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: ***Improvement of East Bypass road (2nd part) start from Girls School Road to South side Jayantinagar BC road including street light, Ch. 0+00 to 1+323 & Link 0+00 to 0+740m, Total= 2,063m under Chouddagram Pourashava, Cumilla***

Package No: MGSP/CHM/ 2018-19/W-05

Chouddagram Pourashava, Cumilla

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

Chouddagram Pourashava was established in the year of 2003. At present, Chouddagram Pourashava is A type Pourashava. The Pourashava covers an area of 18.10 square kilometer. The current population of Chouddagram Pourashava is about 38,317 (*BBS 2011*). Chouddagram Pourashava has 101.21 km road among them 50.56% pucca road, 8.77% semi-pucca road and 40.67% katcha road. The Chouddagram Pourashava has 8.95 km drain which includes 1.82 km pucca and 7.13 km earthen drain. (*Chouddagram Pourashava Master Plan: Land-use Survey 2009-2010*). With the increasing population and rapid urbanization, Chouddagram Pourashava requires continuous infrastructure development.

Under this subproject, East Bypass road (2nd part) start from Girls School Road to South side of Jayantinagar BC road includes BC & RCC pavement, RCC drain, culvert and palisading works with inclusion of street lighting facilities (Ch. 0+00-1+323m & Link Ch. 0+00-0+740m, Total = 2,063m). The significant features of the subproject are mentioned below:

Name of the Subproject :	Improvement of East Bypass road (2nd part) start from Girls School Road to South side Jayantinagar BC road including street light (Ch. 0-1323 & Link Ch. 0-740m, Total= 2,063m)
Package No. :	MGSP/CHM/2018-2019/W5
District Name :	Comilla
ULB Name :	Chouddagram Pourashava
Jurisdiction Area :	Wards number 07 & 08
Structural Design Option :	BC & RCC pavement, RCC drain, culvert and palisading work
Beneficiary Population :	More than 11,594 as per information of BBS, 2011 - Chouddagram Pourashava
Tribal People :	No tribal people settlement found in the subproject area
Land Acquisition :	No land acquisition is required
Estimated Cost :	53.168 million BDT
Subproject Duration :	09 Months
Tentative Start Date :	1st June, 2019
Tentative Completion Date :	28th February, 2020

1.2 Objective 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 relevant Pourashava officials, within the subproject area and interested and affected people within the subproject influence area;
- Obtaining relevant documents from the Pourashava and local people within the subproject influence area;

- 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

This subproject East Bypass road (2nd part) comprises BC and RCC pavement with RCC drain, culvert, palisading and street lighting works from Girls School Road to south side Jayantinagar BC Road. 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***.

