GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

Local Government Engineering Department (LGED)

Local Government Division

Ministry of Local Government, Rural Development and Cooperatives

ENVIRONMENTAL ASSESSMENT (EA) REPORT

Name of the Subproject: a) Improvement of road and drain (with cover) from Kulalpara Jeep Station to Bus Station Fuara via Lamar Bazar bridge (Ch. 0+00 to 0+810m), b) Improvement of road from east side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty (Ch. 0+00 to 1+250m), c) Improvement of road from Teknaf Post office to Krishi Bank (Ch. 0+00 to 0+275m), d) Construction of RCC road and primary drain from Uttar Jaliapara Foyaz Alam's house to Berry bandh (Ch. 0+00 to 0+575m), e) Improvement of road and drain from Sona Miah shop near Cox's Bazar main road to Sukkur's Bari via Naitangpara Budda Chita (Ch. 0+00 to 0+615m and Link Ch. 0+00 to 0+335m), f) Improvement of road and road level drain from Naitangpara Najmul's house to Nurul Hoq house (Ch. 0+00 to 0+ 275m)

Package No: MGSP/TEK/ 2018-19/W-01

Teknaf Pourashava, Cox's Bazar

Municipal Governance and Services Project (MGSP)

Design, Supervision and Management (DSM) Consultant Team

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ABBREVIATIONS

AP (AP's)	Affected Person
BDT	Bangladeshi Taka
BMD	Bangladesh Meteorological Department
BOQ	Bill of Quantity
CC	Cement Concrete
CIP	Capital Investment Plan
CP	Contingency Planning
DSM	Design, Supervision, and Management
EA	Environmental Assessment
ECR	Environmental Conservation Rules
EMP	Environmental Management Plan
EPP	Emergency Preparedness Planning
ES	Environmental Screening
FGD	Focal Group Discussion
GoB	Government of Bangladesh
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GRP	Grievance Redress Procedure
IIS	Infrastructure Improvement Section
LGED	Local Government Engineering Department
MGSP	Municipal Governance and Services Project
PD	Project Director
PMU	Project Management Unit
RCC	Reinforcement Cement Concrete
RP	Relevant Reports
TL	Team Leader
ULB	Urban Local Body
WB	World Bank
XEN	Executive Engineer

1 INTRODUCTION

1.1 Subproject Background

Teknaf Paurashava established on 25th May, 2000 with an area of 4.05 sq km, bounded by Chttagong hill tracts hilly area and Ukhia Upazila on the north, the Bay of Bengal on the south and west, Naf River and Myanmar on the east. Main River is Naf River and most notable khal in this area are Hashar Khal, K-K khal and others are Isakhali, Mahamaya, Domkhali, Hinguli, Koila Govania and Mayani Khal [*Teknaf Paurashava Master Plan: 2011-2031*]. It comprises of 9 wards, 9 mahallas on 1 mouza and current population of the Pourashava is about 25,056 [*BBS, 2011*]. Teknaf Pourashava is B Type Pourashava. At present Teknaf Pourashava has 35.00 km roads which includes 28 km pucca roads and 7 km earthen roads. The municipality has 28 km drains which includes 22 km brick drains and 6 km earthen drains. For draining out of storm water and prolongation of river/canal water flow 4 bridges and 18 culverts/cross drains are exist in Pourashava boundary [*Teknaf Pourashava - At a glance*]. With the increasing population and rapid urbanization, Teknaf Pourashava requires continuous infrastructure development. Hence, this subproject is a continuation of the infrastructural development of the Teknaf Pourashava for the improvement of transport and drainage facilities.

This subproject includes the following components: Reinforcement Cement Concrete (RCC) pavements and RCC drains with allied works including street light at different Wards (Wards no. 01, 03, 06, 07, 08 and 09) of Teknaf Pourashava. The significant features of the subproject are mentioned below:

Name of the Subproject:	a) Improvement of road and drain (with cover) construction from Kulalpara Jeep Station to Bus Station Fuara via Lamar Bazar bridge including street light, Ch. 0+00 to 0+810m. b) Improvement of road from east side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty including street light, Ch. 0+00 to 1+250m. c) Improvement of road from Teknaf Post office to Krishi Bank including street light, Ch.0+00 to 0+ 275m. d) Construction of RCC road and primary drain from Uttar Jaliapara Foyaz Alam's house to Berry bandh including street light, Road Ch. 0+00 to 0+575m, Drain Length-825m, outfall at No. 1 sluice gate. e) Improvement of road and drain from Sona Miah shop near Cox's Bazar main road to Sukkur's Bari via Naitangpara Budda Chita including street light Ch.0+00 to 0+615m and Link Ch.0+00 to 0+335m. f) Improvement of road and road level drain from Naitangpara Najmul's house to Nurul Hoq house including street light, Ch.0+00 to 0+ 275m.
Package No.:	MGSP/TEK/2018-19/W-01

District Name:	Cox's Bazar
ULB Name:	Teknaf Pourashava
Jurisdiction Area:	Ward no. 01, 03, 06, 07, 08 & 09 of Teknaf Pourashava
Structural Design Option:	RCC Road and drain with allied works
Beneficiary Population:	About 16,017 (*Population of ward no. 01, 03, 06, 07, 08 & 09 of Teknaf Pourashava - Population and housing census, 2011*)
Tribal People:	No tribal people settlement found in the subproject area
Land Acquisition:	No private land acquisition is needed.
Estimated Cost:	163.718 million BDT
Subproject Duration:	09 Months
Tentative Start Date:	21 May, 2019
Tentative Completion Date:	20 February, 2020

1.2 Objectives of the Study

The aim of the study is to examine the environmental impacts due to construction and operation of the subproject and formulate the environmental management plan to minimize the negative impacts and enhance the positive impacts.

The specific objectives include:

- To assess the existing environmental conditions of the subproject site and its adjacent areas in order to establish a baseline framework against which potential environmental impacts due to implementation of the subproject would be compared;
- To identify and assess impacts resulting from the subproject during its construction phase and operation phase;
- To develop a rational environmental management plan with recommendations for mitigating adverse impacts and enhancing positive impacts and outlining environmental monitoring requirements both during construction and operational phase of the subproject.

1.3 Scope and Methodology of the Study

For the preparation of the subproject appraisal, environmental screening has been performed for all the subproject components. According to the screening, environmental assessment is required to fulfill the regulatory requirement of this subproject. The study methodology comprised the following activities:

- Desktop Study;
- Field Investigations and Data Collection;
- Data Analysis and Report Writing.

Desktop Study

The desktop study involved:

- Initial meetings with client, stakeholders to discuss the proposed subproject, including subproject activities;
- Collection and review of the baseline data, maps, reports and other relevant information on the existing environmental and social conditions of the subproject area;
- Review the relevant existing legislation, regulation and policies;
- Understand the anticipated technical processes that may affect the environment.

Field Investigation and Data Collection

A team of the consultants made a field investigation to the proposed site. Field investigations involved mainly site walks within the subproject area and the neighboring areas that may be affected by the subproject. The following key tasks were performed during the field visit:

- Taking photographs of the significant aspects to assist in describing the baseline environmental conditions of the subproject area;
- Interviews with representatives of the Teknaf Pourashava officials, within the subproject area and interested and affected people within the subproject influence zone;
- Obtaining relevant documents from the Pourashava and local people within the subproject influence zone;
- Verifying information and data collected during the desktop study and to collect new information that may have been important in the assessment of the impacts and design of the mitigation measures.

Data Analysis and Report Writing

The data and information collected from all the sources (literature review, secondary and primary data, public consultation) were analyzed to describe the existing environmental setting of the subproject area, to identify the potential positive and negative impacts of the proposed subproject, as well as to provide preliminary suggestions for mitigation measures. Finally, this environmental assessment report has been prepared.

2 SUBPROJECT DESCRIPTION

2.1 The Study Area

The subprojects are located at different Wards of Teknaf Pourashava. Kulalpara Jeep Station to Bus Station Fuara via Lamar Bazar bridge road (Ch. 0-810m), East side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty road (Ch. 0-1250m), Teknaf Post office to Krishi Bank road (Ch. 0-275m), Uttar Jaliapara Foyaz Alam's house to Berry bandh road (Ch. 0-575m), Sona Miah shop near Cox's Bazar main road to Sukkur's Bari via Naitangpara Budda Chita (Ch. 0-615m and Link Ch. 0+00 to 0+335m) and Naitangpara Najmul's house to Nurul Hoq house (Ch. 0+00 to 0+ 275m), are situated within the jurisdiction of the wards no. 01, 03, 06, 07, 08 and 09 No. Wards of Teknaf Pourashava The location map, topographical features and layout plan of the subproject are shown in ***Figure 2.1.1, Figure 2.1.2*** and ***Figure 2.1.3***.

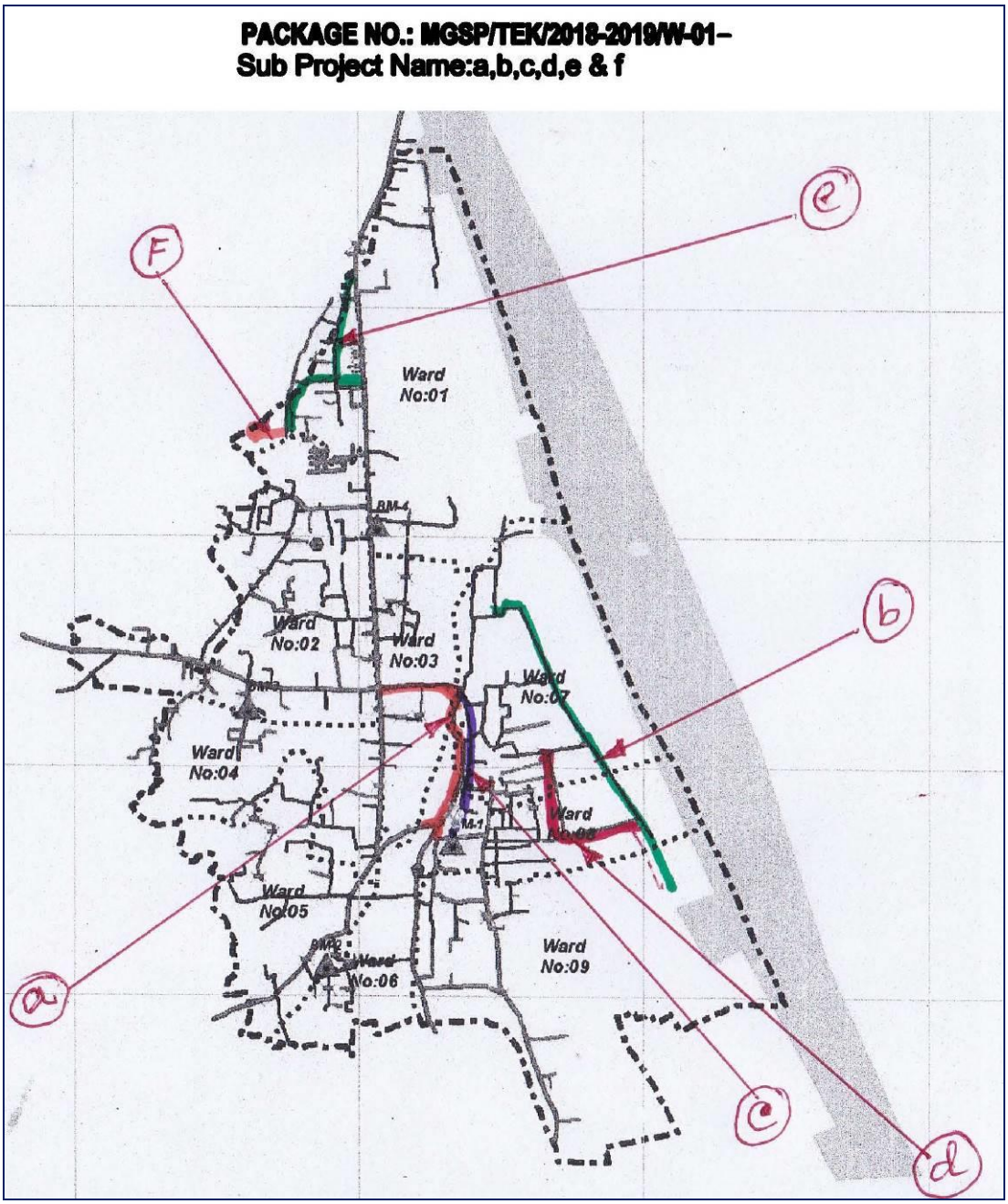

Figure 2.1.1: Location Map of the Subproject

Figure 2.1.2: Topographical Features of the proposed overall Subproject roads and drain with influence zone at Teknaf Pourashava

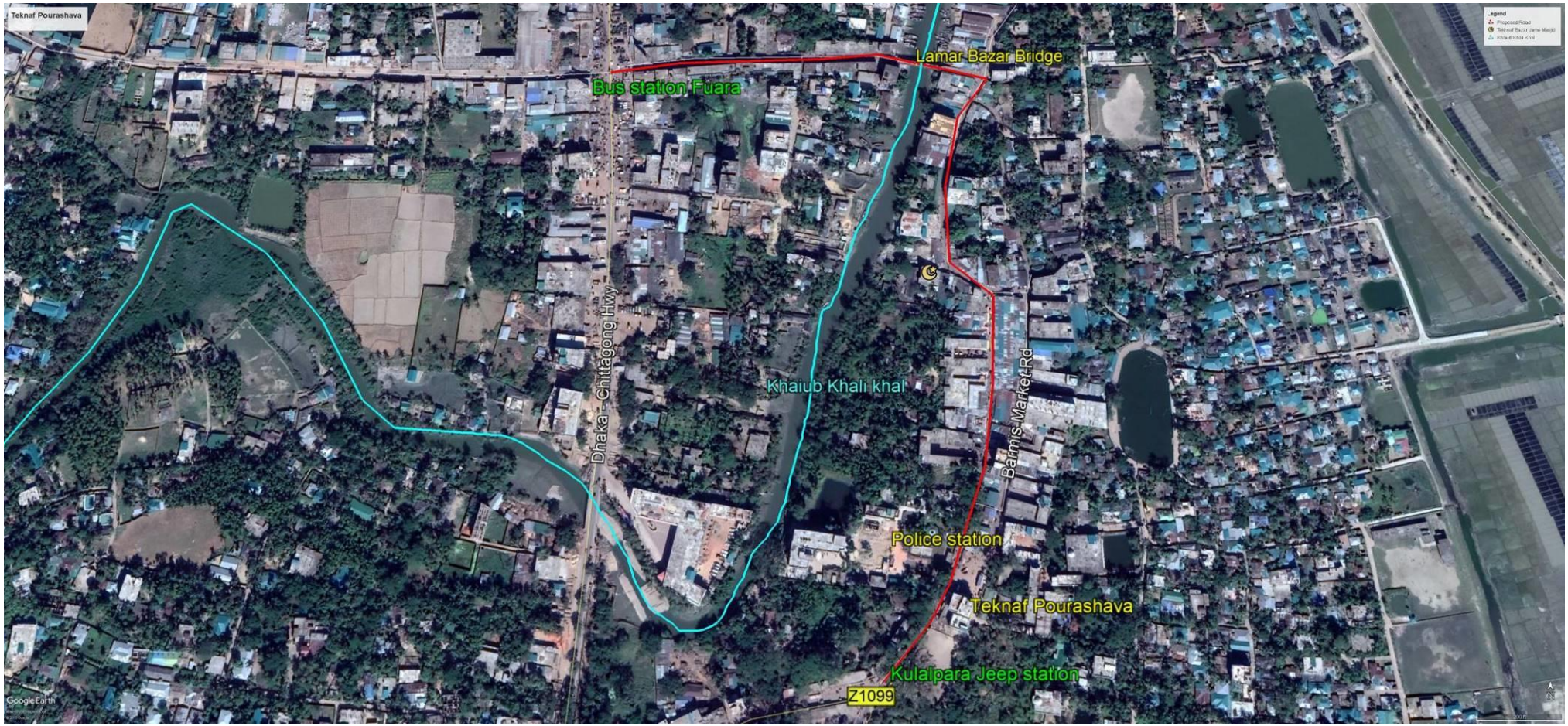

Figure 2.1.2 (a): Topographical Features of the proposed Subproject (a) Kulalpara Jeep Station to Bus Station Fuara via Lamar Bazar bridge road with influence zone

Figure 2.1.2 (b): Topographical Features of the proposed Subproject (b) East side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty road with influence zone

Figure 2.1.2 (c): Topographical Features of the proposed Subproject (c) Teknaf Post office to Krishi Bank with influence zone

Figure 2.1.2 (d): Topographical Features of the proposed Subproject (d) Uttar Jaliapara Foyaz Alam's house to Berry bandh road with influence zone

Figure 2.1.2 (e): Topographical Features of the proposed Subproject (e) Sona Miah shop near Cox's Bazar main road to Sukkur's Bari via Naitangpara Budda Chita with influence zone

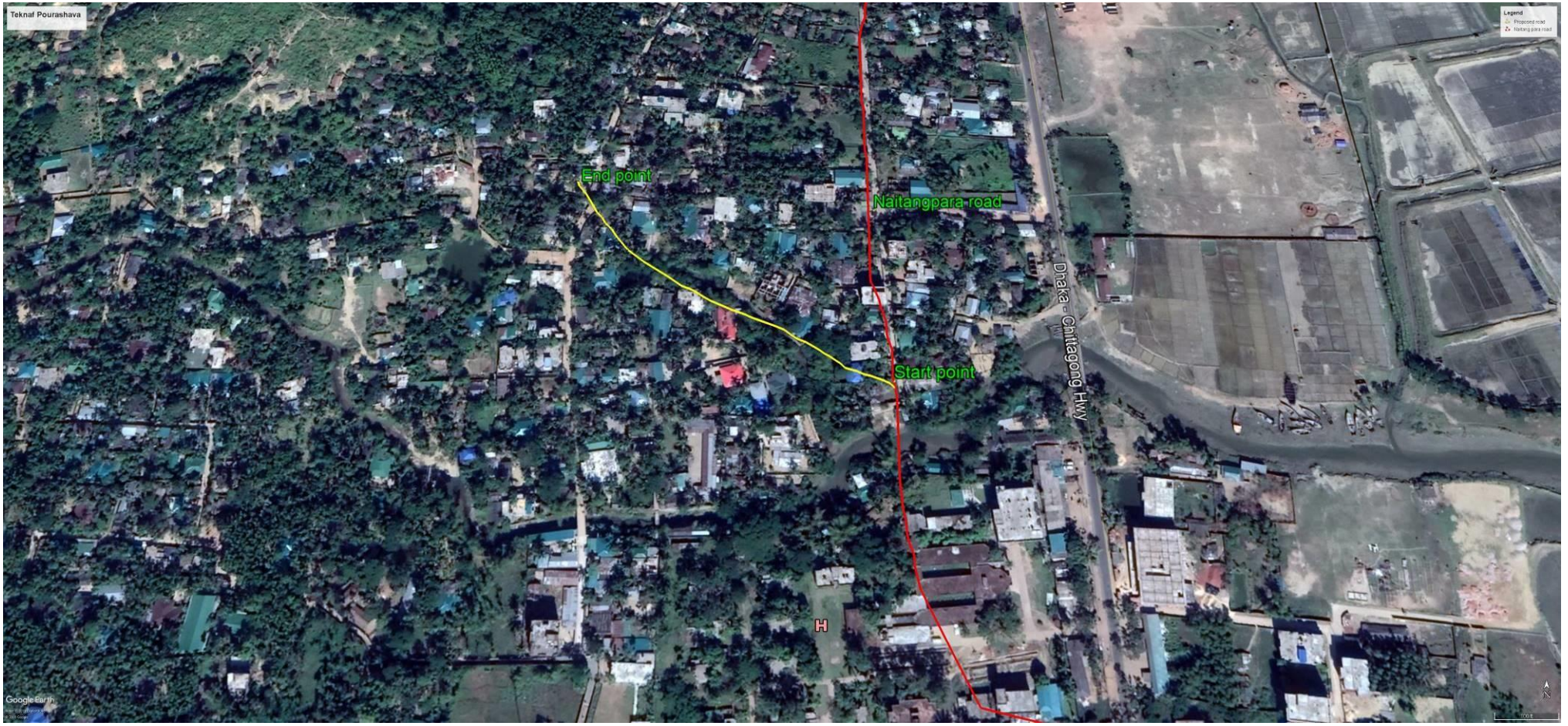

Figure 2.1.2 (f): Topographical Features of the proposed Subproject (f) Naitangpara Najmul's house to Nurul Hoq house with influence zone

