GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

Environmental Assessment Report

Improvement of Road and Drain at Different Location of Savar Pourashava

Savar Pourashava, Dhaka

Package No.-01

BANGLADESH MUNICIPAL DEVELOPMENT FUND (BMDF)

MUNICIPAL GOVERNANCE AND SERVICES PROJECT (MGSP)

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ABBREVIATIONS

AP (AP's)	Affected Person
BDT	Bangladeshi Taka
BOQ	Bill of Quantity
BMDF	Bangladesh Municipal Development Fund
CC	Cement Concrete
CIP	Capital Investment Plan
CP	Contingency Planning
EA	Environmental Assessment
ECR	Environmental Conservation Rules
EMP	Environmental Management Plan
EPP	Emergency Preparedness Planning
ES	Environmental Screening
EMF	Environmental Management Framework
FGD	Focal Group Discussion
GoB	Government of Bangladesh
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GRP	Grievance Redress Procedure
MGSP	Municipal Governance and Services Project
MD	Managing Director
PPEs	Personal Protective Equipment's
PMU	Project Management Unit
RCC	Reinforcement Cement Concrete
RP	Relevant Reports
ULB	Urban Local Body
WB	World Bank
XEN	Executive Engineer

EXECUTIVE SUMMARY

BACKGROUND

As a rapidly developing country, which aims to achieve the medium income level as a nation by 2021, Bangladesh faces a sharp increase in the demand of urban infrastructural facilities (road and drainage facilities). Absence of sustainable infrastructural facilities major hindrance in the expected socioeconomic development goals. Moreover, Saver Municipality is one of the major industrial area of the Bangladesh. But most of the internal road and drainage network of the Pourashava is vulnerable condition. Consequently, industrial and residential activities has been facing troubled for long time. In this context, under this subproject, Road and Drain facilities improvement work have been included. These improvement work will be implemented at different seven location. All of the proposed road will be reconstructed in their original right-of-ways and alignments with improved subgrade, sub base, base course, and surfacing. The existing right-of-way is mostly clear, and for which no acquisition for land is required. Moreover, there are only few part of widening work at different location of the proposed subproject to provide the uniform road width.

Typical construction related impacts are projected with this type of civil works. Intensity of the probable impact is insignificant and short term. Eventually it will be site specific and limited context with in subproject boundary. Therefore, it can be mitigated by appropriate measures including enforced traffic management by the contractor and adoption of good construction practices related to protection of community health and safety. There is no any sensitive and protected area within the location of the subproject site.

As per the definition of the Environment Conservation Rules (ECR), 1997 of Bangladesh, the proposed Project falls under “Orange-B category subproject and as well as accordance with WB Safeguard Policy. Hence, for the fulfillment of the condition required under this Category, an Environmental Impact Assessment (EA) study has been carried out with the aim of assessing the impacts of this subproject, proposing mitigation measures and its implementation plan (EMP).

PURPOSE OF THE STUDY

The objective of the overall assignment is to carry out an Environmental Assessment (EA) and to prepare comprehensive Environmental Impact statement for the implementation of the proposed subproject. The study is intended to meet the requirements of the Government of Bangladesh, World Bank’s safeguard policy and the subproject specific EA.

DESCRIPTION OF THE ENVIRONMENT

Sub-project components are located in the urban area of the Savar Pourashava. The Sub-project sites are located in existing right of ways (ROWs) and Pourashava-owned land. There are no protected areas, wetlands, mangroves, or estuaries in or near the Sub-project location. There are no forest areas within or near Savar Pourashava.

SUMMARY OF SUBPROJECT-RELATED IMPACTS AND BENEFITS

The following presents a summary of the potential impacts to natural, social, economic, and cultural resources as a result of the proposed roadway and drainage improvement subproject.

Impact Category	Impact Assessment
Land Use	• Existing land use adjacent to the roadways will not change as a result of the subproject (but the land value will be increased).
Site Clearing Work	• Road side's trees and natural grown vegetation to be cut down for the road widening.
Noise	• Moderate adverse impacts to adjacent residential and commercial properties, during construction works. • Change in noise levels will not exceed State regulatory thresholds at any location
Tribal People	• No minority, or tribal populations exist on site or within the immediate area and, therefore, no impacts will fall on such populations. The subproject will not adversely impact the character of the community surrounding the roadway.
Air Quality	• No measurable impacts are anticipated
Water Quality	• Though, the drains are designed only for the storm water; however, storm water may carry wash-out materials which may disturb the aquatic environment of the outfall. In addition, dumping of solid wastes, household wastewater into the drain and illegal toilet connections may create pollution in the aquatic environment. • Throwing of waste material into the adjacent water bodies, may degrade the surface water quality.
Threatened and Endangered Species	• There is no threatened and endangered species in the subproject area. So, no impacts are anticipated to threatened or endangered species habitat.
Drainage Congestion	• Drainage congestion is minor. However, erratic rainfall may create drainage congestion for short term.
Pollution of Construction Debris	• Improper collection and disposal of the generated wastes materials may degrade the quality of the surrounding environment and degrade the aesthetic value.
Traffic Congestion	• Vehicle movement and possibility of traffic congestions on the road is unlikely.
Benefit Category	**Benefit Assessment**
Traffic Safety	• Substandard roadway elements will be eliminated, reducing potential crashes. Additional roadway features such as lighting, and pavement drainage will contribute to the improvements in motorized vehicles and pedestrian safety.
Socio-economy	• Increased job opportunity for locals. Economy related to material supply etc. expected to boom.
Water logging	• RCC drain will improve drainage facilities and prevent the accumulation of the stagnant water on the road surface.

	• This will prevent formation of muddy and slippery surface on the road.

CONSULTATION, DISCLOSURE AND GRIEVANCE REDRESS

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

MONITORING AND REPORTING

The PMU-BMDF, and PIU (Pourashava), will be responsible for safeguard monitoring. The PIU (Pourashava) will submit monthly monitoring reports to PMU-BMDF, and the PMU-BMDF will send quarterly monitoring reports to WB.

BASELINE ENVIRONMENT

Baseline environment is concerned with existing physical, chemical and biological conditions of the area where the plant is going to be set up. The surface water, and noise level have been analyzed to evaluate the primary baseline of the area. The data of air quality will be analyzed prior to the construction, to evaluate the baseline data. The main objective of examining the present environment is to provide an environmental baseline against which potential impacts from development and operational phases of the project can be compared. In physicochemical component, parameters are included as; land, water quality, soil quality, air quality, climate and noise. Biological environment covers general description on floral and faunal species in the study area. Socio-economic environment presents social structure, housing pattern, etc.

FORECAST AND EVALUATION OF IMPACTS

To maintain logical sequence of the EA process, the possible mitigation/enhancing measures for significant impacts are discussed in the chapter-6. Beneficial impacts and enhancement during development and operation phase have been identified and found that the subproject will ensure safe potable water to the dwellers of Pourashava.

ENVIRONMENTAL MANAGEMENT PLAN

Environmental management is concerned with the implementation of the measures necessary to minimize or offset adverse impacts and benefit enhancement measures identified. In order to be effective, environmental management must be fully integrated with the overall project management effort. A monitoring program needs to be put in place to assess any adverse impacts on the environment. Sections **7-1**and**7-2** set out the management measures to be taken with regard to controlling the potential impacts which could occur during the construction and operational phases of the subproject, and indicates responsibilities for the various actions concerned.

INSTITUTIONAL ARRANGEMENTS

BMDF is the Executing Agency (EA) responsible for management, coordination and execution of all activities funded under the loan. BMDF has established a Project Management Unit (PMU) to manage all aspects of loan project implementation, coordinate construction of subprojects across all towns, and ensure consistency of approach and performance. The Environmental and Social Safeguard Specialists have been appointed to coordinate social and environmental issues. Environmental review of subproject and monitoring implementation of mitigation measures are primary functions of the Environmental and Social Safeguarded Specialist within the PMU.

The EA has been prepared by the Environmental Consultant of ULB assisting the PMU-BMDF at the time of the detailed design. Costs for mitigation measures and monitoring are considered at the time of bid document preparation and in contract procurement. A Project Implementation Unit (PIU) will be established at the Savar Pourashava, staffed by Savar Pourashava and supported by PMU-BMDF staff. The PIU-engineers are trained in ensuring the environmental safeguard compliance issues during implementation (capacity building has already ensured by BMDF).

The PIU will hire Construction Contractors (CC) to build elements of the infrastructure. Environmental Specialists within the PMU will assist PIU to ensure that the construction packages comply with environmental safeguards and the Environmental Monitoring Plan contained in the EA. Inspection of progress in construction will be undertaken locally by the PIU, supported by the PMU-BMDF. During implementation, the contractor will submit monthly progress reports to the PIU, which includes a section on EMP implementation. The PIU will submit reports to the PMU for review. The PMU will review progress reports to ensure that all the mitigation measures are properly implemented. The PMU will consolidate monthly reports and submit quarterly reports to WB for review.