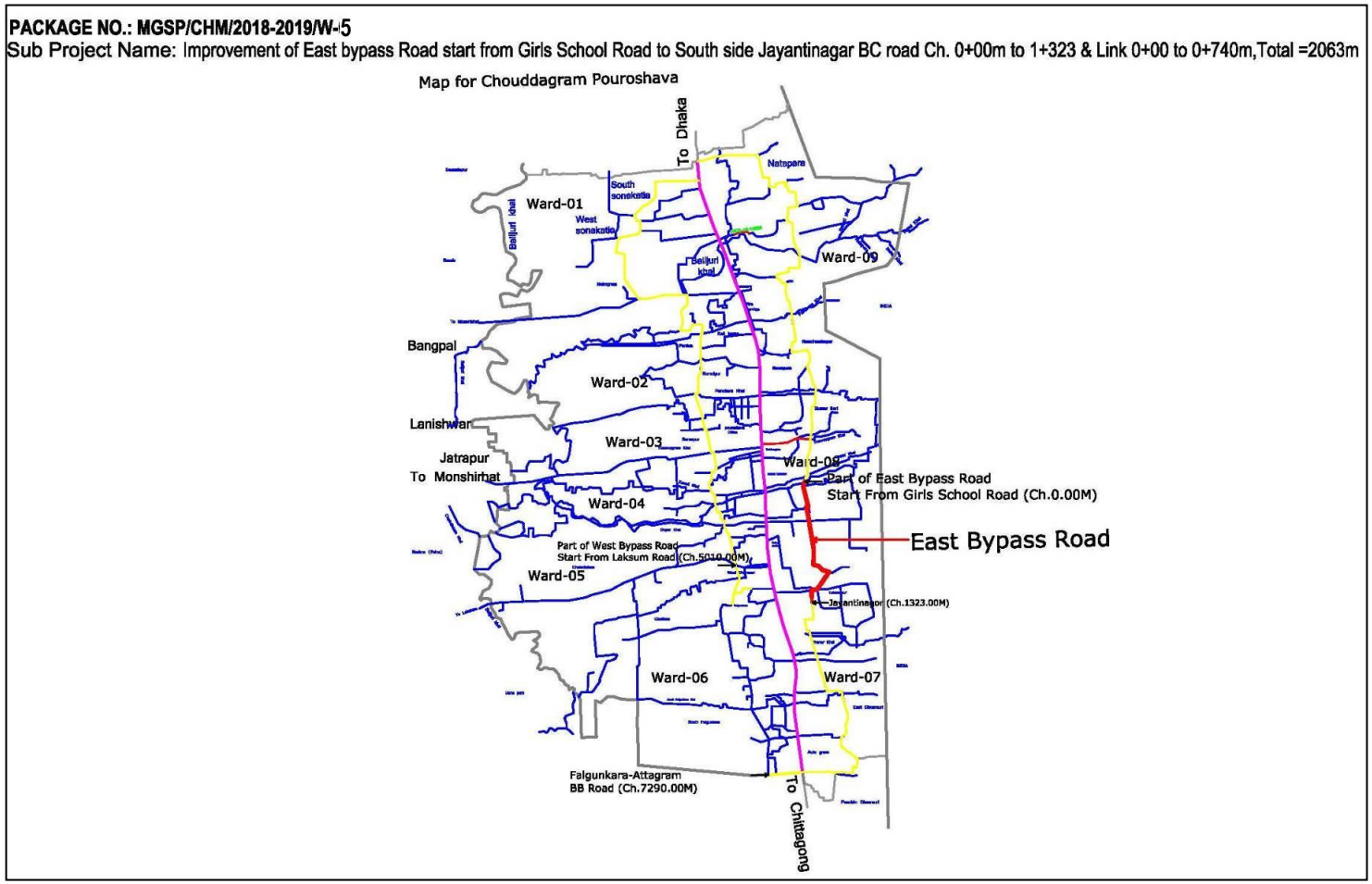


Figure 2.1.1: Location Map of the Subproject site

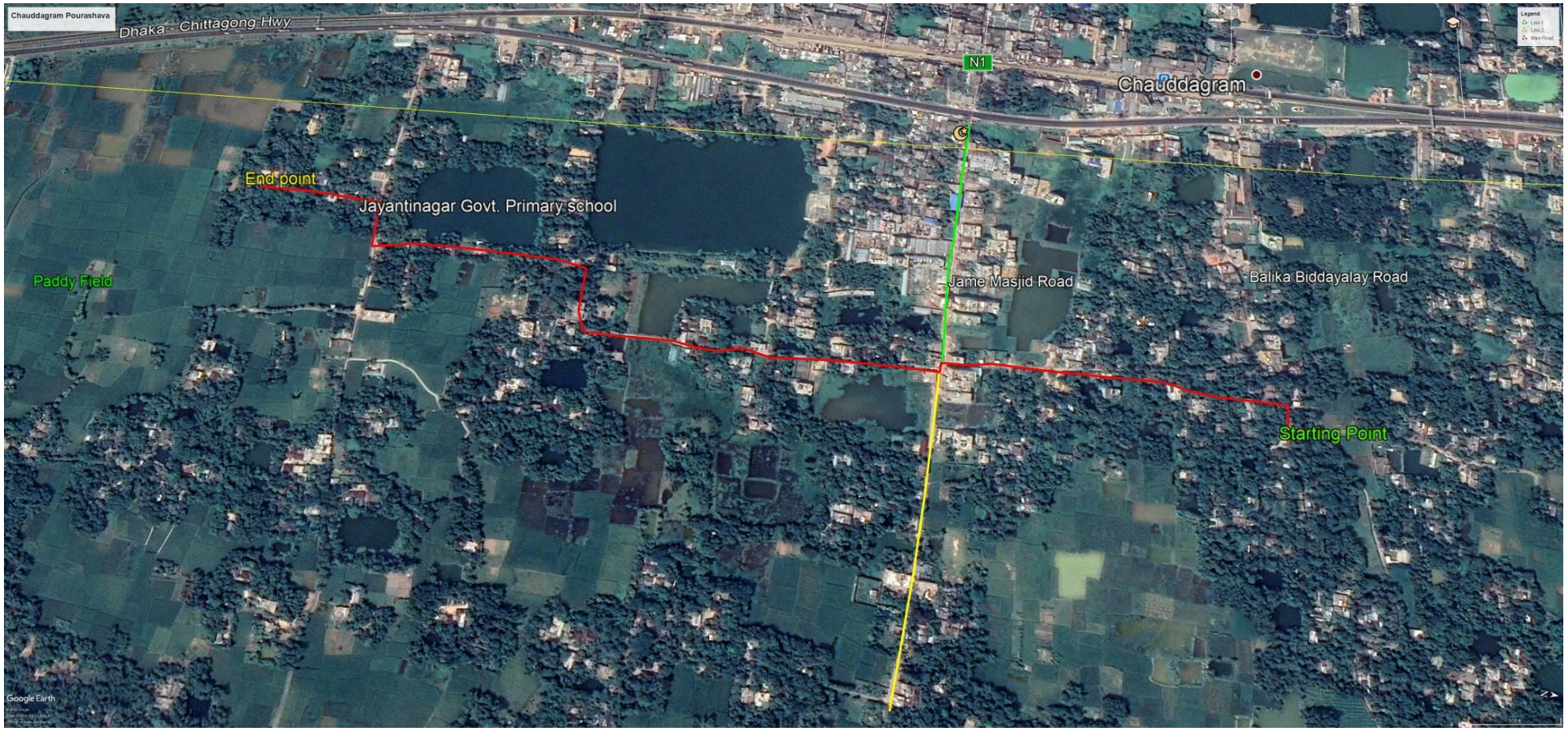


Figure 2.1.2: Topographical Features of the Proposed Subproject with influence area

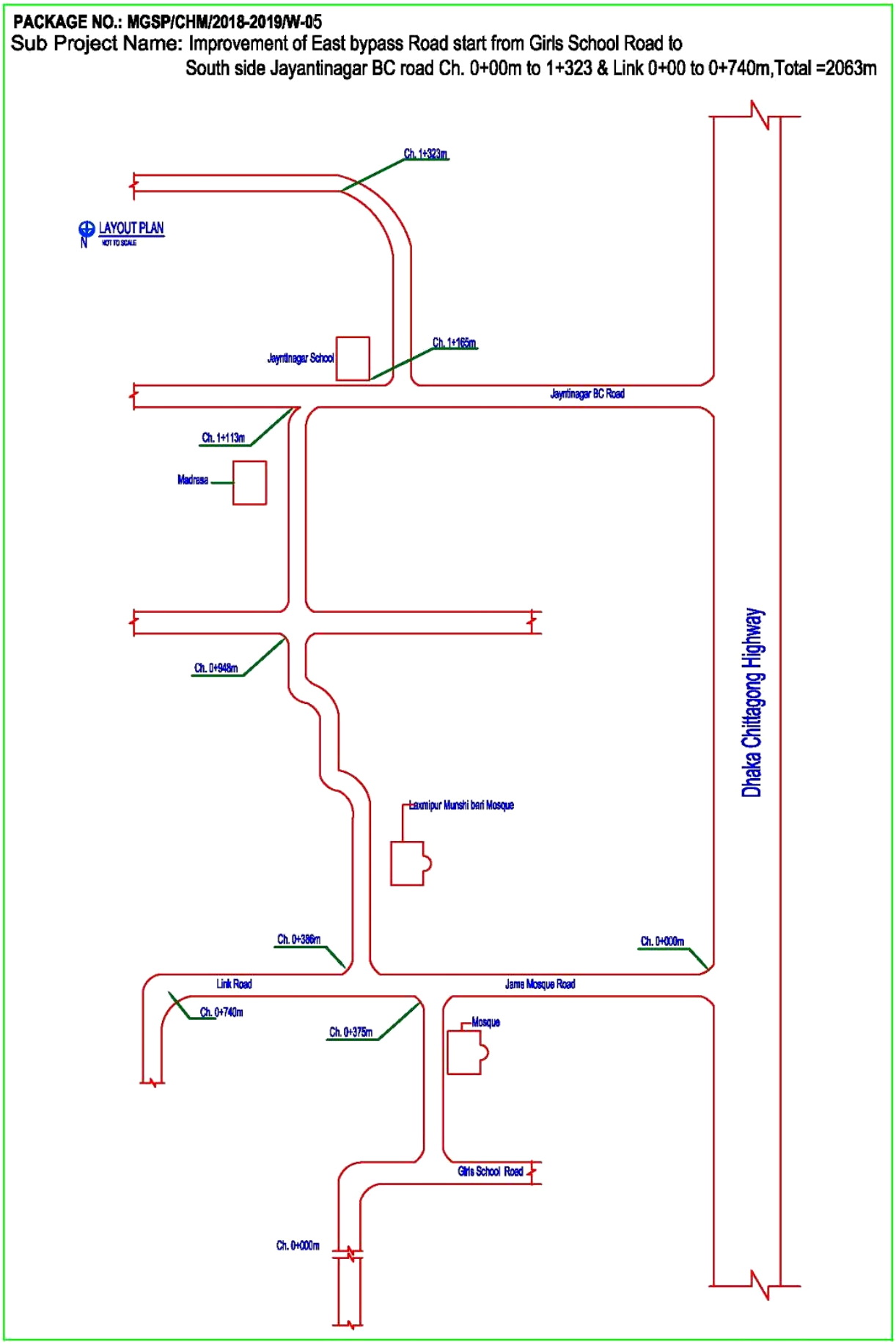


Figure 2.1.3: Layout Plan of the Proposed Subproject

2.2 Current Situation, Proposed Intervention and Need for the Subproject

The proposed road starts from start from Girls School Road to South side Jayantinagar BC Road at Chouddagram East Bypass road (2nd part). This is the continuation subproject of Chouddagram East Bypass road, after completion of 1st part road improvement (Package-MGSP/CHM/W-01: Improvement of road from Birchandranagor highway to Chouddagram Girl's school road). The proposed 2nd part of East Bypass road is started from Girls School Road and ends at South side of Jayantinagar Govt. primary school (Ch. 0-1323m) with link road at Chouddagram Central Jame mosque road (Ch. 0-740m). The subproject site is situated within the jurisdiction of the ward no. 07 and 08 of Chouddagram Pourashava. The proposed road will be developed by replacing the existing damaged BC and CC road to new BC road and RCC pavement.

The existing road condition at main road is damaged BC paved (Ch. 0-380m and Ch. 1113-1323m) and impaired cement concrete (CC) pavement (Ch. 380-1113m) with narrow pavement width is 2.3m and the crest width is varies from 3.7-4.2m. The slope of roadway embankment ranges from1:1 to 1:1.25 at left side and 1:1 to 1:1.5 at the right. Additionally, at the link road from Ch. 0-226m, the road is impaired concrete type with narrow pavement width is 3m and crest width ranges from 4.1m to 5.0m. Furthermore, at Ch. 226-740m of the link road is damaged BC with narrow pavement width is 2.3m and crest width ranges from 4.1m to 5.0m. The slope of roadway embankment ranges from1:1 to 1:1.2 at left side and 1:1.1 to 1:1.4 at the right. The existing BC pavement consists of improved subgrade (ISG) of thickness 100-110mm, sub-base of 75-100mm, WBM of 75-90mm and damaged bituminous carpeting of 25mm. The rigid pavement thickness is 75 -100mm. In addition, cracks are found in most of the places of road surface. Potholes and undulations are formed on existing road which makes the road un-trafficable. Considering the poor condition of the pavement with a narrow width in places, it is necessary to improve all of these roads with a proper width. To provide an easy and smooth traffic movement, increasing business volumes of the community people and reducing the maintenance cost of the road, improving the proposed road by RCC pavement and BC road on priority basis for the community people. At main road Ch. 0-1113m, it is proposed to improve the existing pavement by providing 150mm RCC with nominal reinforcement. To achieve widen pavement for increasing number of traffic, it is proposed to widen the existing pavement by 0.65m on both sides of road. 150mm of improved subgrade, 150mm of sub-base and 150mm of RCC will be provided to widen part of road. Again at Ch. 1113-1323m it is proposed to provide 150mm WBM and 40mm bituminous carpeting overlay on the existing damaged BC road. For link road at Ch. 0-740m, it is recommended to provide RCC pavement because rain water accumulated in this stretch of road for the time being during monsoon period.