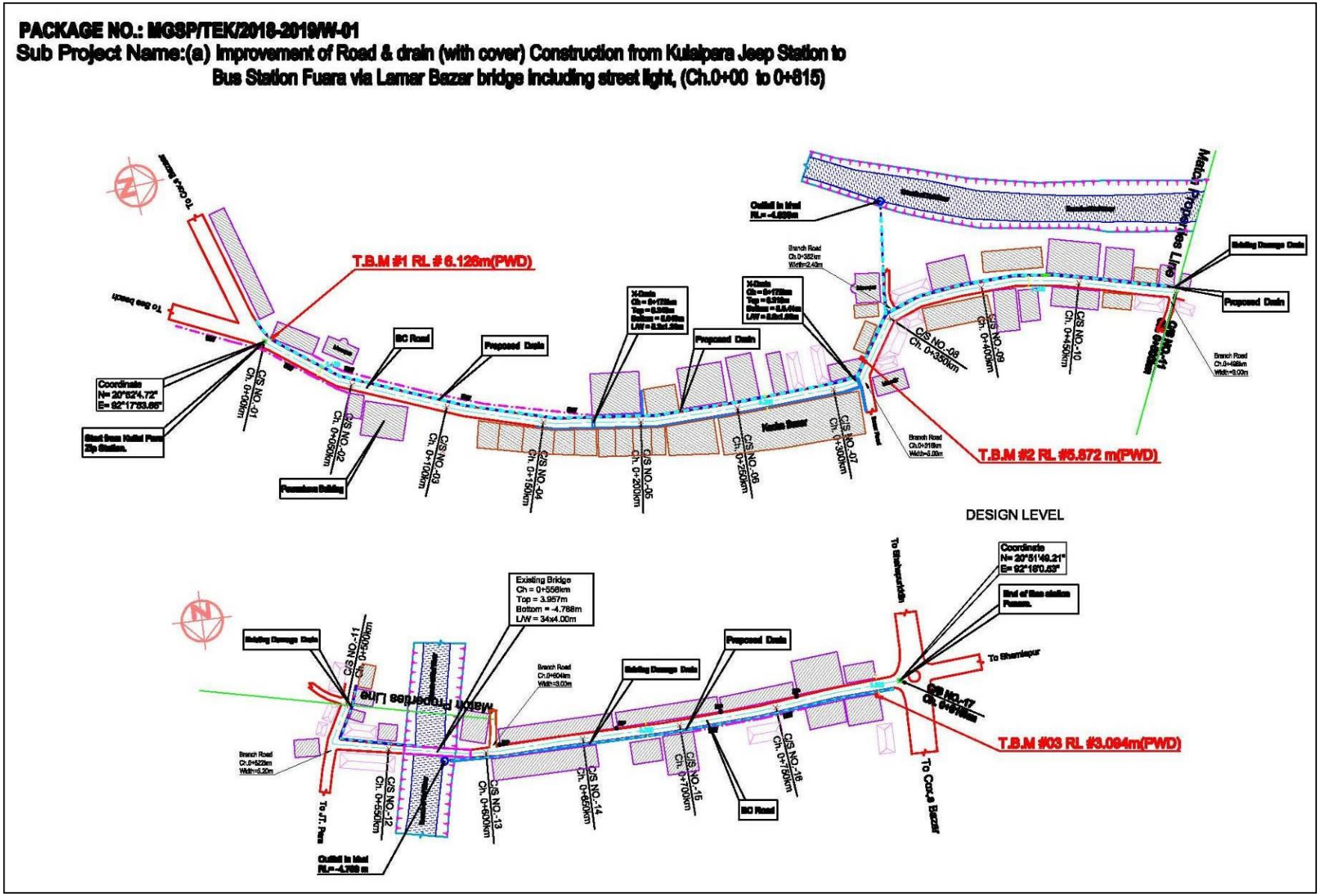

Figure 2.1.3 (a): Layout Plan for the proposed Subproject (a) Kulalpara Jeep Station to Bus Station Fuara via Lamar Bazar bridge road

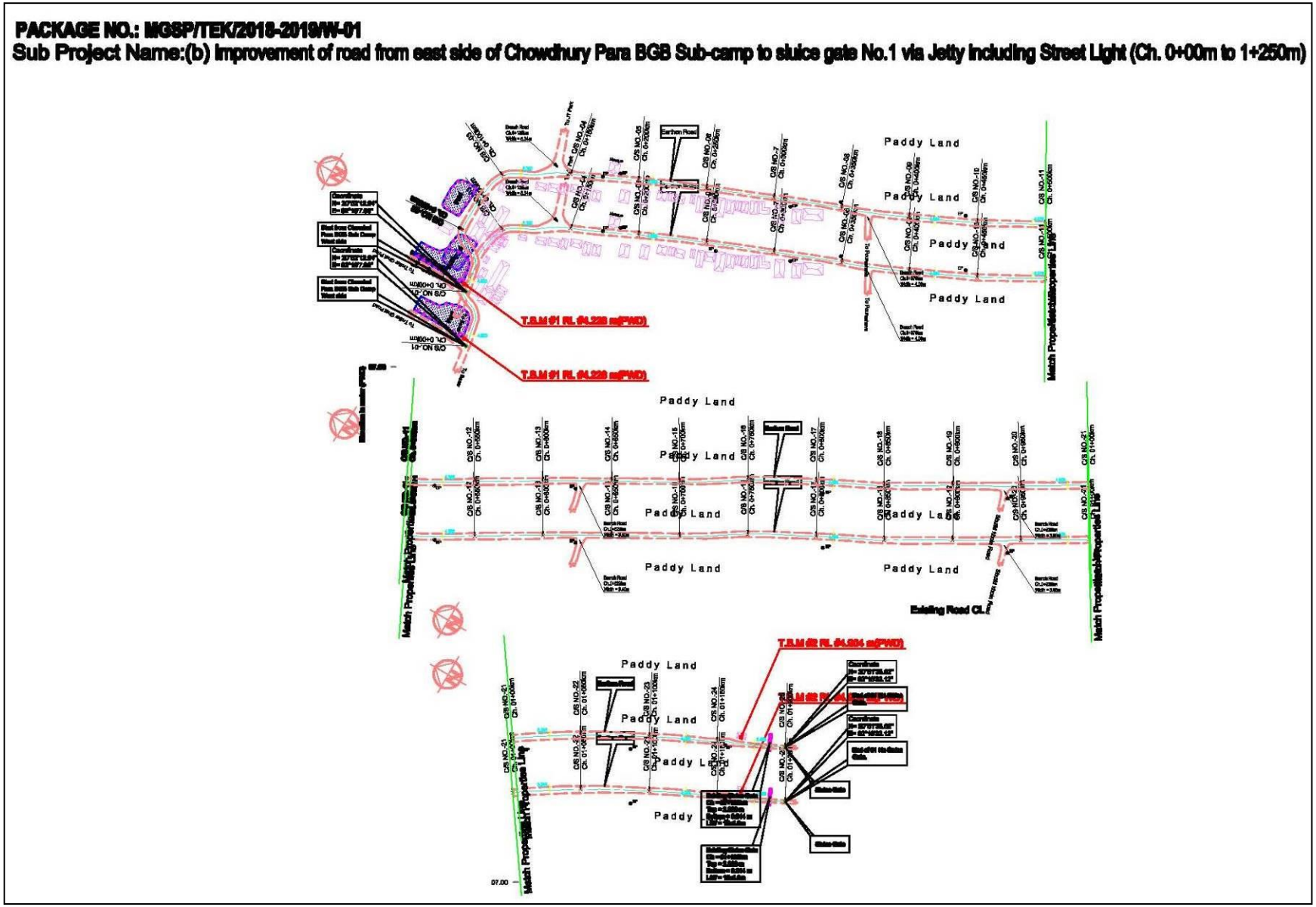

Figure 2.1.3 (b): Layout Plan for the proposed Subproject (b) East side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty road

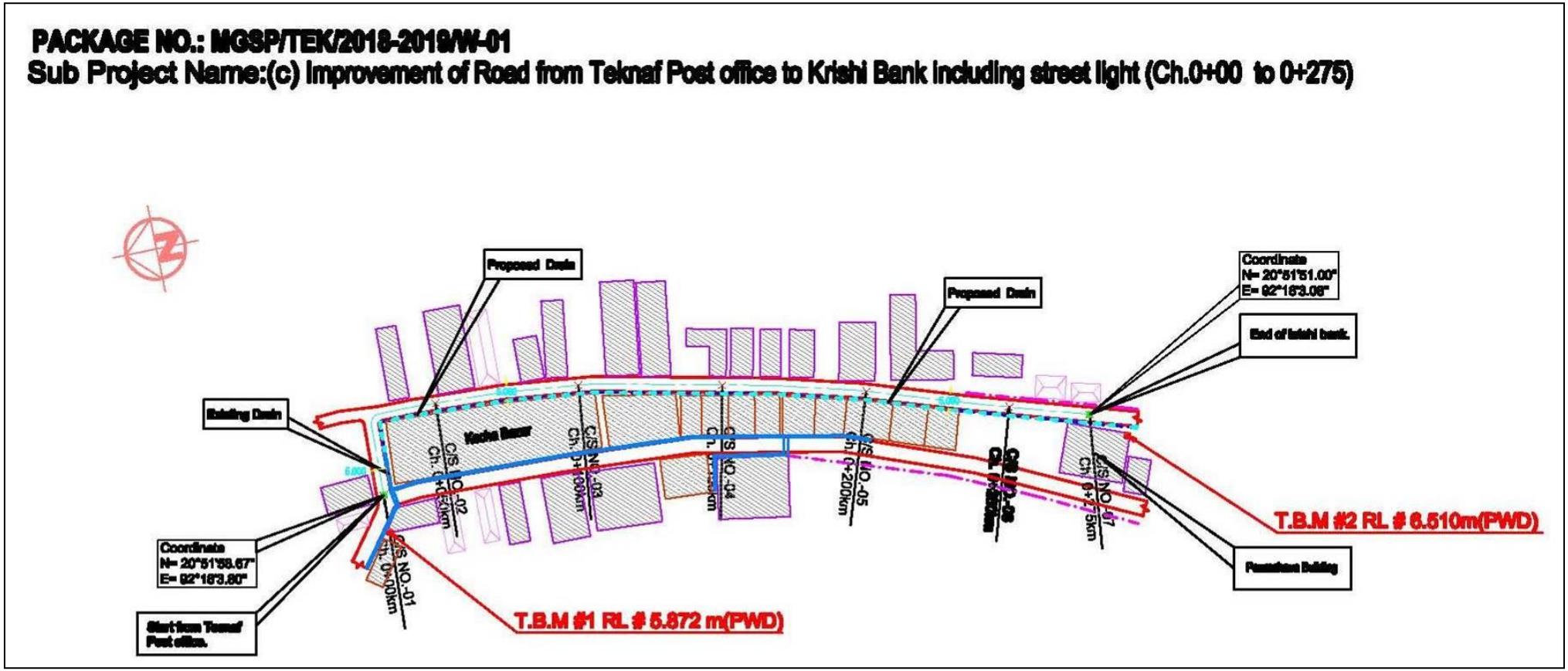

Figure 2.1.3 (c): Layout Plan for the proposed Subproject (c) Teknaf Post office to Krishi Bank

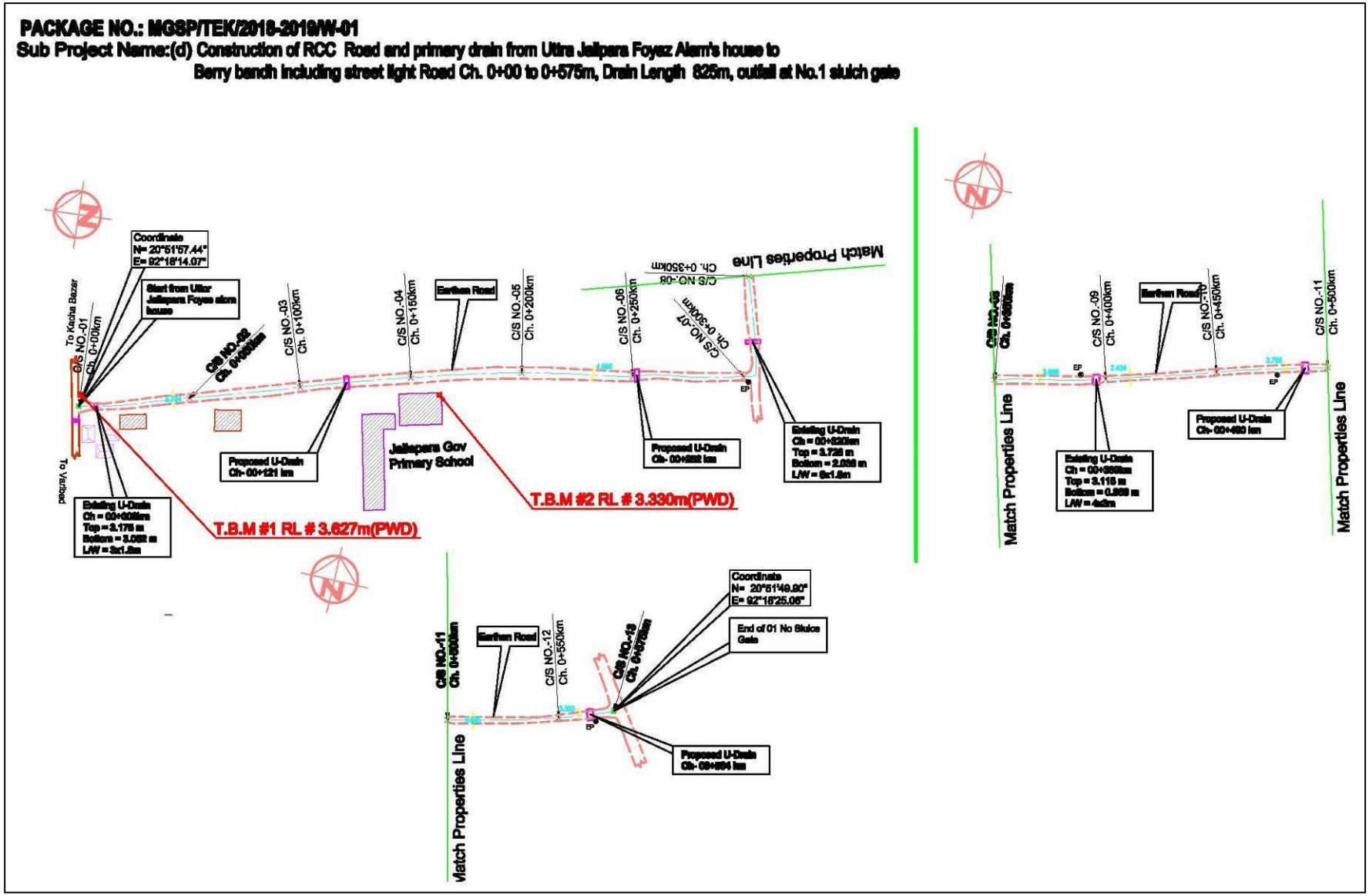

Figure 2.1.3 (d): Layout Plan for the proposed Subproject (d) Uttar Jaliapara Foyaz Alam's house to Berry bandh road

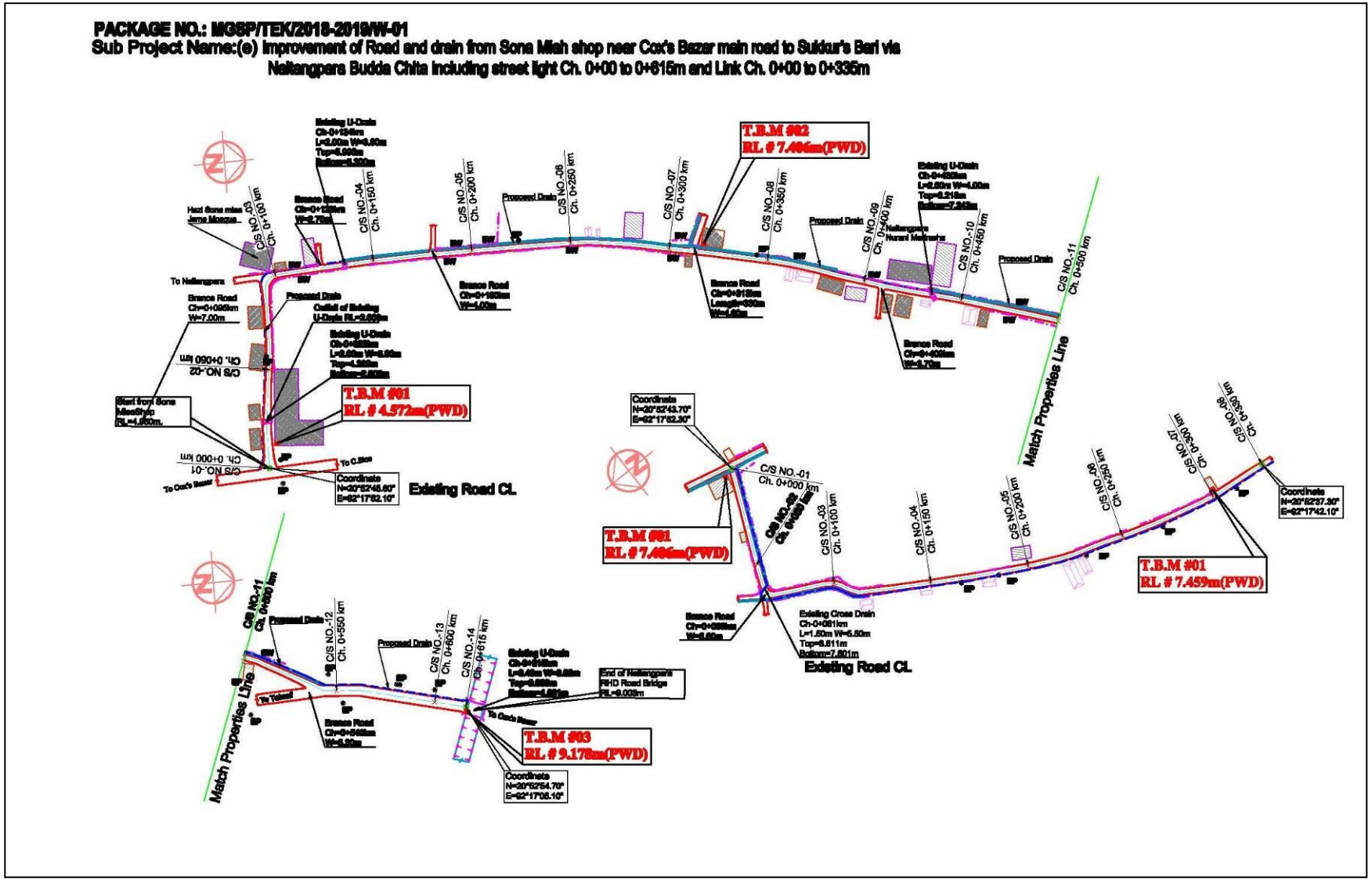

Figure 2.1.3 (e): Layout Plan for the proposed Subproject e) Sona Miah shop near Cox's Bazar main road to Sukkur's Bari via Naitangpara Budda Chita

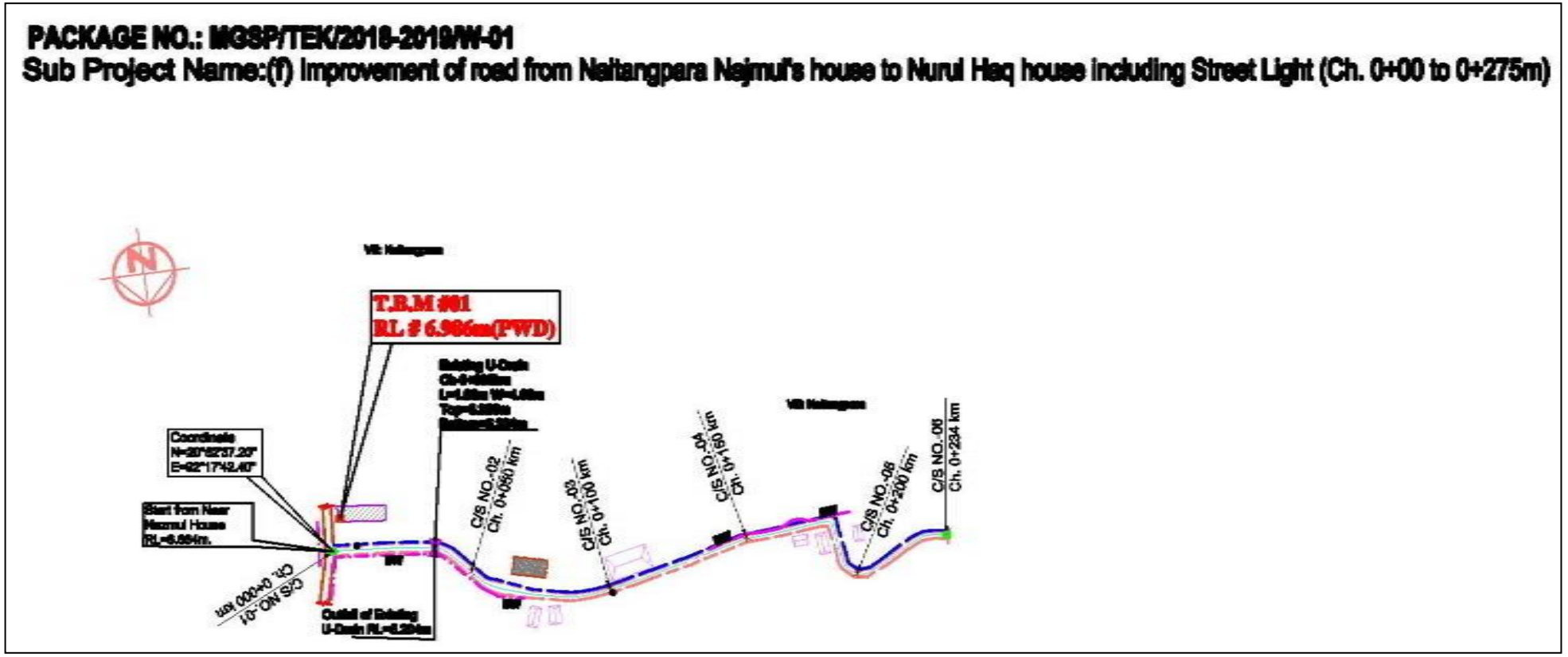

Figure 2.1.3 (f): Layout Plan for the proposed Subproject (f) Naitangpara Najmul's house to Nurul Hoq house

2.2 Current Situation, Proposed Intervention and Need for the Subproject

This subproject (Package: MGSP/TEK/2018-2019/W01) includes RCC pavement and RCC drain including street light from Kulalpara Jeep Station to Bus Station Fuara (Ch. 0-810m), East side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty road (Ch. 0-1250m), Teknaf Post office to Krishi Bank road (Ch. 0-275m), Uttar Jaliapara Foyaz Alam's house to Berry bandh road (Ch. 0-575m), Sona Miah shop near Cox's Bazar main road to Sukkur's Bari via Naitangpara Budda Chita (Ch. 0-615m and Link Ch. 0+00 to 0+335m) and Naitangpara Najmul's house to Nurul Hoq house (Ch. 0+00 to 0+ 275m),. The subproject site is situated within the jurisdiction of the ward no. 01, 03, 06, 07, 08 and 09 of Teknaf Pourashava. The proposed road will be developed by replacing the existing damaged BC, HBB and earthen roads to new RCC pavements.

