runoff passages should be considered by the design; structures, at not condition, should block the water passage; (iii) Any borrow pits established by contractors near any of the sites should be rehabilitated promptly once the required materials have been extracted, with slopes reshaped and revegetated to prevent the development of erosion problems; (iv) To prevent soil contamination, contractors should maintain equipment to a high standard and regularly monitor for leaks. Contractors must also adopt proper procedures for spill prevention during equipment refueling and servicing, including using impermeable mats under working areas to catch and contain drips and spills, and storing fuels, lubricants, coolants and other fluids only in designated areas with spill containment structures with free capacity at least 110% of the volume of the largest stored container. If the contractors establish any borrow pits, the same precautions should be taken there as well.

(j) Impact on air pollution

235 Potential impacts: The potential for dust generation during construction is significant for all project sites, given that the amount of rainfall is less in Cox's Bazar (annual average ~1000mm) compared to the national average (annual average ~2155mm) and brown sandy erosion prone soils. Additionally, possible air pollution from activities involved in cyclone shelter construction is likely to be significant since it is close to sensitive receptor like the school complex. The impact of air pollution is expected to be localized since the vehicles and other machineries are expected to be involved in construction on the roadside. 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 at school sites. Significant amounts of dust may also will arise from the roads that materials haulers are likely to use to access the site. These are unpaved and pass through urban areas, so there exists some potential for dust impacts on residents living along these roads. If the contractors working at any of the project sites source

sand and gravel directly from borrow pits near residential areas, dust and emissions impacts could also arise at those sites. The dust can harm the school going children and teachers (and other staff) for long since the constructions are supposed to be in close range of the exiting school buildings.

236 **Mitigation measures:** (i) The first task of the contractors to devise the CEMP as instructed earlier and approved by the Environmental specialist from IA. They will only approve the CEMP when satisfied with safety measures planned for the sites to protect the children and teachers from air pollution ; (ii) contractors should first demarcate the construction site with high plastic/tin made fence so that heavy dust cannot escape from the site; (iii) contractors should suppress dust at the sites and along any unpaved haul road in the vicinity of schools by lightly spraying the road surface with water as needed. The water spraying needs to be frequent so that no dust is visible near the school; (iii) haul truck loads should be tightly covered with tarpaulins and wetted prior to departure; (iv) to prevent undue emissions impacts, contractors should maintain haul trucks and other equipment to a high standard; (v) any borrow pits used by contractors should be well away from school, residential areas or individual residences; (vi) construction equipment, borrow pits, sharp object, harmful chemicals etc should be put away safely from the reach of the children playing within the boundaries of the schools.

(k) Impact on surface water quality

237 **Potential impacts:** The most schools sites are vulnerable to water pollution or contamination from stockpile materials and construction waste. As stated earlier, most of the stream near the proposed sites are perennial and therefore only visible at rains. Construction of structures and putting construction materials on the path of the streams may block the flow and cause flooding and waterlogging. Moreover, hill runoffs may also bring eroded materials and cause sedimentation problem. As most of the sites are gently sloped towards nearby surface waterbody, any poorly managed site, specially where construction materials not kept safely under Tripoline and silt-curtains, may cause surface water pollution. 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. Mismanagement of sediments/silts may lead to surface water pollution in the entire drainage network. Hammering during sit preparation on the hillside roads can lead to localized landslide or accelerate erosion. At hillside Sections there is a potential of erosion due to rainfall-runoff. Earthwork activities during construction at this point may result in drainage congestion. Impact of direct discharge of bentonite/mud fluid generated from pile driving site to the adjacent stream/drainage network. The effects may be short term severe, but manageable by close monitoring and mitigation measures.

238 **Mitigation measures:** Implement eco-friendly waste management system: practice waste minimization, reuse and segregation; provide adequate waste bins, enforce onsite rule of throwing waste into bins; provide separate storage area for solid waste and hazardous waste to contain spill area; and implement measures to mitigate sedimentation/siltation. In all sites follow a Removed Soil Management Plan linked to the Excavation Segmentation/Management Plan, specifying, e.g., separate areas for stockpiling "reusable soils" & "unsuitable & excess soils" appropriate stockpiling areas, on flat grounds & away from or not obstructing main surface drainage routes disposal of unsuitable & excess soils as soon as possible hauling trucks to be required appropriate cover & min 2 ft freeboard employ any combination of the following measures to prevent stockpiled soils & fine aggregates from being eroded or carried away by wind and rain: silt fences, sediment traps, sandbags, barrier nets, earth bunds, speed stilling humps along surface drainage routes, limiting stockpile to a maximum height of 2 m, &/or diversion drains to reroute surface runoff away from stockpiles, whichever would be appropriate for the site & site conditions. Monitor immediate low areas or valleys for drainage congestion. If drainage congestion seems eminent, excavate or clear excess sediment/wash materials to clear congestion. Install silt protection curtain/steel nets

alongside hill side roads. All other effluents not to be disposed of directly into natural waters, but via settling basins to allow suspended sediment to settle out. All earthworks must to be conducted during dry season/dry spell to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low-lying areas. Garbage disposal service to be provided, Concrete refuse reused or disposed of without habitat loss.

(l) Impact on groundwater resources

239 **Potential impact:** 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). There are small hilly streams on the RoW potentially be contaminated seepage wastes from workers camp and stockpile materials. The effects are short term, minor and reversible by mitigation measure.

240 **Mitigation measures:** Please follow the mitigation measures for surface water contamination.

(m) Impact on noise

241 **Potential impacts:** The parameters considered for screening of noise impacts during construction phase of a school cum cyclone shelter include intensity of involvement of heavy machineries, type of heavy machineries, type of activities and proximity of the work area to school compound. Construction of the cyclone shelter involves use of equipment/machines producing significant noise (e.g., generators, pile driver). The proposed sites are in the existing school complex. Therefore, noise pollution would be significant (in the absence of mitigation measures). Similarly, use of stone crushers, excavation works, and movement of vehicle would generate air pollution. Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times.

242 **Mitigation measures:** Planning activities in consultation with Local Authority is suggested so that activities with the greatest potential to generate noise are conducted during periods of the day, which will result in least disturbance. Use of high noise generating equipment shall be stopped during nighttime.

(n) Impact on Vegetation and hill erosion

243 **Potential impacts:** The sites are vegetated. It is likely most sites will require vegetation removal up to some extent. School areas are small and government owned. It is expected that the new construction will be built within the boundary of the schools unless land acquisition is absolutely necessary. However, it has been assured by the IAs that no land acquisition will be done. Therefore, it is expected that vegetation removal will take place within the school boundary. On hilltop or elevated sites, vegetation removal has significant negative impact. The hills are made of sandy rocks and thus erosion prone. Vegetation offer a great resistance to the local erosions and thus protects the hills from landslides. Removal of erosion may trigger local hillsides and erosion and also give increase to local sedimentation problems.

244 **Mitigation measures:** (i) Site location needs to carefully chosen so that the least amount of vegetation have to be removed; (ii) in case of absolute necessity, a plan for replantation with native hill grown species needs to be prepared in advance of vegetation removal, which has to be approved by the environmental specialist of IA; (iii) in case of slope vegetation removal, a protection plan must be devised in advance in combination with steel net, geo-cell, bush planting, RCC toes, organic matter reinforcement etc.; (iv) devise site-specific plantation plans before the construction starts and update this EMP, identify

how many trees are to be planted along with bushes and grass to project hill sides; chose only native species.

(o) Pollution from solid waste and sewage effluent

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

246 The waste stream during construction at most project sites can be expected to consist of (i) process water; (ii) excavated material not used in backfilling; (iii) packaging and containers; (iv) solid waste generated by workers (food and food packaging); (v) sewage from any temporary on-site toilets; and (vi) grey water from any temporary on-site kitchens and wash-up facilities. Based on the limited scale of the proposed buildings and absence of plans for any batch plants, process water is likely to be quite limited. Construction waste should also be quite limited, due to the relatively small footprint of planned buildings and the sandy local soils, which is likely to be appropriate for backfilling.

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

248 **Mitigation measures:** Receptacles for solid waste should be provided for the use of workers, and their contents should be disposed of in officially sanctioned local landfills. Construction waste should also be disposed of in legal local landfills. Clean construction waste such as excess soil or rubble should be used in landscaping on site or given to landowners and developers seeking fill material. As rudimentary standards prevail at local landfills, the contractors should take every opportunity to reduce the amounts of waste generated, and also collect recyclable material for processing by local operators. Grey water from temporary on-site kitchens and wash-up facilities should be directed to a settling basin, which should be filled in upon site closure. With regards to sewage, connections to local sewerage (or septic system in the case of worker camp) should be installed as the first step in the construction process, and temporary toilets connected to it.

(p) Disturbance in wildlife

249 **Potential impacts:** Clearing of existing vegetation may result in loss of associated ecological habitats and their fauna. Noise, vibrations, and intrusive activities related to construction works may scare away animals remaining onsite after vegetation clearance. Elephant-human conflicts may arise if elephant movement pathways are disrupted. Wildlife may be impacted by vegetation clearance and the temporary

loss of small habitat locations at pole sites. However, subproject areas are located in the sites where open spaces are already provided with existing school buildings, which are devoid of any wildlife, vegetation or elephant. Therefore, no impact is predicted.

250 **Mitigation measures:** No mitigation measure is necessary. However, during detail design, the mitigation measures needs to be updated based on the latest information.

(q) Pollution from construction camps

251 **Potential impacts:** Poor siting and improper management of construction camps may lead to several adverse impacts on environment: (i) loss of vegetation due to use of wood as fuel source for cooking, (ii) deterioration of nearby surface water quality, (iii) compaction and contamination of soil due to uncontrolled disposal of solid waste, (iv) increase in generation of domestic solid waste; (v) temporary air an noise pollution from machine operation; and (vi) poor sanitation resulting to transmission of communicable diseases. In the subproject area, construction camp is suggested to be establish outside of the camp area to avoid the predicted impacts.

252 **Mitigation measures:** Please follow the mitigation measures stipulated in para. 234 and 244.

(r) Impact of traffic

253 **Potential impacts:** In most cases, the proposed sites are adjunct to nearby main roads. However, earthen uphill roads run to connect few sites. Given the main road's traffic volume, it is expected that during peak construction time when heavy vehicles and machineries will be transported at full scale, the extra traffic movement will disrupt the normal traffic at a moderate significance. Especially sites located in the suburb areas, a traffic plan needs to be devised before construction goes onboard.

254 **Mitigation measures:** A traffic management plan (TMP) must be devised prior to construction and approved by the environmental specialist from IA and approved from local zilla parishad/police station. As sample TMP has been attached with this IEE as Annex C.

(s) Occupational, Health, and Safety Risks

255 **Potential impacts:** Occupational hazards may arise if not properly managed (risk of fall and electrocution, etc). Increase in dust may cause health problems to workers. Insufficient supply and improper use of personal protective equipment (PPE) and lack of safety procedures may cause injuries or fatal accidents.

256 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.

257 **Mitigation measures:** There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in populous areas. Workers need to be mindful of the occupational hazards, which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. The generic measures suggested are as followed: Comply with requirements of Government of Bangladesh Labour Law of 2006 (amended in 2013) and all applicable laws and standards on workers' health and safety (H&S). Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. Produce and implement a site H&S plan which include measures as: (i) excluding the public from

worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing H&S training for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records.

258 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 D. A graphical guideline specially prepared for ADB funded project has been prepared in English language and attached with this IEE as Annex E. Text version of the guideline (in English) is also attached as Annex F. 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 G, Annex H and Annex I as a response to COVID-19.

(t) Community Health and Safety Hazards

259 **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.

260 **Mitigation measures:** 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 environment management specialist within 48 hours of receipt of such complaint/grievance.

261 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 stricting following the guideline provided by Bangladesh Government and ADB is the key to combat COVID-19 at worksites. Please follow the instructions made in para. 258 for details.

3. Impacts and mitigation measures during Operation Phase

(a) Topsoil loss, erosion and landslide

262 **Potential impacts:** Not much erosion is expected since design is expected to consider tree removal and hill erosion effect. However, poor maintenance of hill protection structures and putting less care on the bush and native tree species that prevent hill erosion may dispel all the prevention efforts by planned in the design stage.

263 **Mitigation measures:** (i) Devise a plan of operation and maintenance of the hill protection efforts, allocate adequate manpower and budget for maintenance; (ii) strict monitoring of the hill protection structures/components established during construction.

(b) Water and sludge pollution

264 **Potential impacts:** Often lack of maintenance cause drainage blocks countenancing water pollution. Adequate drainage systems in the design phase will be adopted to pass perennial stream water and discharge wastewater generated from the cyclone shelters. However, poor maintenance can lead to drainage congestion and water pollution.

265 **Mitigation measures:** (i) Strict monitoring of drainage congestion; (ii) allocate adequate budget and manpower for maintenance.

VII. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

A. Purpose of this EMP

266 This environmental management plan (EMP) has been prepared for the ADB- supported Regional Upgrades of Sanitary and Phytosanitary Measures for Trade Project, in accordance with the ADB's Safeguard Policy Statement 2009. Specific measures are developed in relation to the design, construction and operation of each project component, to address the physical, biological, cultural and socio-economic impacts identified and discussed in the chapter on Anticipated Impacts and Mitigation Measures of the Initial Environment Examination (IEE) report.