CONCLUSIONS AND RECOMMENDATIONS

The present EA report finds that though there are certain adverse environmental impacts associated with the construction activities under consideration, these are manageable.

The impact on the social environment is positive through creation of job and business opportunities for local residents from the subproject. The subproject will help in the accelerating socioeconomic growth, and improving quality of road and drainage network. The subproject has been designed to comply with the country's environmental laws and regulations, and WB environmental safeguard policy especially on physicochemical, Ecological and socio-economic parameter. The subproject management will take steps to ensure that the interventions meets the World Bank's environmental standards. Given the management measures and monitoring commitments by the ULB for the subproject, environmental impact of the subproject will be manageable.

1 INTRODUCTION

1.1 Background of the Project

The Government of Bangladesh (GoB) intends to enhance the capacity of urban local bodies (ULBs) in development and management of urban infrastructure, and improve municipal governance and services through undertaking the Municipal Governance and Services Project (MGSP) in selected Pourashava and City Corporations. The Local Government Engineering Department (LGED) and the Bangladesh Municipal Development Fund (BMDF) will implement the project with participation of the selected ULBs. The project will be financed by IDA, with GoB contribution for land acquisition and management, and Municipalities equity for accessing BMDF competitive finance. Under the MGSP the LGED will implement about 20 types of subprojects in 26 ULBs, which include 22 Pourashava and 4 City Corporations; while the BMDF will implement about 13 types of sub-projects in 119 Pourashava.

Both the LGED and the BMDF intends to ensure that the proposed infrastructure takes into account the environmental concerns in accordance with the Environment Conservation Rules 1997, and the World Bank Safeguard Policies. In this regard under MGSP a framework approach has been adopted for EA; the EA has two major components: (a) Overall environmental assessment, and (b) Development of Environmental Management Framework (EMF). Hence, to meet the regulatory requirement EA is mandatory to implement any subproject under MGSP.

1.2 Subproject Background

Savar Municipality is situated under the Savar Upazilla of Dhaka District in the Division of Dhaka. It is located at a distance of about 24 kilometers to the northwest of Dhaka city. The municipality lies between 23°44' and 24°02' N latitude and 90°11' and 90°22' E 2 longitude. It has an area of 14.08 km^2. The Savar Pourashava is bounded by Kaliakair and Gazipur Sadar Upazilla on the north, Keranigonj Upazilla on the south, Dhaka City on the east and Dhamrai and Singair Upazilla on the west. The Savar Pourashava situated on the bank of the river of Bangshi[1]. The Pourashava has 09 (Nine) wards. There are five types of road like BC road, BFS road, RCC road, HBB road and earthen road having overall total 263km in length whereas drain is comprise of RCC drain, RCC Pipe drain, Brick drain and Earthen, its total length is about 70km^2.

Savar municipality has been experiencing a rapid growth of population and urbanization and Industrialization from the beginning of the 1990s. According to the Population Census Report (BBS 2011) population-density is about 7435 persons per square kilometer. Over the last decade, urbanization followed an upward trend for Savar municipality due to increasing rate of industrialization.

Dhaka-Aricha highway is goes through the Savar Pourashava area. Other than highway some of the roads are more than 3 or 5 meters (m) in width and in most of the roads is less than 3.00m width[2]. In addition to narrow width, most of the road of Pourashava is badly damaged. In addition, there is no adequate and integrated drainage system in the Pourashava. Moreover, exiting drain is also mostly clogged that cannot properly drain out waste water

[1] Banglapedia, Savar Upazilla, Dhaka
[2] Capital Investment Plan (CIP), 2018 Savar Pourashava, Dhaka

during heavy rains. Under such circumstance, Pourashava needs focuses mainly on the infrastructure development and control of haphazard spatial development through the instrument of land use zoning.

The substandard road and drain network cannot cope with the growing demand. Hence, planned development of road and drain network is essential to meet the emergent demand. Hence, this subproject directly will contribute for the infrastructure development of the Pourashava.

This subproject includes the following components: BC Road and RCC Cover Drain. The significant features of the subproject are mentioned below:

Name of the Subproject	a) Improvement of Road from Dhaka Aricha Road near Razalakh firm to Kazimokmapara Shaha House via Bank colony Madrasa Mosque. Ch. 0.0 m to 1190m Link: 0m to 375m. Under ward no- 4 & 5. b) Improvement of Road from Dhaka Aricha Road near Habib Tower to Savar College via Chapra Mosque Ch. 0.0m to 1235m under Ward no: 5. c) Improvement of Road from GYM Moar to Dokkhinpara Mondir link Palpara Mondir to Mollik House, Ch. 0.0m to 700m Link: 0.0m to 350m. d) Improvement of Road from Engr. Rashid House to Girls School via Parvez Chairman house. Ch. 0.0m to 250m. e) Improvement of Road from 2 no Ward Care Bridge to Mahindra Ghosh shop. Ch. 0.0m to 450m. f) Improvement of Road from Ofaz Uddin Spining Mills to Karnapara Khal via Mr. Nazim Uddin House. Ch. 0.0m to 330m g) Improvement of Road from 7 no Wards Dagormora Mosque to Dhaka Aricha Road via Fulki Office. Ch. 0.0m to 800m. h) Construction of Drain from Rajalakh Firm to Rong Bay Rong Shop. Ch. 0.0m to 600m i) Construction of Drain from Habib Tower to Samrat House. Ch. 0.0m to 200m j) Construction of Drain from Aysha Library to Dakkhinpara Mondir Link Palpara Mondir to Mollik house. Ch. 0.0m to 550m link 0.0m to 350m k) Construction of Drain from Bank Colony Engr. Rashid house to Girl's School Road. Ch. 0.0m to 250m l) Construction of Drain from Ofaz Uddin Spining Mills to Karnapara Khal via Mr. Nazim Uddin House. Ch. 0.0m to 230m m) Construction of Drain from 7 no Wards Dagormora Mosque to Dhaka Aricha road via Fulki Office. Ch. 0.0m to 800m.

Package No.	MGSP/ Savar/ 2017-18/W-01
District Name	Dhaka
ULB Name	Savar Pourashava
Structural Design Option	BC Road, RCC Drain, and Street Light
Jurisdiction area:	Wards no. 2, 4, 5, 6 and 7
Beneficiary Population	About 95000
Tribal People	None
Land Acquisition	Not required
Estimated Cost	150 million in BDT
Subproject Duration	18 months
Tentative Start Date	January- 2019
Tentative Completion Date	March-2020

1.3 **Aims of the Study**

This report presents the finding of an Environmental Assessment (EA) of road and drain. The objective of the study is to provide an examination and assessment of the principal environmental impacts of the subproject activities. The outline of an environmental management plan also suggested with an indication of the extent of work to be done to keep the development and environment compatible. In this context, it should be noted that the term "environment" and its derivatives have been used in a wide sense, which covers not only physical and chemical aspect, but also the human dimension. The specific objectives of this EA are to:

- Present a brief discussion on the EA process and its role in the planning and implementation of development subprojects;
- Present a general description of the subproject and the process;
- Present a description of the pre-project environment;
- Delineate the significant environmental issues found and believed to be involved;
- Identify the environmental impacts of the subproject and quantify them to the extent possible;
- Suggest plan for management of the environment, during the implementation and operation.
- To present the findings for public input.
- To provide sufficient information to serve as a record for environmental approvals and consultations as required by law.

1.4 **Scope of the EA**

The EA report was prepared on the basis of proposed engineering works, field investigations, stakeholder consultation, primary and secondary data collection, screening of all baseline environmental parameters, environmental quality baseline monitoring, and review of other similar project reports in Bangladesh. The study conducted on 1 and 2 June in the year of 2018. The EA covers the general environmental profile of the subproject area including physical, ecological, environmental, social, cultural and economic resources. Baseline environmental monitoring (primary data) was carried out on water (surface), and noise quality

measurements. The EA includes an overview of the potential environmental impacts and their severity, and proposes necessary mitigation measures and environmental management plan for each of the identified and anticipated impacts. Four numbers of public consultations were conducted as part of the EA.