The proposed road starts from Kulalpara Jeep Station and continues upto Old Bus Station Fuara via Lamar Bazar Bridge passing through the Kulalpara jeep station, Teknaf Upper Bazar area, Teknaf Pourashava, Barmis market, Lamar bazar and old bus station area. The existing road from Ch. 0+000 to 0+810m is BC paved. The bituminous carpeting is mostly damaged, potholes and rutting formed at several places of the road. The existing pavement width varies from 5m to 7m and the crest width of the road varies from 5.3m to 8.0m. The slope of the roadway embankment ranges from 1:5 to 1:5.5 at the left side and 1:6 to 1:6.5 at the right. Considering the poor condition of the pavement, it is necessary to improve the road. By improving the proposed road by RCC with pavement width 5.5m on priority basis for the community people. From Ch. 0+000 to 0+500m and 0+625 to 0+815m it is proposed to provide 150mm improved subgrade, 150mm sub base on the prepared subgrade at the widening part of road and 150mm RCC on existing pavement & widening with nominal reinforcement. However, From Ch. 0+500 to 0+550m and 0+575 to 0+625m, the approaches of the bridge is recommended to improve with average 500mm sand filling, 150mm sub base and 150mm RCC. This subproject area with its influencing extent contains the tidal channel named Khaiubkhali Khal. The subproject area is a densely populated and core area of the Pourashava due to administration activities and trade and commerce transaction (several markets including kitchen market, whole sale fishery market). However, in the subproject area, the drainage facility is inadequate and inappropriate. The existing narrow, damaged and silted-up brick drains at different segments of the proposed road is not functioning properly. Moreover, excessive storm water due to heavy and continuous rainfall at wet season, tidal influence by Khaiubkhali khal and natural catastrophe causes delay discharge of water from the subproject area and creates drainage congestion and water logging in the subproject area. As a result, major environmental and public health hazard occurs in the subproject area. In addition, the stagnation of water damages the road surface. As a result smooth traffic flow is hampered and amount of traffic accidents are increasing. That's why a well-designed covered drain at three segments of the proposed road side with proper outfall is essential to

complete the drainage network for ease and safe movement for traffic & pedestrians and to improve the circumstance of waterlogging and drainage congestion during monsoon. The Khaiubkhali Khal will be act as outfall of the proposed drains. This subproject has significant benefit to the community people after completion. This is one of the important road and drain that will fasten the progression of rapidly growing Teknaf Pourashava and also increases its services and governance strength.

The proposed road from BGB Sub-camp to sluice gate No.1 is passed through the Chowdhurypara, Jetty ghat, Jaliapara, Beribandh area. The proposed road starts from Chowdhury para BGB Sub-camp besides Ezhar Company's salt warehouse and continues up to sluice gate No.1 via Jetty. The existing road from Ch. 0 - 230m is brick paved [HBB (Herring bond-bone)] and remaining part is earthen. The HBB road is mostly damaged, potholes and undulations are formed on the road. In the rainy season the earthen road become muddy and slippery. The misery for pedestrian and traffic movement reaches highest limit who are bound to use this road. Again, the narrow width of the road creates traffic congestion and increases the rate of accidents which makes the road un-trafficable. The crest width of the road varies from 4.0 - 5.0m. Considering the poor condition of the pavement with a narrow width in places, it is necessary to improve the road. By improving the proposed road by RCC pavement with crest width 5.0m on priority basis for the community people. This subproject influencing area comprise of man-made water bodies (aquaculture ponds, salt pane), natural low wet land and river (Naff River) to carry the storm water from the subproject area. The rain fall run-off is drawn easily on the sides of road and finally reach the watershed. This subproject has significant benefit to the community people after completion. This is one of the important road that connects the rapidly growing Chowdhury para and Jaliapara to the central part of the Teknaf Pourashava.

The proposed road from Teknaf Post office to Krishi Bank is passed through the Teknaf Pourashava, Upper bazar, Namar bazar and Bishnu Mandir. The proposed road starts from Teknaf Post office besides Poura Bhavan and Upper Bazar and continues up to Krishi bank besides Bishnu temple and meet the subproject a (Kulal Para Jeep station to bus station Fuara via Lamar Bazar bridge road) to make a road network. The existing road from Ch. 0+00 to Ch. 0+275m is BC paved. The bituminous carpeting is mostly damaged, potholes and rutting formed at several places of the road. Again, the narrow width of the road creates traffic congestion and increases the rate of accidents which makes the road un-trafficable. The existing average pavement width is 5.0m. Considering the poor condition of the pavement with a narrow width in places, it is necessary to improve the road. By improving the proposed road by RCC pavement with crest width 5.0m on priority basis for the community people. This subproject has significant benefit to the community people after completion. This is one of the important road that connects the rapidly growing Teknaf Pourashava.

The proposed road starts from Foyaz Alam's house at Uttar Jaliapara and continues upto BGG sub camp to 1No. Sluice gate road. The existing road is earthen. Undulations are formed on the road. In the rainy season the earthen road become muddy and slippery. The misery for pedestrian and traffic movement reaches highest limit who are bound to use this road. Again, the narrow width of the road creates traffic congestion and increases the rate of accidents which makes the road un-trafficable. The crest width of the road varies from 4.0 - 5.0m. Considering the poor condition of the pavement with a narrow width in places, it is necessary to improve the road. By improving the proposed road by RCC pavement with crest width 5.0m on priority basis for the community people. This subproject influencing area comprise of man-made water bodies (aquaculture ponds, salt pane), natural low wet land and river (Naff River) to carry the storm water from the subproject area. The rain fall run-off is drawn easily on the sides of road and finally reach the watershed. But the existing drain at Uttar Jaliapara area comes to and end at the low land besides the proposed road. Due to inappropriate outfall, excessive storm water due to heavy and continuous rainfall at wet season, tidal influence by Naf river and natural catastrophe causes delay discharge of water from the low land and creates drainage congestion and water logging in the subproject area which damage the road surface. To carry out the secondary drain water to the final outfall (Naf River) a primary drain is designed with adequate and appropriate measures. The River Naf will be act as outfall for the proposed drain. Furthermore, RCC palisading at 5 stretches condition of the proposed road (length 462m) are proposed to provide to protect the soft shoulder of road. 2 nos. of RCC road cross drain (1.2m x 1.2m and 0.75mx0.75m at Ch. 0+007m and 0+515m) as well as 3 Nos. RCC box culvert of size 2mx2m at Ch. 0+120m, 0+215m and 0+350m respectively will be constructed to divert water from one to other side of the road. This subproject has significant benefit to the community people after completion. This is one of the important road that connects the rapidly growing Chowdhury para and Jaliapara to the central part of the Teknaf Pourashava.

The proposed road starts from Cox's Bazar main road near Sona Mia's shop and continues upto Sukkur's Bari via Naitangpara Budda Chita. The existing road is BC paved. The carpeting of the road is badly damaged. The existing pavement width is 3.0m and the crest width varies from 3.0m to 3.5m. In the rainy season waterlogging take place in some stretches of the road. Considering the poor condition of the pavement, it is necessary to improve the road. By improving the proposed road by RCC with pavement width 3.5m on priority basis for the community people. From Ch. 0+00 to 0+587m of main and Link road (Ch. 0+00 to 0+335m) it is proposed to provide 150mm improved subgrade, 150mm sub-base on the prepared subgrade at the widening part of road and 150mm RCC on existing pavement & widening part with nominal reinforcement. This subproject area with its influencing extent contains the tidal channel named Haccha Khal. The subproject area is a densely populated and core area of the Pourashava due to administration activities and trade and commerce

transaction. However, in the subproject area, the drainage facility is inadequate and inappropriate. The existing narrow, damaged and silted-up brick drains at different segments of the proposed road is not functioning properly. Moreover, excessive storm water due to heavy and continuous rainfall at wet season, tidal influence by Haccha khal and natural catastrophe causes delay discharge of water from the subproject area and creates drainage congestion and water logging in the subproject area. As a result, major environmental and public health hazard occurs in the subproject area. In addition, the stagnation of water damages the road surface. As a result smooth traffic flow is hampered and amount of traffic accidents are increasing. That's why a well-designed covered drain of the proposed road side with proper outfall is essential to complete the drainage network for ease and safe movement for traffic & pedestrians and to improve the circumstance of waterlogging and drainage congestion during monsoon. The Haccha Khal will be act as outfall of the proposed drains. 296m palisading is to be provided from Ch.0+291m to 0+587m to protect the right side soft shoulder of road. 2 nos. RCC road cross drain on the main road and 1 on the link will be constructed to divert water from one to other side of the road. This subproject has significant benefit to the community people after completion. This is one of the important road and drain that will fasten the progression of rapidly growing Teknaf Pourashava and also increases its services and governance strength.

The proposed road from Naitangpara Najmul's house to Nurul Hoq house will be developed by replacing the existing earthen road to new RCC pavement. The existing road is earthen. In the rainy season the road become untrafficable. The crest width of the road varies from 3.7m to 4.0m. The slope of the roadway embankment ranges from 1:1 to 1:1.2 at the left side and 1:1 to 1:1.5 at the right. In the rainy season waterlogging take place in some stretches of the road. Considering the poor condition of the pavement with a narrow width in places, it is necessary to improve the road. By improving the proposed road by RCC pavement with crest width 4.0m on priority basis for the community people. It is proposed to provide 150mm improved subgrade, 150mm sub-base and 150mm RCC with nominal reinforcement on the prepared subgrade to improvement the road. RCC palisading at 3 stretches of length 122m are proposed to provide to protect the soft shoulder of road. 1 no. RCC road cross drain on the road will be constructed to divert water from one to other side of the road. This subproject has significant benefit to the community people after completion. This is one of the important road that connects the rapidly growing Naitangpara to the central part of the Teknaf Pourashava.

Moreover, absent of the street light hampers the normal traffic operation and safety at night. Therefore, fixing of the street light is also needed for smooth traffic operation, pedestrian's safety and social safety net at night.

This subproject has significant benefit to the community people after completion. The proposed road and drain with allied works including street light will improve the transport and drainage facilities, build new road and drain network as well as enhance the infrastructure development of Teknaf Pourashava. The proposed road will make easier connection and comfortable traffic movement to central area of Pourashava from the subproject areas. Therefore, the proposed road will definitely have a positive impact of the business transaction & proceeds and stress-free communication with the local administration tires. After completion, this subproject will create employment opportunities and better livelihood for local people which results in rapid accelerating of the urbanization process and will provide better environment to the community people. In addition, night time safety will be improved due to installation of the street light. This is one of the important road and drain that will fasten the progression of rapidly growing Teknaf Pourashava and also increases its services and governance strength.

The present situation of the subproject area is further elaborated in the following ***Photographs 2.2.1***.

Photographs 2.2.1 (a-i): Current Situation of the Subproject Site (a) Kulalpara Jeep Station to Bus Station Fuara via Lamar Bazar bridge road

Photographs 2.2.1 (a-ii): Current Situation of the Subproject Site (b) East side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty road

Photographs 2.2.1 (a-iii): Current Situation of the Subproject Site (c) Teknaf Post office to Krishi Bank road

Photographs 2.2.1 (a-iv): Current Situation of the Subproject Site (d) Uttar Jaliapara Foyaz Alam's house to Berry bandh road

Photographs 2.2.1 (a-v): Current Situation of the Subproject Site (e) Sona Miah shop near Cox's Bazar main road to Sukkur's Bari via Naitangpara Budda Chita

Photographs 2.2.1 (a-vi): Current Situation of the Subproject Site (f) Naitangpara Najmul's house to Nurul Hoq house

Photographs 2.2.1 (b): Current Situation of the Outfall

2.3 Justification of Selection of this Subproject

With the facilitation of PMU, WB and DSM Consultants team and the Pourashava prepared the CIP list. According to the CIP list, Teknaf Pourashava prepared the priority list of the subprojects considering the demand and requirement. As a part of the reconnaissance survey, PMU Officials and DSM consultants' visited and evaluated the existing site condition of the subproject. To implement this subproject the road side built infrastructure will not be severely disturbed. In addition, private land acquisition is not an issue for implementation of this subproject. The Pourashava mostly owned the subproject road. This subproject will have minor impact on ecology due to tree felling and clearing of roadside naturally grown vegetation

The proposed subproject components (Roads and drains with street lighting works) will improve the transport and drainage facilities and build a new communication structure. The improved road will definitely have a positive impact on business transaction and proceeds. After completion, the proposed road will be used for better traffic communication and transshipment of goods (sea fishes, dried fishes and salt) to local market as well as to country wide and will accelerating the urbanization process of the Sub-project area. The new drains will reduce the drainage congestion and water logging problem and will completing the drainage demand of the municipality as per their master plan which will provide a better environment to the community people. In addition, night time safety (smooth traffic operation & pedestrian's safety and social safety net at night) will be improved due to installation of the street light. As per information by the Teknaf Pourashava considering the ward population (Ward no. 01, 03, 06, 07, 08 & 09) about 16,017 people will be benefited directly and many

others indirectly. This subproject will create employment opportunities and better livelihood for local people which results in rapid accelerating of the urbanization process and will provide better environment to the community people. Considering the significant potential benefits that will derive after completion, the local community demands and welcome this subproject.

2.4 Envisaged Subproject Activities and Implementation Process

The general activities of the subproject includes: construction of the semi-pucca site office, construction of the labor shed, site clearing and grubbing work, relocation of the electric poles and tree plantation work.

The specific activities for the subproject includes: site clearing and dismantling work, maintaining of the semi-pucca site office and installation of waste collection bins, road painting work.

The key activities of the ***RCC Drain with allied works*** includes:

i. Earth work in excavation of the foundation;
ii. Pumping and bailing out of water as per requirement;
iii. Lying of polythene sheet;
iv. Sand filling for the preparing foundation bed;
v. Plain cement concrete work in foundation;
vi. Manufacturing CC blocks;
vii. Fabrication of the ribbed or deformed bar;
viii. Reinforced cement concrete work.

The key activities for ***RCC Road*** includes:

i. Clearing and grubbing works;
ii. Earth work in box cutting;
iii. Earth filling work;
iv. Sand filling on the road bed;
v. Mechanical compaction;
vi. Plain cement concrete work in foundation;
vii. Manufacturing CC blocks;
viii. Fabrication of the ribbed or deformed bar;
ix. Reinforced cement concrete work.

The key activities for ***Street Lighting works*** includes:

i. Assembling, fitting, fixing, installation, testing and commissioning of the GI pole;
ii. Fitting and fixing energy meter ;
iii. Earthling the electrical installation;
iv. Fixing insulator;
v. Erection of tubular pole;

vi. Fixing of the overhead conductor;
vii. Fixing of the wire rack;
viii. Fixing and installation of the switch board;
ix. Providing, fitting and fixing of the water tight street light.

The materials and resources to be used for the key activities: Soil in earth work, sand, bricks, brick chips, stone chips, cement, concrete, reinforcement, diesel, electricity, water, GI poles and other associate accessories.

The major equipment to be used for the implementation of the subproject: hydraulic excavator, brick breaking / stone crushing machine, concrete mixer, mechanical vibrator, mixture machine, mechanical compactor, diesel engine, MS sheet, steel cutter, steel shutter, boulders, dump truck, water tanker, pump, ladder and light fixing equipment.

2.5 Category of the Subproject

The environmental impacts due to the subproject intervention are mainly site specific, limited within the subproject boundary and significantly manageable through the appropriate mitigation measures.

For RCC road and drain with footpath works

- According to ECR 1997 : Green □ Orange A □ Orange B □√ Red □ Not Listed □
- According to WB classification : Category B □√ Category C □

In the Project EMF, RCC road and drain with allied works are categorized as Orange A or Orange B depends on environmental impact. Hence, considering the anticipated environmental impacts, primarily RCC road and drain with allied works can consider as Orange-B category as per ECR-97 [*ECR, 1997*]. According to the WB classification, it can classify as Category B.

For Street Light

- According to ECR 1997 : Green □√ Orange A □ Orange B □ Red □ Not Listed □
- According to WB classification : Category B □ Category C □√

Considering the environmental impacts, the street light can be considered as Green category as per ECR-97 [*ECR, 1997*]. According to the WB classification, it can be classified as Category C.

2.6 Subproject Schedule

The tentative schedule of construction of the subproject is:

(a) Subproject duration (months) : 09 months
(b) Tentative start date : May 21, 2019
(c) Tentative completion date : February 20, 2020

The daily construction hours will normally include regular working time. However, daily working hours may vary based on the on-site condition. The detailed work program will be prepared by the contractor with the assistance of the PIU. Then it will be shared with the PMU, LGED and DSM consultants. In addition, the detailed work program will also be shared with the Bank as per requirement.

3 BASELINE ANALYSIS OF THE ENVIRONMENTAL CONDITION

3.1 Physical Environment

Important Environmental and Infrastructural Features

During site visit, the environmental and infrastructural features within the subproject area were collected. Conditional survey has also been conducted for designing the subproject. Hence, survey data is also used for preparing the report. The major environmental and infrastructural features listed for the subproject within 100m of the both sides from the center line of the road at 100 m longitudinal intervals. The key findings of the site visit are given below.