267 The EMP for the project defines mitigation and monitoring measures and identifies the institutions, responsibilities and mechanisms that will ensure their implementation. Such institutions and mechanisms will seek to ensure continuous improvement of environmental protection activities during the pre-construction, construction, and operation phases of the project, in order to manage adverse impacts.

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

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

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

B. Institutional Responsibilities

1. Oversight Body

270 The Office Refugee Relief and Repatriation Commissioner (RRRC) is acting as the coordinator on behalf the government to execute all interventions. RRRC and ADB are conducting regular coordination meetings involving all EA/IAs, relevant stakeholders including deputy commissioner (DC), Cox's Bazar, other development partners and agencies. ADB has established extended mission office in Cox's Bazar for close coordination, facilitation of sub-projects development and implementation.

271 A steering committee comprising higher officials from relevant ministries coordinated by ERD is formed to provide necessary guidance to expedite the sub-project development and implementation. An organogram of the institutional arrangements is presented in Figure VII-1.

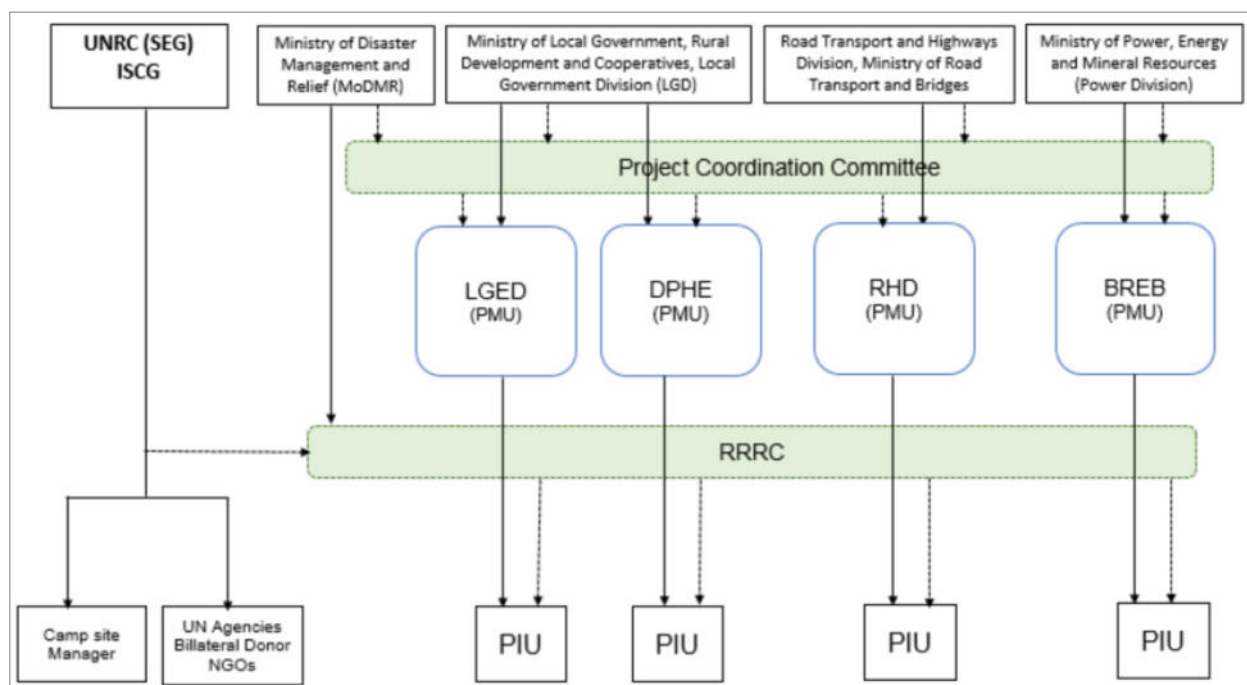


Figure VII-1 Project Organization Structure

2. Executing Agency / Implementing Agency

272 The Local Government Engineering Department (LGED) is the EA/IA for the Project. The EA/IA will coordinate environment safeguards planning and implementation and ensure that the environmental assessment and review framework is followed during subproject implementation. There is a safeguards focal person in the EA/IA. The EA/IA is assisted by PMCs. Consultants include an Environment Specialist engaged during project implementation.

3. Project Implementing Unit (PIU)

273 PIU is formed in LGED, with a dedicated safeguards focal person. PIU is assisted by DSC. Consultants include Environment Specialists engaged during project implementation.

4. Design and Supervision Consultants (DSC)

274 Once hired through bid processing, 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.

275 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 contractors

276 Contractors performing work on project components will be required to formulate contractor EMPs (CEMPs) with management systems for adverse impacts, e.g., dust control, noise control and traffic management, meeting the prescriptions of this EMP at a minimum. The CEMPs will be renewed on a yearly basis, submitted to the PMU for review, and to ADB for approval. Each civil works contractor will appoint an environment, health and safety officer (EHSO) to coordinate CEMP implementation. To ensure that the contractors comply with the EMP provisions, the PMU, with the help and technical support of the ADB (environmental consultant), will prepare and provide the following specification clauses for incorporation into the bidding procedures: (i) a list of environmental management requirements to be budgeted by the bidders in their proposals and (ii) environmental clauses for contractual terms and conditions. The contractors will also be expected to cooperate fully with local DoE inspectors. Contractors will submit monthly CEMP implementation reports to the PMU, and provide information including reports, monitoring results or other information relating to EMP implementation as requested by the PMU.

C. Monitoring and Reporting

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

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

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

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

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

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

281 The following table (Table VII-1) summarizes the environmental responsibilities of the parties identified for each stage in the project's development:

Table VII-1 Summary of environmental responsibilities during project development

Phase	Responsible Agencies	Environmental Responsibilities
Project Preparation	EA	Submit IEE and request local DoE to issue general permits Conduct IEE in accordance with ADB SPS 2009. Also collect permissions from local authorities (Zilla Parishad) and District Commissioner (DC) of Cox's bazar.
	ADB	Review and approve IEE, including EMP. Disclose on ADB website
Conceptual and Detailed Design	Design firms	Incorporation of environmental mitigation measures in detailed designs and bidding documents
	PMU, IAs	Update EMP based on approved detailed design, if necessary
	ADB	Approve updated EMP, if necessary
Tendering	PMU, IAs, design firms	Incorporate mitigation measures and the EMP clauses in tendering documents, civil contracts and contractors' construction management plans
	ADB	Review tendering documents, confirm project's readiness
Construction	EA, IAs	Advise on implementation of mitigation measures
	Contractors, EHSOs	Implementation of mitigation measures and conduct internal monitoring, supervision
	PMU	Coordinate grievance redress mechanism; supervise EMP implementation; conduct regular site inspections; conduct training; support PIU in preparing annual environmental progress report
	Licensed laboratory	Conduct quarterly environmental monitoring, prepare monitoring reports
	Local DoE	Advise on mitigation measures; provide comprehensive technical support to PMU, EA and IAs for environmental management; conduct training; conduct annual EMP compliance review
	ADB	Conduct review missions; review and approve annual environmental progress reports, including disclosure
O & M	PMU	Conduct EMP compliance review, instruct IA on environmental management requirements; prepare annual environmental progress report for first year of operation
	IAs	Implementation of mitigation measures as defined in EMP; conduct environmental monitoring following approved monitoring plan
	ADB	Review and approve environmental progress report, disclose on ADB project website

D. Assessment of project readiness

282 Before construction, the PIU will assess the project's readiness in terms of environmental management based on a set of indicators (Table VII-2) and report it to the ADB and the PMU. This assessment will verify that environmental commitments are being carried out and environmental management systems are in place before construction starts, or if this is not the case, propose corrective actions to ensure that all requirements are met.

Table VII-2 Indicators of project readiness in relation to environmental management

Indicator	Criteria	Assessment	
DoE approval	• DoE approves the IEE and ECC is being obtained	Yes	No
EMP update	• The EMP is updated after detailed designs are approved, and approved by ADB and DoE	Yes	No
Compliance with loan covenants	• The borrower complies with loan covenants related to project design and environmental management planning	Yes	No
Public involvement effectiveness	• Meaningful consultation completed • GRM established at entry point	Yes	No
Environmental supervision in place	• PIU supervision in place	Yes	No
Bidding documents and contracts with environmental safeguards	• Bidding documents and contracts incorporating the environmental activities and safeguards listed as loan assurances • Bidding documents and contracts incorporating the impact mitigation and environmental management provisions of the EMP	Yes	No
Contractor readiness	• Contractor EMPs (CEMPs) have been prepared and approved by PIU and PMU • Environmental, Health and Safety Management Plans (EHSMP) established for construction sites • Environment, Health and Safety Officers appointed • Assessment of potential disruption to utilities services conducted • Stakeholder interviews conducted to confirm issues if services are disrupted	Yes	No
EMP financial support	• Required funds have been set aside to support the EMP implementation according to the financial plan	Yes	No

E. Environmental Management Plan (EMP)

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

- Define the responsibilities of the project proponents in accordance with the three project phases (design, construction and operation);
- Facilitate the implementation of the mitigation measures by providing the technical details of each project impact, and proposing an implementation schedule of the proposed mitigation measures;
- Define a monitoring mechanism and identify monitoring parameters to ensure that all proposed mitigation measures are completely and effectively implemented;
- Identify training requirements at various levels and provide a plan for the implementation of training sessions;
- Identify the resources required to implement the EMP and outline corresponding financing arrangements; and Providing a cost estimate for all proposed EMP actions

284 The Environmental Management Plan (EMP) presented in Table VII-3. Only the prioritized risks are presented in the EMP for specific measures.

Table VII-3 Environmental Mitigation Plan (EMiP) for the Subproject

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
1. Project preparation and IEE development							
1.1	Impact screening	<ul style="list-style-type: none"> Negative impacts from project infrastructure development 	All	<ul style="list-style-type: none"> Prepare applications for impact assessment for all project locations and submit to DoE environment authorities for review Include special conditions, if any, in IEE update 	LGED	PMU, PIU	Approval of DoE; Approval of ADB
1.2	Due diligence	<ul style="list-style-type: none"> Impacts associated with existing facilities 		<ul style="list-style-type: none"> Visited all sites during IEE preparation and detailed Rapid Environmental Assessments completed 	ADB project preparatory mission	EA, ADB	ADB approval of IEE
1.3	Legal verification	<ul style="list-style-type: none"> Delays due to ownership conflict or unclear legal status 	All	<ul style="list-style-type: none"> Provide verification of land ownership for project component. 	IAs	PMU	ADB approval of IEE
1.4	Consultation	<ul style="list-style-type: none"> Potential conflict due to misinformation and inadequate project communication 	All	<ul style="list-style-type: none"> Conduct consultations in relation to all project components 	ADB project preparatory mission	EA, ADB	ADB approval of IEE
1.5	Grievance redress mechanism	<ul style="list-style-type: none"> Potential conflict and delays due to unhappy project affected people 	All	<ul style="list-style-type: none"> Define and establish GRM 	IAs, PMU	EA, ADB	ADB approval of IEE
2. Design phase							
2.1	IEE updating	<ul style="list-style-type: none"> IEE and EMP out of date due to changing conditions or plans 	All	<ul style="list-style-type: none"> Mitigation measures defined in this EMP will be reviewed, updated (if necessary) and incorporated into detailed designs to minimize adverse environmental impacts. 	PMU, PIU	EA, ADB	ADB approval of updated IEE
2.2	Bidding documents and contractors	<ul style="list-style-type: none"> Inclusion of mitigative action in legally binding documents to ensure implementation 	All	<ul style="list-style-type: none"> Include environmental provisions as cited in the EMP in the RFPs Include environmental clauses 	PMU, PIU	EA, ADB	EHS provisions in bid documents and contracts
2.3	Provisions for connection to service infrastructure	<ul style="list-style-type: none"> Potential for unplanned construction activity 	All	<ul style="list-style-type: none"> Confirm location, capacity, functionality and connection readiness of water, sewerage, electricity, heating and legal landfills to avoid wastewater dumping, ad-hoc connection arrangements, or inappropriate waste disposal in construction phase 	PIU, PMU	PMU	Precise locations and planned connection dates confirmed and documented
2.4	Integration of climate	<ul style="list-style-type: none"> Environmental and safety impacts from lack of climate- proofing, 	All	<ul style="list-style-type: none"> Review of flash flood and hydrological regime in the region and plan structures accordingly 	PMU	PIU	Climate-proofing measures evident

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
	change considerations in design	production of avoidable GHG emissions		<ul style="list-style-type: none"> Review extreme rainfall events and adopt technical and ecological solution for the sustainability of the structure 			in detailed designs Energy efficiency features evident in detailed designs
2.5	No objection from local authorities	<ul style="list-style-type: none"> Failure to obtain necessary consents, permits, NOC's can result in design revisions and/or stoppage of the Works. 	All	<ul style="list-style-type: none"> All the sites have own land available to the School Management Committee. LGED will contact the School Committees for land records and other necessary papers that are required for clearance for construction. The School Committees will issue the NOCs to LGED as well as local upazila parishad 	PIU, PMU	PIU	NOCs collected from each school authorities and corresponding upazila parishads
2.6	Existing utilities	<ul style="list-style-type: none"> Disruption of services 	All	<ul style="list-style-type: none"> Survey for existing utilities 	PIU, PMU	PMU	Survey report submitted by of existing utilities by PIU and other independent survey team, reviewed by ADB and approved by PMU.
2.7	Timing of construction activities	<ul style="list-style-type: none"> The existing primary schools are active. Therefore, noise and traffic movement from construction activities may hamper daily school activities like teaching 	All	<ul style="list-style-type: none"> Development of noise proof plan by PIU/PMU and agreed with the school committees 	PIU, PMU	PMU	Noise reduction plan formulated by the design consultants and submitted to PMU Plan reviewed and approved by PMU and ADB
2.8	EMP Implementation Training:	<ul style="list-style-type: none"> If the contractors and construction supervision engineers are not aware about the implementation of this EMP, the project may not proceed and comply with ADB and GoB environmental policies. 		<ul style="list-style-type: none"> Project manager and all key workers will be required to undergo EMP implementation including spoils management, Standard operating procedures (SOP) for construction works; health and safety (H&S), core labour laws, and applicable environmental laws. 	PMU	ADB	One two-day EMP implementation training held in Cox's bazar.