In the subproject area, the drainage facility is inadequate and inappropriate. Only at Ch. 0-303 a RCC drain is found on the subproject area. Hence, storm water and backflow from the adjacent water bodies creates temporary water logging phenomena at Ch. 303-948m due to delay discharge of storm water at monsoon period. This condition not only creates drainage congestion but also damages the pavement by stagnation water on road surface and increase traffic accidents. As a result smooth traffic flow is hampered and interrupt daily lives and livelihood of the influence area's individuals. To improve the drainage congestion, construction of new RCC drain is needed to minimize the drainage congestion and temporary water logging phenomenon. The primary drains at Ch. 375m (Chouddagram Jame Mosque road drain) will act as primary outfall, whereas the storm water final carry-out at Balujhuri river through the Highway canal and Shopnonala canal. So, Balujhuri River will be the final outfall for the proposed drain. The existing culvert at Ch. 713m is badly damaged. It is necessary to construct a new RCC box culvert of size 2mx2m at these locations and 6 Nos. of road cross drain at different segments for proper drainage facility and divert water from one side to another side.

In the subject area ponds, ditches and low wet lands are exist along road side. The road protection work is also needed to protect the road from possible damage due to subsidence and erosion. It is proposed to construct embankment protection works (RCC palisading) of total length 82m at the side of 4 ponds for main part of the proposed road. 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. The street light will be fixed at one side of the road (left/right side) at 30m interval.

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 Chouddagram Pourashava and also increases its services and governance strength. Therefore, for priority basis this subproject can consider for the implementation.

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




Photographs 2.2.1 (a): Current Situation of the Proposed Subproject area (Main Road)


Photographs 2.2.1 (b): Current Situation of the Proposed Subproject area (Link Road)

2.3 Justification of Selection of this Subproject

With the facilitation of PMU, WB and DSM Consultants, the Pourashava prepared the CIP list. According to the CIP list, Chouddagram Pourashava prepared the priority list of the subprojects considering the demand and requirement. As a part of the reconnaissance survey, the PMU Officials and DSM consultants' visited and evaluated the existing site condition of the subproject.

From the environmental screening it was revealed that the ecological impacts due to this subproject will be moderate due to 80 number of tree felling and vegetation clearing. The subproject also has impacts on the road side built-environment because few road side structures (boundary wall, tin fence) need to be removed. The Pourashava authority has consulted with the beneficiaries and affected people. In addition, the anticipated social issues will be investigated by Social Safeguard Team and mitigation measures will be taken accordingly. Furthermore, land acquisition is not an issue for implementation of the subproject, because Chouddagram Pourashava owned the land. Though, the subproject has adverse impacts on the environment, however; the beneficiaries have no objection regarding the implementation of the subproject. Considering the significant potential benefits that will derive after completion, the local community demands and welcome this subproject.

It should be noted that 400 number of tress will be planted under this subproject to compensate the ecological impact caused by implementation of the subproject and to enhance the ecological condition. In addition, adequate and appropriate mitigation measures will be formulated in the EMP to minimize the adverse impacts. In fact, this subproject will be designed and implemented considering the standard measures to safeguard environment. Consequently, the environmental impacts associated with the construction activities will be relatively minor in comparison to the significant environmental and economic benefits resulting from subproject operation.

After completion, this subproject (roads with allied works) will improve the transport & drainage facilities and recover the existing road network of Chouddagram Pourashava. The proposed road will make easier connection and comfortable traffic movement to central area of Pourashava from the subproject area. Therefore, the proposed road will definitely have a positive impact of the business transaction & proceeds, rapid accelerating of the urbanization process, stress-free communication with the local administration tires and better environment to the community people. 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. As per information by the Chouddagram Pourashava considering the ward population more than 11,594 (source:

Population of wards no. 07 and 08 of Chouddagram Pourashava - *Population and housing census, 2011*) people will be benefited directly and many others indirectly.

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 key activities for ***RCC Road*** include:

i. Dismantling of the wearing surface of the existing HBB road;
ii. Earth work in box cutting;
iii. Sand filling on the road bed;
iv. Mechanical compaction;
v. Brick on edging;
vi. Compacted stone aggregate base course;
vii. Plain cement concrete work in foundation;
viii. Fabrication of the ribbed or deformed bar;
ix. Reinforced cement concrete work.

The key activities for ***BC Road*** include:

i. Dismantling of the damaged sub-base and base course works;
ii. Earth work in box cutting;
iii. Preparation of the hard bed by scarifying and loosening of the existing top;
iv. Sand filling on the road bed;
v. WBM base course;
vi. Compacted aggregates and sub-base course;
vii. Laying pre-mixed dense bituminous surfacing course.

The key activities for ***RCC Drain*** include:

i. Earth work in excavation;
ii. Back filling by sand;
iii. Mechanical compaction;
iv. Polythene sheet laying work;
v. Cement concrete work;
vi. Fabrication of the ribbed or deformed bar reinforcement;
vii. Reinforced cement concrete work.
viii. PVC pipe fitting work

The key activities of the ***RCC Box Culvert and Road Protection Wall*** include:

i. Dismantling of the existing culverts and clearing works;
ii. Earth work in box cutting;

iii. Mechanical compaction;
iv. Laying of Polythene sheet;
v. Cement Concrete work;
vi. Fabrication of the ribbed or deformed bar reinforcement;
vii. 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, stone chips, brick chips, cement, concrete, reinforcement, bitumen, diesel, electricity, water, GI poles and other associate accessories for lighting works.

The major equipment to be used for the implementation of the subproject: hydraulic excavator, concrete mixer machine, mechanical vibrator machine, mechanical compactor machine, steel cutter, steel shutter, MS sheet, boulders, steel drum rollers, pneumatic multiple tire roller, diesel engine, dump truck, water tanker, pump, asphalt plant, rubber tire roller, paver, 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 BC & RCC road and drain with allied 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, local road (BC & 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 BC & 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 : June 01, 2019
(c) Tentative completion date : February 28, 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, the survey data is also used for preparing the report. The major environmental and infrastructural features listed for BC and RCC pavement with drain, RCC retaining wall and culvert works from Girls School Road to South side of Jayantinagar BC road adjacent to Jayantinagar Govt. Primary school (Ch. 0+000 to 1+323m) including Link road: Chouddagram Central Jame mosque road (Ch. 0+000 to 0+740m) 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: Major Environmental and Infrastructural Features at Girls School Road to South side Jayantinagar BC road (Ch. 0-1323m) with Link road (Ch. 0-740m)