1.5 Methodology of the EA

The methodology used for this study is based on the procedures described in Environmental Guidelines, (Volume 1 and 2)[3] published by Local Government Engineering Department (LGED) and Bangladesh Municipal Development Fund (BMDF) and the other relevant regulation of Bangladesh as well as World Bank Guidelines for Environmental and Social Considerations

- Scoping workshop organization with various stakeholders at the beginning of the subproject preparation activities;
- Reconnaissance survey was taken up to collect baseline information in devised formats;
- Analysis of collected data was carried out;
- Documentation of baseline conditions was done by doing on site environmental monitoring
- Analysis and assessment of various alternatives was taken up;
- Identification and assessment of various impacts was done;
- Formulation of mitigation, and avoidance measures was done for identified impacts;

[3] Environmental Assessment Volume 1: Overall Environmental Assessment [Draft Final Report], September 2013. Municipal Governance and Services Project (MGSP), Local Government Engineering Department (LGED) and Bangladesh Municipal Development Fund (BMDF), Ministry of Local Government, Rural Development and Cooperatives, Government of the People's Republic of Bangladesh;
Environmental Assessment Volume 2: Environmental Management Framework (EMF) [Draft Final Report], September 2013. Municipal Governance and Services Project (MGSP), Local Government Engineering Department (LGED) and Bangladesh Municipal Development Fund (BMDF), Ministry of Local Government, Rural Development and Cooperatives, Government of the People's Republic of Bangladesh.

2 SUBPROJECT DESCRIPTION

2.1 Location of the Subproject Site

This subproject package includes –road and drain component at different jurisdiction area (ward no. - 2, 4, 5, 6 and 7) of the Savar Pourashava. Locations for various improvements are shown in Figure 2.1. All improvements will be constructed within existing right-of ways of Savar Pourashava. The subproject area is build up with mixed land use pattern of commercial, industrial and residential area of the Pourashava. Topographic view of the subproject sites area shown in Figure 2-2, 2-3 and 2-4

2.2 Subproject Selection Approach

With the facilitation of the PMU, BMDF and World Bank, a Capital Investment Plan (CIP) has been prepared by Savar Pourashava with the inclusion of the various stakeholders. This proposed subproject has been included in the CIP list. According to the opinions and views of the Mayor - this subproject has been selected by following participatory approach. The subproject is unanimously welcomed by relevant stakeholders including councilors, community people, local administration and civil society members.

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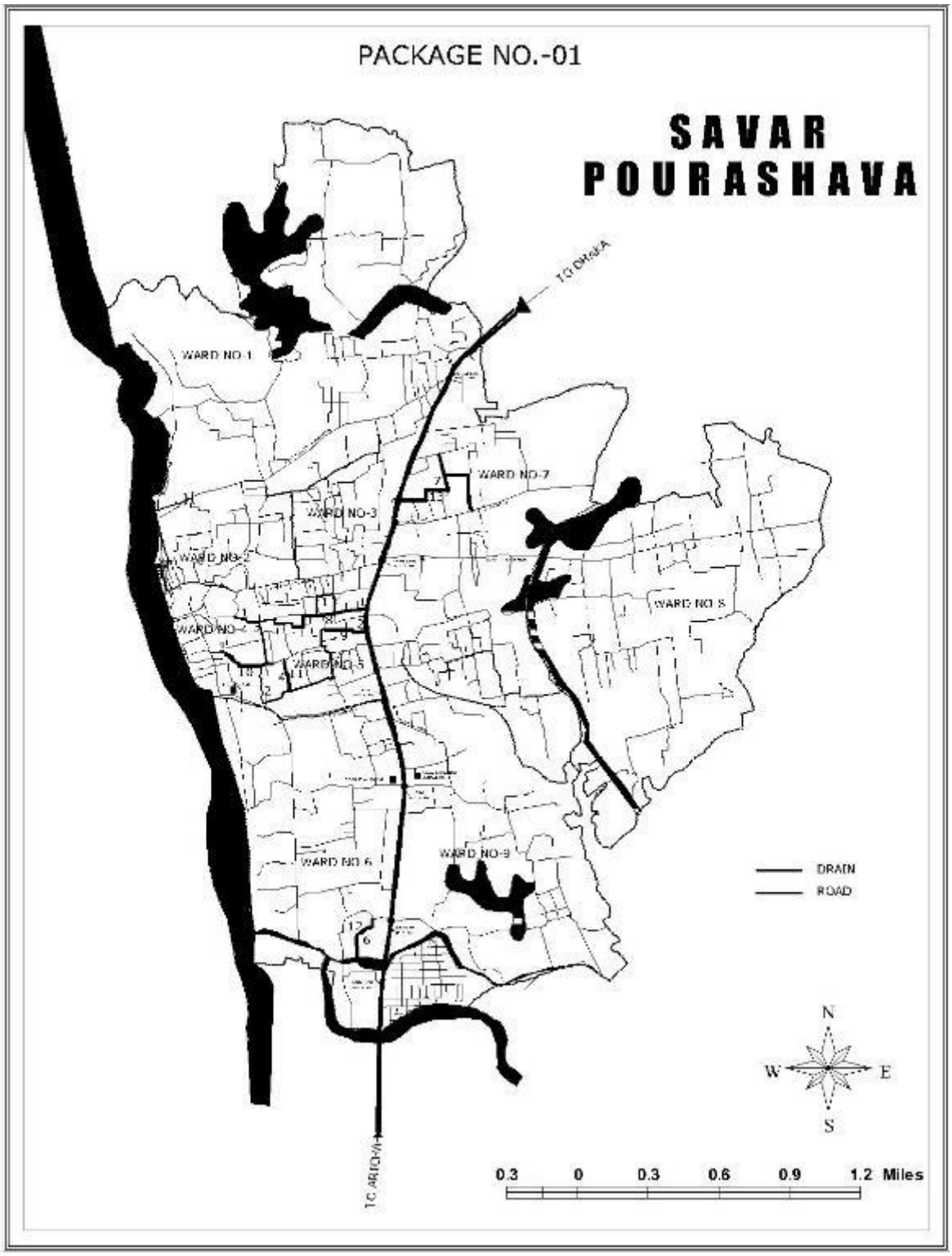

Figure 2-1: Location of Various Improvements in Base Map of Pourashava

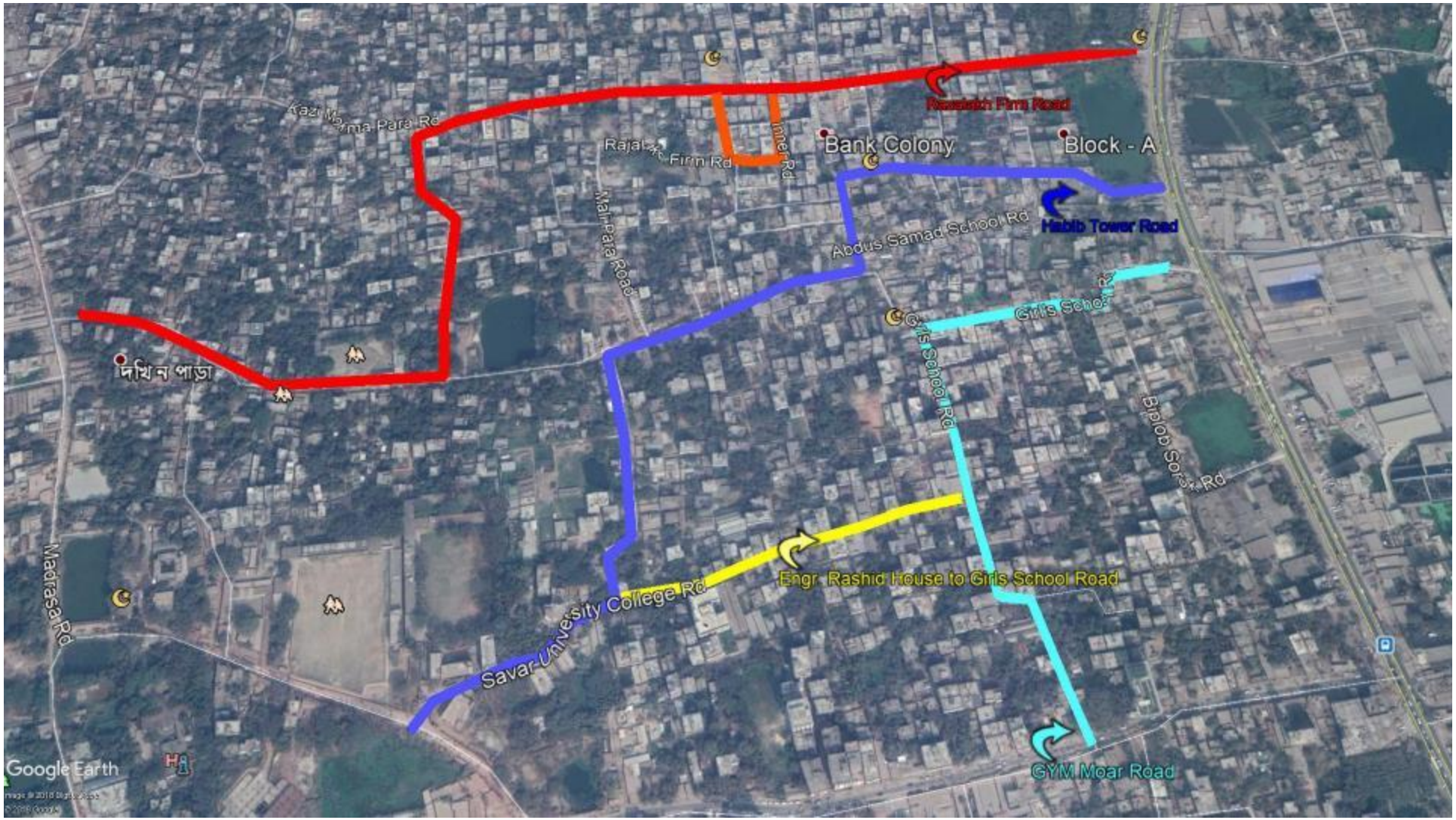

Figure 2-2: Topographic View of Razalakh Firm Road, GYM Moar Road, Habib Tower Road and Engr. Rashid House Road