3. Construction phase

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
3.1	Contractors EMP (CEMP)	<ul style="list-style-type: none"> Occurrence of impacts due to lack of contractor action and weak oversight 	All	<ul style="list-style-type: none"> Review and approve CEMP prepared by each selected contractor, ensuring that all EHS provisions mentioned in bid documents and contracts are adequately addressed 	Contactor	PIU, PMU	CEMP done and approved by PMU and ADB for each of the 14-cyclone shelter site
3.2	Topsoil loss followed by soil erosion	<ul style="list-style-type: none"> Significant excavation, cut and fill is expected. 3-story building will also need concrete mixing, although the extent of time may not exceed couple of weeks. The impacts are negative but short/medium term, site-specific within a relatively small area and reversible by mitigation measures. Of the proposed sites package 6, 7 and 9 (Kocchopia GPS only) are located on elevated places or foothills and feature hillside water runoff and associated sedimentation. The hills are formed of sandy rocks with somewhat loose formation. All the mentioned areas are show sedimentation brought by water runoff from eroding hills. However, somewhat waterlogging is evident in Teknaf school sites. Most of the proposed construction of a school cum cyclone shelter would involve felling/clearing of trees/vegetation. except 2 sites located near to Naf rivers, all the sites are gently sloped towards nearest waterbody, which pose threat of waterlogging and flooding. Associated soil contamination is also a risk during construction at all sites, if equipment 	P-6, P-7, P-9	<ul style="list-style-type: none"> (i) At the sloped sites, temporary slope protection measures such as swales and berms should be used to slow overland flows, promote infiltration, and direct runoff away from active work areas. Protective ground coverings, such as mulch, can also be used to protect areas of exposed soil from heavy rainfall and runoff; (ii) adequate water runoff passages should be considered by the design; structures, at not condition, should block the water passage; (iii) Any borrow pits established by contractors near any of the sites should be rehabilitated promptly once the required materials have been extracted, with slopes reshaped and revegetated to prevent the development of erosion problems; (iv) To prevent soil contamination, contractors should maintain equipment to a high standard and regularly monitor for leaks. Contractors must also adopt proper procedures for spill prevention during equipment refueling and servicing, including using impermeable mats under working areas to catch and contain drips and spills, and storing fuels, lubricants, coolants and other fluids only in designated areas with spill containment structures with free capacity at least 110% of the volume of the largest stored container. If the contractors establish any borrow pits, the same precautions should be taken there as well. 	Contactor	PIU, PMU	<p>Constructions of swales and berms at sloped sites; slopes reshaped and revegetated; equipment quality check; no drainage congestion in site; Measures implemented as prescribed; Absence of erosion, spill marks, litter on ground</p>

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
		is poorly maintained (fluid leaks) or refueling and servicing are improperly carried out (spills). Both erosion and soil contamination are also risk at any local borrow pits used by the contractors.					
3.2	Noise Impacts on Environment and school children	<ul style="list-style-type: none"> Construction of the cyclone shelter involves use of equipment/machines producing significant noise (e.g., generators, pile driver). The proposed sites are in the existing school complex. Therefore, noise pollution would be significant (in the absence of mitigation measures). Similarly, use of stone crushers, excavation works, and movement of vehicle would generate air pollution. Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. 	All	<ul style="list-style-type: none"> Involve the school committees in the planning process of construction work. A plan needs to be devised before construction to avoid peak construction noise during school hours. One very effective method is to discuss with the school authority and settle for a time for heavy machinery usage. Heavy construction machineries should be used in agreements with the school committee to find out the best time for using noise generating equipment. Involve the community in planning the work program so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times. Use of pneumatic impact equipment shall be restricted 100m from noise sensitive locations such as the Buddhist Temple. Instead of pneumatic hammers electric, hydraulic hammers could be used. If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection. Reasonable and scientific construction site layout is a major way in reducing construction noise. Place the fixed noise sources on the construction site collectively to reduce the scope of noise impact. Utilize modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions and ensure that these are maintained to manufacturers' specifications at all times. 	Contactar	PIU, PMU	Measures implemented as prescribed; DoE prescribed noise limit maintained during school time

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
3.3	Water Pollution	<ul style="list-style-type: none"> The most schools' sites are vulnerable to water pollution or contamination from stockpile materials and construction waste. hill runoffs may also bring eroded materials and cause sedimentation problem. most of the sites are gently sloped towards nearby surface waterbody, any poorly managed site, specially where construction materials not kept safely 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. Mismanagement of sediments/silts may lead to surface water pollution in the entire drainage network. Hammering during sit preparation on the hillside roads can lead to localized landslide or accelerate erosion. At hillside Sections there is a potential of erosion due to rainfall-runoff. Earthwork activities during construction at this point may result in drainage congestion. The effects 	All	<ul style="list-style-type: none"> All vehicles and equipment used in construction shall be fitted with exhaust silencers. Use silent-type generators (if required). Implement eco-friendly waste management system: practice waste minimization, reuse and segregation; provide adequate waste bins, enforce onsite rule of throwing waste into bins; provide separate storage area for solid waste and hazardous waste to contain spill area; and implement measures to mitigate sedimentation/siltation. In all sites follow a Removed Soil Management Plan linked to the Excavation Segmentation/Management Plan, specifying, e.g., separate areas for stockpiling "reusable soils" & "unsuitable & excess soils" appropriate stockpiling areas, on flat grounds & away from or not obstructing main surface drainage routes disposal of unsuitable & excess soils as soon as possible hauling trucks to be required appropriate cover & min 2 ft freeboard employ any combination of the following measures to prevent stockpiled soils & fine aggregates from being eroded or carried away by wind and rain: silt fences, sediment traps, sandbags, barrier nets, earth bunds, speed stilling humps along surface drainage routes, limiting stockpile to a maximum height of 2 m, &/or diversion drains to reroute surface runoff away from stockpiles, whichever would be appropriate for the site & site conditions. Monitor immediate low areas or valleys for drainage congestion. If drainage congestion seems eminent, excavate or clear excess sediment/wash materials to clear congestion. Install silt protection curtain/steel nets alongside hill side roads. All other effluents not to be disposed of directly into natural waters, but via settling basins to allow suspended sediment to settle out. All earthworks must to be conducted during dry season/dry spell to maximum extent possible to avoid the difficult working conditions that prevail during monsoon season such as problems from runoff. 	Contactora	PIU, PMU	Settling ponds in use; Measures implemented as prescribed; Absence of erosion, spill marks, litter on ground; installation and use of containment structure on site; absence of fluid leaks on construction equipment; drip mats used in refueling and servicing; absence of spill marks on ground surface

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
		<p>may be short term severe, but manageable by close monitoring and mitigation measures.</p> <ul style="list-style-type: none"> 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). 		<ul style="list-style-type: none"> Ensure diverting storm water flow during construction shall not lead to inundation and other nuisances in low-lying areas. Garbage disposal service to be provided, Concrete refuse reused or disposed of without habitat loss. 			
3.4	Air Quality	<ul style="list-style-type: none"> The potential for dust generation during construction is significant for all project sites possible air pollution from activities involved in cyclone shelter construction is likely to be significant since it is close to sensitive receptor like the school complex. T 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 at school sites. Significant amounts of dust may also will arise from the roads that materials haulers are likely to use to access the site. These are unpaved and pass through urban areas The dust can harm the school going children and teachers (and other staff) for long since the constructions 	All	<ul style="list-style-type: none"> (i) The first task of the contractors to devise the CEMP as instructed earlier and approved by the Environmental specialist from IA and EHSO (contractor) in charge. They will only approve the CEMP when satisfied with safety measures planned for the sites to protect the children and teachers from air pollution; (ii) contractors should first demarcate the construction site with high plastic/tin made fence so that heavy dust cannot escape from the site; (iii) contractors should suppress dust at the sites and along any unpaved haul road in the vicinity of schools by lightly spraying the road surface with water as needed. The water spraying needs to be frequent so that no dust is visible near the school; (iii) haul truck loads should be tightly covered with tarpaulins and wetted prior to departure; (iv) to prevent undue emissions impacts, contractors should maintain haul trucks and other equipment to a high standard; (v) any borrow pits used by contractors should be well away from school, residential areas or individual residences; (vi) construction equipment, burrow pits, sharp object, harmful chemicals etc should be put away 	Contactor	PIU, PMU	<p>Absence of visible smoke from engine exhaust pipes; Equipment not left running when idle; Lack of evidence of waste burning; Levels of NO_x, SO₂; Dust at acceptable levels at site boundaries and a long haul roads; Absence of complaints from nearby residents</p>

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
		are supposed to be in close range of the exiting school buildings.		safely from the reach of the children playing within the boundaries of the schools.			
3.5	Vegetation removal and hill erosion	<ul style="list-style-type: none"> It is likely most sites will require vegetation removal up to some extent. On hilltop or elevated sites, vegetation removal has significant negative impact. The hills are made of sandy rocks and thus erosion prone. Vegetation offer a great resistance to the local erosions and thus protects the hills from landslides. Removal of erosion may trigger local hillsides and erosion and also give increase to local sedimentation problems. 	All	<ul style="list-style-type: none"> (i) Site location needs to carefully choose so that the least amount of vegetation has to be removed; (ii) in case of absolute necessity, a plan for replantation with native hill grown species needs to be prepared in advance of vegetation removal, which has to be approved by the environmental specialist of IA and EHSO from the contractor; (iii) in case of slope vegetation removal, a protection plan must be devised in advance in combination with steel net, geo-cell, bush planting, RCC toes, organic matter reinforcement etc. (iv) devise site-specific plantation plans before the construction starts and update this EMP, identify how many trees are to be planted along with bushes and grass to project hill sides; chose only native species 	Contactar	PIU, PMU	Plantation plan devised and approved; plantation properly done and at least 80% of the plants survive for 2 years from plantation date; no erosion observed during construction period
3.6	Pollution from solid waste and sewage effluent	<ul style="list-style-type: none"> Untreated sewage from the pit latrines could have the potential to enter surface water if not adequately designed and positioned to reflect the local hydrological and hydrogeological patterns. Periods of high rainfall could lead to the overflow of the pit and overland flow, or rapid through-flow of the effluent to surface water prior to its full digestion in the soil. Raw sewage can potentially impact surface water quality by promoting the growth of algae and delivering pathogens may be harmful to human and ecological receptors. Use of toxic materials such as solvents and vehicle maintenance fluid (oil, coolant) and diesel fuel may contaminate surface and 	All	<ul style="list-style-type: none"> Receptacles for solid waste should be provided for the use of workers, and their contents should be disposed of in officially sanctioned local landfills. Construction waste should also be disposed of in legal local landfills. Clean construction waste such as excess soil or rubble should be used in landscaping on site or given to landowners and developers seeking fill material. As rudimentary standards prevail at local landfills, the contractors should take every opportunity to reduce the amounts of waste generated, and also collect recyclable material for processing by local operators. Grey water from temporary on-site kitchens and wash-up facilities should be directed to a settling basin, which should be filled in upon site closure. With regards to sewage, connections to local sewerage (or septic system in the case of worker camp) should be installed as the first step in the construction process, and temporary toilets connected to it. 	Contactar	PIU, PMU	Absence of litter and waste piles on site; Lack of evidence of waste burning; Implement site solid waste management plan as developed in CEMP, including education of workers and waste reduction, prompt collection, and disposal in licensed landfill; Enforce strict prohibition on burning of solid waste on site

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
		<p>groundwater if these are disposed of directly into the ground or washed into the streams.</p> <ul style="list-style-type: none"> Human waste from construction workers may also contaminate surface water and groundwater if there are no adequate sanitary facilities. 					
3.7	Community Health and Safety	<ul style="list-style-type: none"> Exposure to physical hazards from use of heavy equipment and cranes; trip and fall hazards; Exposure to dust and noise; falling objects; work in confined spaces; Exposure to hazardous materials; Exposure to electrical hazards from the use of tools and machinery. 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. 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. 	All	<p>The following Generic Mitigation measures are advised:</p> <ul style="list-style-type: none"> Contractor's activities and movement of staff will be restricted to designated construction areas. Consult with the Local Authority on the designated areas for stockpiling of, soils, gravel, and other construction materials. If the contractor chooses to locate the work camp/storage area on private land, he must get prior permission from the environment management specialist and landowner. Use small mechanical excavators to attain faster excavation progress. For rock and concrete breaking, use non-explosive blasting chemicals, silent rock cracking chemicals, and concrete breaking chemicals.⁴⁷ Under no circumstances may open areas or the surrounding bushes be used as a toilet facility. Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged. A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: <ul style="list-style-type: none"> (i) no alcohol/drugs on site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of 	Contactor	PIU, PMU	<ul style="list-style-type: none"> Fencing and security in place Traffic management measures in use when needed Absence of speeding haul trucks Lack of complaints from public about construction traffic

⁴⁷ These products come in powder forms, and once mixed with water (being the catalyst) simply expand and crack the rock from hole to hole. This product is environmentally friendly and can be washed away after it has been used.