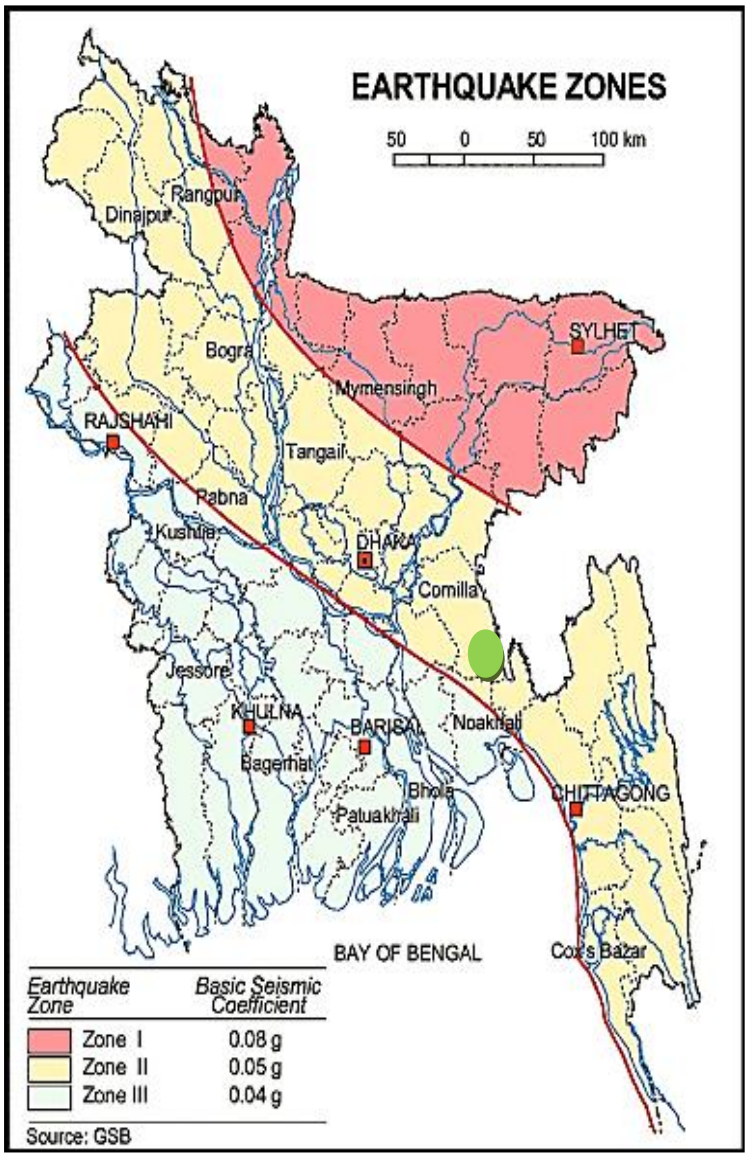
Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
Girls School Road to South side Jayantinagar BC road, Ch. 0+000 - 1+323m			
0-110	√		Shankar moth mission gate, existing damage bridge, existing retaining wall, Pahari Chora/canal, boundary wall, common planted trees and natural grown vegetation, Bishwanath temple, Temple guard house, pilgrims rest place
		√	College road, Shankar moth mission gate, existing damage bridge, Pahari Chora, common planted trees and natural grown vegetation, edge of the Chora naturally grown vegetation is abundant
0-100	√		Boundary wall, shop, existing RCC drain, common planted trees, semi-pucca, pucca and tin shed structures for residence, connecting RCC road of Ramarai-gram Bajal Member bari to Baidder khil, electric pole, Chouddagram Darul Ma'Arif madrasa
		√	semi-pucca, pucca and tin shed structures for residence, connecting Girls school road, boundary wall, common planted trees, electric pole
100-200	√		Existing RCC drain, retaining wall, connecting CC and BC road, boundary wall, semi-pucca and tin shed structures for residence, common planted trees, pond
		√	Connecting earthen road, boundary wall, semi-pucca and tin shed structures for residence, common planted trees, shops, ditch
200-300	√		Existing RCC drain, boundary wall, low wet land, semi-pucca, pucca and tin shed structures for residence, common planted trees and naturally grown vegetation
		√	Mosque, shops, semi-pucca, pucca and tin shed structures for residence, low wet land, pond, common planted trees and naturally grown vegetation
300-400	√		Boundary wall, connecting earthen road, pond, Jame mosque road, shops, low wet land, semi-pucca, pucca and tin shed structures for residence, common planted trees and naturally grown vegetation
		√	Boundary wall, damage culvert, shops, semi-pucca, pucca and tin shed structures for residence, low wet land, pond, common planted trees and naturally grown vegetation

Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
400-500	√		Boundary wall, semi-pucca, pucca and tin shed structures for residence, common planted trees and naturally grown vegetation
		√	Pond, mosque, boundary wall, semi-pucca, pucca and tin shed structures for residence, common planted trees and naturally grown vegetation
500-600	√		Boundary wall, low wet land, semi-pucca, pucca, katcha and tin shed structures for residence, common planted trees, mosque
		√	Pond, retaining wall, Laxmipur Munshibari mosque (Babor), tube-well, agricultural land, culvert, semi-pucca, pucca and tin shed structures for residence, common planted trees and naturally grown vegetation
600-700	√		Boundary wall, pond, low wet land, semi-pucca, pucca, katcha and tin shed structures for residence, common planted trees and naturally grown vegetation
		√	Agricultural land, boundary wall, culvert, semi-pucca, pucca, katcha and tin shed structures for residence, common planted trees and naturally grown vegetation
700-800	√		Boundary wall, retaining wall, tin fence, semi-pucca, pucca, katcha and tin shed structures for residence, common planted trees and naturally grown vegetation
		√	Boundary wall, tin fence, semi-pucca, pucca, katcha and tin shed structures for residence, common planted trees and naturally grown vegetation
800-900	√		Boundary wall, agricultural land, semi-pucca, pucca, katcha and tin shed structures for residence, common planted trees and naturally grown vegetation, electric pole
		√	Pond, boundary wall, retaining wall, agricultural land, semi-pucca, pucca, katcha and tin shed structures for residence, common planted trees and naturally grown vegetation, electric pole
900-1000	√		Agricultural land, common planted trees and naturally grown vegetation, bamboo fence, madrasa, semi-pucca, katcha and tin shed structures for residence
		√	Agricultural land, common planted trees and naturally grown vegetation, semi-pucca, katcha and tin shed structures for residence, shop, electric pole
1000-1100	√		Agricultural land, common planted trees and naturally grown vegetation, semi-pucca, pucca, katcha and tin shed structures for residence, Jayantinagar govt. primary school
		√	Agricultural land, common planted trees and naturally grown vegetation, semi-pucca, katcha and tin shed structures for residence, shop, electric pole
1100-1200	√		Jayantinagar govt. primary school, katcha and tin shed structures for residence, agricultural land, common planted trees and naturally grown vegetation,
		√	Agricultural land, palm trees with common planted trees and road side naturally grown vegetation, pond
1200-1323	√		Agricultural land, common planted trees and naturally grown vegetation, semi-pucca and pucca, structures for residence, boundary wall
		√	Agricultural land, palm trees with common planted trees and road side naturally grown vegetation, pond

Chainage (m)	Left	Right	Major Environmental and Infrastructural Features
Link Road, Ch. 0+000 - 0+740m			
0-100	√		Dhaka-Chittagong highway, semi-pucca structures for market shops, common planted trees, electric pole
		√	Dhaka-Chittagong highway, semi-pucca structures for market shops and pucca structures for residence, common planted trees, electric pole
100-200	√		Common planted trees, semi-pucca, pucca and tin shed structures for shops and residence, ditch
		√	Common planted trees, pucca structures for residence, electric pole, Jame mosque, open land, agricultural land, shops
200-300	√		Common planted trees, semi-pucca, pucca and tin shed structures for shops and residence, ditch, existing drain
		√	Common planted trees, semi-pucca and pucca structures for residence, electric pole, open land, agricultural land, shops
300-400	√		Common planted trees, semi-pucca, pucca and tin shed structures for shops and residence, low wet land, agricultural land, existing drain
		√	Common planted trees, semi-pucca and pucca structures for residence, electric pole, open land, agricultural land, existing drain
400-500	√		Common planted trees, semi-pucca, pucca and tin shed structures for shops and residence, low wet land, agricultural land, existing drain
		√	Common planted trees, semi-pucca, tin shed and pucca structures for residence, electric pole, open land, agricultural land
500-600	√		Common planted trees, semi-pucca, pucca and tin shed structures for shops and residence, low wet land, agricultural land, existing drain
		√	Common planted trees, semi-pucca, tin shed and pucca structures for residence, electric pole, open land, agricultural land
600-740	√		Common planted trees, semi-pucca, pucca and tin shed structures for shops and residence, boundary wall, tin fence
		√	Common planted trees, semi-pucca, tin shed and pucca structures for residence, electric pole, boundary wall, tin fence

Geology, Topography and Soils

The topographical feature of the Chouddagram Pourashava is not uniform. It has a mixed topography. Pourashava area has laid in medium to highland. It includes substantial areas more than 5 meters above sea-level. Besides the hilly tracks, most of the Pourashava land is flat plain area known as alluvium land with both hard and granular sandy or clayey silts and sloping gently to the south and southeast. The soil is light to medium gray, fine sandy to clayey silt. Soils are poorly stratified and these soils are slightly acidic or neutral. Soaking capacity is not that good (*Chouddagram Pourashava Master Plan: Land-use Survey 2009-2010*). According to Geological Survey Bangladesh (*GSB, 1978*) the Pourashava area falls in medium intensity seismic zone (Zone-II).



The green circle denotes the Chouddagram Pourashava

Figure 3.1.1: Location of Chouddagram Pourashava in Earthquake zoning map of Bangladesh

Climate and Meteorology

The climate of the Chouddagram Pourashava can be described as Tropical Monsoon. It is characterized by warm, humid summers and cool, and dry winters. From November to March, it is dry and cool while from April to May it is extremely hot during the pre-monsoon season. From June to October, the monsoon season is warm, cloudy, and wet. The warmest month is April, the coolest is January, the wettest is July and the driest is January (*BMD, 2019*).

According to Bangladesh Meteorological Department (*BMD, 2019*), this area is distinctive as tropical-subtropical sub-humid climatic region. From 2010-2019, the maximum mean temperature observed in Chouddagram Pourashava is about 25-32°C between May-August, with the minimum temperatures of between 12-15°C in January as shown in ***Figure 3.1.2*** and annual average rainfall is about 2430 mm. Monthly precipitation records clearly show a distinct dry and rainy season in ***Figure 3.1.3***.