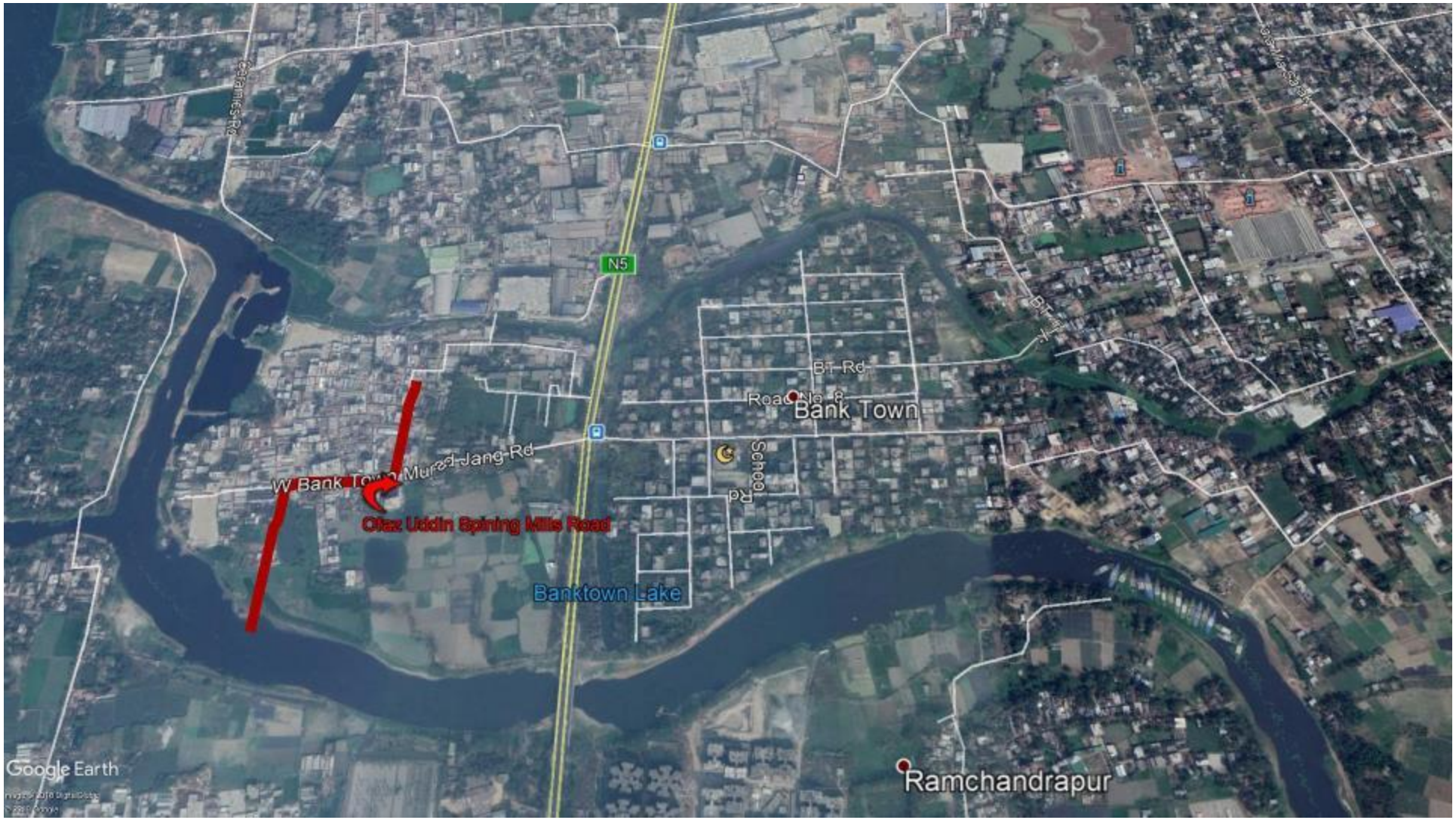

Figure 2-3: Topographic View of Ofaz Uddin Spinning Mill Road

Figure 2-4 : Topographic View of Dagormora Mosque to Dhaka Aricha Road

2.3 Subproject Scope of its Components

Depending of the availability of space, road width may be variable for each sites. Drain capacity will also variable for each road depends on subproject demand and catchment area as well. The road improvements total 4.82 km in length while drain is 2.99 km.

To meet the subproject demand, 1000-1500 mm wide reinforcement concert slot drains with concretes cover slab will be constructed at one side of the road. On the other hand, different roads will have different width which may varies from 3 to 6m.

Subgrade and base courses of the existing road will be rebuilt on some roads and as well as to provide uniform road width, whereas elsewhere new materials will be placed on top of the existing roadway and extension portion materials.

2.4 Present Status and Need for the Subproject

Razalakh Firm Road is situated within the jurisdiction of the ward no 4 and 5 of the Savar Pourashava. It is the urban area of the Pourashava where first half of the road is fully commercial area whereas rest of the portion is residential area. This road starts from Razalakh Firm near Dhaka Aricha Road (Ch.0m) and end at House of Kazimokmapara Shaha (Ch.1190m).The road passes through bow bazar area and bank colony area. In addition, there is one link road, it is starts from bank colony Laboratory College and end at BM Electronics.

Due to use of the heavy vehicles for the carrying of goods to the bazar area, surface course is scraped at most section of the road from Ch.0-400m, remaining portion is partially damaged. There are lots of pot holes in the road surface. During rain these pot holes retain storm water which hasten the decay of BC road. Exposed base course due to scraping of the surface course become muddy and slippery during rainy season. Hence, existing road condition does not permit the vehicles movement. In fact, during rainy season both vehicles and pedestrian (seller and buyer of the bazar) suffer a lot due to bad condition. Hence to cope the increasing traffic demand as well as pedestrian demand, this damaged BC road need to be improved. Hence, from Razalakh Firm near Dhaka Aricha (Ch.0m) and end at House of Kazimokmapara Shaha (Ch.1190m) BC road is proposed.

On the contrary, in the subproject proper drainage facilities is absence. At present from Ch.-150m (approximately) there is no drain. But in front of the Bow Bazar to Rong Bay Rong Shop there is brick drain. However, most of the section of drain is damaged and narrow in size and discontinuous. This drain is also blocked by waste materials (Polythene and plastic bottle).Thus, after rainfall drain water become overflow and stagnant on the road until drying up. Hence, at few portion of the subproject areas become inundated. Consequently, access in to the roads side establishment is tremendously hampered. Therefore, to overcome this

adverse condition, from Rajalakh firm to Rong bay Rong shop (Ch.0-600m) RCC drain with cover slab is proposed. The proposed drain will be connected with UGIP-II drain at Ch.600m.

***Figure 2-5: Current condition of road and drain at* Razalakh Firm Road**

Habib Tower Road is starts from Dhaka Aricha Road near Habib Tower (Ch.0m) and end at Savar College (Ch.1235m). This road goes via Chapra Mosque. It is the urban area of the Pourashava and located at the Jurisdiction of the ward no.5 of the Pourashava. Existing road width varies from 4-5.5m. Though sub grade and base materials are mostly generally in place, the roadways are currently in very poor condition, with the road surfaces broken and cratered over most of their lengths. Improvements are needed to maintain acceptable traffic flow, and will enhance mobility within and between communities, commercial areas, schools and markets. Considering the adverse situation and mitigate the suffering of the subproject area people 1235 m long BC road of uniform width has been proposed on the existing damaged BC road.