Table 3.1.1 (a): Major Environmental and Infrastructural Features from Kulalpara Jeep Station to Bus Station Fuara road via Lamar Bazar Bridge (Ch. 0-810m)

Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
Kulalpara Jeep Station to Bus Station Fuara road, Ch. 0+00 - 0+810m			
0-100	√		Semi-pucca and pucca structure for residence and varieties shops (Pharmacy, tea stall, fruits shop), electric poles, Old hospital, Teknaf Police station, common planted trees
		√	Central Eidgah, Central graveyard, Al Jamia Al Islamia Madrasa, temporary Pourashava Bhavan
100-200	√		Semi-pucca and pucca structure for residence and varieties shops, electric poles, Teknaf Police station, common planted trees, mobile tower
		√	Semi-pucca and tin shed structure for varieties shops, Supari market
200-300	√		Semi-pucca, pucca and tin shed structure for varieties shops, Mongi Chowdhury market, kitchen market
		√	Semi-pucca and tin shed structure for varieties shops, Barmis market, kitchen market, dried fish market, Bishnu mandir
300-400	√		Semi-pucca, pucca and tin shed structure for varieties shops, Naf City market, Lamar Bazar, kitchen market, mosque, Khaiub Khali Khal, common planted trees
		√	Tin shed structure for varieties shops, kitchen market
400-500	√		Semi-pucca, pucca and tin shed structure for varieties shops, Hasem market, Kawser market, Khaiub Khali Khal, common planted trees
		√	Semi-pucca and pucca structure for residence, common planted trees, tin shed structure for varieties shops, kitchen market
500-600	√		Lamar Bazar moar, Semi-pucca, pucca and tin shed structure for residence and varieties shops, hotel Naf, mosque, Khaiub Khali Khal, common planted trees
		√	Semi-pucca and pucca structure for residence and varieties shops and markets (Mojaher Company market, Goni market, Niribili hotel), common planted trees, Lamar Bazar Bridge, whole sale fishery market
600-700	√		Semi-pucca, pucca and tin shed structure for residence and varieties shops, hotel Naf International, Goni market, Choto Hazi market, Dhaka hotel, Islami bank
		√	Semi-pucca and pucca structure for residence and varieties shops and markets (Barmis market, Goni marke, Boro Hazi market), common planted trees, Teknaf Barmis Govt. primary scholl

Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
700-810	√		Semi-pucca, pucca and tin shed structure for residence and varieties shops, hotel Sonargaon, AB bank, bus station Fuara
		√	Semi-pucca, pucca and tin shed structure for residence and varieties shops

Table 3.1.1 (b): Major Environmental and Infrastructural Features from East side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty (Ch. 0-1250m)

Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
East side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty Ch. 0+00 - 1+250m			
0-100	√		Aquaculture Pond, salt pane, BGB sub camp, Ezhar Company's Salt Godaun, HBB road
		√	Playground, residential houses, common planted trees
100-200	√		Teknaf Jetty road, salt pane, Jetty, common planted trees, HBB and earthen road, coastal forestry, Naff river
		√	Residential houses, common planted trees, salt pane
200-300	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road, Uttar Jaliapara residential area
300-400	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road, Uttar Jaliapara residential area
400-500	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road, Uttar Jaliapara residential area
500-600	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road
600-700	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road
700-800	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road
800-900	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road
900-1000	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road
1000-1100	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road
1100-1250	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road

Table 3.1.1 (c): Major Environmental and Infrastructural Features from Teknaf Post office to Krishi Bank (Ch. 0-275m)

Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
Teknaf Post office to Krishi Bank Ch. 0+00 - 0+275m			
0-100	√		Teknaf Supari market, Semi-pucca and tin shed structures for varieties shops, cooling corner
		√	Semei-pucca and pucca structures for residence, varieties shops, market, Post office, Teknaf Islamia Madrasa, Sonali bank, Dhaka bank, common planted trees
100-275	√		Teknaf Barmis market, Semi-pucca and tin shed structures for varieties shops, kitchen market
		√	Semei-pucca and pucca structures for residence, varieties shops, market, Krishi bank, common planted trees, Bishnu tempel

Table 3.1.1 (d): Major Environmental and Infrastructural Features from Uttar Jaliapara Foyaz Alam's house to Berry bandh (Ch. 0 - 0+575m)

Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
Uttar Jaliapara Foyaz Alam's house to Berry bandh, Ch. 0+00 - 0+575m; drain 825m			
0-100	√		Aquaculture Pond, salt pane, earthen road
		√	Bortom bari pond, Semi-pucca and tin shed structure for residence
100-200	√		Aquaculture Pond, salt pane, earthen road
		√	Halima Govt. Primary school, Semi-pucca and tin shed structure for residence, common planted trees
200-300	√		Aquaculture Pond, salt pane, earthen road
		√	Halima Govt. Primary school, Semi-pucca and tin shed structure for residence, common planted trees, Sorbi khola
300-400	√		Aquaculture Pond, salt pane, earthen road
		√	Aquaculture Pond, salt pane, earthen road
400-500	√		Aquaculture Pond, salt pane, earthen road
		√	Aquaculture Pond, salt pane, earthen road
500-600	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road
600-700	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road
700-825	√		Salt pane, road side common planted trees, coastal forestry, Naff river
		√	Salt pane, road side common planted trees, earthen road

Table 3.1.1 (e): Major Environmental and Infrastructural Features from Sona Miah shop near Cox's Bazar main road to Sukkur's Bari via Naitangpara Budda Chita (Ch. 0- 587m) with Link road (Ch. 0-335m)

Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
Main road, Ch. 0+00 - 0+587m			
0-100	√		Brick drain, varieties shops, semi-pucca and tin shed structures for residence, common planted trees, Cox's Bazar main road
		√	Brick drain, semi-pucca, pucca and tin shed structures for residence, common planted trees, boundary wall, tin fence
100-200	√		Semi-pucca and pucca structure for residence and varieties shops, Link road, paddy field, common planted trees
		√	Semi-pucca, pucca and tin shed structure for residence and shops, common planted trees, boundary wall, tin fence
200-300	√		Semi-pucca and tin shed structure for residence, common planted trees, tin fence
		√	Semi-pucca, pucca and tin shed structure for residence and shops, common planted trees, boundary wall, tin fence, mosque
300-400	√		Semi-pucca and tin shed structure for residence, common planted trees, tin fence
		√	Semi-pucca, pucca and tin shed structure for residence and shops, common planted trees, boundary wall, tin fence
400-500	√		Semi-pucca and tin shed structure for residence, common planted trees, tin fence, Boudda chitta
		√	Semi-pucca, pucca and tin shed structure for residence and shops, common planted trees, boundary wall, tin fence
500-587	√		Semi-pucca and tin shed structure for residence, common planted trees, tin fence, Boudda chitta
		√	Semi-pucca, pucca and tin shed structure for residence and shops, common planted trees, boundary wall, tin fence, Cox's Bazar main road
Link Road, Ch. 0+00 - 0+335m			
0-100	√		Semi-pucca, pucca and tinsshed structure for residence, common planted trees, tin fence
		√	Semi-pucca, pucca and tin shed structure for residence, common planted trees, boundary wall, tin fence
100-200	√		Semi-pucca, pucca and tinsshed structure for residence, common planted trees, tin fence, boundary wall
		√	Semi-pucca, pucca and tin shed structure for residence, common planted trees, boundary wall, tin fence
200-335	√		Semi-pucca, pucca and tinsshed structure for residence, common planted trees, tin fence, boundary wall
		√	Semi-pucca, pucca and tin shed structure for residence, common planted trees, boundary wall, tin fence

Table 3.1.1 (f): Major Environmental and Infrastructural Features from Naitangpara Najmul's house to Nurul Hoq house (Ch. 0- 275m)

Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
Naitangpara Najmul's house to Nurul Hoq house Ch. 0+00 - 0+275m			
0-100	√		Semi-pucca, pucca and tin shed structures for residence, earthen drain, pond, common planted trees
		√	Semi-pucca, pucca and tin shed structures for residence, earthen drain, common planted trees
100-200	√		Semi-pucca, pucca and tin shed structures for residence, earthen drain, pond, common planted trees
		√	Semi-pucca, pucca and tin shed structures for residence, earthen drain, common planted trees
200-275	√		Semi-pucca, pucca and tin shed structures for residence, earthen drain, common planted trees
		√	Semi-pucca, pucca and tin shed structures for residence, earthen drain, common planted trees

Geology, Topography, and Soils

Geology in the Teknaf is composed of sandstones, alternating with bluish-grey shales and siltstones. These sediments are probably of fluviatile origin through some of the even-bedded siltstones and shales of considerable lateral extent of shallow marine beds. 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. According to Geological Survey Bangladesh [*GSB, 1978*] the subproject area falls in medium intensity seismic zone (Zone-II, Basic Seismic Coefficient 0.05g).

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-out and probably the oldest of the area 28. See Figure 3.1.1 for details.

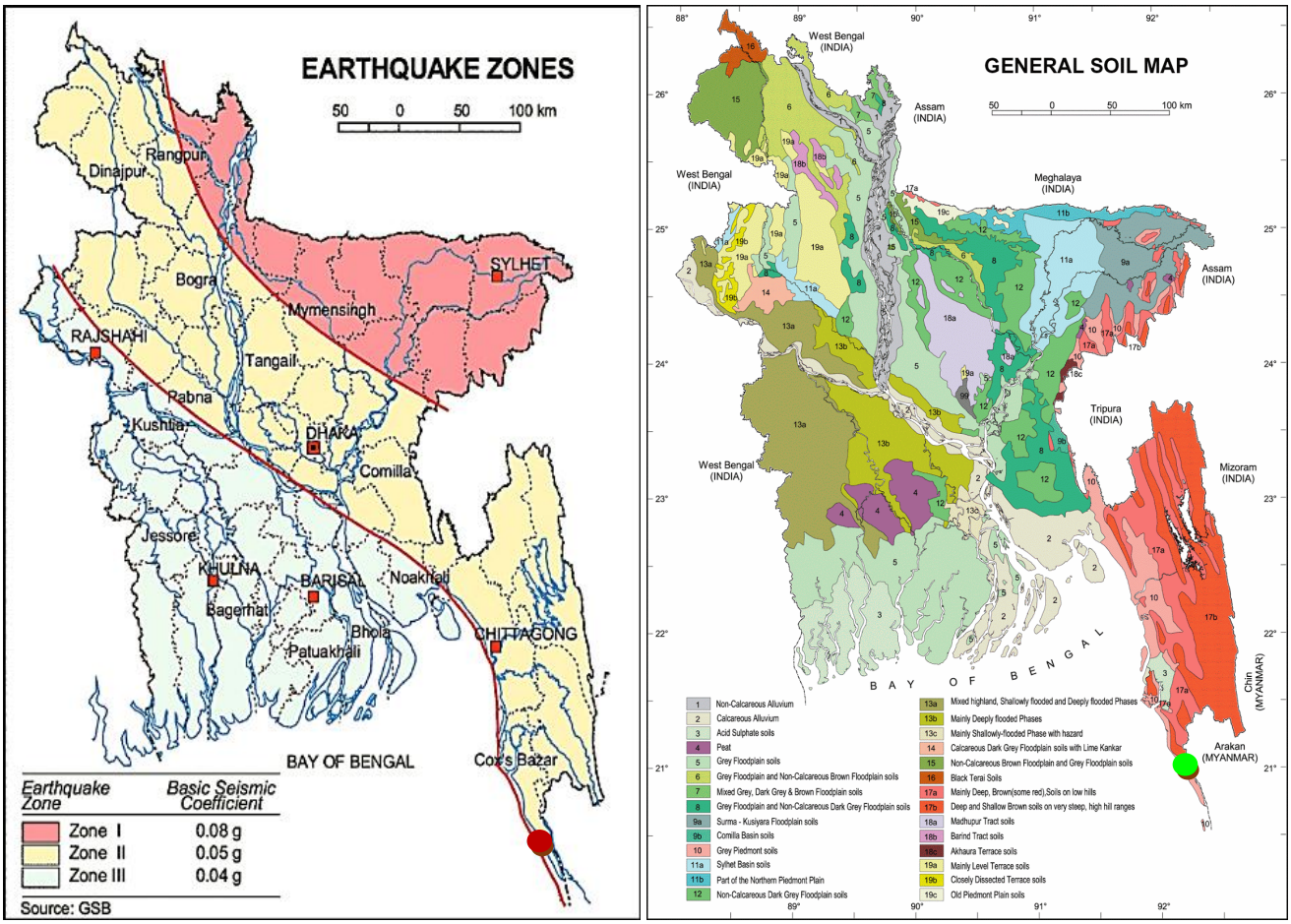

Figure 3.1.1: Location of Teknaf Pourashava in Earthquake Zoning map of Bangladesh and general soil map of Bangladesh

Landform and ecology

Historically, the main uses of the land of the region (Cox's Bazar District) were small-scale agricultural crop production and aquaculture, betel nut/leaf cultivation and another homestead agroforestry [*UNDP 2018*]. 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 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.

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 3.1.2 presents the ecologically critical and conserved areas around the region.

Figure 3.1.2: Ecologically critical areas in and around Cox's Bazar District

Climate and Meteorology

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 municipality is the part 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 [*BMD, 2017*] for details Table 3.1.2[1].

Table 3.1.2: Average climate data of Teknaf Pourashava, Cox's Bazar District

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C	32.8	33.9	36.1	37.2	35	36.1	33.3	33.3	34.4	33.9	33.3	31.7	37.2
Average high °C	26.7	28.5	30.9	32.1	32.3	30.7	30	30.2	30.9	31.6	30	27.5	30.1
Average low °C	15	17	20.7	23.9	25.1	25.2	25.1	25	25	24.3	21.1	16.5	22
Record low °C	7.8	9.4	11.1	16.1	16.7	20.6	21.7	19.4	21.7	17.2	13.3	8.9	7.8
Rainfall avg. (mm)	4	17	35	122	287	802	925	667	330	214	109	13	3524
rainy days (avg.)	1	2	3	6	13	19	22	21	14	7	4	1	113
Relative humidity avg. (%)	72	71	75	78	80	87	89	88	86	82	77	74	80

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

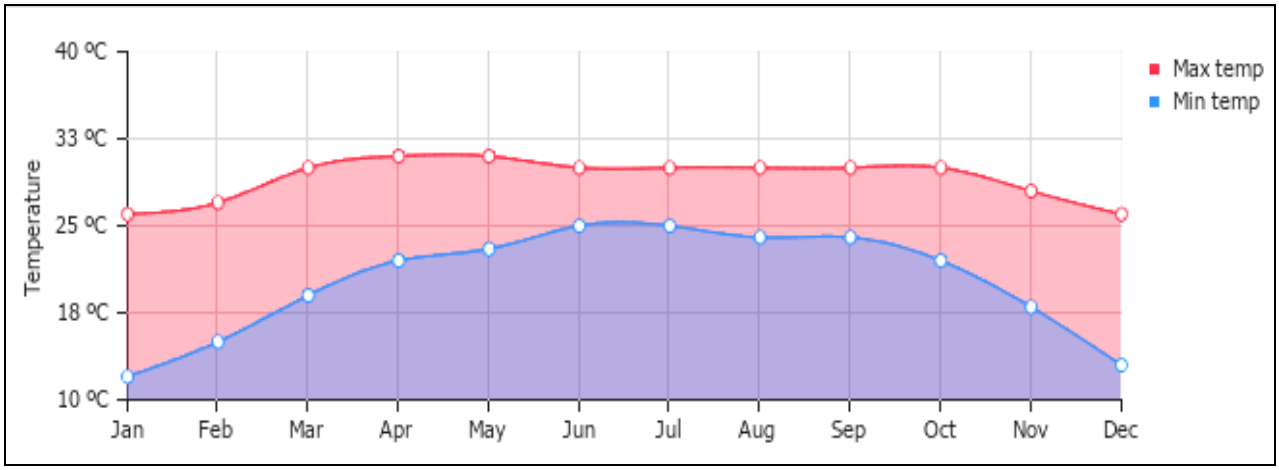

Figure 3.1.3: Average Minimum and Maximum Temperature in Cox's Bazar District

The trend of rainfall of Cox's Bazar district was as usual and normal before 1991, however, radical changes have been observed in the recent years, in particularly after the year 2000. Once, the rainfall and its continuation was steady according to the seasons of the year. Interestly, 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 [*BMD, 2017*].

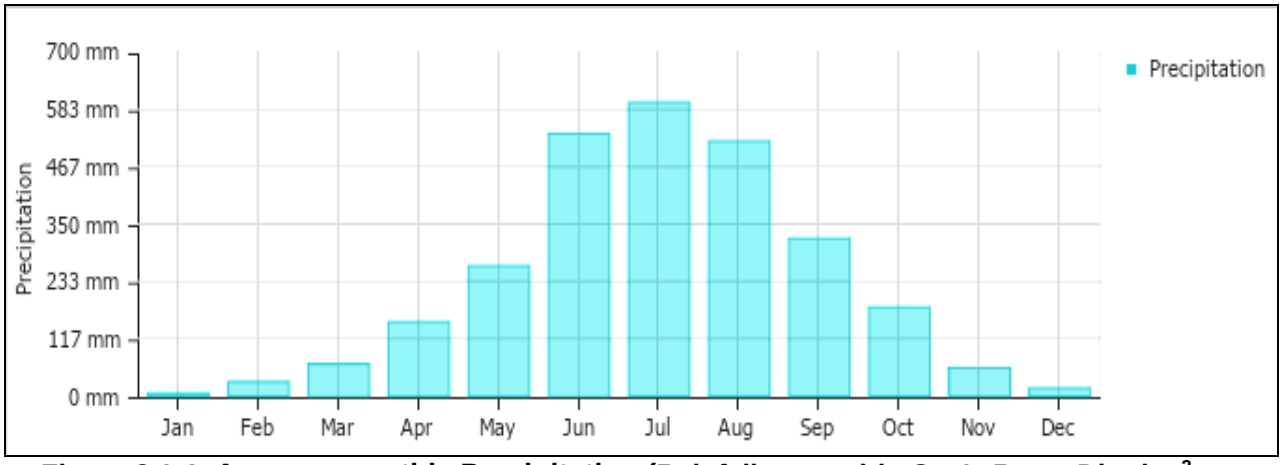

Figure 3.1.4: Average monthly Precipitation (Rainfall pattern) in Cox's Bazar District [2]

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

[2] Same as 1.

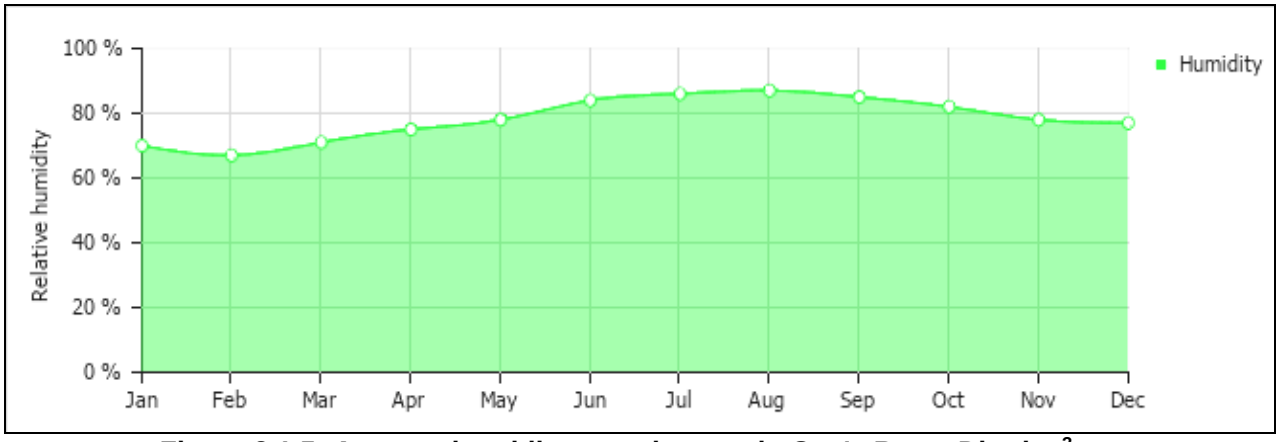

Figure 3.1.5: Average humidity over the year in Cox's Bazar District [3]

According to the statistics of the wind data from the Bangladesh Meteorological Department Climate Division, wind direction changes by month. Nevertheless, the northwest, south, and northeast winds are predominant. This area experiences wind speeds low to medium [*BMD 2017*].

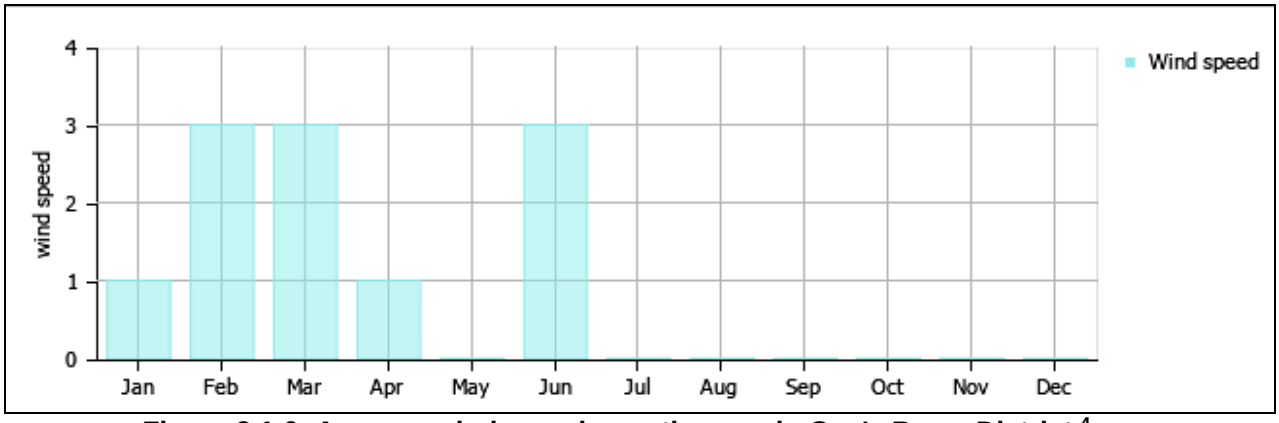

Figure 3.1.6: Average wind speed over the year in Cox's Bazar District [4]

Disasters

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

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

[3] Same as 1.
[4] Same as 1.

water stagnated by the high tide of the sea. There were 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. Cyclone Mahasen at 2013 also damaged the resources, community life, household, cattle head, crops and infrastructures.