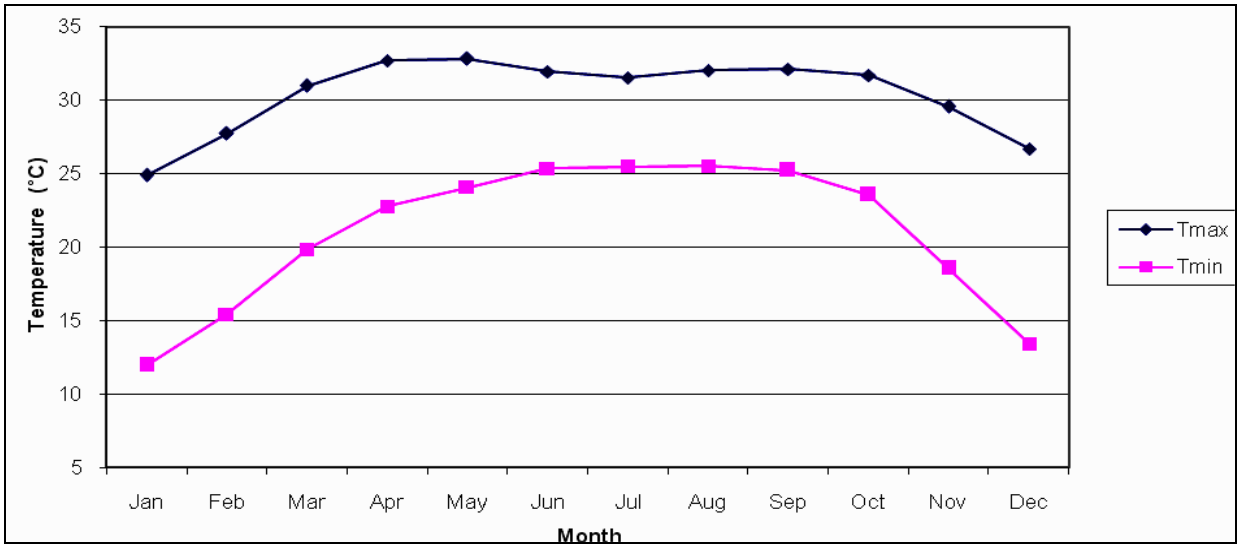


Figure 3.1.2: Average Minimum and Maximum Temperature in Chouddagram Pourashava (2000-19)

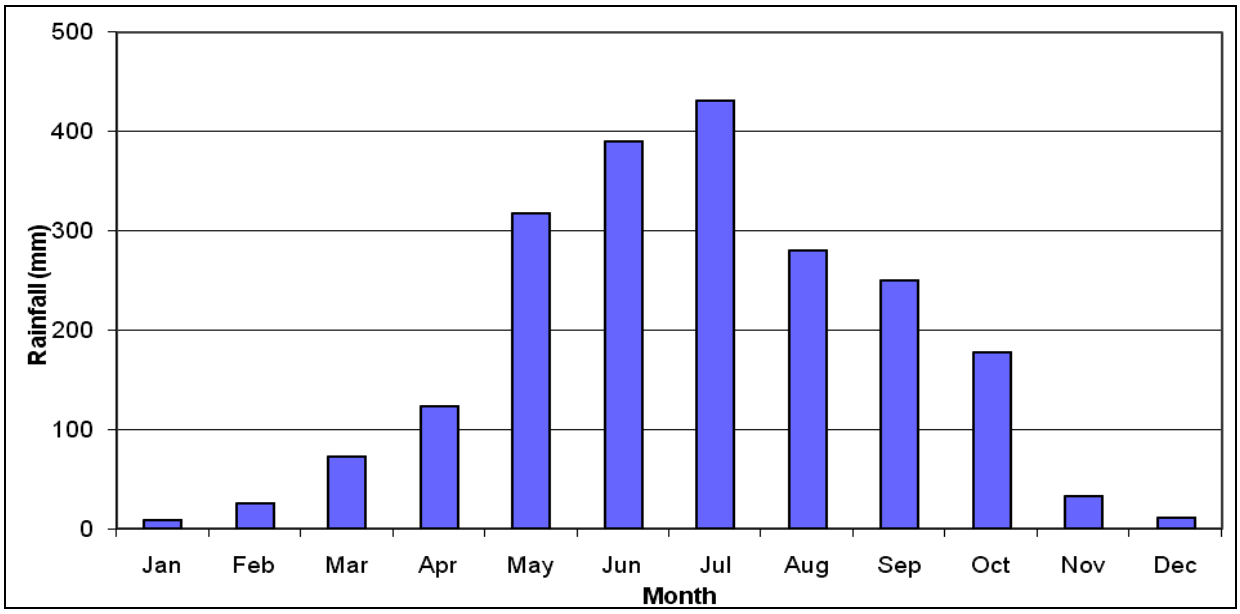


Figure 3.1.3: Average Precipitation in Chouddagram Pourashava (2000-2019)

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 (*ES, 2005*).

Hydrology (Surface Water and Ground Water)

The River Balujhuri and natural canals (Highway road canal, Shopnonala canal, Training Center Khal) are the main sources of surface water in and around the Pourashava area. In and around the subproject area, Balujhuri River, Shopnonala canal and Training Center Khals, some ponds and ditches are functioning as surface water sources. For cultivation people use canal water. Hence, for the construction works the surface water can use where appropriate. Groundwater is the main source of potable water in the subproject area. Deep groundwater is not saline but shallow aquifers contain arsenic and iron (*Chouddagram*

Pourashava Master Plan: Land-use Survey 2009-2010). Local people typically use deep tube-well water for drinking and other domestic purposes.

Flooding, Water Logging and Drainage Pattern

Most of the Pourashava areas of Chouddagram are situated under normal flood level. External flood are caused in the low-lying areas by overflow of surrounding khals, while internal floods are caused due to delay discharge of the storm water during monsoon.

The drainage network of Chouddagram Pourashava is not good enough. There are areas which are annually inundated by water logging for significant duration. There are some secondary drains carry storm water and domestic waste water to the ultimate outfall either Rivers or Khal. The subproject area is situated at the middle of the Chouddagram where Balujhuri canal, and Katakhal canal, ditches, ponds are functioning as natural drainage system. However, for the built-up area new drains are needed for proper draining of the storm water.

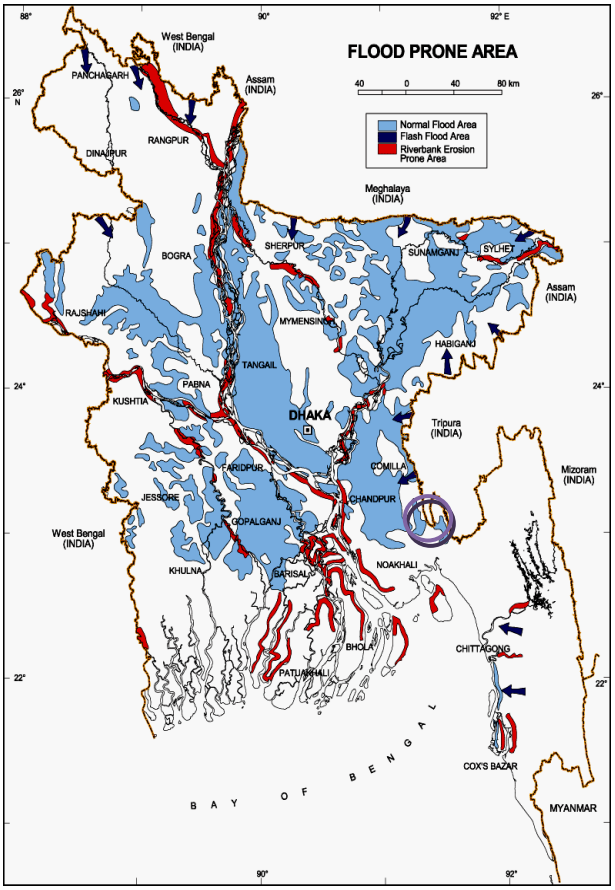


Figure 3.1.4: Location of Chouddagram Pourashava in Flood zone Map of Bangladesh

Air Quality and Dust

In the subproject area, degradation of the air quality is mainly due to emission from the vehicles. The windblown dust from the dried up agricultural field may also degrade air quality. The dusty and rough surfaces of the earthen and semi-pucca road also generate dust during vehicle and pedestrian movement. Open burning of the wastes materials and roadside

disposal of the wastes cause also air quality degradation. The subproject activities may degrade the air quality of the subproject area though the impacts are anticipated to be insignificant

Noise Level

In the subproject area, noise is mainly generated from the moving vehicles, undue use of horns and people crowding in the Bazar area. In the subproject activities, mixer machine, vibrator machine, mechanical compaction machine, steel cutter, hydraulic excavator, asphalt plant may create localized noise nuisance though the impacts are anticipated to be within the tolerable limits.