At present, from Ch.0-200m there is no drainage system. However, remaining part has a functional drain. Hence, to complete the drainage network RCC drain with cover slab has been proposed from Ch.0- 200m. This drain will be connected with existing drain of UGIP II drain at Ch.200m.

Figure 2-6: Current condition of the Habib Tower Road and Drain

GYM More to Dokkhinpara Mondir Road is the semi urban area of the Pourashava. It is located at the jurisdiction of the ward no 5 of the Savar Pourashava. The existing paved width is on average 5m. In addition, there is link road which length is 350m and existing width of the road is on average 4m. Most of the section of this road have uneven-rough surface, damaged topping and pavement sides, narrow in width thus incapable of accommodating road traffic. The road surfaces are worn out partly and in some cases entirely. Therefore, traffic movement are interrupted. Considering the bad condition of road, it is necessary to re-buildup the existing damaged BC. Hence, 700m long BC road will be reconstructed on the existing pavement with new BC from GYM more to Dokkhinpara Mondir Road (Ch. 0-700).Furthermore, at link road 350m road will be reconstructed with bituminous carpeting.

On the other hand, from **Aysha Library to Child Care Institute** there is no drain. Then from Child Care Institute Moar to Dokkhinpara Mondir brick drain is existing. Additionally, there is 350m brick drain at link road. However, the existing drains are damaged and narrow which does not capable to drain off the storm water. Thus, after rainfall road side area become flooded and turn in to very much inconvenient for the community people to use this drain side road. To mitigate the water logging condition in the subproject area, RCC drain with cover slab is proposed from Aysha library to Dakkhinpara Mondir (Ch. 0-550m) with 350m link drain. This drain will be connected with existing drain of UGIP-II.

Figure 2-7: Current condition of the GYM Moar Road and Drain

Engr. Rashid House to Girls School is located at the ward no. 5 of the Savar Pourashava. It is densely populated residential area. The existing width of the road is on average 5m. But entire the road length it is not uniform. In addition, mostly road section is partially damaged and few section is totally damaged due to loss of wearing surface. Loss of wearing surface has created potholes in the road. Therefore, traffic movement are interrupted. Therefore to provide smooth and safe transport facilitates in the subproject area 250m long BC road is proposed from House of Engr. Rashid to Girls School (Ch.0) to Girls School (Ch.250m).

Currently, in the subproject area there is brick drain at one side of the road. However, the existing drain is narrow, partially damaged and capacity of the drain is also inadequate. Thus, this drain does not drain off the storm water after precipitation. Subsequently, due to delay discharge of the storm water and overflow of the drain water is causing water logging and it remain until drying up. Therefore, RCC drain with cover slab has been proposed from Ch.0-250m.

Figure 2-8: Current condition of Engr. Rashid House to Girls School Road

Ofaz Uddin Spining Mills to Karnapara Khal road side area is buildup with industries with few commercial and residential activities. It is situated within the jurisdiction of the ward no.6 of the Pourashava. At present, from Ch.0-130m and Ch.200-330m is partially damaged but from Ch. 130-200m is badly damaged. The proposed road have been damaged mostly of having several cracks, pot holes, broken edges and depressions due to movement of heavy vehicles for a long time without any proper repair and maintenance work. So, traffic movement is interrupted. Therefore, to provide better transport facilities in the subproject area, new BC pavement will be constructed by demolishing the existing damaged BC road from Ch. 0-330m. In the subproject area, there is brick drain available from Ch. 50-90m (Approximately). However, at rest of the portion there is no drain. Moreover, existing drain is also discontinuous. Therefore, storm water cannot drain off properly from the subproject area. Resulting storm water stagnant on the road and turn in to temporary flooded condition which is cause of environment degradation of the subproject and its surrounding area. Additionally, this condition leads the damages of BC road as well. Hence, to minimize the water logging problem and provide better environment in the subproject area, RCC drain with cover slab is proposed from Ofaz Uddin Spining Mills to Karnapara Khal (Ch.0-330m).This drain will be connected with Karnapara Khal.

Figure 2-9: Current condition of Ofaz Uddin Spining Mills Road

Figure 2-10: Current condition of the Outfall (Karnataka Khal).

Dagormora Mosque Road is start from Chapain Road at (Ch. 0m) at end at Dhaka Aricha Road (Ch.700m). It is the semi urban area of the Pourashava. The subproject site is located within the jurisdiction of the ward no 7 of the Pourashava. The existing road is BC and HBB road and its width in on average 3.20m. Existing BC road is badly damaged in the entire road containing cracks, pot holes, edge broken and depressions are prevalent whereas HBB road has missing of bricks. The road surface is also uneven and width of the road is non-uniform. Hence, the normal traffic operation and pedestrian movement is hampering. Additionally, this damaged roads creates dust which has discomfort felling to the road user and nearby residents. So, for better traffic operation damaged BC road will be replaced by new BC pavement. Therefore, new BC road of uniform width and 800m length has been proposed from Ch. 0-800m.

Though, subproject area is developed densely residential area but there is no proper drainage network. The existing drainage facilities of the subproject area is brick and earthen drain. However, the existing drain is damaged and capacity of the drain is also inadequate and clogged by various waste materials and natural grown vegetation. Moreover, the existing drain

is discontinuous. Therefore, this drain is incapable to drain out the runoff water and household water as well. Consequently, after heavy rainfall, as a results of delay discharge subproject area become flooded. Hence, transport facilities and as well as access in to the houses is interrupted. Considering the inadequacy of the drainage network and suffering of the peoples RCC drain with cover slab is proposed from Ch.0-800m. This drain will be connected with the existing drain at Chapain Road.

Figure 2-11: Current condition of Dagormora Mosque Subproject Site

2.5 Justification of Selection of the Subproject

The subproject has significant importance because most of the road has connectivity with Dhaka-Aricha road and more importantly all of the roads are in core area of the Savar Municipality. All of the roads are extensively damaged. Without improvement of these road well transportation system in the Savar area not to be possible. Hence, this subproject has been considered as priority subproject in the CIP. PMU (BMDF) representative, and consultant of Pourashava visited the subproject sites to assess the sites condition. From the site visit, it is revealed that this road is very much inconvenience for the movement of the motorized vehicles. The subproject is located on the right of way. Hence, private land acquisition is not an issue for implementation of this subproject. From the site inspection, it is also revealed that roadside built-up infrastructure will not be severely affected due to the implementation of the subproject.

The subproject has adverse impacts on the physicochemical environment. However, it is anticipated that the adverse impact is not significant and limited in the subproject boundary.

The subproject has significant benefit to the community people. After completion, the road subproject will provide uniform width. By eliminating pot holes and providing smooth road surface it will provide better, easy and safe movement facilities for the travelers. On the contrary, new drains will minimize the drainage congestion and water logging problem. Considering the aforementioned benefits that will derives, the subproject is selected for implementation

2.6 Key Subproject Activities and Implementation Process

The general activities for the subproject includes: Site clearing & grubbing works, construction of the semi-pucca site office, construction of the labor shed and relocation of the electric poles and GI poles.

The key activities for BC Road include: dismantling of the damaged BC and HBB road, earth work in box cutting, earth filling work, sand filling on the road bed, mechanical compaction, brick work on edging, compacted aggregate sand sub base course, preparation of compacted WBM base, providing prime coat, laying pre-mixed dense bituminous surfacing wearing course.

The key activities for RCC Drain include: earth work in excavation of the foundation, pumping and bailing out of water as per requirement, lying of polythene sheet; sand filling for the preparing foundation bed, plain cement concrete work in foundation, manufacturing and placing of cc blocks, fabrication of the ribbed or deformed bar, reinforced cement concrete work.

2.7 Category of subproject

For BC road and RCC Drain

- According to ECR 1997: Orange B
- According to WB classification : Category B

Considering the anticipated environmental impacts, primarily drain and BC road can consider as Orange-B as per ECR-97. According to the WB classification, it can classify as Category *B.*

2.8 Analysis of Alternatives

This section examines alternatives to the proposed subproject site, technology, design, and operation in terms of their potential environmental impacts, and the feasibility of mitigating these impacts. It also states the basis for selecting alternative options for the component. The analysis of alternatives for the subproject components was carried out as part of the feasibility study, and has been taken forward.

a) Zero or No Project Alternative

The No Project option in respect to the proposed subproject implies that subproject area people will deprive from benefit of improve transport and drainage facilities and Pourashava as well.