The following areas are identified by the Teknaf Upazila under Cox;s Bazar District Disaster management Plan [*2014*]: Figure 3.1.7 presents a Hazard Calendar of the Teknaf municipality.

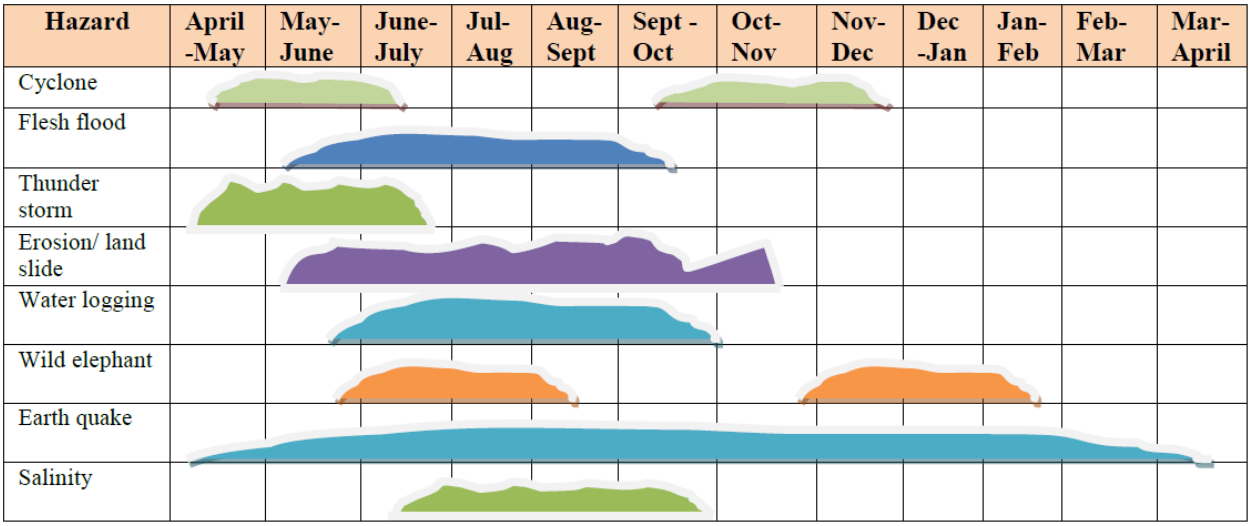

Figure 3.1.7: Hazard Calendar of the Teknaf municipality

Hydrology (Surface Water and Ground Water)

The surface water bodies like river, canals, creeks and the Bay of Bengal are the main waterways of the region. Main River is Naf River and most notable khal in this area are Hashar Khal, K-K khal and others are Isakhali, Mahamaya, Domkhali, Hinguli, Koila Govania and Mayani Khal. Many other mountain fountain (Pahari Chora) run through the hilly hinterland. As a result, a stream network runs through the Pourashava area.

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 5-7m [*BRAC, 2015*]. According to the BADC [*2010*] groundwater zoning map, groundwater table in Teknaf Upazila varies from 0 to 5.3 meter below ground level.

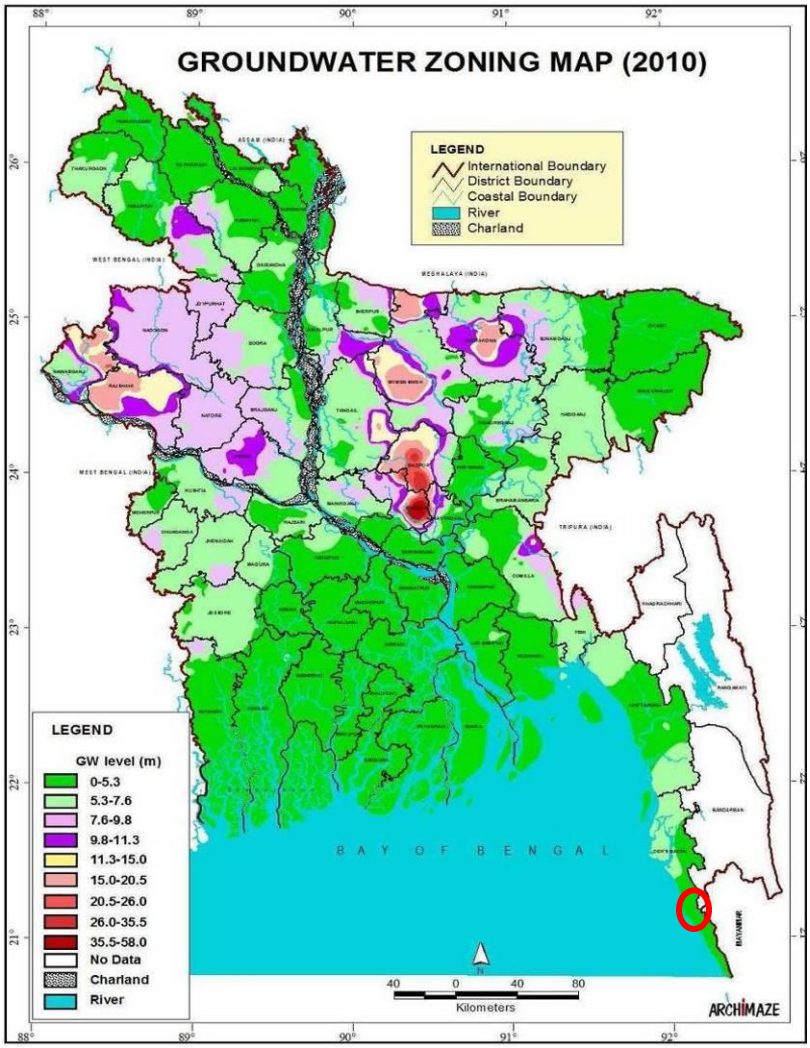

Figure 3.1.8: Location of Teknaf Pourashava in Groundwater Zoning Map of Bangladesh

Flooding, Water Logging and Drainage Pattern

Northern side of the municipality comprising high land and gradually down towards the western and southern side. Khaiub Khali and Hactha khals flows at the middle of the municipality, the River Naf on eastern side and the Bay of Bengal is situated on the west and south side of the municipality. The natural drainage pattern is satisfactory for Teknaf Pourashava. But, due to tidal influence and delay discharge of storm water due to heavy rainfall temporary drainage congestion and flooding is occurring in and around the Pourashava area. However in Cox's bazar district, Matamuhuri River is flowing beside the Chakoria and Ukhiya upazila in north-east and north-west direction. Several natural streams act as the natural drainage system of the region. The mainland surrounding the Pourashava 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. Though, as per flood zoning map of Bangladesh [*BMD, 2012*], Teknaf Pourashava is flood free zone (in last 12 years no major flooding event happens). For the built-up area new drains are needed for proper draining of the storm water. Figure 3.1.9 shows a flood affected area map of the study region.

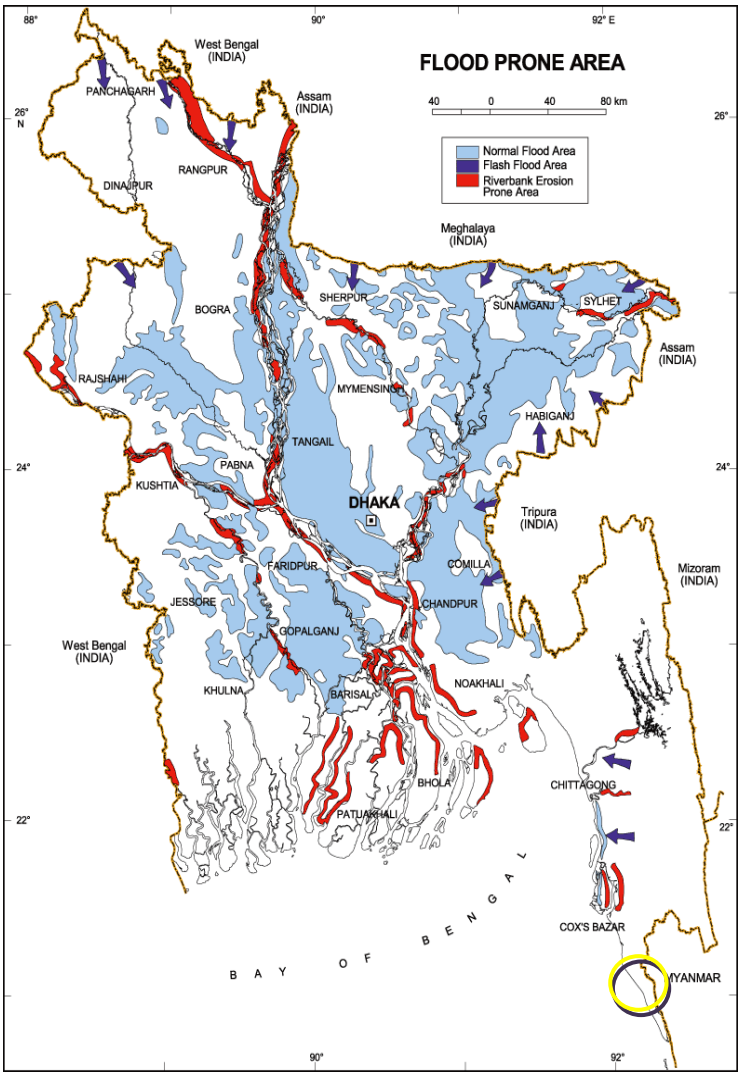

Figure 3.1.9: Location of Cox's Bazar Pourashava in Flood Zone Map of Bangladesh

Land Slides and erosion

The region (Cox's Bazar), especially the Kutupalong area is prone to land slide and erosion. In fact, 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.

Air Quality and Dust

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

Noise Level

Noise level data is not available for the region. The major causes for noise in the subproject area are the vehicle movement (motor cycles, pick-up, mini-trucks, Bus, trucks, private car, CNG rickshaw and auto-rickshaws), playing of loud-speaker and mass people gathering (for

advertising of products and political, social and religious aspects) and local market. This is a common experience of the municipality population that noise poses a threat to the ill / physically weak people health and nerves. In the subproject area at November to March the noise is much more generated due to tourist's activities.

Health and Sanitation

No reliable data available on health and sanitation.

Solid Waste Management

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 Teknaf municipality. No specific information on the municipality is available. However, some information on Cox's Bazar district 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. There are currently no landfill sites available for the municipality 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.

3.2 Biotic Environment

Flora

This subproject area is full built-up areas. Some shoreline coastal species and some planted wooden and fruits bearing species found within 5km radius of the subproject are: Jau, Mahogany, Accacia, Mango, Jackfruit, Jam, Rain tree etc. Among crop-field vegetation, aman is grown during summer rains and boro (winter rice) cultivated by irrigation in winter. Rabi crops like mustard and lentils are also grown in the subproject influence area.

The forestland in the Cox's Bazar district as well as Teknaf municipality is covered by tropical evergreen and semi-evergreen forests dominated by Garjan (*Dipterocarpus spp.*) occurring in deep valleys and shaded slopes. Human activities have denuded most parts of the hills which have been re-occupied by sungrass, herbs and shrubs. Still, the area houses rich biodiversity, especially within the protected areas (PA).

Near to the settlements, the most common trees are the Raintree (*Albizia saman*), Mango (*Mangifera indica*), Coconut (*Cocos nucifera*), Mahogany (*Swietenia mahogany)*, Gogon siris (*Albizia richardiana*), Betel palm (*Areca catechu*) and guava *(Psidium* guajava*) plus* banana (*Musa sp.*). Sessile joy weed (*Alternanthera sessilis),* thorny amaranth (*Amaranthus*

spinosus), bermuda grass *(Cynodon dactylon), s*martweed *(Polygonum sp),* creeping oxalis *(Oxalis corniculata),* etc., are the common weed species.

Fauna

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

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

Fisheries

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

Asian Elephants

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

3.3 Socio-economic and Socio-cultural Environment

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

The subproject area is the core area of the municipality belonging all urban facilities, though the land use pattern is mixed with residential, agriculture, aquaculture, salt farming and trade & commerce zone in the subproject boundary with its influencing periphery. The built-up infrastructures include road side pucca, semi-pucca, katcha and tin-shed structures for residential houses, shops, hotel and motel area, restaurants, tourist/ visitors recreation/

entertainment zone, educational institutions, religious centers, markets, bazar, Pourashava office, office and agencies, salt farming etc.

Beneficiary Population

This road goes through Ward number 01, 03, 06, 07, 08 & 09 of Teknaf Pourashava. As per information by the Population and Housing Census [*2011*], considering the wards population about 16,017 people will be benefited directly and many others indirectly.

Education

In the subproject area (Teknaf Pourashava area), literacy rate (7 years+) is lower (44.9%) than the total average (51.8%) of country. The literacy rate for male (47.5%) is higher than female (33.4%). [*Population and Housing Census, 2011*].

Tribal Communities

There is no indigenous or tribal people settlement in the subproject area. Therefore, there is no measure needed for indigenous peoples' safeguard.

Land Acquisition and Resettlement

Private land acquisition is not needed. For site clearing, few road side boundary wall and fencing need to be removed partially and or completely. The Pourashava Authority has consulted with the owners of these structures. The local people and owners of those structures have no objection regarding the implementation of the subproject. An agreement has been signed by the Pourashava and the local people regarding this issue. The local people agreed to remove their structures for their benefit. However, in case of any objection from the affected person, the DSM will investigate the actual situation. Then, measures will be taken as per rules.

Principal Livelihoods and Economic Activities

The subproject area is now inhabited by the mixed occupational people where major income comes from farm (agricultural, aquaculture, dried fishes and salt farming activities) and non-farm activities such as catching fishes from river and sea, fishing boat ownership, operations and employee, business, enterprises, government and non-government job, transport vehicle ownership and operation.

Cultural Heritage and Protected Areas

Within the influence area of the subproject no historical sites were identified. Religious center, educational institutions, Sea beach, Naf river view point, Jetty ghat and local bazar bring cultural values to the community people. Figure **Error! Reference source not found.**3.1.10 shows the protected areas of Bangladesh.

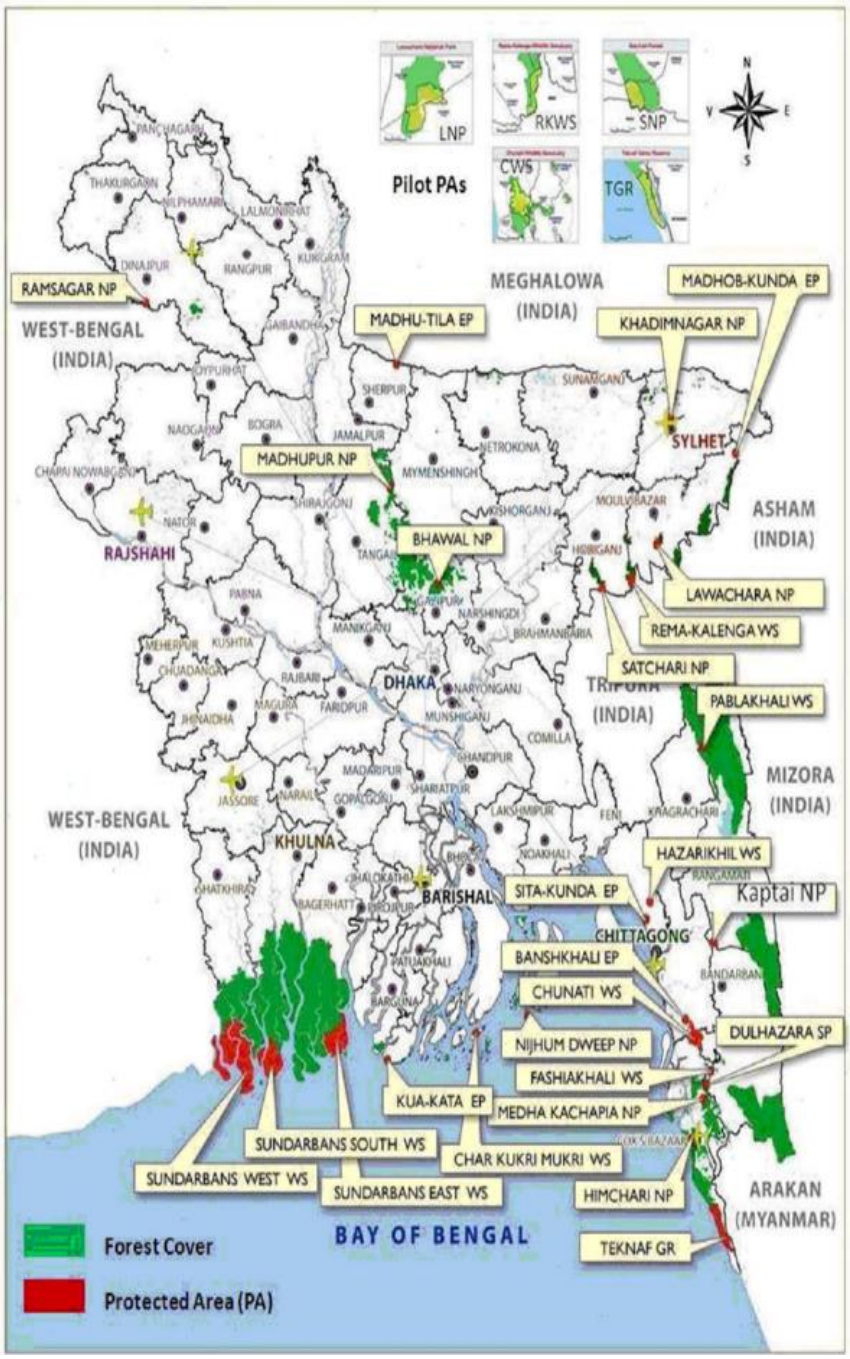

Figure 3.1.10: Protected areas of Bangladesh

4 ENVIRONMENTAL SCREENING

Environmental Screening Checklist, as adopted in Appendix C of the Environmental Management Framework (EMF) of the MGSP, was administered for identifying the impacts and their extents. The screening data and information designed for the RCC road and drain including street light with allied works have been formulated and are shown in below. [*Environmental Assessment: Volume-1 and 2, 2013*]

(1) Potential environmental impact during construction phase:

(a) Ecological impacts:

➢ Felling of trees	Significant □	Moderate □	Minor □√	Number of trees	10
➢ Clearing of vegetation	Significant □	Moderate □	Minor □√		
➢ Potential impact on species of aquatic (i.e., water) environment	Significant □	Moderate □	Minor □√		

Major trees to be felled down is Acacia. There is no tree to be felled down bring religious and heritage importance. However, the trees to be felled down have significant economic value, because most of them are small to medium in size considering length and diameter. Vegetation coverage is not similar in all sections of the road. However, clearing of the road side naturally grown vegetation (herbs and shrubs) have minor level of ecological impacts. In addition, anticipated impact on species of aquatic environment is minor except throwing of the wastes materials in to the road side and influence area water bodies (ponds, ditches and low wet lands) have impacts on the aquatic environment. Considering the overall situation, the ecological impact is considered as minor.

(b) Physicochemical impacts:

➢ Noise pollution	Significant □	Moderate □√	Insignificant □
➢ Air pollution	Significant □	Moderate □√	Insignificant □
➢ Drainage congestion	Very likely □	Likely □	Unlikely □√
➢ Water pollution	Significant □	Moderate □	Insignificant □√
➢ Pollution from solid/ construction wastes	Significant □	Moderate □√	Insignificant □
➢ Water logging	Significant □	Moderate □	Insignificant □√

The subproject will have temporarily and localized negative impacts on noise and air quality during construction phase due to mobilization of the equipment, vehicles movement for the transportation of the materials, using of hydraulic excavator, brick breaking machine, mechanical compaction machine, concrete mixer machine and vibrator machine. The construction work will be performed section wise. Hence, it is anticipated that the impacts will be temporary, site specific and not significant. It should be noted that, home stead area, educational institutions and religious centers may be significantly affected by generated noise and particular materials due to subproject activities, if measures are not taken. The generated construction wastes, un-suitable materials and solid wastes may degrade the adjacent water bodies if not properly collected and disposed and thrown into the road side water bodies. Improper collection and disposal of the generated wastes materials also may degrade the quality of the surrounding environment and degrade the landscape value. The anticipated water logging problem during construction period is insignificant because space is available all the section of the proposed road for draining-out the storm water. In addition, pumping facilities will be provided to drain-out the storm water if required.