Solid Waste Management

The Chouddagram Pourashava has a designated dumping site at Natapara (beside Dhaka-Chittagong Highway near Balujhuri Bridge). The collected solid wastes are transported by the garbage trucks to the dumping site. Due to lack of awareness about waste disposal by the community people, Chouddagram Pourashava faces challenges for proper disposal of the solid wastes. The local people informed that due to habitual problem they throw their solid wastes into the vacant lowland, khals and drains. Therefore, improper solid waste disposal by the community people creates severe public health hazards and environmental degradation.

3.2 Biotic Environment

Flora and Fauna

This sub-project area is full of natural flora (aquatic plants and terrestrial herbs, shrubs and trees) and fauna (birds and animals). In the subproject area, paddy is the main crop. The local people cultivate paddy two times (Aman and Boro). They also cultivate mustard and wheat. Other crops and seasonal vegetables are also cultivated in the agricultural land and homestead garden.

The common natural native species of trees are found in the sub-project area and its buffer zone. The trees are mainly: Jackfruit, Mango, Shil-Korai, Segun, Carpus, Acacia, Mahogany, Ata, Chalta, Coconut, Beatle-nut, Palm tree, Pulm tree, Date tree, Bannyan tree, Sofeda, Papaya, Guava, Rain-tree, and Date Tree. The natural water bodies (canals, ponds, low wet land and ditches) are the worthy habitat for the aquatic flora and fauna. Lots of common local birds i.e. Crow, Sparrow, Chil, Doel, Shalik, Bulbuli, Ghughu, Dove etc. were found during the site visit. Some red listed extinct species "Modontak", Jackal and Mongoose were found during the site visit in and around the subproject boundary. Migratory birds are also available in the Aman harvested paddy field and seasonal wetlands during winter season.

3.3 Socio-economic and Socio-cultural Environment

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

The subproject boundaries are mixed zone of urban and peri-urban area with residential and agricultural zone. The road side infrastructures at subproject boundary are mainly residential houses (pucca, semi-pucca, tin shed and katcha), shops, educational institutions, religious centers, markets etc. In some segments there are agricultural lands on the both side of the proposed road where crops and vegetables are growing abundantly. There are water bodies like canals (Shopnonala canal, Highway khal), ponds, low wet lands, irrigation wells and ditches along the road alignment.

Beneficiary Population

As per information by the Chouddagram Pourashava, considering the ward population (*ward no. 07 & 08 of Chouddagram Pourashava*) about 11,594 people (*Population and housing census, 2011*) will be benefited directly and many others indirectly.

Education

In the subproject area (Chouddagram Pourashava), literacy rate is higher (63%) than the total average (51.8%) of country. The literacy rate for male (63.7%) is higher than female (62.4%) (*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 roadside boundary wall and tin fences to be removed partially. The Pourashava authority has consulted with the beneficiaries and affected people. In addition, the anticipated social issues will be investigated by Social Safeguard Team and mitigation measures will be taken accordingly. Furthermore, land acquisition is not an issue for implementation of the subproject, because Chouddagram Pourashava owned the land. Though, the subproject has adverse impacts on the environment, however; the beneficiaries have no objection regarding the implementation of the subproject. Considering the significant potential benefits that will derive after completion, the local community demands and welcome this subproject. Additionally, 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 activities) and non-farm activities such as small business, enterprises, transport vehicle ownership and operation.

Cultural Heritage and Protected Areas

Within the influence area of the subproject, no real historical and archeological sites were identified. However, educational and religious institution brings cultural values to the community people.

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 BC & RCC road with RCC drain, box culvert & retaining wall and allied works have been formulated and are shown in below. (*Environmental Assessment: Volume-1 and 2, 2013)*

The screening data and information for the BC and RCC Road with RCC drain, retaining wall and box culvert has been formulated and are shown in below:

(1) Potential environmental impact during construction phase:

(a) Ecological impacts:

➢ Felling of trees	Significant □	Moderate □√	Minor □ Number of trees	80
➢ 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 are: Mango, Palm trees, Acacia, Rain tree, Mahogany, Coconut and Betel nut etc. There is no tree to be felled down bring religious and heritage importance. However, the trees to be felled down have economic value, though 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 moderate 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 (cannel, ponds, ditches and road side low wet lands/seasonal agricultural land) have impacts on the aquatic environment. Considering the overall situation, the ecological impact is considered as moderate.

(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, paver, roller, brick breaking machine, mechanical compaction machine, concrete mixer machine, vibrator machine and asphalt plant. The construction work will be performed at 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, religious centers and daily road users may be significantly affected by generated noise, dust 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 negative impact on traffic congestion. This road is busy for traffic operation. However 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 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. Though, the culvert and palisading may be restricted free movement and disturb natural breeding of the aquatic species. Furthermore, 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	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. Additionally, RCC culvert will allow to pass storm water to low-elevated water-shed. Furthermore, the new drain will properly carry-out the storm water and 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 agricultural 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 by using road. 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 moderate 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 delimited within the subproject boundary. However, the impacts will be temporary, localized and limited within the subproject boundary 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, road protection wall and culvert consists of dismantle of the existing road & drain, 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 fabric;
- Disposal of soil and construction wastes at the designated dump site at Natapara beside Dhaka-Chittagong Highway near Balujhuri Bridge.

5.2 Tree Feeling, Clearing of the Vegetation and Ecological Impact

There are 80 numbers of planted and naturally grown roadsides trees (Acacia, Rain tree, Mahogany, Coconut and Betel nut etc) will be felled down and roadside vegetation will be cleared due to implementation of this subproject.

Mitigation and Enhancement Measures

- Considering the space availability 400 nos. of the local fruits, flowers, medicinal and ornamental trees will be planted to compensate the ecological imbalance to be caused due to felled down of the trees;
- The trees will be planted preferably at both sides of the Chouddagram East Bypass road (start from Girls school road to Jayantinagar primary school road side), where space is available and any other Pourashava owned suitable places in and around the subproject influence area where space is available and the trees are – Mango, Jam, Jackfruit, Kathbadam, Apple wood, Kodbell, Krisnachura, Radhachura, Polash, Simul, Jarul, Sonalu, Kadom, Satim, Neem, Arjun, Amloki, Tentul, Horitoki, Bohera, Mahogany, Shil Koroi, Babla, Rain Tree, Gamari, Segun, Garjan and Palm Trees. (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.

Table 5.2.1: Details of Tree Plantation (*Plant size, procedures, fencing and monitoring method*)

Plant Selection / **Height and Spacing**	**Planting and Fencing Details**	**Follow Up Take Care**
• Most types of trees average height should be **more than 1 meter** which equals **more than 3ft.** at the time of planting; • As all trees height are not same, at the time of some specific tree plantation ULB and Contractor should communicate with DSM Consultant Team; • Tree plantation spacing should be **3m c/c** from one tree to another tree	Preparation of pit by earth work in excavation of 600 x 600 x 450 mm size pit for plantation, applying cow dung mixing with loamy silty soil and excavated earth, planting the plants, tightened with 1800 mm long borrak bamboo post by jute rope including supply of tools and plants etc. all complete as per direction of the E-I-C including providing Muli bamboo tree guard by 1200 mm long and 500 mm dia of best quality muli bamboo including supplying, preparation, fitting and fixing Muli bamboo split 2 mm in size having 75 mm x 75 mm a square holes with 2 mm wide bamboo splits strengthen with 4 Nos. 2 mm wide bamboo split in both sides tightened with G.I wire fitted with 3 Nos. 63 mm dia borrak bamboo post of 1800 mm long of which 600 mm will be driven into earth by digging hole followed by fill back including cost of tools and plants etc. all complete as per direction of the E-I-C.	• ***Watering:*** needs two times in a day; Prefer specially rainy season for tree plantation if it is in other season then proper watering is needed; • Needs weed out grass and other unnecessary vegetation • Need regular monitoring by ULBs