The No Project option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of local people would remain unchanged.
- No employment opportunities will be created for the local residents who will work in the sub project area.
- Development of infrastructural facilities (roads and associated infrastructure) will not be undertaken.
- Water logging problem of the subproject area would not to be improved.
- Maximize usage and utilization of this township will not to be achieved

b) Analysis of the Alternative Routes/ Alignments/ Location

(i) Analysis of alternative routes/ alignments for BC Road:

This is an improvement subproject where the existing BC and HBB road will be replaced by the new BC pavement using the same alignment. Therefore, analysis of alternatives routes/ alignment is not really applicable

(ii) Analysis of alternative routes/ alignments for RCC drain:

The following three alignments can primarily be considered for alternative analysis.

Route/Alignment	Advantages	Disadvantages
Alternative-1 (both sides of the road)	-Easier house connection -Ease of construction without much disruption to traffic	-Two drainage lines need to be constructed -Expensive-it needs more money, area and time.
Alternative-2 (median/center of the road)	-Single drain needs to be constructed along the median	-Difficult to make house connection
Alternative-3 (one side of the road)	-Single drain needs to be constructed -It is suitable for single lane road	-Difficult to make house connections from other side of the road -It is not suitable for more than single lane road.

As per sites requirement three alternative has been recommended. Designer will be decided with the assistance of ULB engineer which one is suitable for the subproject areas.

c) Analysis of the Alternative Designs

(i) Analysis of the Alternative Designs for BC road:

For a road subproject, alternative designs may include asphalt road, HBB road and RCC road. Through a comparative study considering the advantages of the BC road, HBB road and RCC road, the consultants examined which one is feasible. General advantage and disadvantage of the BC, HBB and RCC roads are shown in following table.

Design Alternatives	Advantages	Disadvantages
Alternative 1: Bituminous Carpeting (BC) Road	• Low Construction cost • Provide smooth surface • Aesthetic value is high	• Frequency of maintenance is relatively high; • Early damaged in heavy rainfall
Alternative 2: HBB Road	• Require less construction cost; • Construction time is less	• Frequent maintenance is required • Surface is not smooth
Alternative 3: RCC Road	• Capacity of passing heavy loaded vehicles • RCC road is not damaged in heavy rainfall • Frequency of maintenance is relatively low.	• High construction cost • Provide relatively less smooth surface

From environmental point of view RCC and HBB road is more feasible. However, bituminous road provides comparatively smooth surfaces which have more aesthetic value than rough surface that provided by RCC and HBB road. Most importantly, provision of the further expansion of the utility services for instance water supply line, gas line is key issue for road selection which is complex and difficult for RCC road. Therefore, considering the low construction cost and high aesthetic value and as a whole to meet the Pourashava demands, BC and HBB road is recommended by the designer.

(ii) Analysis of alternative designs for drain:

For a RCC drain subproject, alternative designs may include RCC drain and earthen drain. The following table discusses the general advantages and disadvantages of RCC drain and earthen drain.

Design	Advantages	Disadvantages
Alternative 1: RCC drain	• Not prone to encroachment • Area above RCC drain could be used as a part of road/footpath	• Higher cost of construction
Alternative 2: Earthen drain	• Less construction cost	• Need more land for construction of open earthen drain • Prone to encroachment, disposal of solid waste/ debris
Alternative 3: Pipe drain	• Require less time to construction	• Maintenance is difficult

The selected design is alternative 1.

d) Analysis of the Alternative Technologies/ Methods of the Construction

Method of the construction should be selected based on the available technologies in Bangladesh and with the assistance of the consultant, the Pourashava Officials. However, to minimize occupational health and safety risks and for effective use of the human labors, it is highly recommended to adapt mechanical system where possible for instance concrete mixer machine for casting, mechanical vibrator machine, and other electro-mechanical equipment as per requirement. From the field investigation, it is revealed that, the existing road width is not enough for the use of mechanical excavator.

3 DETAILED ENVIRONMENTAL AND INFRASTRUCTURAL FEATURES

The major environmental and infrastructural features in the subproject area have been collected from the field investigation. The survey team of Pourashava has also performed the conditional survey. The finding of the site inspection and investigation at: (a) Reconstruction of Razalakh Firm to Kazimokmapara Shaha House Road by BC (b) Improvement of Habib Tower to Savar College Road by BC (c) Improvement of road from GYM Moar to Dokkhinpara Mondir by BC(d) Improvement of Rashid House to Girls School with BC (e) Improvement of road from Ofaz Uddin Spining Mills to Karnapara Khal, by BC (f) Improvement of road from Dagormora Mosque to Dhaka Aricha road by BC is listed .Effort has been given for getting major environmental and infrastructural features within 100 m of both sides from the center of the road at 100 m longitudinal intervals. The major environmental and infrastructural features are given below Table 3.1.

Table 3-1(a): Major Environmental and Infrastructural Features of Razalakh Firm to Kazimokmapara Shaha House. (Effective Length-1190m)

Chainage (m)	Right	Left	Key Environmental and Infrastructural Features
0-100	√		Boundary wall, Low Land, Trees, Krishi Shomprosharon Odhidoptor, Savar Driving Training Center, Forhad General Store, Pucca, Semi-pucca and Tin shed Varieties Shops and Residents, Electric Pole;
		√	Boundary wall, Electric Pole, Shajahan Store, Hanger Birds, Law Chamber, Rokeya Fassion, Green Belt Laboratory School.
100-200	√		Palash Pharmacy, Etika Parlor, Taylor Shops, Trees, Pucca, Semi-pucca and Tin shed Varieties Shops and Residents, Electric Pole;
		√	Tamim Beding Store, Shotota Electric, Ma Homeo Hall, Al Faruk Physiotherapy Center, Pucca, Semi-pucca and Tin shed Varieties Shops and Residents,
200-300	√		Pucca, Semi-pucca and Tin shed Varieties Shops and Residents, Electric Pole
		√	Sahjalal Physiotherapy Center, Boundary Wall, Pucca, Semi-pucca and Tin shed Varieties Shops and Residents, Brick Drain
300-400	√		Shejuti Beauty Parlor, Gan Toto, Chotpoti Dokan, Modern Library and Stationary, Apurbo Hair Jents Parlor,
		√	Bow Bazar, Pucca, Semi-pucca and Tin shed Varieties Shops and Residents,, Stationary Shops, Electric Pole, Brick Drain
400-500	√		Savar Laboratory School, Boundary Wall, Baitul Mamur Jame Mosque, Zahid Metal Workshop
		√	Dia Library, Salon, Marzia Tailors, Shahin Tailors, Maer Doa Fassion, Brick Drain
500-600	√		Pucca, Semi-pucca and Tin shed Varieties Shops and Residents, Electric Pole;

			Pucca, Semi-pucca and Tin shed Varieties Shops and Residents, Under Constructed Building,
600-700	√		Rong Berong Fassion, Brick Drain, Pucca, Semi-pucca and Tin shed Varieties Shops and Residents,
		√	Varieties Shops, Pucca, Semi-pucca and Tin shed Varieties Shops and Residents,
700-800	√		Pucca, Semi-pucca and Tin shed Residents, Icon School and College, Boundary Wall, Open Space, Trees,
		√	Earthen and Brick Drain, Ward Office, Pucca, Semi-pucca and Tin shed Residents,
800-900	√		Pucca, Semi-pucca and Tin shed Residents, Trees,
		√	Brick Drain, Ward Office, Pucca, Semi-pucca and Tin shed Residents,
900-1000	√		Boundary wall, Trees, , Pucca, Semi-pucca and Tin shed Residents, Stationary Shops, Electric Pole
		√	Pucca, Semi-pucca and Tin shed Residents, Stationary Shops, Electric Pole, Stationary Shop,
1000-1100	√		Pucca, Semi-pucca and Tin shed Residents, Stationary Shops, Electric Pole, RCC Drain,
		√	Pucca, Semi-pucca and Tin shed Residents, Stationary Shops, Electric Pole, Boundary Wall,
1100-1190	√		Boundary Wall, Pucca, Semi-pucca and Tin shed Residents, Stationary Shops,
		√	Stationary Shops, Pucca, Semi-pucca and Tin shed Residents, Stationary Shops, Electric Pole
Link: 0m to 375m.			
0-100	√		Raza lak Butik, Miyabi Fashion, Pucca, Semi pucca and Tin Shed Residents, Electric Pole, Trees
		√	Engineering Auto Bike Servicing Center, Pucca, Semi pucca and Tin Shed Residents, Electric Pole, Trees
100-200	√		Assets School, Pucca, Semi pucca and Tin Shed Residents, Electric Pole, Trees, Brick Drain
		√	Pucca, Semi pucca and Tin Shed Residents, Electric Pole, Trees
200-300	√		Tress, Pucca, Semi pucca and Tin Shed Residents, Brick Drain, Boundary Wall,
		√	Boundary Wall, Electric Pole, Tress, Pucca, Semi pucca and Tin Shed Residents, Brick Drain
300-375	√		Pucca, Semi pucca and Tin Shed Residents, Brick Drain
		√	Stationary Shops, Pucca, Semi pucca and Tin Shed Residents, Brick Drain