(c) Socio-economic impacts:

➢ Traffic congestion	Very likely □	Likely □√	Unlikely □
➢ Health and safety	Significant □	Moderate □√	Insignificant □
➢ Impact on archaeological and historical	Significant □	Moderate □	Insignificant □√
➢ Employment generation	Significant □√	Moderate □	Insignificant □

During construction, the subproject will have localized and negligible negative impact on traffic congestion. This road is busy for traffic operation but the construction works will be performed at section wise. On the other hand, the local people can use alternative roads at construction period which will continue the communication system. So, traffic movement due to road construction does not create any major problem for the community communication. Furthermore, the construction work will follow simple procedure with commonly used equipment. Hence, anticipated impact on health and safety is moderate. However, using of the personal protective equipment by the workers will significantly reduce any occupational health and safety risks. There is no archeological and historical site within the influence area. Hence, the anticipated impact on socio-economic impacts due to subproject activities is insignificant. The overall subproject has significant positive impact by generating work opportunities for the local people and supplying of the construction materials, equipment, food and other necessary stuffs to the campsite.

(2) Potential environmental impact during operational phase:

(d) Ecological impacts:

➢ Potential impact on species of aquatic (i.e., water) environment	Significant □	Moderate □√	Minor □

The road component does not have any impact on the aquatic environment during operation. The waste water from the drain may degrade the water quality of the outfall if carries pollutants. Though, the drain is designed for storm water only. However, the storm water may carry washed-out materials, pollutants from any sources that may disturb the aquatic environment of the outfall. Hence, anticipated impact on species of aquatic environment due to drain component is considered as moderate.

(e) Physicochemical impacts:

➢ Potential air quality	Improvement □	No-improvement □	Deterioration □√
➢ Potential noise level	Improvement □	No-improvement □	Deterioration □√
➢ Drainage congestion	Improvement □√	Minor Improvement □	No Impact □
➢ Risk of Water pollution	Significant □	Moderate □√	Minor □
➢ Pollution from solid waste and other sorts of wastes	Improvement □	No-improvement □	Minor □√

After completion, due to improve and newly develop road network, traffic volume may increase. Consequently, air quality and noise level may be degraded due to black smoke emission and hydraulic horn from the vehicles. The new road will minimize water stagnation on road surface and road slopes allow to passes the water to water shed which will may reduce the temporary drainage congestion and water logging problem. But, the new drain will minimize drainage congestion and water logging problem. Thus, it will provide better environment to the community people. Though, the storm water to be discharged through the drain may degrade the water quality of the outfall if carry pollutants from any sources. Again, the covered drain will minimize spreading of the bad odor from the drain. Thus, it will provide better environment to the community people. At operation phase the RCC road doesn't emits any pollutant substances to the adjacent water bodies.

(f) Socio-economic impacts:

➢ Traffic	Improvement □√	No-improvement □	Adverse □
➢ Safety	Improvement □√	No-improvement □	Adverse □
➢ Employment generation	Significant □√	Moderate □	Minor □

After completion, this road will be enhanced and developed new road network for the Pourashava. The motorized and non-motorized vehicles can use this road for communicating and transshipment of goods. Road side shops and business facilities will be increased which will accelerate the work opportunity for the local people. Hence, this road will be an income generating source for the local inhabitants. The new road will minimize the frequency of the maintenance for three to five years after completion. Consequently, it will enhance safety traffic operation and pedestrians' movement. After completion, the drain will enhance the drainage network of the Pourashava and removing drainage congestion problem. Thus, it will reduce water logging problem in the subproject area. In addition, new drain prevents the accumulation of the stagnant water on the road surface. Consequently, it will enhance safety traffic operation and pedestrians' movement. Furthermore, fixing of the street light will also improve smooth traffic operation, pedestrian's safety and social safety net at night.

(3) Summary of Possible Environmental Impacts of the Subproject

From the overhead study, it seems that the subproject have minor impacts on ecology. Development of the RCC road and drain with allied works may temporary affect the roadside water bodies due to construction activities. The physicochemical components will be disturbed due to the subproject activities during the construction phase. The subproject activities may degrade the air and noise level to a limited extent. The inputs that may affect the environment will be mainly at construction phase and limited within the subproject boundary. Nevertheless the impacts will be temporary and localized and limited and fundamentally manageable through the appropriate mitigation measures. The generated solid wastes due to the subproject activities should be properly collected and disposed in a designated dumping site. The labor shed and stack yard should be located in a designated place. Likewise, there is significant adverse impact is anticipated at operational stage. The physico-chemical components like as air quality and noise level may be deteriorated due to vehicles emission and horns.

Furthermore, safety concern is an important issue for both the construction and operation phases that should be considered properly to avoid any potential safety risks. This subproject will have positive impacts in terms of the generation of the employment opportunities and business activities by supplying construction materials and equipment at construction phase and by providing extended business activities at operation phase.

5 SPECIFIC IMPACT, MITIGATION, AND ENHANCEMENT MEASURES

The likely impacts of the subproject are mainly caused by the activities required for the implementation of the subproject and materials, resources and equipment to be used to perform the activities.

This section describes some specific impacts due to the subproject activities and their mitigation measures.

5.1 Dismantle Work, Site Clearing, Excavation Work and Earth Work

The road improvement work with drain consists of dismantle of the existing road (BC and HBB road), site clearing work (clearing of the wastes materials generated due to dismantle work and removal of the unsuitable materials) and earth work (earth excavation, earth filling work, back filling etc.). These works lead dust blowing, improper disposal of the wastes, noise and vibration which may disturb the local people.

Mitigation Measures

- Proper care will be taken by the contractor during dismantle work, excavation work, earth work and disposal work to avoid any undue disturbances to the nearby people;
- Avoid loss of the topsoil for the earth filling work;
- Cover the exposed earth works with tarpaulin/fabric;
- Disposal of soil and construction wastes at the Chowdhury para dumping site at Jaliapara.

5.2 Tree Feeling, Clearing of the Vegetation and Ecological Impact

There is a few numbers (10 numbers) of planted roadsides trees [Acacia] will be felled down and roadside vegetation will be cleared due to implementation of this subproject.

Mitigation and Enhancement Measures

- Considering the space availability 250 nos. of the local fruits, flowers, medicinal and ornamental trees will be planted to compensate the ecological imbalance and enhance the environmental sustainability in and around the subproject area to be caused by felling down of trees and clearing of roadside naturally grown vegetation;
- The trees will be planted at the proposed road side area (at both sides and or one side of the "East side of Chowdhury para BGB Sub-camp to sluice gate No.1 and :Uttar Jaliapara Foyaz Alam's house to Berry bandh road") where space is available and or anywhere Pourashava owned suitable places within the influence area of the subproject and the recommended trees are - Mango, Jam, Jackfruit, Kathbadam, Kodbell, Krisnachura, Radhachura, Polash, Jarul, Sonalu, Kadom, Kathgolap, Satim, Neem, Arjun, Amloki, Horitoki, Bohera, Mahogany, Shil Koroi, Babla, Rain Tree, Gamari, Segun, Garjan, Palm Trees etc. (proposed sapling height is minimum 1m and comprising protection, fencing and conservation up to project defect liability period);
- Planting many trees will enhance the ecological condition of the area after their successful growth.

5.3 Pollution from the Construction Materials

Dumping of the construction spoils, including accidental leakage of the oil, grease, and fuel in equipment yards is a significant hazard. Both surface and groundwater might be polluted from these contaminants. Air pollution and dust may affect the nearby settlement which is generated from fine aggregate and vehicles. Even the people to be engaged for the construction activities might endanger the physical and human habitats of the area.

Mitigation Measures

- Safe transport, storage, and disposal provisions for the construction materials, and the equipment have to be carried out in order to avoid the accidental spillage and loss;
- Maintain adequate moisture content of soil and sand during transportation, compaction and handling;
- Carry the materials especially loose soil and sand with adequate cover;
- Fuels, lubricants, and other hazardous materials should store over raised platforms and not directly on the ground;
- Disposal of soil and wastes (solid wastes, construction wastes and other forms of wastes) at the Chowdhury para dumping site at Jaliapara.

5.4 Air Quality and Dust

During construction phase, air pollutants will be emitted from the equipment and construction vehicles are expected to remain low. Local residents and road users in the vicinity of the work sites will be temporarily disturbed by the limited dust effluence. The overall impacts, however, are expected to remain low.

Mitigation Measures

- Water should be sprayed at the work site and camp site area for dust control;
- Ensure sprinkle and cover stockpiles of the loose materials (e.g., fine aggregates);
- Maintain adequate moisture content of soil and sand for transportation, compaction, bed preparation, backfilling and handling;
- Avoid use of dust generating equipment (which produce significant amount of particulate matter) far from the local residents;
- Ensure that all subproject vehicles are in good operating condition.

5.5 Noise and Vibration

Noise and vibration caused by the equipment and movement of the construction vehicles may temporarily disturb nearby residents. In this subproject, sensitive areas like roadside residence, Govt. and non-government agencies, educational institutes and religious centers are likely to be affected by noise nuisance, though the impacts are anticipated to be limited.

Mitigation Measures

- Transportation of the construction materials have to be carried during the scheduled times, and mainly during the day in off-peak time;

- If applicable and needed, all powered mechanical equipment and machineries will be fitted with noise abating gear such as mufflers for effective sound reduction.

5.6 Water Quality

The water quality may deteriorate if the construction materials, sand, construction wastes, effluent from the work camps, and food wastes are dumped in the roadside ditches, ponds, canal (KK Khal, Haccha Khal), River (Naf River) and the sea (The Bay of Bengal).

Mitigation Measures

- Proper construction management including waste management as well as providing training of the operators and other workers should avoid to throw any pollutant substances to the water bodies;
- Construction waste will dispose properly (not in water bodies or lowland), for which contractor will be responsible.
- Construction wastes will dispose properly at the designated dumping site at the Chowdhury para dumping site at Jaliapara.

5.7 Occupational Health and Safety

The most important risks associated with the construction activities are listed below:

- Exposure to the sunlight- workers are being exposed to the sun for long hours;
- Exposure to the high temperature, and humidity for a long time resulting in dehydration;
- Contact with the hazardous substances and wastes pose risks of the infections and diseases;
- Risk of the poor air quality due to the dust;
- Risk of the collision (traffic);
- Risks from head loads for carrying soil, construction materials and construction equipment;
- Risks of the using of the machineries in motion;
- Risk associated to the sudden bad weather working conditions.

General Requirements for the Workers' Health and Safety

The key salient features of the general requirements for the workers' health and safety stated are presented in ***Table 5.7.1***.

Table 5.7.1: General Requirements for the Workers Health and Safety

Issues	Requirements
Health and Hygiene	• Cleanliness at the site premises and workers living places and at the Labor Shed; • Arrangement of the proper ventilation and temperature at the Labor Shed; • Protection against dust and furnace by using of the nose masks and covering of the head and body; • Proper disposal of the wastes and effluents; • Introduce waste bins for the solid waste management system.

Issues	Requirements
Safety and First Aid Box	• Using of the personal protective equipment (helmet, gloves, goggles, nose mask, safety boots); • Precautions during work on or near machineries in motion; • Head loads are prohibited; • First aid facilities should be provided and maintained; • The first aid kit should include adhesive bandages, regular strength pain medication, gauze, and low grade disinfectant.
Compensation for Accidents at Work	• Contractors will bear medical treatment costs. If any sever accidents such as loss of hands, legs or loss of working ability or any case of death needs compensation-(the amount of the compensation should be fixed considering the type of accidents).
Dust and Fumes	• For any dust, fumes, or other impurities likely to be injurious to the workers, effective measures shall be taken to prevent their accumulation and its inhalation by the workers.
Overcrowding	• No labor room should be overcrowded.
Latrines and Urinals	• Sufficient latrines shall be provided; • Latrines shall be maintained in clean and sanitary condition; • Latrines shall be adequately lighted and ventilated.
Disposal of Wastes and Effluents	• Proper disposal system for the solid waste and effluent is required; • Waste bins must be provided by the contractor at labor shed.

5.8 Impacts on Social Environment and Common Property Resources

Through comprehensive study, it is revealed that impacts are expected not to be severe and to be largely manageable. The following ***Table 5.8.1*** presents impacts on socio-economic environment and common property resources.

Table 5.8.1: Impacts on Social Environment and Common Property Resources

Social Components	Impacts on IECs	Impact Significance
Community Perception	The local community people welcome this subproject and there is no visible objection from them.	Significant (+ve)
Employment and Business Opportunity	Community feels happy because the construction works will create work opportunity for the local people for the skilled and non-skilled labor. The subproject will create business opportunity for the equipment and materials suppliers'.	Significant (+ve)
Community Order and Security	This subproject activity does not create any severe security problems to the local community and community people.	Minor (-ve)
Possible damage to existing infrastructure and facilities	Degradation of the existing road infrastructure by the construction equipment/vehicles used in this subproject.	Minor (-ve)
New infrastructure and facilities	Improvement of the existing road will increase municipality infrastructure facilities.	Moderate (+ve)
Labor Habitat	Most of the labors will stay at the Labor shed which will have impacts on the environment relates to the generation of the solid wastes, effluent, and water consumption.	Moderate (-ve)
Health Care	Workers may suffer from the dehydration problems, respiratory problem, and other health hazards.	Minor (-ve)
Accident	In case of road accidents by the vehicles to be used for the transportation may have serious negative impact.	Significant (-ve)

Mitigation Measures

- Conduct dissemination with the local community about the subproject details;
- Continue liaison with the community leaders in order to maintain the community support;
- Engage local contractor and local people as much as possible for positive perception of the local community;
- Follow traffic rules to avoid any accidents;
- Transportation and mobilization of the equipments and construction materials avoiding peak hours and scheduled time;
- Ensure first aid facilities and effective use of personal protective equipments where applicable.

5.9 Labor Influx and Anticipated Impacts

The labor force and associated goods and services required for the construction of infrastructure civil works under this subproject cannot be fully supplied locally. The migration to and temporary settlement of laborers in the subproject, referred to as labor influx, carries an array of potentially positive and negative impacts in terms of demands on public infrastructure, utilities, housing and sustainable resource management and the strain on social dynamics.

Labor influx effects on host communities include positive impacts such as:

- The subproject activities will generate work opportunities for the local people and supplying of the construction materials, equipment, food and other necessary stuffs to the campsite;
- Improved infrastructure and public service access and availability whereby subproject investment catalyzes larger allocation of resources to a region, stimulating the development or expansion of infrastructure and public services.

Critical negative social risks include:

- Increase in criminal activity and alcohol and drug abuse, domestic violence, political attachment and violence, smuggling and robbery etc;
- Increase in gender-based violence, including eve teasing, sexual harassment etc;
- Increases in communicable diseases, including respiratory problems, diarrheal diseases, vector-borne diseases (e.g., malaria), and sexually transmitted infections (e.g., HIV/AIDS, syphilis, gonorrhea, hepatitis B);
- Conflicts arising from increased demand on existing infrastructure, services, and utilities, including transportation, health, education, water and sanitation, waste management, public utilities and community, religious, and recreational facilities and loss of land for access routes.

The general environmental impacts of labor influx include pressure on the natural resources such as using of the water, electricity, other fuel for cooking, loss of land for the labor establishment, depletion of the water supply, sewage and waste water generation, degradation of the air quality, waste generation, increased demands on the local energy and

resources and noise pollution effects. The following safeguard measures are recommended to avoid any risk of labor influx:

- Inform local people about the subproject activities;
- Liaison with the community leaders in order to get community support;
- Engage local people as much as possible to minimize workers from outsiders;
- Monitor workers attitude and behavioral matter;
- Monitor the workers movement for avoiding any unexpected social activities (robbery, crime, political attachment and conflicts, drugs abuse);
- Inform and use local administration to get support if needed;
- Inform local utilities service providers (such as for new electricity connection REB or any other department);
- Ensure effective use of natural resources such as water, electricity, fuel, wood etc.

5.10 Impacts on Traffic Movement

The subproject roads are mainly used for the motorized and non-motorized vehicles. The proposed roads is moderately busy with the heavy traffic movement. Light motorized vehicles (Bike and electric Rickshaw-van, CNG rickshaw, motorcycle, cars, mini-pick-up etc.) and heavy motorized vehicles (trucks, mini-bus, van etc.) are using the road usually. In addition, the alternative and connecting roads are adequate to diversify the traffic volume. Hence, during construction, the subproject will have negligible impact in traffic congestion. In addition, to minimize the impact subproject activities will be performed section wise.

During construction phase, interruption of the traffic movement and impact on the local traffic system due to the subproject activities will be monitored closely. Then separate traffic management plan will be provided if required. However, the following safeguard measures are recommended to minimize the impacts associated to the traffic movement:

- Inform local people about the subproject activities;
- Inspire local people to use connecting and diversion roads;
- Ensure schedule deliveries of material/ equipment during off-peak hours;
- Place traffic sign/cautionary sign to avoid undue traffic congestion and associated traffic control measures to limit possible disruption;
- The place of construction works should be fenced off with fences if required and should be isolated from general public access and marked with signs to ensure safe movement.

6 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The purpose of the Environmental Management Plan (EMP) is to ensure that the activities are undertaken in a responsible and non-detrimental manner. The EMP will guide the environmentally sound construction of the subproject and ensure efficient lines of communication between the Project Management Unit (PMU, LGED), Project Implementation Unit (PIU) of Teknaf Pourashava, DSM consultant team and the contractors.

6.1 Access to Information

The environmental assessment report should be translated into Bengali and disseminated locally. The copies of the report (both in English and Bengali) will be sent to all the concerned field offices of the LGED and Teknaf Pourashava. It will also be made available to the public. The final assessment report will also be uploaded in the LGED website and the World Bank website after approval.

6.2 Grievance Redress Mechanism

The project-specific Grievance Redress Mechanism (GRM) will be established at Teknaf Pourashava to receive, evaluate and facilitate the solution of APs concerns, complaints and grievances concerning the social and environmental performance of the subproject. The GRM aimed to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the subproject.

The Grievance Redress Mechanism is related to resolve the risks and adverse impacts of the subproject. It addresses APs' concerns and complaints promptly, using an understandable and transparent process that is also gender responsive, and culturally appropriate. It should be readily accessible to all segments of the affected people at no costs and without retribution. The mechanism should not impede access to the country's judicial or administrative remedies. The affected people will be appropriately informed about the mechanism.

LGED has its own Grievance Redress Procedure (GRP), which it operates to address any dissatisfaction and complaints by the local people regarding its activities. This procedure is being applied to address any complaints or grievances through negotiations with the community leaders and representatives of the APs during implementation of the MGSP.

6.2.1 Grievance Redress Committee (GRC)

The discussions and negotiations will be conducted by the Project Implementation Unit (PIU) of Teknaf Pourashava and will involve the APs and Grievance Redress Committee (GRC) headed by the Pourashava Mayor. With the facilitation of the DSM, the Pourashava Mayor nominated the GRC members and included representative from the Government agencies, local NGO, and Civil Society. The GRC has been formed and established at Teknaf

Pourashava. A complaints box has already been provided in the Pourashava Office. The grievance response focal point is available at Pourashava Office for instant response to an aggrieved person. The Focal Point will collect written complaints or suggestions from the box and produces them to the GRC for hearing and resolution. The GRC members are as follows.

Table 6.2.1.1: List of GRC committee members

Sl. No.	GRC Members Name	GRC Designation	Position
1	Mr. Hazi Mohammad Islam	Chairman	Honorable Mayor, Teknaf Pourashava
2	Mr. Mir Sirajul Kalam Azad	Member Secretary	Assistant Engineer, Teknaf Pourashava
3	-	Member	Upazila Project Implementation Officer, Teknaf
4	-	Member	Head master, Ezhar Girl's High school, Teknaf
5	Mr. Mohammad Omrah	Member	Director, Shed Teknaf (Local NGO)
6	-	Member	Principal, Teknaf Degree College
7	Mrs. Nazma Alam	Member	Female Councilor, Reserve female seat-3

6.2.2 Grievance Resolution Process

All complaints and suggestions will be received formally in the Pourashava Office by the GRC Member Secretary. A sample Grievance Redress Form has been prepared and already sent to Teknaf Pourashava.