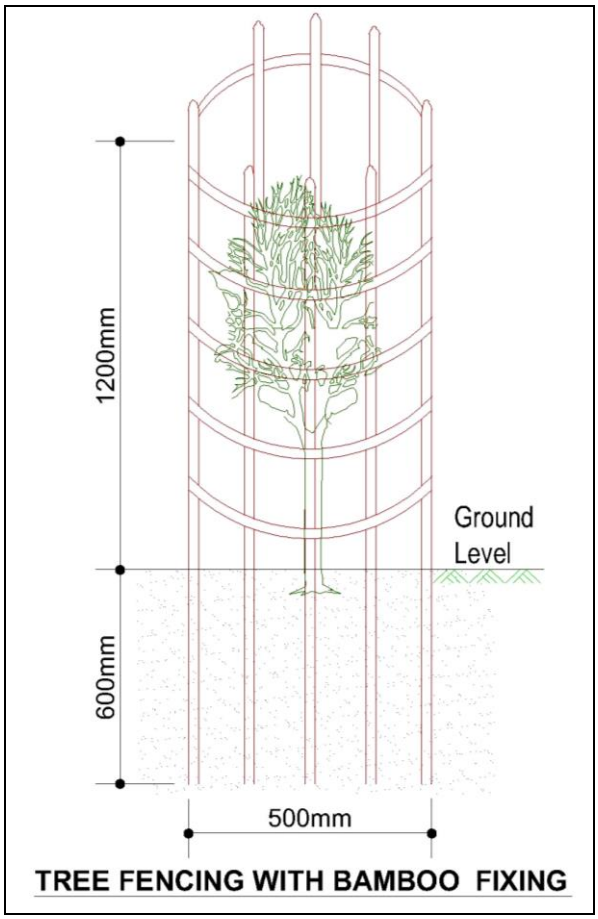


Figure 5.2.1: Drawing of Tree plantation procedure with bamboo fencing

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 & ground water and soil quality might be polluted from these contaminants. Air pollution and dust may affect the nearby settlement which is generated from fine aggregates and vehicles emissions. Even the people to be engaged for the construction activities might endanger the physical and human habitats of the area.

Mitigation Measures

- The playgrounds and yard of the educational institutions should not use as a stockyard or work camp;
- Safe transport, storage, and disposal of the construction materials, and the equipment have to be carried out in order to avoid the accidental spillage and loss;
- Fuels, lubricants, and other hazardous materials should store over raised platforms and not directly on the ground;
- Maintain adequate moisture content of soil and sand during transportation, compaction and handling;
- Carry the materials especially loose soil and sand with adequate cover;
- Disposal of soil and construction wastes at the designated dump site at Natapara beside Dhaka-Chittagong Highway near Balujhuri Bridge.

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 in the vicinity of the work sites will be temporarily disturbed by the limited dust pollution. 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

residents, 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 and low-land and subproject adjacent water bodies like canal, river ditches, ponds and low wet land or seasonal wetlands.

Mitigation Measures

- Proper construction management including waste management as well as training of the operators and other workers should provide to avoid pollution of 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 Natapara beside Dhaka-Chittagong Highway near Balujhuri Bridge.

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.
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)

Social Components	Impacts on IECs	Impact Significance
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 sheds 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)

Specific Measures and Guidelines for the Key Social Issues

The primary objective of these guidelines is to ensure social compliances and requirements required for the subproject. The social guidelines required for the subproject as appeared in this report are given in below.

- Conduct dissemination with details about the subproject to the local community;
- Continue liaison with the community leaders in order to maintain the community support;
- Engage local contractor and local people for the positive perception of the local community;
- Ensure no child workers (less than 18 years) and aged worker (more than 65 years);
- Ensure no discrimination between the male and female in terms of the wages and getting work opportunity;
- Ensure regular payment to the workers;
- Consult with the workers for feeling of any health problems and take measures accordingly;
- Monitor the workers movement for avoiding any unexpected social activities (robbery, crime, political attachment and conflicts, taking drugs);
- Monitor contractor behavior and attitude to the workers.

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 movement of the motorized vehicle is very few especially for heavy vehicle. At present, few light motorized vehicles (Electric bike and Rickshaw-van, CNG rickshaw, motorcycle, mini-pick-up etc.) are using these roads. The local inhabitants can use alternative road at construction period for vehicle and pedestrian can use the road side walk-way which will continue the traffic flow. 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 Chouddagram Pourashava, DSM, 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 Chouddagram 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 Chouddagram 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 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 is 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 Chouddagram Pourashava and will be involved the APs and Grievance Redress Committee (GRC) headed by the Pourashava Mayor. With the facilitation of DSM, the Pourashava Mayor nominated the GRC members, included representative from Government agencies, local NGO and CSO (Civil Society Organization). The GRC has been formed and established at Chouddagram 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	Md. Mizanur Rahman	Chairman	Honorable Mayor, Chouddagram Pourashava
2	Kazi Shakhawat Hossain	Member Secretary	Assistant Engineer, Chouddagram Pourashava
3	Mohammad Syedur Rahman	Member	Assistant Commissioner (Land), Chouddagram
4	Md. Abul Khayer Bhuiyan	Member	Assistant Professor
5	Md. Kamrul Islam	Member	Manager, BRAC
6	Md. Shamsul Haque (M Sc)	Member	Freedom Fighter
7	Mrs. Kohinur Akter Mrs. Feroza Begum Mrs. Amena Begum	Member	Ward Councilor (Reserve seat), Chouddagram Pourashava
8	Related ward Councilor (Elected)	Member	Ward Councilor, Chouddagram Pourashava
9	Mohammed Abdul Alim	Member	Sub-Assistant Engineer (Civil), Chouddagram Pourashava

6.2.2 Grievance Resolution Process

All complaints and suggestions will be received formally in the Chouddagram Pourashava Office by the GRC Member Secretary. A sample Grievance Redress Form will be prepared and sent to Chouddagram 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-LGED for further review. If the case at this level is again found unacceptable by the aggrieved person/s, PD, LGED will advise the Pourashava to drop the subproject. Chouddagram Pourashava should publish the outcome of cases on public notice boards. All costs involved in resolving the complaints (meetings, consultations, communication, and information dissemination) will be borne by the PIU.

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)/Deputy Team Leader will directly involve. The PD and TL/DTL 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.

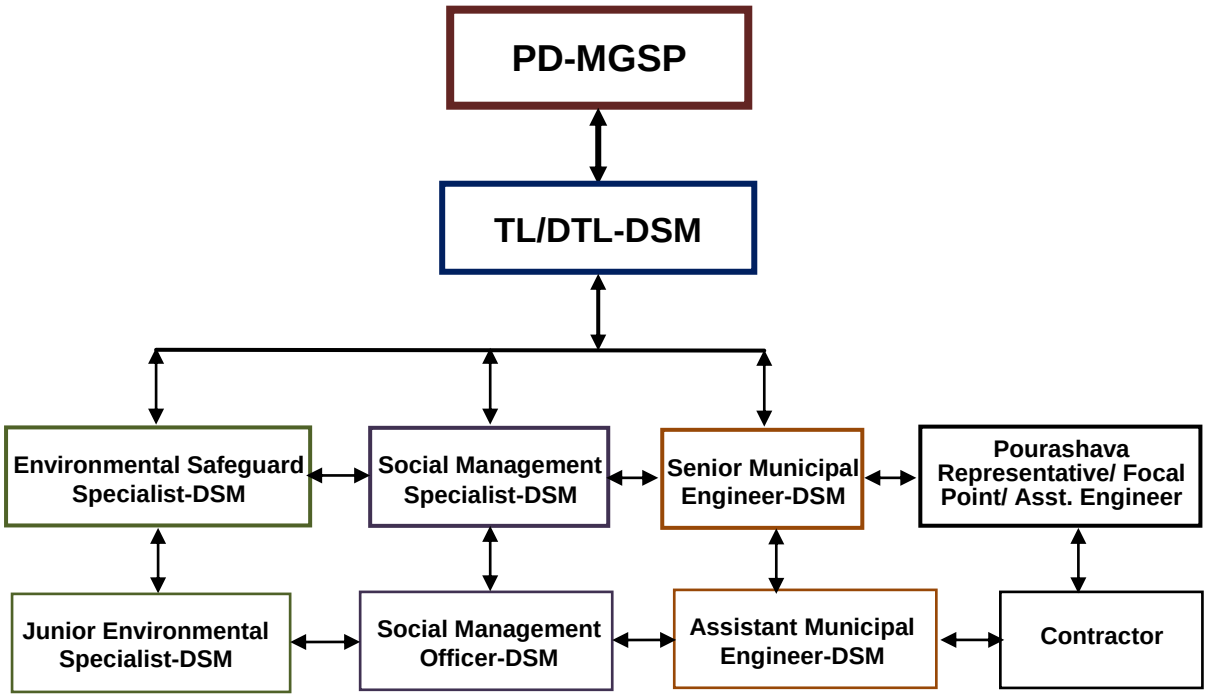


Figure 6.3.1: Environmental and Social Management Team (Tentative)

6.4 Capacity Building

A series of training program has already been conducted by the PMU and DSM to build the capability of the PMU, PIUs and DSM field staffs. Under this training program, PMU and DSM will organize an introductory course for training the participants 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 found during the course of the implementation. A separate training program for the contractor has also been conducted to enhance the Environmental awareness. A detailed training manual has already been developed by the Environmental Safeguard Specialist. Hence, the existing manual will be reviewed and modification will be done as per requirement for the next training program.