Table 3-2(b) Major Environmental and Infrastructural Features from Habib Tower to Savar College (Effective Length-1235m)

Chainage (m)	Right	Left	Key Environmental and Infrastructural Features

0-100	√		Boundary Wall, Garbage Storage Place, Electric Pole, Trees, Pucca, Semi-pucca and Tin shed Structure, Electric Pole
		√	Tin shed Godwon, Boundary Wall, Pucca, Semi-pucca and Tin shed Residential Structure, Electric Pole, Stationary Shops
100-200	√		Stationary Shops, Pharmacy, Pucca and Tin Shed Houses, Boundary wall, Trees,
		√	Stationary Shops, Pucca and Tin Shed Houses, Boundary wall, Trees,
200-300	√		Bismillah General Store, Sristy Shonchoy and Rindan Somite, Pucca and Tin Shed Houses, Boundary wall, Trees,
		√	Pucca, Semi-pucca and Tin Shed Houses, Boundary wall, Trees,
300-400	√		Pucca, Semi-pucca and Tin Shed Houses, Boundary wall, Trees,
		√	Pucca, Semi-pucca and Tin Shed Houses, Boundary wall, Trees,
400-500	√		Tailors Laundry, Pucca, Semi-pucca and Tin Shed Houses, Boundary wall, Trees,
		√	Antor Telicom, Stationary Shop, Pucca, Semi-pucca and Tin Shed Houses, Boundary wall,
500-600	√		Darul Olum Tahfizul Quran Madrasha, Doctor Chamber, Pucca, Semi-pucca and Tin Shed Houses, Boundary wall,
		√	Pucca, Semi-pucca and Tin Shed Houses, Boundary wall, Stationary Shops
600-700	√		Modern School and College, Notabani School and College, Boundary wall, Pucca, Semi-pucca and Tin Shed Houses
		√	Varieties Shops, Pucca, Semi-pucca and Tin Shed Houses, Boundary Wall
700-800	√		SS Enterprise, Pucca, Semi-pucca and Tin Shed Houses, Boundary Wall
		√	Furniture Shops, Pucca, Semi-pucca and Tin Shed Houses, Boundary Wall, Varieties Shops
800-900	√		Tangail Cadet Academy, Hashem Cha Store, Varieties Shops, Pucca, Semipucca and Tin shed Resident, Trees,
		√	Rohim Electric, Molla Enterprise, BR Photocopy and Stationary, Asad Automatic Dry Clearer, Pucca, Semi-pucca and Tin Shed Houses, Boundary Wall,
900-1000	√		Parlur Furniture, Chapra Mosque, Varieties Shops, Boundary Wall, Electric Pole, Rafia Pharmacy,
		√	Mukul Rafia Pharmacy, Heven Dol Beauti Parlor, Mimi Omi Departmental Store, Hriodoy Store,
1000-1100	√		Nazma Jewelry, Bonik Concept, Mirpur Tailors, Ma Hotel, Pucca, Semipucca Houses, Boundary Wall,
		√	Golap Gosto Bitan, Varieties Shops, Mosque, Pucca and Semipucca Houses, Jamalpur Tailors and Fabrics,
1100-1200	√		Brick Drain, Boundary Wall, Rana Shop, Pucca and Semipucca Houses, Electric Pole
		√	Pucca and Semipucca Houses, Electric Pole, Boundary Wall, Stationary Shops

1200-1235	√		Savar College, Boundary Wall, Semipucca and Pucca Resident, Trees, Brick Wall
		√	Community Center , Trees, Pucca House, Electric Pole

Table 3-3(c): Major Environmental and Infrastructural Features from GYM Moar to Dokkhinpara Mondir (Effective Length-700m).

Chainage (m)	Right	Left	Key Environmental and Infrastructural Features
0-100	√		Under Constructed, Boundary Wall, Varieties Shops, Stationary Shops, Semipucca and Tin shed Residents,
		√	AKZ Photocopy, Varieties Shops, Boundary Wall, Semipucca and Pucca Residents, Planted Trees,
100-200	√		Bijoy Enterprise, Rowson Library, Boundary Wall, Pucca, Semipucca and Tin Shed Residents, Trees
		√	Aisha Library, Boundary Wall , Pucca and Semipucca, Trees, Mosque,
200-300	√		Scholars Arina School, Boundary Wall , New Momotaz Bedding Store, Pucca, Semipucca and Tin Shed , Rezia Library
		√	Pucca, Semipucca and Tin Shed Residents, Trees, Boundary Wall, Keya Garments, Stationary Wall, Photocopy Shops, Anutosh Shop, Studio, Childfare Academy
300-400	√		Boundary Wall, Pucca, Semipucca and Tin Shed Residents, Trees, Brick Drain,
		√	Savar Uccha Balika Bidaloy, Nobin Nidhi Store, Pucca, Semipucca and Tin Shed Residents, Trees, Boundary Wall, Temple
400-500	√		Al-amin Library, Shotojit Sha, Semipucca and Tin Shed Residents, Trees, Boundary Wall, Temple, Brick Drain
		√	Savar Manik Chandra Govt. Amenity Medical and Lab., Primary School, Pucca, Semipucca and Tin Shed Residents, Boundary Wall
500-600	√		Pucca, Semipucca and Tin Shed Residents, Boundary Wall, Trees
		√	Temple, Pucca, Semipucca and Tin Shed Residents, Boundary Wall, Trees
600-700	√		Sumon Bitan, Temple, Pucca, Semipucca and Tin Shed Residents, Boundary Wall, Trees,
		√	Laundry, Under Constructed, Shops, Pucca, Semipucca and Tin Shed Residents, Boundary Wall, Trees

Table 3-4(e): Major Environmental and Infrastructural Features from Rashid House to Girls School (Effective Length-25om).

Chainage (m)	Right	Left	Key Environmental and Infrastructural Features
0-100	√		Boundary Wall, Warisha Confectionary, Pucca and Semipucca Structure, Electric Pole, Brick Drain, Trees

		√	Pucca and Semipucca Residents, Boundary Wall
100-200	√		Pucca and Semipucca Structure, Electric Pole, Biswas Coaching Center, Nurani Madrasa, Kindergarten
		√	Boundary Wall, Pucca and Semipucca Structure, Electric Pole, Brick Drain, Trees
200-250	√		Pucca and Semipucca Structure, Electric Pole, Brick Drain,
		√	Pucca and Semipucca Structure, Electric Pole, Brick Drain,

Table 3-5(f): Major Environmental and Infrastructural Features from Ofaz Uddin Spining Mills to Karnapara Khal (Effective Length-350m).

Chainage (m)	Right	Left	Key Environmental and Infrastructural Features
0-100	√		Friends Automatic Dry Cleaners, Bondhon Medical Hall, Khan Electronic, Roman General Store, Mayer Doa Export, Pucca and Semipucca Commercial and Industrial Building, Electric Pole
		√	Ofaz Uddin Spinning Mill, Boundary Wall, Pucca and Semipucca Residents
100-200	√		Bijoy Tailors and Fabrics, Al-amin Tradeing, Poli Garments, DBBL ATM, Boundary Wall , Pucca and Semipucca Residential Building, Trees, Bismillah Pharmacy
		√	Pucca and Semipucca Residential Building, Boundary Wall, Tuli Shorno Shilpaloy, Nibin Enterprise, Trees
200-300	√		Trees, Varieties Shops, Al Insaf Textile Mill, Boundary wall, Electric Pole, Varieties Shops
		√	Pucca and Semipucca Commercial and Industrial Building, Electric Pole, Belkichi Neting and Dyeing
300-350	√		Denitex Textile Ltd, Boundary Wall, Electric Pole
		√	Denitex Net and Dyeing Unit, Boundary Wall

Table 3-6 (g): Major Environmental and Infrastructural Features from Dagormora Mosque to Dhaka Aricha road (Effective Length-800m)

Chainage (m)	Right	Left	Key Environmental and Infrastructural Features
0-100	√		Varieties shops, Trees, Boundary Wall, Electric Pole, Pucca , Semipucca and Tin Shed Residents,
		√	Varieties shops, Boundary Wall, Pucca and Semipucca Residents,
100-200	√		Boundary Wall, Pucca and Semipucca Residents,
		√	Boundary Wall, Pucca and Semipucca Residents,
200-300	√		Dagormora Mosque, Pucca, Semipucca Residents, Trees, Earthen Drain
		√	Stationary Shop, Boundary Wall, Pucca and Semipucca Residents,
300-400	√		Pucca and Semipucca Residents, Boundary Wall, Electric Pole