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		There is also a risk of transmitting COVID-19 to the local residents.		<p>surrounding bushes as a toilet facility); (iv) no fires permitted on site except if needed for the construction works; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; and (vii) no worker may be forced to do work that is potentially dangerous or that he/she is not trained to do.</p> <ul style="list-style-type: none"> Interested and affected parties need to be made aware of the existence of the complaints book and the methods of communication available to them. The contractor must address queries and complaints by: (i) documenting details of such communications; (ii) submitting these for inclusion in complaints register; (iii) bringing issues to the environment management specialist's attention immediately; and (iv) taking remedial action as per environment management specialist's instruction. The contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to the environment management specialist within 48 hours of receipt of such complaint/grievance. 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. 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 COVI-19. The Bengali guideline is attached with this IEE as Annex. A graphical guideline specially prepared for ADB funded project has been prepared in English 			

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
				language and attached with this IEE as Annex. Text version of the guideline (in English) is also attached as Annex. 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, Annex and Annex as a response to COVID-19.			
3.8	Worker's health and safety	<ul style="list-style-type: none"> There is invariably a safety risk when construction works such as excavation and earthmoving are conducted in populous areas. Workers need to be mindful of the occupational hazards, which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. 	All	<p>The following Generic Mitigation measures are advised:</p> <ul style="list-style-type: none"> Comply with requirements of Government of Bangladesh Labour Law of 2006 (amended in 2013) and all applicable laws and standards on workers' health and safety (H&S). Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. Produce and implement a site H&S plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing H&S training⁴⁸ for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances Maintain necessary living accommodation and ancillary facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous 	Contactar	PIU, PMU	<ul style="list-style-type: none"> Workers using personal protective equipment as appropriate to tasks Sites well stocked with emergency supplies Toilets, kitchens and eating areas sanitary COVID-19 guidelines by GoB and ADB being strictly followed

⁴⁸ Key areas that are to be covered during training shall be in compliance with the Health and Safety Manual according to site specific requirements and shall be conducted by the Supervision consultants

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
				<p>or noxious substances; and (iii) sanitation facilities are available at all times.</p> <ul style="list-style-type: none"> • Provide medical insurance coverage for workers; • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Ensure moving equipment is outfitted with audible back-up alarms; • Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and - Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. • 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 COVI-19. The Bengali guideline is attached with this IEE as Annex. A graphical guideline specially prepared for ADB funded project has been prepared in English language and attached with this IEE as Annex. Text version of the guideline (in English) is also attached as Annex. Sample Emergency Team formation at worksites, sample health and safety monitoring plan 			

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
				and sample signboards has also been prepared and attached to this IEE as Annex, Annex and Annex as a response to COVID-19.			
3.9	Physical and cultural heritage	<ul style="list-style-type: none"> The construction will take place on built-up area; however, the opportunity of chance find is quite low. 	All	<ul style="list-style-type: none"> All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the government. Prevent workers or any other persons from removing and damaging any fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest. Stop work immediately to allow further investigation if any finds are suspected. Chances are limited but need to be careful about any finding in the site. 	Contactor	PIU, PMU	Documentation of any unearthed artifacts and use of chance find procedure; Monthly report submitted
3.10	Traffic disruption	<ul style="list-style-type: none"> The sites are not busy premises. The only expected impact may rise from traffic movement (heavy vehicles) during construction works 	All	<ul style="list-style-type: none"> A traffic management plan (TMP) must be devised prior to construction and approved by the environmental specialist from IA and approved from local zilla parishad. As sample TMP has been attached with this IEE as Annex. Warning lights should be set up along the construction road sections, guiding the access of vehicles. 	Contactor	PIU, PMU	TMP devised and approved by PMU and local authorities; warning signs are properly placed
3.11	Post-construction clean-up	<ul style="list-style-type: none"> Damage due to debris, spoils, excess construction materials. 	All	<p>The following generic measures should be taken:</p> <ul style="list-style-type: none"> Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; All excavated roads shall be reinstated to original condition; All disrupted utilities restored; All affected structures rehabilitated/compensated; The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up; All hardened surfaces within the construction camp area shall be ripped; All imported materials removed, and the area shall be top soiled and regressed using guidelines set out in the re-vegetation specification that forms part of this document; The contractor must arrange the cancellation of all temporary services; 	Contactor	PIU, PMU	Site reinstated and the PMU and ADB is satisfied.

Ref. No.	Parameter	Potential Impacts and/or Issues	Locations	Mitigation measures	Implementation Agency	Supervision Responsibilities	Monitoring Indicators
				<ul style="list-style-type: none"> Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work. 			
3.12	Solid waste management	Construction and domestic wastes generated on construction sites	All	Implement site solid waste management plan as developed in CEMP, including education of workers and waste reduction, prompt collection, and disposal in licensed landfill. Enforce strict prohibition on burning of solid waste on site	Contactor	PIU, PMU	Absence of litter and waste piles on site; Lack of evidence of waste burning
3.12	Reporting	Submission of EMP implementation Report: Unsatisfactory compliance to EMP	All	<ul style="list-style-type: none"> Appointment of Supervisor to ensure EMP implementation; Timely submission of monitoring reports including pictures. 	Contactor, PIU, PMU	PIU, PMU	Monthly Report submitted by contractor; semiannual report submitted by PMU
4. Operation and management phase							
4.1	Topsoil loss, erosion and landslide	Not much erosion is expected since design is expected to consider tree removal and hill erosion effect. However, poor maintenance of hill protection structures and putting less care on the bush and native tree species that prevent hill erosion may dispel all the prevention efforts by planned in the design stage.	P-6, P-7, P-9	<ul style="list-style-type: none"> (i) Devise a plan of operation and maintenance of the hill protection efforts, allocate adequate manpower and budget for maintenance; (ii) strict monitoring of the hill protection structures/components established during construction. 	PMU	PMU/ADB	Semi-annual report submitted and no erosion and landslide observed
4.2	Water and sludge pollution	Often lack of maintenance cause drainage blocks countenancing water pollution. Adequate drainage systems in the design phase will be adopted to pass perennial stream water and discharge wastewater generated from the cyclone shelters. However, poor maintenance can lead to drainage congestion and water pollution.	All	<ul style="list-style-type: none"> (i) Strict monitoring of drainage congestion; (ii) allocate adequate budget and manpower for maintenance. 	PMU	PMU/ADB	Semi-annual report submitted and no erosion and landslide observed

VIII. ENVIRONMENTAL MONITORING PLAN

A. Environmental Monitoring

285 Environmental monitoring and inspection will consist of: (i) environmental impact monitoring; and (ii) EMP performance verification (compliance monitoring). Environmental impact monitoring will assess the degree to which the project environmental management and mitigation measures are successful in avoiding impacts to the biophysical environment (soils, air quality, water quality) and the socio-economic environment (livelihoods, quality of life, occupational health and safety, public health and safety) during the project's construction and operation phases. The PMU will engage an environmental specialist for monitoring and reporting. EMP performance verification will assess the performance of design consultants, contractors, facility operators and PMU in complying with, or adhering to, the EMP and CEMPs, beginning with documentary checks, clearances, and specialized implementation plans that must be obtained or developed before construction can begin. Performance verification monitoring will continue through the construction and operation phases. The PMU will conduct performance verification during the pre-construction and construction phases, after which this will become the responsibility of the IAs. Details of the monitoring requirements and tasks covering all sites and all three project implementation phases are compiled in an Environmental Monitoring Table (EMoT), presented in Table VIII-1.

Table VIII-1 Environmental Monitoring Table (EMoT)

Environmental Criterion	Method, Location, Parameters	Responsibility & Frequency
Pre-Construction Phase		
Project readiness	<ul style="list-style-type: none"> Method: Review of PMU's and contractors' readiness to implement all component projects based on assessment of project readiness indicators Parameters: Readiness indicators (as per Table VII-3) 	<ul style="list-style-type: none"> ADB – once before construction
Detailed designs	<ul style="list-style-type: none"> Method: Review detailed designs for each project facility and discuss with design firms as needed for clarification as per Table VII-3 Parameters: Monitoring indicators listed for each design item 	<ul style="list-style-type: none"> ADB and PMU - once before approval of detailed designs
Plans	<ul style="list-style-type: none"> Method: Review specialized plans prescribed in as per Table VII-3 Parameters: Preparation of each plan item listed in Table VII-3 	<ul style="list-style-type: none"> PMU/ADB - once before approval of each prescribed plan
Construction Phase		
Soil erosion and contamination	<ul style="list-style-type: none"> Method: Visual inspection Location: All project construction sites, including borrow pits and access roads as applicable Parameters: (i) adequacy of soil erosion prevention; measures; (ii) adequacy of soil contamination prevention techniques; (iii) evidence of excessive soil erosion or soil contamination 	<ul style="list-style-type: none"> EHSOs - daily during construction phase PIU – quarterly
Surface and ground water	<ul style="list-style-type: none"> Method: Visual inspection; worker interviews as needed Location: All project construction sites, including borrow pits and access roads as applicable Parameters: (i) adequacy of spill and leak prevention; measures, including storage of chemicals, fuels, lubricants; (ii) worker awareness of spill response plan; (iii) evidence of spills and leaks on ground surface; (iv) appropriate use of settling basins for process water; (v) appropriate connections to sewers and septic tanks 	<ul style="list-style-type: none"> EHSOs - daily during construction phase PIU – quarterly
Air quality	<ul style="list-style-type: none"> Method: Observation; interviews with local people Location: At construction site perimeters nearest to residences; by side of access and haul roads as applicable; at borrow pits as applicable Parameters: Airborne dust level, appearance of machinery exhaust 	<ul style="list-style-type: none"> EHSOs - daily during construction phase PIU – monthly

Environmental Criterion	Method, Location, Parameters	Responsibility & Frequency
Livelihoods	<ul style="list-style-type: none"> Method: Interviews with workers and site managers Location: At all project construction sites Parameters: Percentage of local workers on site 	<ul style="list-style-type: none"> PIU - quarterly
Noise	<ul style="list-style-type: none"> Method: Observation; interviews with local residents Location: At perimeter of all sites nearest to residences Parameters: (i) adherence to prohibition on noisy site activity between dusk and dawn; (ii) presence of functional mufflers on motorized equipment; (iii) complaints of local residents 	<ul style="list-style-type: none"> EHSOs - daily during construction phase PIU - quarterly
Worker health and safety	<ul style="list-style-type: none"> Method: Visual inspection; and interviews with workers Location: At all project construction sites Parameters: (i) worker use of personal protective equipment; (ii) adherence to the approved Health and Safety Management Plan (HSMP); (iii) performance of the EHSO; (iv) worker complaints and concerns 	<ul style="list-style-type: none"> EHSOs - daily during construction phase PIU - quarterly
Public health and safety	<ul style="list-style-type: none"> Method: Observation; interviews with nearby residents, interviews with local police Location: In the vicinity of all project construction sites Parameters: (i) adherence to approved temporary traffic management plan; (ii) adequacy of construction site signage, fencing and security presence; (iv) accidents involving public and workers; (v) emergencies and responses; (v) public complaints 	<ul style="list-style-type: none"> EHSOs - daily during construction phase PIU - quarterly
Solid waste management	<ul style="list-style-type: none"> Method: Visual inspection Location: All project sites Parameters: (i) adequacy of solid waste collection, storage, containment and disposal system; (ii) absence of solid waste dumps or evidence of waste burning; (iii) proper disposal of construction waste in legal landfill 	<ul style="list-style-type: none"> EHSOs - daily during construction phase PIU - quarterly
EMP Compliance	<ul style="list-style-type: none"> Method: Review of (i) monitoring reports and data; (ii) documentation of corrective action; (iii) overall contractor compliance with terms of CEMPs; (iv) project's overall adherence to EMP and loan covenants Location: all sites Parameters: Contractor performance relative to CEMPs and contracts; project performance relative to stipulations of EMP 	<ul style="list-style-type: none"> PMU, PIU - yearly
Construction Completion and Operation Phase		
Post-construction site inspection	<ul style="list-style-type: none"> Method: Visual inspection Location: All completed project facilities Parameters: (i) general site environmental conditions; (ii) all equipment and waste removed from site; (iii) all site components, including landscaping and parking, complete 	<ul style="list-style-type: none"> Environmental inspection and report twice: one week before completion, once after completion

B. Environmental reporting

1. Quarterly reports

286 Concise quarterly environmental monitoring reports will be composed by the PMU, based on (i) monthly progress reports submitted by the contractors, which will include monitoring data collected by the site EHSOs; (ii) quarterly impact monitoring reports prepared PMU appointed independent environmental specialist; and (iii) its own performance verification activity. The environmental monitoring reports will reference national standards where appropriate (such as for air quality and noise), as well as benchmarks for project compliance and progress.

2. Semi-annual environmental monitoring reports

287 To ensure proper and timely implementation of the EMP and adherence to the agreed environmental covenants, the PMU will submit to ADB semi-annual environmental monitoring reports, based on quarterly progress reports of the PMU. The reports should confirm the project's compliance with the EMP and identify any environment-related implementation issues and necessary corrective actions and

reflect these in a corrective action plan. The performance of the contractors will also be reported on with respect to environmental protection and impact mitigation. The operation and performance of the project GRM, as well as environmental institutional strengthening and training, will be included in the annual environmental progress report as well. Table VIII-2 summarizes the project's environmental reporting requirements and responsibilities.