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, Chouddagram 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 Natapara dumping station beside Dhaka-Chittagong Highway near Balujhuri Bridge.	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 works	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 cannel, 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	• 400 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 Chouddagram East Bypass road (start from Girls school road to Jayantinagar primary school road side), where space is available and any other Pourashava owned suitable places in and around the subproject influence area where space is available.	
	Destruction of aquatic habitat	• Avoid complete closing of the khal/ canal for RCC culvert that affects aquatic species; • Ensure that developmental waste and work design does not create any problem for the movement and breading of aquatic species;	
	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	

Activity / Issues	Potentials Impacts	Proposed Mitigation and Enhancement Measures	Responsible Parties
Environmental impacts due to the key construction activities and corresponding mitigation measures for BC & RCC Road with RCC drain, Retaining wall and box culvert			
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 Pourashava existing dumping site at Natapara beside Dhaka-Chittagong Highway near Balujhuri Bridge.	Contractor Monitoring- Primarily by Pourashava Secondarily by PMU, LGED and DSM
	Accidents	• Carefully handle of the hydraulic excavator.	
	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; • Bolly drive for deep depth construction works.	
	Air pollution	• Regular maintenance of the equipment.	
ISG (Improved Sub Grade)/ Sand filling for road & Back filling work for drain, palisading and culvert	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.	

Activity / Issues	Potentials Impacts	Proposed Mitigation and Enhancement Measures	Responsible Parties
Setting up and operation of asphalt plant	Possible degradation of the air quality by the suspended particles and increase of the noise level from asphalt plant affecting nearby settlements;	• Locate plant away from residential settlements; • Consider use of emulsified bitumen.	Contractor Monitoring- Primarily by Pourashava Secondarily by PMU, LGED and DSM
	Possible water pollution by bitumen and solvents;	• Avoid spills and proper collection and disposal of the generated spills.	
	Possible preparation of the bitumen in open air and using of charcoal and wood as fuel	• Strictly prohibit bitumen preparation in the open air and use of charcoal and wood as fuel.	
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	Potentials Impacts	Proposed Mitigation and Enhancement Measures	Responsible Parties
Operation of the 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. × Increased air and noise pollution affecting surrounding areas.	• 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); • Traffic management, increased vehicle inspection.	Monitoring- Pourashava
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 (khal/canal or existing primary drain) 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 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*** has 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, near misses 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 at construction phase)

Monitored Parameter/ Issues	Monitoring method/Key aspects	Location of monitoring	Period & Monitoring Frequency
Ambient air quality	➢ Visually-black smoke; ➢ Sampling; ➢ Analysis at laboratory; ➢ Data analysis of merits determination by using quality standards; ➢ Through digital instruments.	Subproject site	● Twice at construction phase; ● Reporting: Once in a month and immediately after measurement
Waste Water quality	➢ Sampling; ➢ Analysis at laboratory; ➢ Data analysis of merits determination by using quality standards.	Subproject site	● Once at construction phase (at source and outfall point); ● Reporting: Once in a month and immediately after measurement
Noise level	➢ Through digital instruments.	Subproject site	● Three times during construction phase; ● Reporting: Once in a month and immediately after measurement

In addition, a comprehensive Environmental Compliance Monitoring checklist has been preparing 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	a) Dust suppression measures by water spraying throughout the construction period in and around the subproject site, uncovered aggregates and loose materials such as stoke piles of the sands, excavated earth etc.	Lumpsum		10,000.00
	b) Dust suppression measures for BC road by water sprinkling (it includes water sprinkling for overall BC road construction works that includes-Subgrade, ISG, ASG and WBM)	Lumpsum		5,000.00
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	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	5,000.00	2x2x1	20,000.00
eme-4	Water quality (pH, BOD5 and NH3) measurement of the outfall and at source for drain. It can be measured from the pre-approved public institute/ university twice during construction period.	10,000.00	2x2x3	120,000.00

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 Natapara dumping site: 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, Apple wood, Kodbell, Krisnachura, Radhachura, Polash, Simul, Jarul, Sonalu, Kadom, Satim, Neem, Arjun, Amloki, Tentul, Horitoki, Bohera, Mahogany, Shil Koroi, Babla, Rain Tree, Gamari, Segun, Garjan and Palm Trees (including protection, fencing and conservation during project defect liability period): Preferably at Chouddagram East Bypass road (start from Girls school road to Jayantinagar primary school road side), where space is available and any other Pourashava owned suitable places in and around the subproject influence area where space is available - 400 nos. of the trees (Tree plantation detailed will be given in the EMP)	750.00	400.00	300,000.00
eme-14	Cautionary signs- 4 nos. (Detailed specifications will be given in the EMP)	2,500.00	4.00	10,000.00
	Total			**782,500.00**

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, preparation of bitumen mix etc. may degrade the air quality in the subproject area. In addition, mechanical compactor, hydraulic excavator, asphalt plant, pile driving work, drum truck, paver 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. To compensate the felled 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: Consultant Team Visited the Sites with Pourashava Officials

Photographs 7.1.2: Meeting with Pourashava Officials at Chouddagram Pourashava

7.2 Issues Raised by the Participants

The participants raised the issues related to the infrastructure development of Chouddagram 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 future infrastructure development through a list of the subprojects. The major environmental problems in the Chouddagram Pourashava are related to sanitation and drainage system, road communication, solid waste management, monitoring water and land pollution. Water logging and flash flood in the low lying areas within the Pourashava area is another major problem.

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 is needed for future development of Southern part of Chouddagram Pourashava;
- The participants stated that the water supply facilities, sanitation facilities, and access road is inadequate;
- The participants suggested Pourashava Officials to ensure quality construction works by the contractors;
- The participants also suggested that construction works should be scheduled properly to avoid any undue disturbances to the nearby people;
- The participants stated that the construction work should be performed following the EMP to minimize the adverse impacts;
- The participants emphasized on the capacity building workshops to enhance knowledge.

8 CONCLUSIONS AND RECOMMENDATIONS

The subproject intervention has moderate ecological impact due to felling of trees. However, to compensate the felled down trees and to enhance the ecological condition, adequate tree plantation work is included in the design of the subproject. 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:

- EMP should be available in the site during construction phase;
- Regular field visit by PMU, DSM and Pourashava is needed for the effective implementation of the EMP;
- 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.

9 REFERENCES

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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	Improvement of East Bypass road (2nd part) start from Girls School Road to South side Jayantinagar BC road including street light (Ch. 0-1323 & Link Ch. 0-740m, Total= 2,063m)
Package No.	MGSP/CHM/2018-19/W-05
ULB Name	Chouddagram 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 Natapara dumping station beside Dhaka-Chittagong Highway near Balujhuri Bridge.								
	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 works	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 cannel, 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	• 400 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 Chouddagram East Bypass road (start from Girls school road to Jayantinagar primary school road side), where space is available and any other Pourashava owned suitable places in and around the subproject influence area where space is available.								
	Destruction of aquatic habitat	• Avoid complete closing of the khal/ canal for RCC culvert that affects aquatic species; • Ensure that developmental waste and work design does not create any problem for the movement and breading of aquatic species;								
	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.								

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	
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.								
• **For BC & RCC Pavement, RCC Drain, RCC Culvert and Palisading**										
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 Pourashava existing dumping site at Natapara beside Dhaka-Chittagong Highway near Balujhuri Bridge.								
	Accidents	• Carefully handle of the hydraulic excavator.								
	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; • Bolly drive for deep depth construction works.								
	Air pollution	• Regular maintenance of the equipment.								

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	
ISG (Improved Sub grade)/ Sand filling for road and Back filling work for drain, culvert and palisading	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.								

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	
Setting up and operation of asphalt plant	Possible degradation of the air quality by the suspended particles and increase of the noise level from asphalt plant affecting nearby settlements;	• Locate plant away from residential settlements; • Consider use of emulsified bitumen.								
	Possible water pollution by bitumen and solvents;	• Avoid spills and proper collection and disposal of the generated spills.								
	Possible preparation of the bitumen in open air and using of charcoal and wood as fuel	• Strictly prohibit bitumen preparation in the open air and use of charcoal and wood as fuel.								
• **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