An intake register will be maintained at the office of the Member Secretary. Member Secretary will record the details of the grievances in the intake register for documentation and ensure impartiality, fairness, and transparency. The intake register will have data and information columns including (i) Case no., (ii) Date of receipt, (iii) name, type of complaint, grievance, (iv) father's name, husband's name, (v) sex, (vi) complete address of the person raising the complaint, grievance, (vii) main objection (loss of land, property, or entitlement), (viii) detailed complaint story, (ix) expectation with documentary evidence and previous records of similar grievances, etc.

No GRC members are allowed to contact the aggrieved persons in advance. Rather, the concerned persons are informed to attend the formal hearings at an appointed date. The GRC committee will sit for hearing the complaints of the aggrieved persons. The GRC will record salient points presented by the aggrieved person and will examine documentary evidence submitted during informal hearings. A resolution register will be maintained by the Member Secretary at the Pourashava Office. The resolution register will contain (i) serial no., (ii) case no., (iii) name of complaint, (iv) complaint story and expectation, (v) date of hearing, (vi) date of field investigation (if any), (vii) results of hearing and field investigation, (viii) decision of GRC, (ix) progress (pending, solved) and (x) agreement or commitments. Closing register will keep records such as, (i) serial no., (ii) case no., (iii) name of complaint, (iv) decision and

response to complaints, (v) mode and medium of communication, (vi) date of closing, (vi) confirmation of complainant's satisfaction and (vii) management actions to avoid recurrence.

The GRC will decide within 30 days of receiving a complaint. There will also be an appeals procedure where, if a person is dissatisfied with the ruling of the GRC, he or she or a representative may attend their next meeting to present the case again. The committee will then reconsider the case in private, after which their decision is final. If the appellant is still not satisfied, then GRC will refer the complaint with the minutes of the hearings to the PD-MGSP, LGED for further review. If the case at this level is again found unacceptable by the aggrieved person/s, PD will advise the Pourashava to drop the subproject. Teknaf Pourashava should also publish the outcome of the cases on the public notice boards. All costs involved in resolving the complaints (meetings, consultations, communication, and information dissemination) will be borne by the Teknaf Pourashava.

Based on consensus, this procedure will help to resolve issues or conflicts amicably and quickly, saving the aggrieved persons from having to resort to expensive, time consuming legal action. The procedure will however, not pre-empt a person's right to go to the courts of law.

6.3 Institutional Arrangement for Environmental Safeguard Compliance

In the institutional arrangement procedure, Project Director (PD), Team Leader (TL) will directly involve. The PD and TL would be supported by DSM, Environmental Safeguard Specialist and Social Management Specialist. The Pourashava Officials, especially members of Infrastructure Improvement Section, would be responsible for supporting the construction supervision as well as environmental and social management with the facilitation of DSM consultants. The civil works contractors will implement the environmental mitigation measures.

The PMU, with the facilitation of Environmental Safeguard Specialist and Social Management Specialist will submit the monthly and quarterly progress reports on Environmental and Social Compliances to the World Bank.

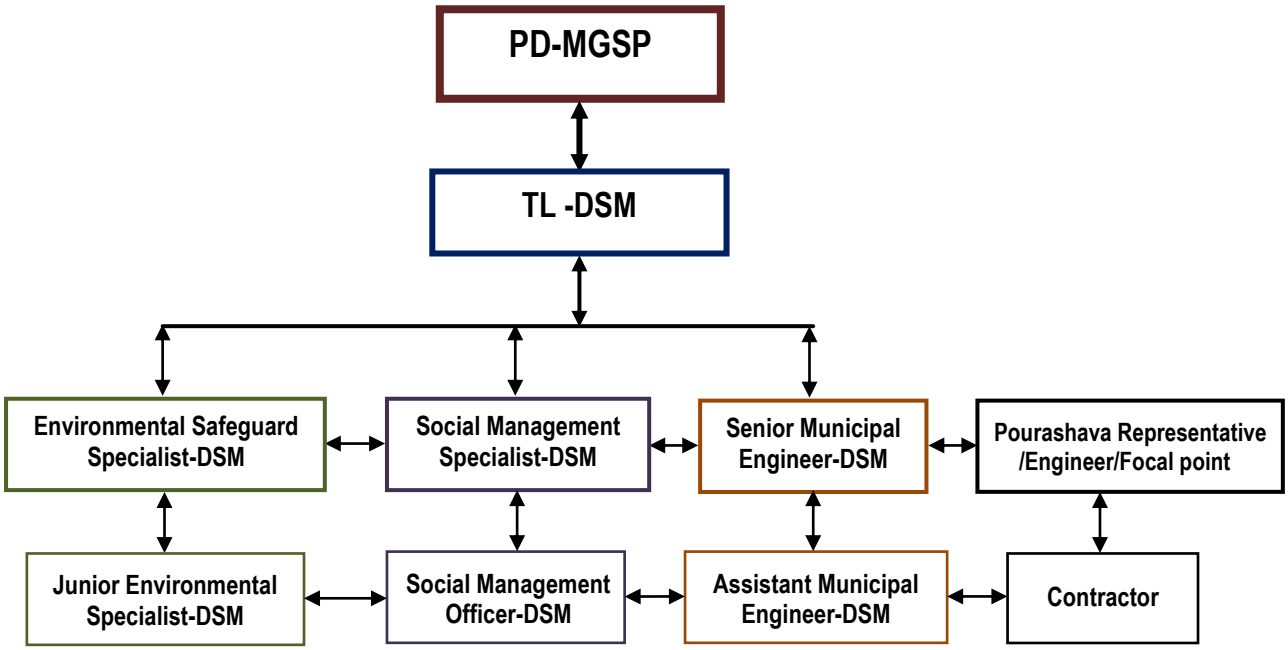

Figure 6.3.1: Environmental and Social Management Team (Tentative)

6.4 Capacity Building

A demonstration training program has already been conducted by PMU, LGED and DSM team to build the capability of the PIUs concern and DSM field staffs. Participants from Teknaf Pourashava were attended. Under the demonstration training program, PMU and DSM team organized an introductory course for preparing them on: (i) Environmental Screening, (ii) EMP Implementation, including environmental monitoring requirements related to mitigation measures; and (iii) taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures to be found during the course of the implementation.

A separate capacity building workshop should be conducted for the Teknaf Pourashava Officials and members of Infrastructure Improvement Section. The contractor should be also included in the training program to enhance the Environmental awareness and orientation among the workers. A detailed training manual has already been developed by the Environmental Safeguard Specialist and Social Management Specialist. Hence, the existing manual will be reviewed and modification will be done as per requirement.

6.5 Emergency Response and Disaster Management

Disaster management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular the preparedness, response and recovery to lessen the impact of disasters. Emergency Preparedness Planning (EPP) and Contingency Planning (CP) are the processes of disaster management plan for developing strategies, arrangements, and procedures to address the humanitarian needs of those adversely affected by the crisis. There are four main types of disasters, namely: Natural Disasters, Environmental Emergencies, Complex Emergencies and Pandemic Emergencies.

For MGSP activities, Teknaf Pourashava would identify the immediate needs, prioritize the tasks and identify resource requirements to address the humanitarian needs of those adversely affected by the crisis.

6.6 Environmental Management Action Plan

The activity wise anticipated environmental impacts and corresponding mitigation measures have been outlined in ***Table 6.6.1*** and ***Table 6.6.2***.

Table 6.6.1: Anticipated Environmental Impacts during Construction Phase and Corresponding Mitigation and Enhancement Measures

Activity / Issues	Potentials Impacts	Proposed Mitigation and Enhancement Measures	Responsible Parties
Construction and operation of labor shed for the workers (Workforce and labor shed management)	• Generation of sewage and solid waste may degrade quality of the adjacent water bodies and surrounding environment	• Construction of sanitary latrine considering 15 persons for one toilet at the labor shed and separate toilet for male and female; • Erection of "no litter" sign, provision of waste bins (introduce separate waste bins for organic and inorganic wastes); • Ensure wastes (solid wastes and other forms of wastes) disposal at the Chowdhury para dumping site at Jaliapara.	Contractor Monitoring- Primarily by Pourashava Secondarily by PMU,LGED and DSM
	• Health of workers	• Conduct formal and unofficial discussion to increase awareness about hygiene practices among the workers; • Ensure availability and access to first-aid equipment and medical supplies for the workers.	
	• Possible development of labor camp into permanent settlement	• Contractor to remove labor camp at the completion of contract.	
	• Outside labor force causing negative impact on health and social well-being of local people	• Ensure that contractor employ local work force to provide work opportunity to the local people and conduct formal and unofficial awareness program for the health and social well-being of the local people.	
General construction work	• Drainage congestion and flooding	• Ensure provision for adequate drainage of storm water if needed; • Ensure provision for pumping of congested water if needed; • Ensure adequate monitoring of drainage effects, especially if construction works are carried out during the wet season.	Contractor Monitoring- Primarily by Pourashava Secondarily by PMU,LGED and DSM
	• Air pollution	• Check regularly and ensure that all the subproject vehicles are in good operating condition; • Ensure contractor spray water on dry surfaces regularly to reduce dust generation; • Maintain adequate moisture content of the soil and sand used for transportation, ISG, bed preparation, compaction and backfilling; • Ensure contractor sprinkle and cover stockpiles of loose materials (e.g., fine aggregates); • Ensure contractor avoid use of equipment at site and far from the local residents, which produce significant amount of particulate matter.	
	• Traffic congestion, effect on traffic and pedestrian safety	• Ensure schedule deliveries of materials/ equipment during off-peak hours; • Place traffic/ cautionary sign to avoid undue traffic congestion and accidents; • Inform the local people about the subproject activities.	

Activity / Issues	Potentials Impacts	Proposed Mitigation and Enhancement Measures	Responsible Parties
	• Noise pollution	• In front of the road side sensitive infrastructures i.e., religious centers, construction work should be performed considering the prayer time; • Check and maintenance the equipment properly; • Avoid using of construction equipment producing excessive noise at night; • Regulate use of horns and avoid undue use of hydraulic horns in subproject vehicles.	Contractor Monitoring- Primarily by Pourashava Secondarily by PMU,LGED and DSM
	• Water and soil pollution	• Prevent discharge of fuel, lubricants, chemicals and wastes into adjacent water bodies like ponds, ditches and seasonal springs.	
	• Accidents	• Conduct formal and informal discussion for creating awareness about the accidents; • Provide PPEs and ensure using of the personal protective equipment by the workers.	
	• Felling of trees, clearing of vegetation and ecological disturbances	• 250 nos. of trees will be planted to compensate the felled down trees and enhanced the environmental sustainability of the surrounding area, preferably local fruits, timber, medicinal and ornamental trees at both sides and or one side of "East side of Chowdhury para BGB Sub-camp to sluice gate No.1 road" and :Uttar Jaliapara Foyaz Alam's house to Berry bandh road" where space is available and any other Pourashava owned suitable places in and around the subproject influence area where space is available	
	• Spills and leaks of oil, toxic chemicals	• Proper handling of lubricating oil and fuel so that it does not fall on the soil and water body; • Collection, proper treatment, and disposal of the spills.	
All construction works	• Beneficial impact on employment generation • Possible complaints and suggestion from the local people and stakeholder about the subproject activities • General degradation of the environment	• Employ local people in the subproject activities as much as possible; • Give priority to poor people living within subproject area in subproject related works (e.g., excavation and other works, which do not require skilled manpower). • Use existing grievance registrar and complaints box that has been already delivered in the Pourashava. • Ensure environmental enhancement measures such as tree plantation and traffic/cautionary sign will be provided	
Environmental impacts due to the key construction activities and corresponding mitigation measures for the RCC Road and RCC drain with RCC Retaining wall and culverts			
Dismantle work / Excavation / Earth work	• Generation of solid and construction wastes due to the dismantle works; • Generation of loose soil due to the earth excavation work.	• Cover exposed earth works with much fabric; • Disposal of soil and construction wastes at Chowdhury para dumping site at Jaliapara.	

Activity / Issues	Potentials Impacts	Proposed Mitigation and Enhancement Measures	Responsible Parties
	• Accidents	• Carefully operate the hydraulic excavator; • Operate the hammer carefully for the dismantle work.	Contractor Monitoring- Primarily by Pourashava Secondarily by PMU,LGED and DSM
	• Air pollution	• Regular maintenance of the equipment to avoid black smoke emission.	
	• Possible damage of road side infrastructure due to earth excavation for drain construction	• Ensure drum sheet palisading work for shallow depth to stabilize the structure; • Ensure plunk palisading work for shallow depth to stabilize the structure; • Ensure bolly drive or similar protective works to stabilize the structure.	
Sand filling for roads & Back filling work for drains, culverts & Retaining wall	• Air and dust pollution affecting nearby settlements	• Maintain adequate moisture content of soil during transportation, compaction and handling; • Carry the materials especially loose soil and sand with adequate cover.	
Cutting and welding of the reinforcement	• Noise pollution due to rod cutter and welding machine if any	• Avoid using of rod cutter and wielding machine at night; • Avoid prolonged exposure to noise (produced by equipment) by workers.	
	• Potential health and safety risks from rod cutter and welding machine if any	• Ensure use of the personal protective equipment's (helmet, goggles, gloves, safety boot); • Availability and access to first-aid equipment and medical supplies in case of any accidents.	
RCC (reinforcement concrete) work	• Air pollution due to black smoke emission from concrete mixer machine and vibrator machine	• Regular maintenance of the concrete mixer and vibrator machine to avoid any black smoke emission.	
	• Noise nuisance from concrete mixer machine and vibrator machine	• Avoid operation of the concrete mixer and vibrator machine at night; • RCC work should be avoided at schooling and prayer time; • Inform local people about casting work and potential impacts.	
Environmental impacts due to the key construction activities and corresponding mitigation measures for Street light			
Setting up the pole and electrical connection	• Potential health and safety risks	• Inform the local authority to switch off power during connection; • Ensure use of the PPEs.	
Source of electricity and equipment	• Reduce of resource i.e. use of electricity	• Provision of renewable energy (solar panel electrification) and use of environmental friendly equipment (LED bulb rather than CFL bulb).	

Table 6.6.2: Anticipated Environmental Impacts during Operational Phase and Corresponding Mitigation and Enhancement Measures

Activity/Issues	Potential Impacts	Proposed Mitigation and Enhancement Measures	Responsible Parties
Operation of the RCC road	• Increase in traffic speed and accidents; • Increased traffic congestion due to movement of increased number of vehicles; • Damage to road by movement of heavy vehicles; spillage of water to bitumen road surface.	• Better traffic management; • Avoid movement of heavy loaded vehicles that may exceed the load carrying capacity of the road; • Avoiding spillage of water on road from vehicles carrying fish/ fresh produce (through monitoring, creation of awareness).	Monitoring- Pourashava
	• Increased air and noise pollution affecting surrounding areas	• Traffic management, increased vehicle inspection	
Operation of RCC drain	• Pollution of downstream water body due to disposal of polluted water from the drain	• Ensure installation of septic tank by the household people in all establishment; • Stop connecting sanitation facilities to storm drain directly.	
	• Possible backflow of water through drainage canal causing water logging	• Proper maintenance and cleaning of the drain and outfall (river, lowland ditches) on regular basis.	
	• Possible degradation of the water quality	• Raising awareness among the beneficiaries, "Do not through solid waste, plastics and sanitary waste into the water body".	
Operation of RCC culverts	• Blockage of the water passing passage due to disposal of solid waste/ debris	• Regular maintenance / cleaning at both sides of the culverts and beneath the culverts.	
Operation and maintenance for street light	• Accident due to collapse of the arms, electric bulbs and poles;	• Monthly checking and maintenance of the arms, switch box, electric bulbs; if needed; • Provision of automatic shut-down the switch, lamps during thunder storm and other natural disasters.	
	• Traffic congestion, traffic problems for maintenance works;	• Schedule deliveries of materials/ equipment during off-peak hours;	
	• Beneficial impact on employment generation for maintenance works.	• Engage local people for the maintenance activities.	

6.7 Environmental Monitoring Plan

Environmental Monitoring Plan for this subproject will help to evaluate the extent and severity of environmental impacts against the predicted impact and the performance of environmental protection measures. The following ***Table 6.7.1*** and ***Table 6.7.2*** have been recommended for the key environmental indicators.

Table 6.7.1: Matrix Table of Monitoring Plan (Visual observation during construction phase)

Monitored Parameter/ Issues	Monitoring method/ Key aspects	Location of monitoring	Period & Monitoring Frequency
Safety orientation & training of workers	Frequency of training and orientation of workers for safety	Sub-project site	• Once in a month • Reporting: Once in a month
Personal Protective Equipment and safety equipment	Ensure every single person involved in the activities wear and use safety equipment	Sub-project site	• Daily • Reporting: Once in a month
Worker's health	Monitoring process of worker's health	Sub-project site	• Daily • Reporting: Once in a month
Sanitation & drinking water facility to the workers	Availability of safe drinking water and sanitation to the workers	Sub-project site	• Daily • Reporting: Once in a month
Incident record & reporting	Documented record of all incident, accident and its remedial process	Sub-project site	• Daily • Reporting: Once in a month
Site security	Isolation of site from general access	Sub-project site	• Daily • Reporting: Once in a month
Bulletin/ announcement boards/ prohibition signs	Visible in good condition or not	Sub-project site	• Daily • Reporting: Once in a month
Equipment /vehicles	-Switched-off diesel engines when not in use; - Search any possible leakage; - Fuelling.	Sub-project site	• Daily • Reporting: Once in a month
Dust	Dust is visible or not	Sub-project site	• Daily • Reporting: Once in a month
Oil waste generation and disposal	Quantity of oily waste, storage and disposal	Sub-project site	• Daily • Reporting: Once in a week
Solid waste generation	Quantity of solid wastes and disposal	Sub-project site	• Daily • Reporting: Once in a month
Drainage facilities	Provision of open /closed surface drainage if needed	Sub-project site	• Monthly • Reporting: Once in a month
Gender equity	No discrimination regarding payment	Sub-project site	• Once in a month • Reporting: Once in a month
Child labor	No child will be engaged in the activities	Sub-project site	• Daily • Reporting: Once in a month
Handling of hazardous materials	Fuelling, storage, operation	Sub-project site	• Daily • Reporting: Once in a month

Table 6.7.2: Matrix Table of Monitoring Plan (Analytical Monitoring during construction phase)

Monitored Parameter / Issues	Monitoring method/Key aspects	Location of monitoring	Period & Monitoring Frequency
Air quality	• Visually-black smoke; • Sampling; • Analysis at laboratory; • Data analysis of merits determination by using quality standards; • Through digital instruments.	Subproject site	• Twice during construction period; • Reporting: Once in a month based on field inspection and immediately after laboratory analysis.
Waste Water quality	• Sampling; • Analysis at laboratory; • Data analysis of merits determination by using quality standards.	Subproject site	• Once during construction period; • Reporting: Once in a month based on field inspection and immediately after laboratory analysis.
Noise level	• Through digital instruments	Subproject site	• Twice during construction period • Reporting: Once in a month based on field inspection and immediately after noise level measurement.

In addition, a comprehensive Environmental Compliance Monitoring checklist has been prepared that is enclosed in ***Appendix-I***.

6.8 Cost of Environmental Enhancement Works in BOQ

Considering the environmental impacts and their mitigation measures for this subproject, several items are included in the BOQ for environmental management. The estimated cost for environmental management budget is elaborated in ***Table 6.8.1***.