Table VIII-2 Environmental reporting requirements and responsibilities

Report	Frequency	Purpose	From	To
Contractor's Progress Report	Monthly	Satisfy EMP	Contractor	PMU
Environmental Monitoring Report	Quarterly	Monitoring of environmental effects	PMU Environmental Specialist	PMU
Semiannual monitoring report	Six-monthly	Adherence to environmental covenants and EMP	PMU	ADB

3. Mechanism for Feedback and Adjustment

288 Based on environmental monitoring results, the PMU will assess whether further mitigation measures are required as corrective action, or if any other improvement in environmental management practices is called for. If the PMU identifies a substantial deviation from the EMP, or if any changes are made to the project scope that may cause significant adverse environmental impacts or increase the number of affected people, then the PMU shall immediately consult with the ADB to identify appropriate adjustments to the EMP.

4. Institutional Strengthening and Training

289 It has been acknowledged in the course of the project's preparation that expertise in the area of environmental safeguards application, and the capacity of institutions to implement safeguards programs, are well adopted in Bangladesh, although implementation process often get neglected. Training and institutional strengthening, aimed at personnel responsible for implementing and supervising various aspects of the project EMP on behalf of the EA, IAs, PMU and contractors, have been included in the project's outputs for that reason. All parties involved in implementing and supervising the EMP must have an understanding of the goals, methods, and practices of project environmental management.

290 **Institutional strengthening:** The capacities of the IA and PMU to coordinate environmental management has been strengthened through engagement of national environmental consultants appointed by both PMU and ADB under the grant implementation consultancy. The PMU will lead the implementation of the EMP assisted by the consultants, with responsibility for such key tasks as ensuring project readiness; reviewing and approving designs and plans; ensuring that environmental information in bid documents and environmental clauses in construction contracts are on target; providing training on environmental mitigation measures; supervising and directing environmental monitoring; and providing guidance on environmental matters whenever needed. The work and leadership of the environmental consultants will strengthen environmental management and supervision capacity of the EA, IAs, PMU and contractors, and ensure the project's full compliance with the ADB's SPS.

291 In addition to the activity of the environmental consultants, the project's environmental management and supervision will be enhanced by engagement of a licensed laboratory to undertake quarterly site

monitoring, including quantitative measurement of air quality and noise levels at all active construction sites; this importation of technical monitoring expertise will ensure adherence to DoE standards. Finally, all contractors will be required to hire an Environment, Health and Safety Officer (EHSO) for each site under their control and empower that officer to manage the implementation of an Environment, Health and Safety Management Plan (EHSMP) for the site. With the guidance, support and supervision of the environmental consultants, the EHSOs will play a key role in ensuring sound implementation of environmental mitigation measures prescribed by the EMP. It is believed that these institutional strengthening measures will enable competent and efficient environmental management of the project. The institutional strengthening plan is summarized in Table VIII-3.

Table VIII-3 Institutional Strengthening Measures

Target Agencies	Institutional strengthening measures	Timing
EA, IAs	<ul style="list-style-type: none"> Define institutional arrangements for environmental management, monitoring and supervision Define positions and responsibilities 	During project preparation
PMU	<ul style="list-style-type: none"> Recruit and contract one national environmental consultant for environmental management, environmental training, EMP compliance review, and reporting 	At start of pre-construction phase
PMU	<ul style="list-style-type: none"> Recruit and contract licensed laboratory for quarterly environmental monitoring before and during construction phase 	Prior to start of construction
Contractors	<ul style="list-style-type: none"> Hire Environment, Health and Safety Officers for each construction site 	Prior to start of construction

292 **Training:** Selected personnel of the EA, PMU, IAs and contractors will receive training in environmental management, environmental monitoring and supervision, mitigation planning, emergency response, public consultation and use of the GRM, occupational and community health and safety, and other environmental management topics. The topics, methods, and estimated costs of the training are outlined in Table VIII-4. Training sessions will use a workshop format. Training will be developed and provided by the environmental consultants with support of other experts engaged under the grant implementation consultant services.

Table VIII-4 Training Program and implementation cost

Training Topic	Targeted Agencies	Timing	Duration, Costs
EMP Implementation: Roles and Responsibilities, Monitoring, Supervision and Reporting Procedures Grievance Redress Mechanism: Roles and Responsibilities, Procedures, Occupational and Community Health and Safety, Emergency Preparedness and Response, Pollution Control and Environmental Monitoring, Inspection and Reporting, Public Consultation Contractor Engagement and Management, including EMP Enforcement, Operation-Phase Environmental Management and Monitoring	IAs (local, regional, national), PMU, Contractors EHSOs	Prior to construction phase	2-day training BDT 100,000

C. EMP Implementation cost

293 Cost estimates for mitigation measures, environmental monitoring, public consultations, and capacity building are summarized in Table VIII-5 EMP implantation cost. Contractors will bear the direct costs of all mitigation measures during construction, which will be included in the tender and contract

documents; this includes features built into facility designs in order to prevent environmental impacts from arising. The IAs will bear the costs related to mitigation measures during operation. Costs related to environmental supervision during construction will be borne by the IAs (for hiring a licensed laboratory to conduct quarterly monitoring), the PMU (for the activities of the environmental consultants) and by the contractors (for monitoring work carried out by the EHSOs). During the operation phase and monitoring costs will be borne by the IAs (for regular monitoring activity of their site EHSOs).

Table VIII-5 EMP implantation cost

Sl. No	Description of activity	Unit cost (BDT)	Calculation	Cost (BDT)
1	Recruit and appoint EHSOs for each of 4 packages for 18 months (estimated construction period)	BDT 35,000 per month	BDT 35,000 x 4 packages x 18 months	2,520,000
2	Soil erosion and drainage congestion monitoring at every working sections of the road during construction. Especial attention should be paid at the Camp site also. Soil erosion and drainage congestion should be monitored using visual inspection and will be judged by the supervision environmental officer/engineer	lump sum for communicating among sites	BDT 50,000 x 4 packages	200,000
2	Tree plantation at each site and maintenance for 2 years as required and as per direction of the E.I.C. Plantation should be following the suggestion in the EMP table. The payment is to be made only when trees are fully grown)	BDT 500 per sapling (sapling, fencing, mulching, watering etc)	14 sites x 100 trees x BDT 500	700,000
3	Debris disposal and waste management on camp site. Temporary camp site waste disposal facility improvement 2 nos (1 no of organic waste and 1 no of inorganic waste disposal facility) Site cleaning, Removal and disposal activities	lump sum	14 sites x BDT 50,000	700,000
4	Traffic management during construction, equipment for traffic management	lump sum	14 sites x 15,000	210,000
5	Slope and hill edge Protection: Grass turfing and native bush planting around the unstable edges of school complex. Turfing on embankment top and slope, building compound with good quality turf supplied by the contractor of not less than 225mm square in dimension including placing and watering till grass is fully grown, etc. all complete as per direction of the E-I-C (payment to be made only when grass is fully grown).	lump sum	To be estimated during detain design. Once estimated, this EMP cost to be updated. 14 sites x 2500m x BDT 50	1,750,000
6	Medical supplies (First Aid box), other medical requirements, note, equipment, kits, dress etc.	lump sum	4 packages x BDT 30,000	120,000
7	Waste collection facilities with collection bins, scheduled disposal, carry to designated places, waste separation process etc	lump sum	14 sites x BDT 10,000	140,000
8	Health safety warning signs and log maintenance, COVID-19 response as identified in the EMP	lump sum	14 sites x BDT 30,000	420,000
9	Personal Protection equipment, EMP implementation training	lump sum	14 sites x BDT 30,000	420,000
10	Safe Drinking water facilities for campsites	lump sum	14 sites x BDT 30,000	420,000
11	Separate male female toilet facilities for camp and work site, sanitary facilities, Response to COVID-19 as stipulated in the EMP	lump sum	14 sites x BDT 50,000	700,000
12	EMP training	Lumpsum	4 packages x BDT 100,000	400,000
13	(a) Quarterly Air quality monitoring (ECR 1997 Schedule 2): Parameters: 1.PM _{2.5} ; 2.PM ₁₀ ; 3. SO ₂ ; 4. NO _x and 5.CO (b) Quarterly Surface Water quality monitoring (ECR 1997 Schedule 3) Parameters: 1. pH; 2. Turbidity; 3. Total Coliform (TC), Fecal Coliform (FC); 4. Arsenic (As); 5. Salinity; 6. Total Suspended Solids (TSS); 7. Dissolve Oxygen (DO); 8. Biochemical Oxygen Demand (BOD); 9. Chemical Oxygen Demand (COD)	Lumpsum	14 sites x BDT 60,000 x 8 times (once before construction + 6 times during construction + once after completion)	6,720,000

Sl. No	Description of activity	Unit cost (BDT)	Calculation	Cost (BDT)
	(c) Quarterly Noise Levels (ECR 1997 Schedule 4): Day (1 hr. average)			
	(d) Soil quality monitoring (ECR 1997 Schedule 10): 1. Organic matter (OM); 2. Lead (Pb); 3. Iron (Fe)			
Total cost				15,420,000

IX. GRIEVANCE REDRESS MECHANISM

294 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

295 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

296 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

297 Should the grievance remain unresolved, the PIU's project director will activate the third level of the GRM by referring the issue (with written documentation) to a Grievance Redress Committee (GRC), which will, based on review of the grievances, address them in consultation with the PIU, contractor, DSC, and affected persons. The GRC will consist of Refugee Relief and Repatriation Commission (RRRC), as chairperson, EA/IA representative, camp-in-charge, and other relevant stakeholders. A meeting will be called with the GRC, if necessary, where the affected person can present his/her concern and issues. The process will promote conflict resolution through mediation. The GRC will meet as necessary when there are grievances to be addressed. The GRC will suggest corrective measures at the field level and assign clear responsibilities for implementing its decision within 15 days. The functions of the GRC are as follows: (i) to provide support to affected persons on problems arising from environmental or social disruption, asset

acquisition (where required), and eligibility for entitlements, compensation, and assistance; (ii) to record grievances of affected persons, categorize and prioritize them, and provide solutions within 15 days; and (iii) to report to the aggrieved parties' developments regarding their grievances and decisions of the GRC. The EA/IA safeguards focal person will be responsible for processing and placing all papers before the GRC, recording decisions, issuing minutes of the meetings, and taking follow-up action to see that formal orders are issued, and the decisions carried out.

298 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).

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

300 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).⁴⁹ ADB's Accountability Mechanism, including information on how to file a complaint, will also be explained to affected households. The grievance redress mechanism and procedure are depicted in Figure IX-1.

⁴⁹ Contact information on ADB's Bangladesh Mission is in <https://www.adb.org/countries/bangladesh/main>. Information on ADB's Accountability Mechanism is in www.adb.org/site/accountability-mechanism/main.

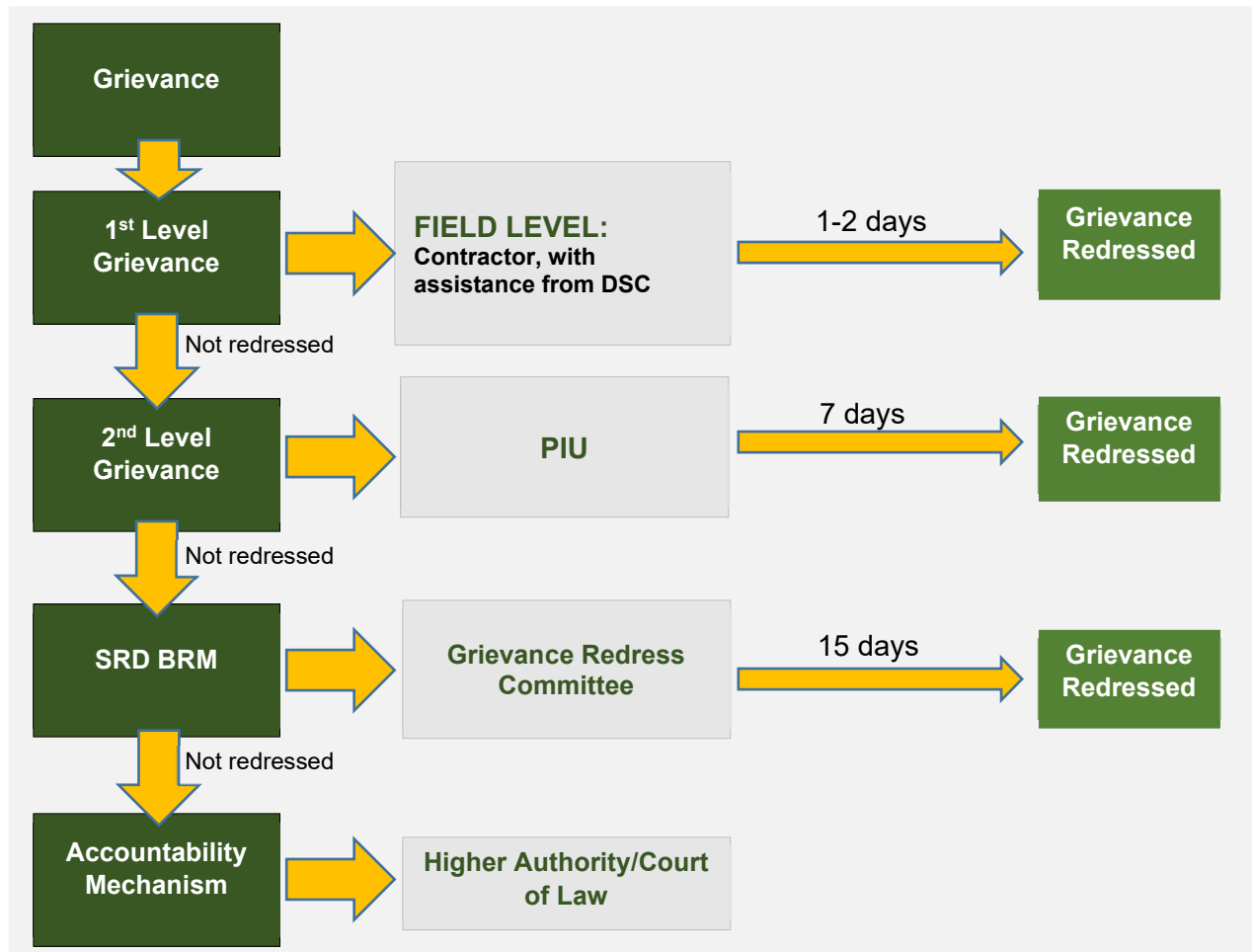


Figure IX-1 Grievance redress process

X. STAKEHOLDER CONSULTATION AND INFORMATION DISCLOSURE

A. Stakeholder Consultation

303 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.

304 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

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

C. Key target stakeholders

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

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

D. Public Consultation History

307 Initial Public consultation has been carried out in the project area with the objectives of minimizing probable adverse impacts of the project and to achieve speedy implementation of the project through bringing in awareness among the community on the benefits of the project. As part of the project consultations, efforts were made to consult with the public as well as a number of local authorities, to

determine their thoughts, opinions and feedback on the impact of the proposed Shelter in their respective locations. Information and comments collected from the public early in the study process were of use.

308 Different stakeholders were consulted to give them the opportunity to express their views and concerns. As part of the process, they were also provided with relevant and sufficient information on the project prior to its start-up. These stakeholders include the central and local authorities, as well as the local population to determine their thoughts, opinions and feedback on the impact of the project. Attendees in the consultation meeting were apprised of the processes through which the project was to proceed toward implementation and the environmental impacts to arise out of such processes along with the steps to be taken toward mitigating the impacts. They were told about the impacts all of which could be easily mitigated. The audience expressed satisfaction of such mitigation measures (Figure X-1). The public consultation was held during field visit of 19 August 2020. Representatives of LGED PMU, PIU were also present in the consultation.



Figure X-1 Public consultation for the cyclone shelter Subproject

E. Findings of the Public Consultation

- **Location:** Harinmara GPS; **Date and Time:** 18 August 2020, 3:15 PM
- **Information Disclosed during Consultation:**
 - Need for the Project
 - Description of the Project
 - Construction Work
 - Probable Impacts due to the Project (before, after and during construction)
 - Dust pollution
 - Noise pollution
 - Water pollution
 - Waste generation
 - Drainage congestion
 - Traffic safety
 - Community health and safety
 - Worker health and safety
 - Grievance Redress Mechanism

309 Public Query was answered by Md. Shahid Zaman, Environmental Specialist (Consultant), Asian Development Bank; Sayon Dewan, Gender Specialist (Consultant), Asian Development Bank. Findings of the public consultation summarized below (Table X-1).

Table X-1 Summary of the public consultation

Sl no.	Respondent	Comments
1.	Mohammad Arif Service	<ul style="list-style-type: none"> Appreciated initiation of the cyclone shelter project by the government. Graveyard located behind the school must not be disturbed during construction. Dust generated due to construction activity must be suppressed. Natural drainage system for the storm water must be preserved. Expected fast construction so that students will suffer less.
2.	Jahangir Alam Student	<ul style="list-style-type: none"> Welcomed the project and mentioned the project as very important for his area. Opined for large playground at the school if budget is available. Noise pollution during construction period would be a major problem for the student during school time.
3.	Mohammad Sayed Mason	<ul style="list-style-type: none"> Worker should be recruited from the local area. Multistoried building should be built so that more people can accommodate there during disaster. Protection gears should be arranged for the workers.
4.	Shahjahan U.P Member	<ul style="list-style-type: none"> Appreciated the government for initiating the project. Opined that local people would sacrifice for the development of their area. Opined for recruitment of workers from the locality during construction. Fast construction expected. Mentioned regular communication with the consultant group must be maintained.

310 List of participants of public consultation is given in Figure X-2.

Public Consultation Meeting					
Emergency Assistance Project					
Venue: Hariunera GPS Date: 18 August 2020					
Attendance Sheet					
Sl. No.	Name	Occupation	Address	Phone No.	Signature
2	Mr. M. M. M. M.	Teacher	Haripur	01813-266182	
2	Mr. M. M. M. M.	Teacher	"	01855547102	
6	Mr. M. M. M. M.	Teacher	"	01833270388	
8	Mr. M. M. M. M.	"	"	0183337008	
8	Mr. M. M. M. M.	Teacher	"	01829628338	
6	Mr. M. M. M. M.	Teacher	"		
9	Mr. M. M. M. M.	"	"		
8	Mr. M. M. M. M.	"	"		
5	Mr. M. M. M. M.	Teacher	"	01879596365	
20	Mr. M. M. M. M.	"	"	01824972318	
22	Mr. M. M. M. M.	Teacher	"		
22	Mr. M. M. M. M.	Teacher	"		Taslima
26	Mr. M. M. M. M.	Teacher	"	01818047745	Tarek
28	Mr. M. M. M. M.	"	"	01767895260	Rodwan
28	Mr. M. M. M. M.	"	"	01885490670	M. DARIF

Figure X-2 List of participants in the public consultation

F. Information disclosure

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

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

312 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.

XI. CONCLUSION AND RECOMMENDATION

A. Conclusion

313 Officials and concerned authorities involved in this project expressed keen interest in the sub-project. Project beneficiaries were not consulted due to the prevailing COVID-19 pandemic. Their main interest is that the overall facilities of the structures created as shelters for local people during cyclones as well as improved conditions for the school going children. The new extra room will accommodate more students and new facilities like toilets, wash basins, tubewells will benefit the children. Local laborers also, however, will be benefited, as the project will generate some employment opportunities for them during the pre-construction and construction phases.

314 Minor negative impacts of the project will be felt during the construction phases which may involve hill erosion, water and waste pollution. The major significant impacts can come from disrupting local hydrological system, hill erosion and waste pollution. Another major impact may be caused by the prevailing COVID-19 pandemic situation. These impacts of noise and increase in traffic are expected to be within the existing level experienced by the local people. The contractor will be under specific orders for providing PPE to the workers engaged for the job. Strict site and labour camp health and safety regulation will be forced as per government and ADB guidelines. The IEE is indicative of the suggestions that should guide the topographic surveys, soil testing and detail designs. Site specific EMPs will be developed after detail design is developed and this IEE should be updated as well.

315 The monitoring plan, if properly implemented during the pre-construction, construction and post-construction and operation phases will ensure taking corrective measures. The proposed project will have no residual adverse impact on the environment or the eco-system if mitigation measures are properly followed. LGED is required to take clearance from the DoE for implementing the transmission line and other ancillary works. The IEE report has been prepared with this end in view.

B. Recommendations

316 The IEE study reveals that the construction of the cyclone shelters has some major negative impacts but will contribute to national development by improving the school conditions for primary students and providing space for local people during storm events. Local people will have employment opportunities during construction and operation phase. The contractor should be specifically instructed to employ local laborers as much as possible.

317 The major recommendations made in the IEE are as follows:

- Major negative impacts like disruption of local microhydrological systems, hill erosion, increasing noise level, air and water pollution at the pre-construction and construction phases should be taken care of by taking proper mitigation measures as suggested in the EMP section of this IEE.
- This IEE is indicative of suggestions to develop detail design. Once details design is done, the site specific EMPs must be developed and this IEE should be updated accordingly. The Site specific EMPs should be verified by the LGED/ADB appointed Environmental Specialist.
- The EMP and EMP cost must be included in the bid documents prepared by LGED.
- The contractor needs to prepare the site-specific CEMP prior construction works starts. The CEMP must be approved by PMU and ADB.
- LGED should get clearance from DoE before start of the construction. This IEE is prepared in the view that this document belongs to LGED and should be used for obtaining ECC from DoE. Any

further instruction conveyed from DoE prior obtaining the ECC, LGED is responsible to update this IEE accordingly. An Environmental Specialist should be appointed by LGED prior construction works to develop and update the EMPs.

ANNEX A: List of wildlife 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
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

SL	Scientific name	English name	Family
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

PLANTS:

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

SL	Scientific name	English name	Family
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
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

SL	Scientific name	English name	Family
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 B: Rapid Environmental Assessment (REA) Checklist (Buildings)

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 (SDS) for endorsement by the Director, SDS 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;⁵⁰ (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: BAN: Emergency Assistance Project – Additional Financing

Sector Division:

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA...			
▪ DENSELY POPULATED?	X		The proposed cyclone shelters are located outside the camps, which are less densely populated areas. The other proposed constructions (i.e. community center, food distribution center, operation theatre) are located within in the densely populated (46,000 persons per sqm) camps. Proper precautions needed to consider while constructing within the camp areas as per EMPs stipulated in the IEEs. Mitigations measures will be taken by the contractors during construction period and EAs/IAs during O/M period.

⁵⁰ 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
▪ HEAVY WITH DEVELOPMENT ACTIVITIES?	X		Within the camps development activities (mainly construction) are high due high construction activities and high vehicle/people mobility. Women led community centers, bathing facilities, diagnostics centers etc. are to be constructed within the camps. However, cyclone shelters will be constructed outside of the camps.
▪ ADJACENT TO OR WITHIN ANY ENVIRONMENTALLY SENSITIVE AREAS?			
• CULTURAL HERITAGE SITE		X	Himchari National park within 30km of the project site, Fashiakhali Wildlife Sanctuary within 35km of the project site, Sheikh Jamal Inani National Park with 30km of the project site, Teknaf Wildlife Sanctuary within 45km of the project site, Medhakachhapia National Park within 45km of the project site. The subproject selection criteria will avoid subprojects in the mentioned protected areas of in the region.
• PROTECTED AREA		X	
• WETLAND		X	
• MANGROVE		X	
• ESTUARINE		X	
• BUFFER ZONE OF PROTECTED AREA		X	
• SPECIAL AREA FOR PROTECTING BIODIVERSITY		X	
• BAY		X	
B. POTENTIAL ENVIRONMENTAL IMPACTS Will the project cause...			
▪ encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		X	The subproject selection criteria will avoid subproject in the mentioned protected areas of in the region.
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?		X	
▪ Encroachment of precious ecology (e.g. sensitive of protected area)			
▪ alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		X	Construction-related adverse impacts are expected to be temporary and short-term. Impacts are not considered significant and can be addressed by adopting site-specific mitigation measures during construction. Environmental impacts will be managed through EMPs and ECoPs which will be implemented by the contractor.
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	X		
▪ increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	X		
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?	X		

Screening Questions	Yes	No	Remarks
▪ noise and vibration due to blasting and other civil works?	X		Unprecedented environmental problems occurring during construction and operations period will be addressed through the GRM by the EAs.
▪ dislocation or involuntary resettlement of people?		X	Subproject selection criteria avoids land acquisition and IR impacts. A resettlement framework has been prepared to guide the screening, categorization, and management of resettlement impacts.
▪ dislocation and compulsory resettlement of people living in right-of-way?		X	
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	
▪ other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	X		Construction -related adverse impacts are expected to be temporary and short-term. Impacts are not considered significant and can be addressed by adopting site-specific mitigation measures during construction. Environmental impacts will be managed through EMPs and ECoPs which will be implemented by the contractor. Unprecedented environmental problems occurring during construction and operations period will be addressed through the GRM by the EAs.
▪ hazardous driving conditions where construction interferes with pre-existing roads?	X		
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local, populations?	X		
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	X		
▪ accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?	X		Increased vehicular traffic may be applicable during construction. Road safety signs will be placed in accident-prone areas and high-density areas.
▪ increased noise and air pollution, resulting from traffic volume?	X		
▪ increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	X		
▪ social conflicts if workers from other regions or countries are hired?		X	On the basis of the nature of subprojects, it is likely that laborers will be from local areas. However, considering the prevailing pandemic situation constructions within the camps will hire labours from the camps to avoid large influx of labors from outside the camps. Only experts/skilled labours necessary for construction/supervision will be hired from population outside the camp/region. For constructions outside the camp, no labours from the camp will be allowed to avoid contamination. Considering the COVID-19 pandemic, special specific health conditions will be strictly enforced that will be stipulated in the IEEs.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		X	
▪ community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.		X	

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: BAN: Emergency Assistance Project – Additional Financing

Sector:

Subsector:

Division/Department:

Screening Questions		Score	Remarks ⁵¹
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?	0	
	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.)?	1	Project needs to consider extreme rainfall events which is like to cause landslides in the camps area which is densely populated
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)?	1	Extreme/excessive rainfall may cause landslides in the camp area.
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 lifetime?	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.