Table 6.8.1: Environmental Measurement Budget

Item No.	Description of the Works	Unit Rate (BDT)	Qty (Number)	Amount (BDT)
eme-1	Dust suppression measures by water spraying throughout the construction period in and around the subproject sites, uncovered aggregates and loose materials such as stockpiles of the sand, excavated earth etc.	Lumpsum		15,000.00
eme-2	Air quality (SPM, PM 10, PM 2.5) measurement. It can be measured from the pre-approved public institute/ university twice at two different locations during construction phase for RCC road, drain and overall subprojects construction activities (DSM consultant will assist to select the site)	10,000.00	2x2x3	120,000.00
eme-3	Noise level measurement. It can be measured from the pre-approved public institute/ university twice at two different locations during construction phase for RCC road, RCC drain and overall subprojects construction activities (DSM consultant will assist to select the site)	5,000.00	2x2x1	20,000.00
eme-4	Water quality (pH, BOD5 and NH3) measurement for three different outfalls (at Khaiubkhali Khal, Naf River and Hacca Khal) and at sources for three different drains. It can be measured from the pre-approved public institute/ university once during construction period.	10,000.00	1x6x3	180,000.00

Item No.	Description of the Works	Unit Rate (BDT)	Qty (Number)	Amount (BDT)
eme-5	Prevention of the spillage and leakage of the polluting materials (Detailed procedure will be given in the EMP)	Lumpsum		5,000.00
eme-6	Campsite wastes disposal facility during the construction period: collection, transportation and dumping of the wastes at Chawdhurt Para dumping station at Jaliapara area: 2 nos (1 no. for the organic wastes and 1 no. for the inorganic wastes disposal facility)	20,000.00	2.00	40,000.00
eme-7	Campsite water supply facilities: Preferably 1 no. of tube well at the labor campsite (Depending on the site condition, DSM consultant will assist the contractor for selecting the option)	20,000.00	1.00	20,000.00
eme-8	Campsite sanitation facilities: 2 nos. of the toilets preferably sanitary toilets at the labor campsite (1 no. for women and 1 no. for men)	20,000.00	2.00	40,000.00
eme-9	a) Providing safety gear packages like hand gloves, spectacles for eye protection, ear plug, helmets, masks, visible jacket, safety shoes for at least 30 persons (20 workers and 10 visitors)	3,000.00	30.00	90,000.00
	b) One first aid box with necessary accessories (contractor is responsible for providing necessary medicines, saline as per requirement during construction period)	2,500.00	1.00	2,500.00
eme-11	Tree plantation to compensate the felled down trees and enhance the ecological condition in the subproject area-preferably local fruits, flowers, medicinal and ornamental trees - Mango, Jam, Jackfruit, Kathbadam, Kodbell, Krisnachura, Radhachura, Polash, Jarul, Sonalu, Kadom, Kathgolap, Satim, Neem, Arjun, Amloki, Horitoki, Bohera, Mahogany, Shil Koroi, Babla, Rain Tree, Gamari, Segun, Garjan, Palm Trees (including protection, fencing and conservation during project defect liability period): Preferably at "East side of Chowdhury para BGB Sub-camp to sluice gate No.1 road" and :Uttar Jaliapara Foyaz Alam's house to Berry bandh road" where space is available and any other Pourashava owned suitable places in and arround the subproject influence area where space is available - 250 nos. of the trees (Tree plantation detailed will be given in the EMP)	750.00	250.00	187,500.00
eme-14	Cautionary signs- 10 nos. (Detailed specifications will be given in the EMP)	2,500.00	10.00	25,000.00
	Total			**745,000.00**

After approval to revise the cost estimate has lengthy complex procedure. Hence, as per project EMF, PMU suggestion and experience from other LGED projects, adequate budget has been allocated for the environmental management for the mitigation and enhancement measures.

The subproject activities such as earth work, sand filling, black smoke emission from the subproject vehicles & equipment, dust generating and fine particles spreading through the air from cement works etc. may degrade the air quality in the subproject area. In addition,

mechanical compactor, hydraulic excavator, concrete mixer, mechanical vibrator, drum truck and subproject vehicles generate noise nuisance to the surrounding area. Hence, the budget includes analytical monitoring for air quality and noise level. The budget also includes provision for laboratory analysis of waste water in order to assess the quality of waste water to be discharged.

Plenty of space is available for the tree plantation. Hence, to compensate the felled down trees and to enhance the ecological condition, adequate budget for tree plantation is also included. The budget for labor shed and site office construction is included in the civil works items. Therefore, it is not included in the environmental budget. It should be noted that the contractor will be paid as per actual work done.

6.9 Environmental Codes of Practice

- ECoP-1 (Overall Environmental Protection): Contractor shall take all steps to protect environment and avoid causing all types of public nuisances during implementation;
- ECoP-3 (Labor shed Management): Contractor shall maintain the work camp and construction sites in clean and tidy conditions and shall ensure standard facilities;
- ECop-4 (Workforce Environment): Contractor shall engage local people as much as possible where applicable and ensure prohibition of the child labor (less than 18 years) and aged labor (more than 65 years) in heavy works;
- ECoP-5 (Waste Management): Contractor shall be responsible for the safe transportation and disposal of the wastes generated due to the subproject activities;
- ECoP- 6 (Workers Health and Safety): Contractor shall be responsible for providing personal protective equipment and first aid facilities as per requirements;
- ECoP-7 (Compensation for Accidents): Contractor shall bear medical treatment costs for any accidents. If any severe accidents such as loss of hands, legs or loss of working ability or any case of death needs compensation- (the amount of the compensation should be fixed considering the type of accidents);
- ECoP-8 (Implementation of the Mitigation Measures): Contractor shall responsible for the implementation of the mitigation measures mentioned in the EMP;
- ECoP-9 (Spill Prevention, Fuels and Hazardous Substances Management): Contractor shall take preventive measures for spill prevention and fuels and hazardous substances management;
- ECoP-10 (Restoration of the Facilities): The contractor on completion of the contract shall remove the equipment, surplus materials, and rubbish and temporary structures of all types and shall leave sites in clean condition to the satisfaction of Pourashava and local people.

7 PUBLIC CONSULTATION AND PARTICIPATION

7.1 Methodology

In the context of formulating the Environmental Assessment (EA), participatory public consultation was conducted in the subproject site. The Pourashava Mayor, Officials, Engineers and local individuals as well as LGED and Consultant participants participated. Informal Focus Group Discussions (FGD) and a formal CIP were conducted involving the participants. In addition, walk-through informal group consultations and individual interviews were also held. The local communities were informed about subproject interferences including their benefits. Suggestions made by the participants were listed and incorporated in the EMP accordingly.


Photographs 7.1.1: Consultation Meeting at Teknaf Pourashava with Pourashava Mayor, Officials and Consultant Participants at Pourashava Office


Photographs 7.1.2: Consultant team with Teknaf Pourashava Officials visited the subproject sites and interviewed the local beneficiaries

7.2 Issues Raised by the Participants

The participants raised the issues related to the infrastructure development of Teknaf Pourashava. They emphasized on the subproject selection for the future development and also discussed about the procedure for the quality construction work. In the FGD, the participants discussed the requirements for the Pourashava's future infrastructure development through a list of the subprojects. As per the participant's opinion, the major environmental problems in the Teknaf Pourashava are related to road communication system, drainage congestion, sanitation problem, solid waste management, water pollution and land pollution. They have also stated that water logging in the low lying areas within the Pourashava area is another major problem. The participants also emphasized on minimization of the environmental impacts during construction phase.

7.3 Feedback, Suggestions and Recommendations of the Participants

The participants were presented with feedback, suggestions, and recommendations listed below:

- The FGD results confirmed that an improved communication network, drainage facility, solid waste management, water treatment plant and water supplying system, sewerage treatment plant and sanitation facilities, recreational facilities, health and sports facilities, educational institutions, bus and truck terminal, kitchen market etc. are needed for future development of Teknaf Pourashava;
- Local people also believed that the importance of the area would be grown and various economic activities would be started in the area after the subproject implementation;
- Local people also showed strong expectation for the increased opportunities for employment for unskilled or semi-skilled labor in the construction work;
- Most of the participants stated that the number of subproject that have been selected for each financial year is insufficient;
- The participants also addressed the solid waste management issue to reduce environmental and public health hazards;
- The participants suggested Pourashava Officials to ensure quality construction works by the contractors;
- The participants stated that the construction work should be performed following the EMP to minimize air quality degradation, noise level and solid waste generation;
- The participants emphasized on the capacity building workshops to enhance knowledge;
- The participants also suggested that construction works should be scheduled properly to avoid any undue disturbances to the nearby people.

8 CONCLUSIONS AND RECOMMENDATIONS

The subproject intervention has ecologically minor impact due to chop-down trees and clearing of road side naturally grown vegetation. However, to compensate the felled down trees and to enhance the ecological condition, tree plantation is included in the subproject area. The adverse impacts on the physicochemical components will be localized and limited within the subproject boundary. It is also anticipated that the adverse impacts are largely manageable if proper mitigation, compensation and enhancement measures will be entirely implemented. In fact, the anticipated impacts due to the subproject activities are relatively minor in comparison to the significant benefits that will derive due to the implementation of the subproject.

A few key recommendations are outlined below:

- Regular field visit by PMU, DSM and Pourashava responsible officials is needed for the effective implementation of the EMP;
- EMP should be available in the site during construction phase;
- Equipment should be checked by the Pourashava engineer and DSM consultant prior to work;
- To minimize occupational health and safety risks, it is highly recommended to adapt mechanical system where appropriate;
- Contractor will ensure availability of the PPEs to the workers;
- First aid box with relevant medicine should be available at site;
- The contractor is responsible for the proper disposal of the generated wastes materials from the subproject sites and campsite;
- Inform the local inhabitants about the subproject activities and safety measures would be taken for the pedestrian and traffic movement;
- Contractor will monitor behavioral matter of the workers to avoid any undue risks related to labor influx;
- Proper maintenance is needed for the planted trees by the contractor during project defect liability period.

It should be noted that environmental assessment report is a live document. Hence, due to changing circumstances during the construction phase if any, there might be minor adaptation needed for environmental, health and safety issues.

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APPENDIX

Appendix - I: Environmental Monitoring Checklist

Local Government Engineering Department

Municipal Governance and Services Project (MGSP)

Environmental Compliance Monitoring Form

Part A: General Subproject Information

Subproject Name	a) Improvement of road and drain (with cover) construction from Kulalpara Jeep Station to Bus Station Fuara via Lamar Bazar bridge including street light, Ch. 0+00 to 0+810m. b) Improvement of road from east side of Chowdhury para BGB Sub-camp to sluice gate No.1 via Jetty including street light, Ch. 0+00 to 1+250m. c) Improvement of road from Teknaf Post office to Krishi Bank including street light, Ch.0+00 to 0+ 275m. d) Construction of RCC road and primary drain from Uttar Jaliapara Foyaz Alam's house to Berry bandh including street light, Road Ch. 0+00 to 0+575m, Drain Length-825m, outfall at No. 1 sluice gate. e) Improvement of road and drain from Sona Miah shop near Cox's Bazar main road to Sukkur's Bari via Naitangpara Budda Chita including street light Ch.0+00 to 0+615m and Link Ch.0+00 to 0+335m. f) Improvement of road and road level drain from Naitangpara Najmul's house to Nurul Hoq house including street light, Ch.0+00 to 0+ 275m.
Package No.	MGSP/TEK/2018-19/W-01
ULB Name	Teknaf Pourashava
Approved Estimated Cost in BDT	
Contract Amount in BDT	
Contractor Name	
Date of Commencement	
Target Date of Completion	
Physical Progress (%)	
Financial Progress (%)	
Person Responsible (PIU) (Name, Designation &Phone) for the Overall Subproject Management	
Person Responsible (DSM) (Name, Designation &Phone) for the Overall Subproject Management	
Form Completed by (Name, Designation &Phone)	
Overall Environmental Description of the Subproject	

Part B: Design, Preparation, and Legal Requirements

Environmental Concerns (PMU, PIU & DSM) (Name, Designation & Phone)	PMU-	
	PIU-	
	DSM-	
Subproject Category	DoE-BD-	WB-
Environmental Clearance Received?	Yes	No
EA Required?	Yes	No
EA Prepared and Delivered?	Yes	No
EMP Prepared & Delivered Separately?	Yes	No
Items and Cost of EMP Implementation Included in the Contract?	Yes	No
EMP Included in the Procurement Documents?	Yes	No
Inspection Schedule / Last Inspection / Monitoring by PMU Environmental Concerns	Date-	
	Key findings-	
Inspection Schedule / Last Inspection / Monitoring by PIU Environmental Concerns	Date-	
	Key findings-	
Inspection Schedule / Last Inspection / Monitoring by DSM Environmental Safeguard Specialist / Jr. Environmental Specialist	Date-	
	Key findings-	

Part C: Key Environmental Impacts

The Subproject Results in any of the following Impacts?	Yes	No	NA	If yes, is the impact (give observation)		
				Significant	Moderate	Minor
Felling of the trees						
Clearing of the vegetation that increase the risk of increased soil degradation or erosion						
Disturbance of the terrestrial and or aquatic specifies						
Noise pollution						
Air pollution						
Adverse effects on the quantity or quality of the surface water or groundwater						
Production or increase the production of the solid waste						
Drainage congestion						
Water logging that increases the risk of the water related diseases						
Traffic congestion						
Public safety						

Part D: Work Place Environment and Gender Equity

The Subproject Results in any of the following Impacts?	Yes	No	NA	Observations
Does the contractor pay to the workers regularly?				
Is there any discrepancy between the male and female workers regarding the wages or salary for the same works?				
Is the contractor complying with the GOB labor law concerning the hiring of the workers?				
Does the contractor engage women labors and does the project have suitable works for them?				
Does the contractor engage child labor (less than 18 years) and aged people (more than 65 years old)?				
Does the contractor force to the workers for the completion of the works?				
Do the workers involve with the political activities, crime, drugs addiction and other forms of unwanted activities?				
Are construction camps adequately equipped with water supply, sanitary toilets, washing facilities and facilities for waste collection and storage?				
Has separate sanitation facilities been provided for women at work camps and the construction site? Do the laborers load heavy items on their heads or shoulders?				
Has the contractor undertaken an awareness program for the sexually transmitted diseases especially for HIV-AIDS and other infectious diseases like TB?				

The Subproject Results in any of the following Impacts?	Yes	No	NA	Observations
Are first aid kits readily available for the workers at the job site along with the instructions for use?				
Are supervisors or other site personnel trained in the basic first aid emergency response measures?				
Has the contractor provided necessary safety equipment to the workers and training for use?				

Part E: Potential Impacts, Mitigation Measures, and Monitoring Indicator Mentioned in the EMP

Activity/ Issues	Potential Impacts	Proposed Mitigation and Enhancement Measures	Monitoring Method	Monitoring Frequency	Implementation Status (Yes/ No / NA)	Impact significance if not implemented				Remarks
						Major	Moderate	Minor	No	
Construction and operation of labor shed for the workers (Workforce and labor shed management)	Generation of sewage and solid waste may degrade quality of the adjacent water bodies and surrounding environment	• Construction of sanitary latrine considering 15 persons for one toilet at the labor shed and separate toilet for male and female; • Erection of "no litter" sign, provision of waste bins (introduce separate waste bins for organic and inorganic wastes); • Ensure wastes (solid wastes and other forms of wastes) disposal at the Chowdhury para dumping site at Jaliapara.								
	Health of workers	• Conduct formal and unofficial discussion to increase awareness about hygiene practices among the workers; • Ensure availability and access to first-aid equipment and medical supplies for the workers.								
	Possible development of labor camp into permanent settlement	• Contractor to remove labor camp at the completion of contract.								
	Outside labor force causing negative impact on health and social well-being of local people	• Ensure that contractor employ local work force to provide work opportunity to the local people and conduct formal and unofficial awareness program for the health and social well-being of the local people.								
General construction work	Drainage congestion and flooding	• Ensure provision for adequate drainage of storm water if needed; • Ensure provision for pumping of congested water if needed; • Ensure adequate monitoring of drainage effects, especially if construction works are carried out during the wet season.								

Activity/ Issues	Potential Impacts	Proposed Mitigation and Enhancement Measures	Monitoring Method	Monitoring Frequency	Implementation Status (Yes/ No / NA)	Impact significance if not implemented				Remarks
						Major	Moderate	Minor	No	
	Air pollution	• Check regularly and ensure that all the subproject vehicles are in good operating condition; • Ensure contractor spray water on dry surfaces regularly to reduce dust generation; • Maintain adequate moisture content of the soil and sand used for transportation, ISG, bed preparation, compaction and backfilling; • Ensure contractor sprinkle and cover stockpiles of loose materials (e.g., fine aggregates); • Ensure contractor avoid use of equipment at site and far from the local residents, which produce significant amount of particulate matter.								
	Traffic congestion, effect on traffic and pedestrian safety	• Ensure schedule deliveries of materials/ equipment during off-peak hours; • Place traffic/ cautionary sign to avoid undue traffic congestion and accidents; • Inform the local people about the subproject activities.								
	Noise pollution	• In front of the road side sensitive infrastructures i.e., religious centers, construction work should be performed considering the prayer time; • Check and maintenance the equipment properly; • Avoid using of construction equipment producing excessive noise at night; • Regulate use of horns and avoid undue use of hydraulic horns in subproject vehicles.								

Activity/ Issues	Potential Impacts	Proposed Mitigation and Enhancement Measures	Monitoring Method	Monitoring Frequency	Implementation Status (Yes/ No / NA)	Impact significance if not implemented				Remarks
						Major	Moderate	Minor	No	
	Water and soil pollution	• Prevent discharge of fuel, lubricants, chemicals and wastes into adjacent water bodies like ponds, ditches and seasonal springs.								
	Accidents	• Conduct formal and informal discussion for creating awareness about the accidents; • Provide PPEs and ensure using of the personal protective equipment by the workers.								
	Felling of trees, clearing of vegetation and ecological disturbances	• 250 nos. of trees will be planted to compensate the felled down trees and enhanced the environmental sustainability of the surrounding area, preferably local fruits, timber, medicinal and ornamental trees at both sides and or one side of "East side of Chowdhury para BGB Sub-camp to sluice gate No.1 road" and :Uttar Jaliapara Foyaz Alam's house to Berry bandh road" where space is available and any other Pourashava owned suitable places in and around the subproject influence area where space is available								
	Spills and leaks of oil, toxic chemicals	• Proper handling of lubricating oil and fuel so that it does not fall on the soil and water body; • Collection, proper treatment, and disposal of the spills.								
All construction works	Beneficial impact on employment generation	• Employ local people in the subproject activities as much as possible; • Give priority to poor people living within subproject area in subproject related works (e.g., excavation and other works, which do not require skilled manpower).								

Activity/ Issues	Potential Impacts	Proposed Mitigation and Enhancement Measures	Monitoring Method	Monitoring Frequency	Implementation Status (Yes/ No / NA)	Impact significance if not implemented				Remarks
						Major	Moderate	Minor	No	
	Possible complaints and suggestion from the local people and stakeholder about the subproject activities	• Use existing grievance registrar and complaints box that has been already delivered in the Pourashava.								
	General degradation of the environment	• Ensure environmental enhancement measures such as tree plantation and traffic/cautionary sign will be provided								
For RCC Road and RCC drain with RCC Retaining wall and Culverts										
Dismantle work / Excavation / Earth work	Generation of solid and construction wastes due to the dismantle works; Generation of loose soil due to the earth excavation work.	• Cover exposed earth works with much fabric; • Disposal of soil and construction wastes at Chowdhury para dumping site at Jaliapara.								
	Accidents	• Carefully operate the hydraulic excavator; • Operate the hammer carefully for the dismantle work.								
	Air pollution	• Regular maintenance of the equipment to avoid black smoke emission.								
	Possible damage of road side infrastructure due to earth excavation for drain construction	• Ensure drum sheet palisading work for shallow depth to stabilize the structure; • Ensure plunk palisading work for shallow depth to stabilize the structure; • Ensure bolly drive or similar protective works to stabilize the structure.								
Sand filling for roads & Back filling work for drains, culverts & Retaining wall	Air and dust pollution affecting nearby settlements	• Maintain adequate moisture content of soil during transportation, compaction and handling; • Carry the materials especially loose soil and sand with adequate cover.								

Activity/ Issues	Potential Impacts	Proposed Mitigation and Enhancement Measures	Monitoring Method	Monitoring Frequency	Implementation Status (Yes/ No / NA)	Impact significance if not implemented				Remarks
						Major	Moderate	Minor	No	
Cutting and welding of the reinforcement	Noise pollution due to rod cutter and welding machine if any	• Avoid using of rod cutter and wielding machine at night; • Avoid prolonged exposure to noise (produced by equipment) by workers.								
	Potential health and safety risks from rod cutter and welding machine if any	• Ensure use of the personal protective equipment's (helmet, goggles, gloves, safety boot); • Availability and access to first-aid equipment and medical supplies in case of any accidents.								
RCC (reinforcement concrete) work	Air pollution due to black smoke emission from concrete mixer machine and vibrator machine	• Regular maintenance of the concrete mixer and vibrator machine to avoid any black smoke emission.								
	Noise nuisance from concrete mixer machine and vibrator machine	• Avoid operation of the concrete mixer and vibrator machine at night; • RCC work should be avoided at schooling and prayer time; • Inform local people about casting work and potential impacts.								
For Street Light										
Setting up the pole and electrical connection	Potential health and safety risks	• Inform the local authority to switch off power during connection; • Ensure use of the PPEs.								
Source of electricity and equipment	Reduce of resource i.e. use of electricity	• Provision of renewable energy (solar panel electrification) and use of environmental friendly equipment (LED bulb rather than CFL bulb).								

Prepared by- **Signature-** **Date-**

Copies to 1. PIU
2. SME
3. AME
4. Jr. ES