⁵¹ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

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

Other

Comments: _____

Prepared by: _____

ANNEX C: Generic Traffic Management Plan (TMP)

A. Principles

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

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

B. Operating Policies for TMP

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

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

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

C. Analyze the Impact Due to Street Closure

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

- a) Approval from the ULB/CMC/Public Works Department (PWD) to use the local streets as detours;
- b) consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
- c) Determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
- d) Determining if additional traffic control or temporary improvements are needed along the detour route;
- e) Considering how access will be provided to the worksite;
- f) Contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and

- g) Developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

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

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

D. Public Awareness and Notifications

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

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

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

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

It may be necessary to conduct the awareness programs/campaigns on road safety during construction. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centers. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

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

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

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

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

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

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

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

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

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

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

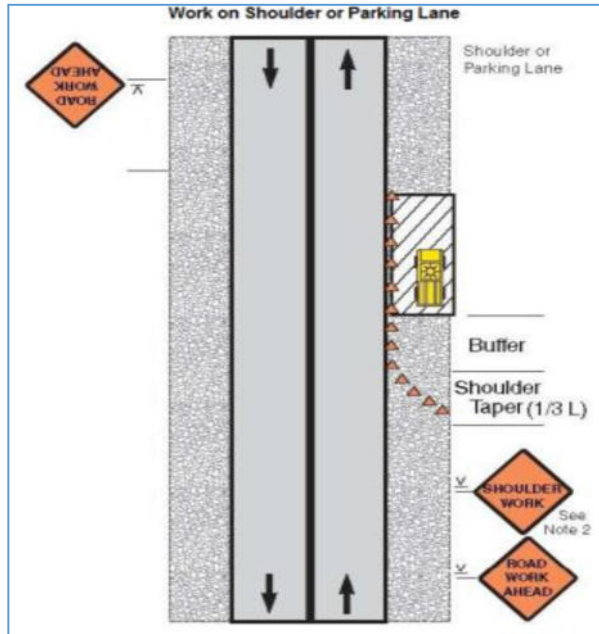


Figure A1 Work with shoulder or Parking area

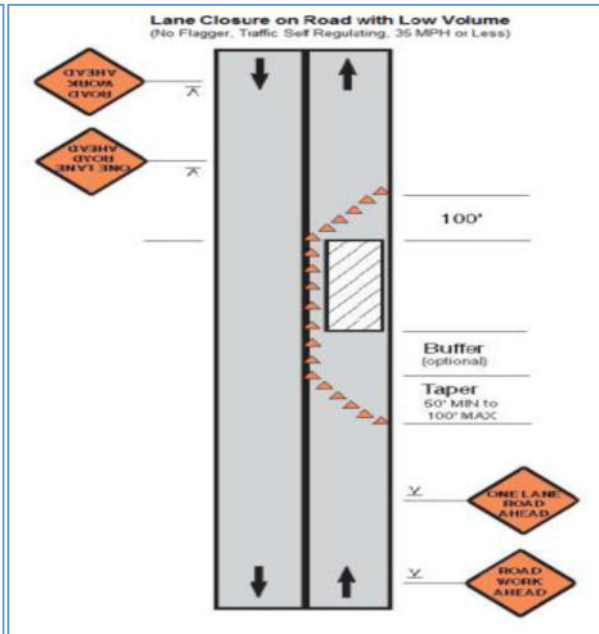


Figure A2 Work with lane closure: low traffic

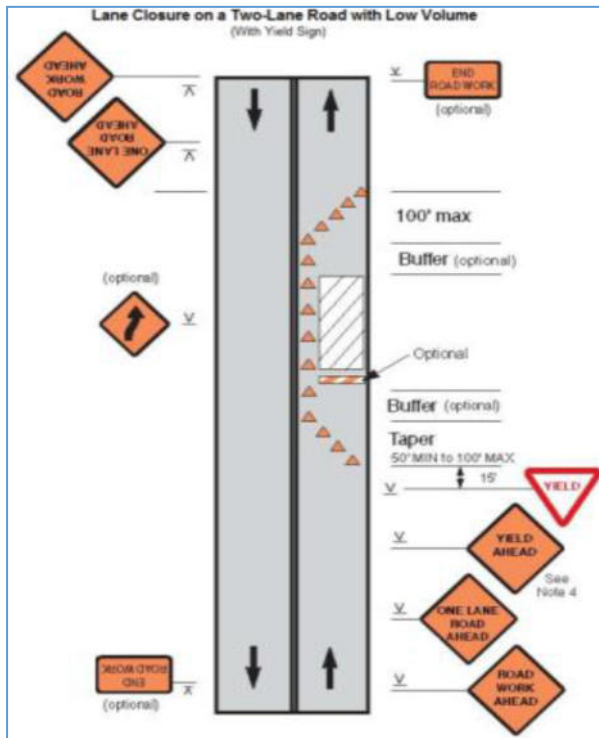


Figure A3 Work on Lane Closure with Yield Sign on Two Lane: Low Volume

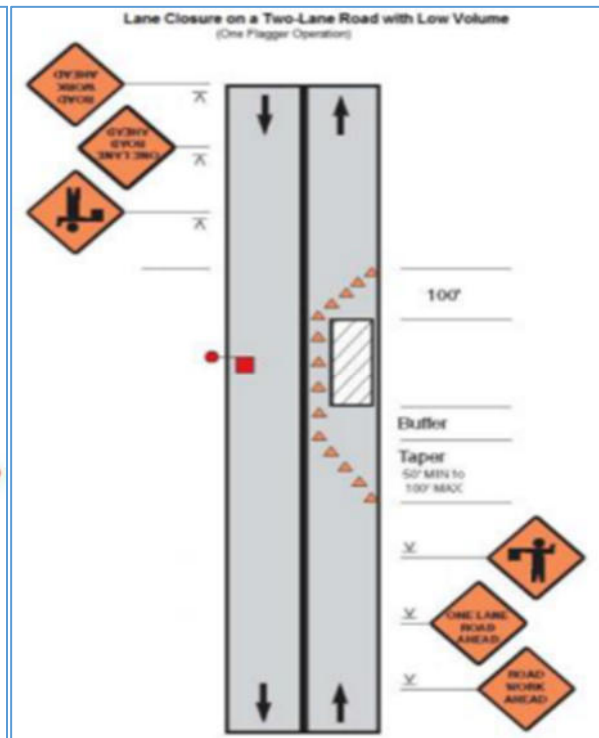


Figure A4 Work on Lane Closure With Single Flag Operator on Two Lane : Low Volume

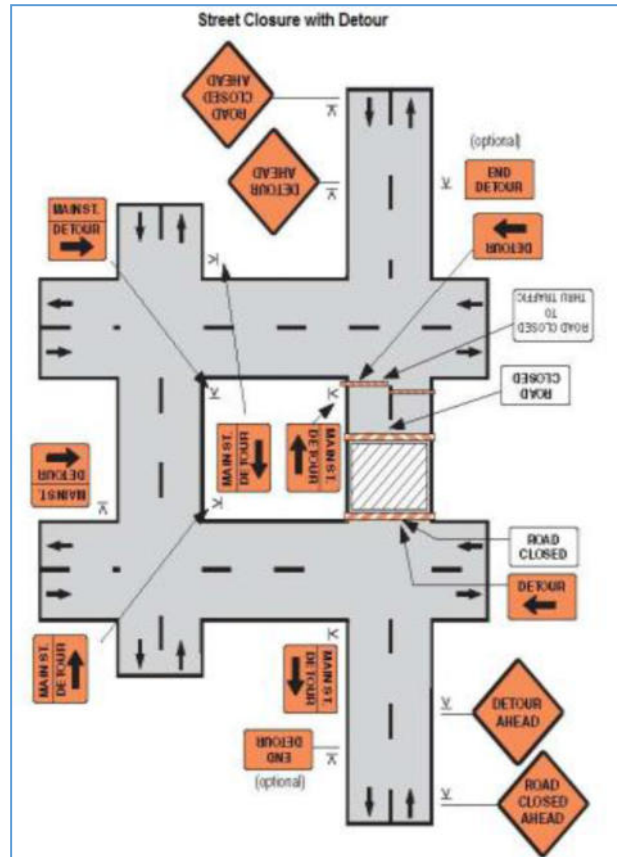
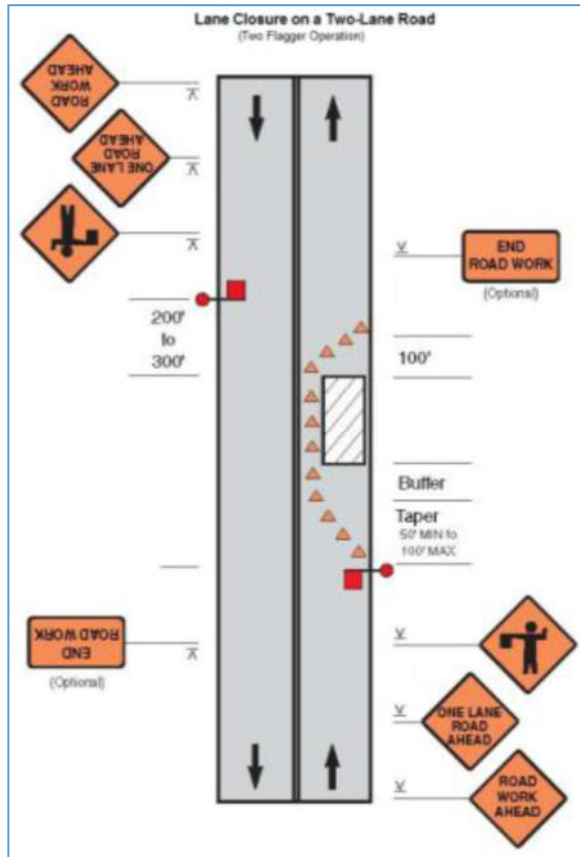
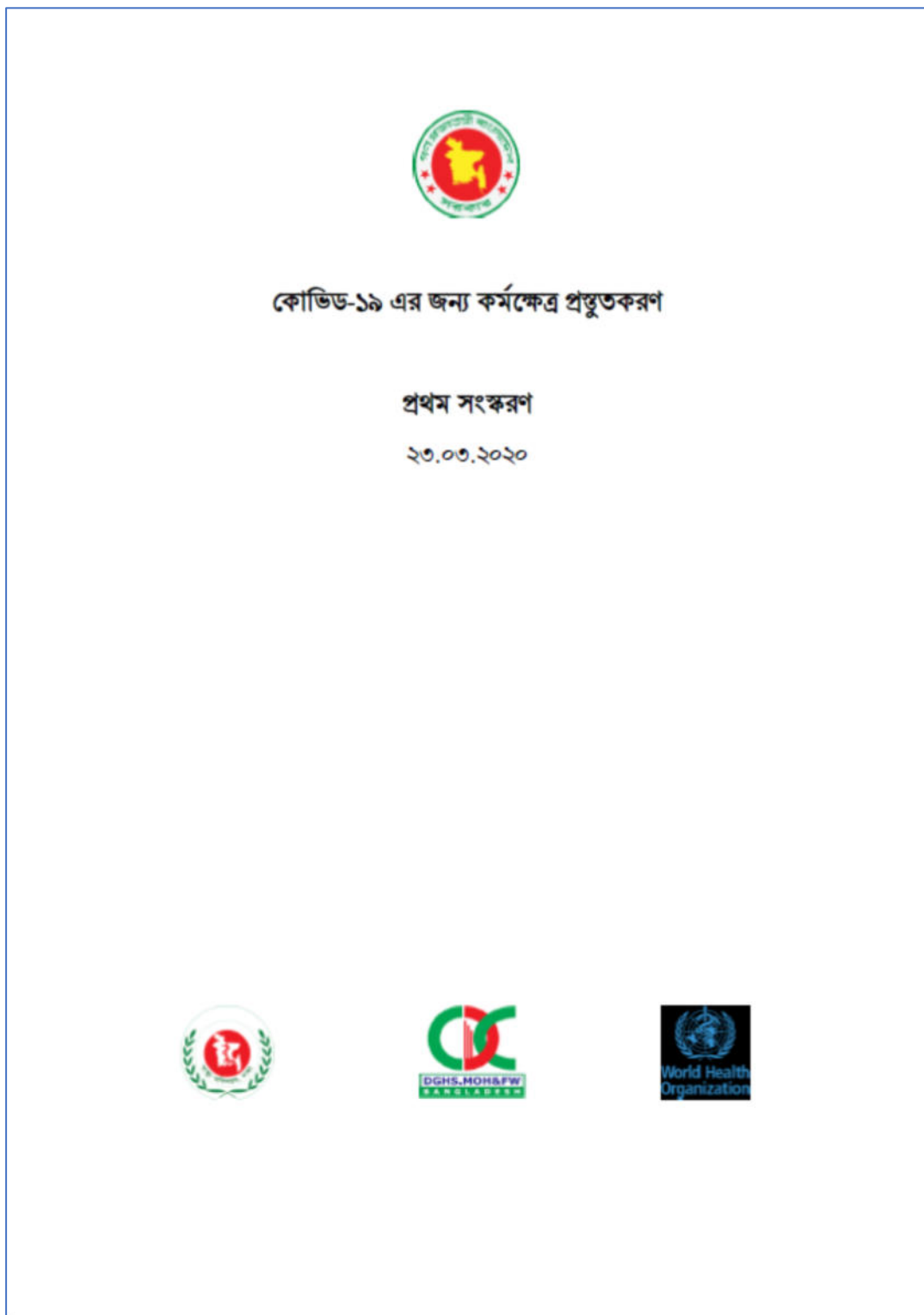


Figure A5 Lane Closure: Two Flag Operators on Two Lane Road
Figure A6 Street Closure with Detour

ANNEX D: 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 মুক্ত 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, গ্রাহকদের 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 জ্বর 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 প্রত্বতকৃত 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 অক্রান্ত 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। টেলিকনফারেন্স বা ইন্টারনেটের মাধ্যমে অনলাইনে সভা আয়োজন করা সম্ভব কিনা তা যাচাই করে দেখা।
- সভা বা অনুষ্ঠানটি ছোট পরিসরে করা যেতে পারে কিনা 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 টিস্যু, সাবান এবং হ্যান্ড স্যানিটাইজারসহ সকল প্রয়োজনীয় সামগ্রীর পর্যাপ্ত সরবরাহ নিশ্চিত করা। প্রয়োজনে উপকরণগুলোর প্রি-অর্ডার করা।
- শ্বাসতন্ত্রের সমস্যার উপসর্গ কারো মাঝে দেখা দিলে তার জন্য মেডিক্যাল/সার্জিক্যাল মাস্ক সরবরাহের ব্যবস্থা রাখতে হবে।
- যেখানে কোভিড-১৯ ভাইরাস বিতরণ 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 ঠিকানা সংগ্রহ করবেন। যদি কোন অংশগ্রহণকারী সন্দেহজনক সংক্রামক ব্যাধিতে অক্রান্ত 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 আনালে 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 সঞ্চোধনের 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 ফিরা 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 পরামর্শকরতে হবে। এর অর্থ হল পরিবারের সদস্যসহ অন্যান্য ব্যক্তিবর্গের সাথে ঘনিষ্ঠ যোগাযোগ (কমপক্ষে ১ মিটার দূরত্ব) এড়িয়ে চলতে হবে।
- স্থানীয় জনস্বাস্থ্য কর্তৃপক্ষকে সভায় অংশগ্রহনকারীদের সাম্প্রতিক ভ্রমণ এবং উপসর্গের বিশদ তথ্য প্রদান করতে হবে।
- সকল অংশগ্রহনকারীকে তাদের সহযোগিতার জন্য ধন্যবাদ আপন 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 যেন সঠিকভাবে মেনে চলে সেটা নিশ্চিত করতে হবে যেমন- যদি স্থানীয় কর্তৃপক্ষ তাকে কোন আয়গায় 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 প্রস্তুতকরণঃ

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 সহায়তা গ্রহণ করতে হবে।
- দপ্তর বা সংস্থা নিয়মিত টেলিযোগাযোগের মাধ্যমে কর্ম সম্পাদনের ব্যবস্থা করতে হবে। কোভিড-১৯ এর প্রাদুর্ভাব ঘটলে স্বাস্থ্য কর্তৃপক্ষ গণপরিবহন এবং জনসমাগম এড়াতে জনগণকে পরামর্শ দিতে পারে; সে ক্ষেত্রে 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-
 - ✓ প্রণয়নকৃত 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 সামাজ্যের 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 প্রস্তাব 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 E: 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.

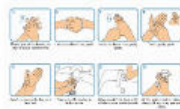
Worksite Entrance Protocol



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.

Camp Management

1. Provide soap, sanitizer, washing facility and safe water at the workers' dwelling. Encourage frequent hand washing.
2. Ensure separate covered bin for disposal of used PPEs.
3. Protect against heat, cold, damp, noise, fire, and disease-carrying animals.
4. Maintain good housekeeping and social distancing in kitchens, meal rooms, canteens.
5. Ensure personal distance at least 1 meter (3 feet), preferably 2m (6ft) during lunch, dinner and prayer.
6. Ensure ample ventilation at the camp.



Place covered waste bins at worksite
Do not forget to dispose your used PPEs in the bins!!

Work at Site Awareness



Inform the designated ESH/Medical personnel immediately if any person starts showing the symptoms of COVID-19.



Encourage respiratory etiquette, including covering coughs and sneezes. Don't touch nose/eye/mouth if not washed recently, do not spit.



Encourage the workers at camp to go out for supplies not more than once a week.



Shorten toolbox meetings. Initiate remote meeting protocol to avoid physical contact.



Stay informed. Get news from WHO and Government news outlets. Ask your EAs. Ask ADB.

ANNEX F: COVID-19 Health and Safety guidance for the construction workforce

COVID-19 Health and Safety Guidance for the Construction Workforce

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.

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

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

1. 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.
2. 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.
3. 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.
4. Always check if the stock of disinfectant, PPEs, medical supplies are sufficient.
5. 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.
6. Arrange a mandatory site brief on COVID awareness in the morning. The session must be conducted by the EHS/medical professional.
7. Encourage workers/site personnel/camp dwellers to inform the designated ESH/Medical personnel immediately if any colleague starts showing the symptoms of COVID-19.
8. 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.
9. Before sharing common tools/machines at worksite, ensure to disinfect.
10. Discourage site personnel to gather and gossip at any time, rather encourage physical distance while chatting/discussing.
11. Keep the day-to-day toolbox meetings as short as possible. Ensure physical distance during meetings.
12. Increase use for internet/phone-based meetings/site visits as much as possible to avoid travelling and physical communication.

13. Restrict worksite personnel to go outside unnecessarily. Also restrict campsite personnel to go outside without any valid cause.
14. If any person related at worksite/campsite fall victim to COVID-19 or being kept isolated for precaution, consider paid leave with no exception allowed.

Section 4: Everyday training

1. 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.
2. Encourage respiratory etiquette, including covering coughs and sneezes. Train the site personnel as needed.
3. Contact with EAs/ADB designated professional for any help with training material/knowledge/miscellaneous.

Section 5: Campsite management

1. 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.
2. Ensure a separate covered bin in place at every campsite/worker's dwelling for disposal of used PPEs.
3. Check and ensure if camps are well ventilated and protected against heat, cold, damp, noise, fire, and disease-carrying animals.
4. Maintain good housekeeping and social distancing in kitchens, meal rooms, canteens and toilets. Make sure campsites are using sanitary toilets.
5. Ensure personal distance at least 1 meter (3 feet), preferably 2m (6ft) during lunch, dinner and prayer.

Section 6: Knowledge management and documentation

1. 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 G: 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

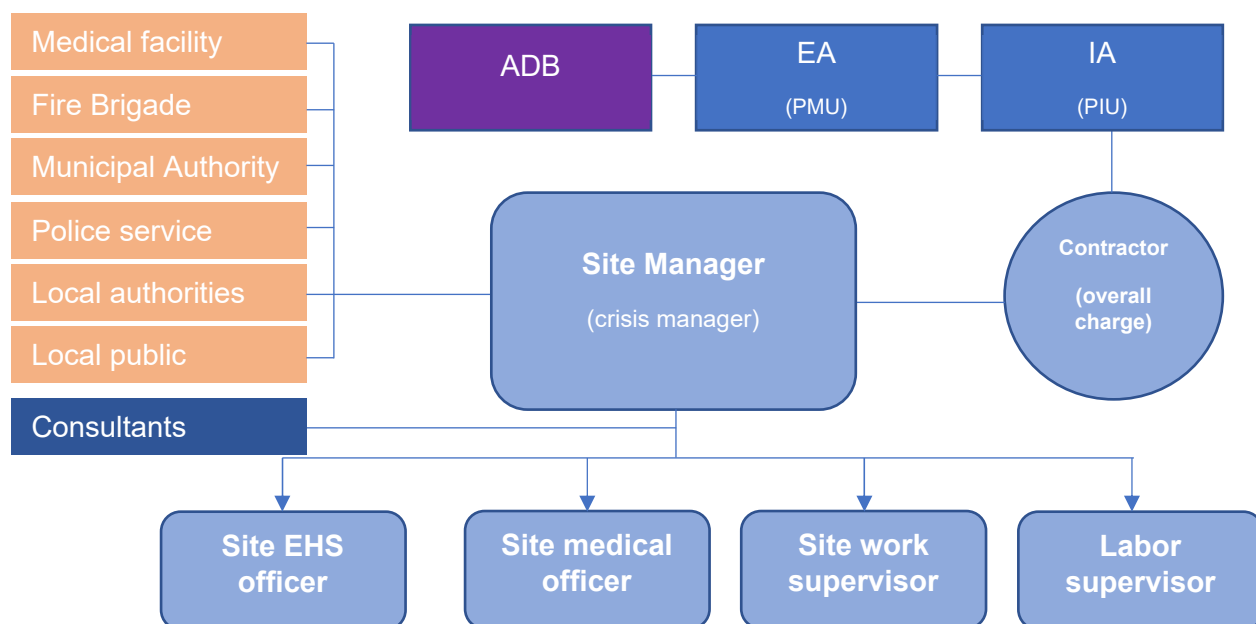


Figure: Organization chart of the crisis management team

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 H: EHS Monitoring and reporting template

Monitoring and Reporting Template

Environmental Health and Safety Monitoring

A. Environmental Health and Safety Checklist

SI no.	Item	Exist in the worksite?		Recommendation And/ or Remarks	Time frame to comply
		Yes <input type="checkbox"/>	No <input type="checkbox"/>		
1	Site readiness (e.g. is worksite fenced and can be distinguished from general establishment? Is the an EHS professional at site? Has he/she been fulltime professional? Has he/she been present at site every day?)				
2	Site access (e.g., is site access road wide and easily accessible?)				
3	Signboard with safety warnings (e.g. with general EHS safety signboards, are COVID 19 response signboards visible at every corner of worksite?)				
4	Lighting (e.g. is every corner of the worksite is well lit?)				
5	Appropriate PPEs (Helmet, Safety Shoe, Vest, Ear plug, Musk etc.) e.g. Is every person in site is wearing appropriate PPEs?				
6	Fall protection measures (e.g. is the fall protection measures at worksite appropriate and adequate?				
7	Fire extinguishers (e.g. are they at site? How many? Are they placed at vulnerable/most accessible places?)				
8	House keeping (e.g. are all workers health records kept? Is the EMP and EHS manual at site? Has the morning briefing on EHS conducted? Is there any vehicle record/material register/attendance register/complain register kept?)				
9	Garbage bins (e.g. are there garbage bins at site? Are the numbers adequate? Is waste thrown to bins? Are the bins well places?				
10	Drinking water supply (e.g. safe drinking water for worksite been supplied? Is drinking water adequate?				
11	Sanitation facilities (e.g. is there separate male and female toilets established? Are they adequate? Hand wash materials and water being provided at toilets? Are those toilets sanitary?				
12	Dust protection measures (e.g. is mask provided for worksite personnel? Is water sprayed frequently as needed to suppress dust? Are sand class materials covered with plastic sheets?				
13	Noise barrier and reduction equipment (e.g. how much noise is generated by site? Does it exceed maximum human exposure limit? Are workers provided with noise reduction gears such as ear mufflers?)				
14	Shelter (e.g. is there a site office or shelter good enough to take shelter during rain or storm event?)				
15	First aid box (e.g. is there a first aid box at site? Are the contents of the first aid box adequate for primary treatment? Is the first aid box handled by at EHS/medical professional				

SI no.	Item	Exist in the worksite?		Recommendation And/ or Remarks	Time frame to comply
		Yes <input type="checkbox"/>	No <input type="checkbox"/>		
16	Toolbox meetings (e.g. are toolbox meeting regularly arranged? Are records kept?)				
17	Others (many other checklists can be formulated by the EHS professional on board)				
COVID -19 protocols on top of usual EHS checklist (this applied to campsite also)					
18	COVID-19 posters/signboards (e.g. 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 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?)				

*Attach photos

**Enter additional criteria as required for site specific measures

Reported by (ESC)	Checked by (TL)	Approved by (EA/IA)
Name Designation Signature Date	Name Designation Signature Date	Name Designation Signature Date
Received and agreed to comply by the representative of the contractor	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	

C. Safety patrol/inspection report form


SITE SAFETY PATROL REPORT AND INSTRUCTION						
Date						
Inspector						
No	Location	Comment/instruction	Photo	Corrective action	Deadline	Responsible person

Reported by (ESC)	Checked by (TL)	Approved by (EA/IA)
Name Designation Signature Date	Name Designation Signature Date	Name Designation Signature Date
Received and agreed to comply by the representative of the contractor	Name Designation Signature Date	

Annex I: EHS Monitoring and reporting template

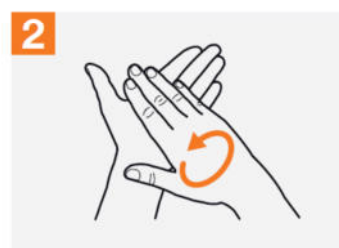
How to Handrub?

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;



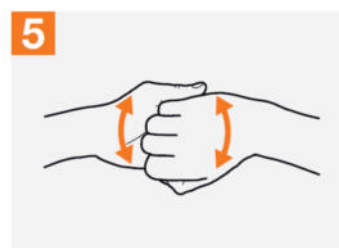
Rub hands palm to palm;



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



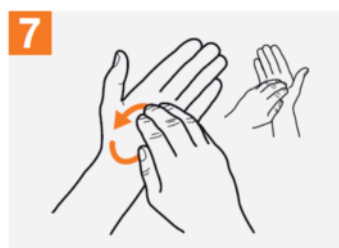
Palm to palm with fingers interlaced;



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 your tools
frequently



Maintain at least 6ft
distance from each other