		√	Pucca, Semipucca Residents, Trees, Boundary Wall, Electric Pole
400-500	√		Mosque, Boundary Wall, Pucca and Semipucca Residents,
		√	Boundary Wall, Pucca and Semipucca Residents,
500-600	√		Vaivai Store, MZ Engineering Work, Rafiq Departmental Store, Pucca and Semipucca Residents
		√	Diba Beuti Parlor, Pucca and Semipucca Residents Fulki Office, Usha Tailors and Fabric,
600-700	√		Earthen Drain, Boundary Wall, Pucca and Semipucca Residents, Stationary Shops
		√	Stationary Shops, Boundary Wall, Open space, Planted Trees in the Homestead Area, Pucca and Semipucca Residents
700-800	√		M Enterprise, Cholotika Metal Engineering, Khan Pharmacy, Earthen Drain, Boundary Wall, Pucca and Semipucca Residents
		√	Open space, Planted Trees in the Homestead Area, Pucca and Semipucca Residents

4 BASELINE ANALYSIS OF THE ENVIRONMENTAL CONDITION

4.1 General Consideration

This section includes the existing environmental baseline status of subproject study area, covering both the natural and social environments. The analysis was completed through the use of a combination of secondary data sources in addition to extensive on ground reconnaissance and baseline studies to establish an understanding of the environmental and socio-economic baseline of the subproject area. The likely impacts on the environment based on the actual and foreseeable events/project activities. Data for this chapter were collected from:

- Secondary Sources: This included data from literature reviews, maps and monitoring reports;
- Primary Sources: This included gathering information from field surveys, laboratory analysis and public consultations in the subproject area.

The baseline condition of environmental quality in the locality of subproject site serves as the basis for identification, prediction and evaluation of impacts. The baseline environmental quality is assessed through field studies within the influence zone for various components of the environment like air, noise, water and socio-economic etc. Data was collected from secondary sources for the macro-environmental setting like climate (temperature, rainfall and humidity), physiography, geology etc. Firsthand information have been collected to record the micro-environmental features within and adjacent to the subproject area. Collection of primary information includes extrapolating environmental features on proposed subproject design, location and measurement of socio-cultural features adjoining proposed subproject area. Ambient noise and water quality samples were collected in terms of environment quality to prepare a baseline database. Consultation was another source of information to explain local environmental conditions, impacts and suggestions etc. The following section describes the baseline environment into four broad categories:

4.1.1 Physical environment

4.1.1.1 *Geology, topography and soils*

The Savar Pourashava area is flat and poorly drained and its elevation is 10.00 meters above mean sea level and the area is nearly slope from east to west. Grey floodplain soils are somewhat porous allowing for some seepage of surface water into the soil, but in general this area is occasionally suffers by seasonal flooding. Channelized drainage covers most of the land, in which slowly draining streams will transport surface runoff to the local river. Conversely, those rivers are part of a regional network that, once flooded, will cause flooding locally and prevent drainage. According to one source, Savar is one of the seasonal rarely flooding areas of Bangladesh due to over flow from the nearby river Bangshi. Non-calcareous Dark Grey & Grey Floodplain Soils: They have a cambic B-horizon, no calcareous dark grey topsoil and subsoil. They occur extensively on the Old Brahmaputra and old Meghna estuarine floodplain. Silt loam and silty clay loam are predominant on the Meghna estuarine floodplain and in the Tista meander floodplain, whereas silty clays and heavy clays are extensive on the Old Brahmaputra floodplain. The majority of these soils are Eutric Gleysols.

4.1.1.2 *Climate and meteorology*

In Savar, the climate is warm and temperate. There is significant rainfall throughout the year in Savar. Even the driest month still has a lot of rainfall. The Köppen-Geiger climate classification is Cfa. The average temperature in Savar is 14.3 °C. The average annual rainfall is 950 mm. With an average of 23.3 °C, July is the warmest month. In January, the average temperature is 5.9 °C. It is the lowest average temperature of the whole year. The precipitation varies 81 mm between the driest month and the wettest month. The average temperatures vary during the year by 17.4 °C. Figure 4-2 indicate the subproject location on the climate map. Average annual climate data of the Savar Pourashava are shown in table 4-1.

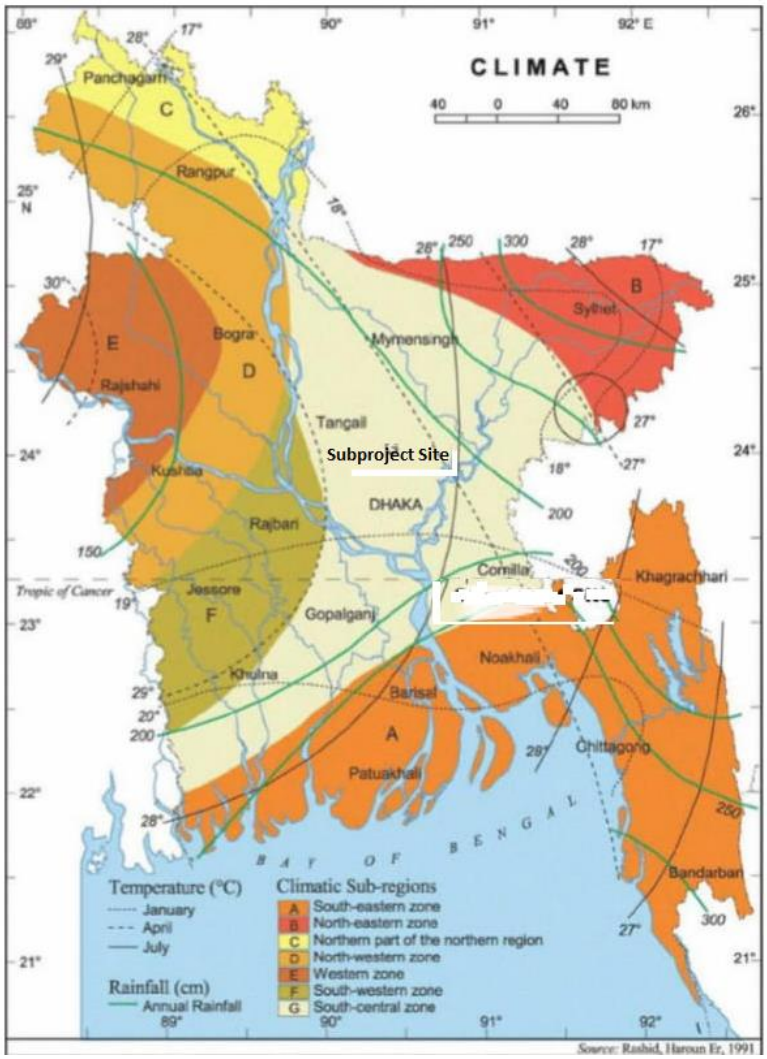

Figure 4.2: Climatic Zones of Bangladesh

Table 4-1: Average Annual Climate Data of the Savar Pourashava

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	5.9	6.7	9.3	12.5	16.8	20.4	23.3	23.2	19.7	15.6	10.6	7.6
Min. Temperature (°C)	2	2.7	4.8	7.9	11.9	15.2	17.5	17.3	14.3	10.9	6.5	3.8
Max. Temperature (°C)	9.9	10.7	13.9	17.2	21.7	25.7	29.1	29.1	25.2	20.3	14.7	11.4
Avg. Temperature (°F)	42.6	44.1	48.7	54.5	62.2	68.7	73.9	73.8	67.5	60.1	51.1	45.7
Min. Temperature (°F)	35.6	36.9	40.6	46.2	53.4	59.4	63.5	63.1	57.7	51.6	43.7	38.8
Max. Temperature (°F)	49.8	51.3	57.0	63.0	71.1	78.3	84.4	84.4	77.4	68.5	58.5	52.5
Precipitation / Rainfall (mm)	88	70	71	64	62	55	45	57	87	118	126	1

4.1.1.3 *Hydrology (surface water, ground water, and rainwater)*

There are two main river channels that drain out the storm and other water generated from households and industrial activities: the Dhaleswari River flows from north to south along a channel that is located west of Savar Municipality, and the northern floodplains of the Buri Ganga bound the area in the east[4]. None of these rivers are close to the subproject area. However, in the subproject are there are low lands, ponds and Khals (Kornapara Khal, Oicha Nuabda Khal, Arapara Khal) which are connected with these river. During site visit, it is observed that water bodies (ponds, low land and khans) are gradually filling up to build up residential accommodation in Savar Pourashava area. Reason is to cope up with the rapid urbanization of the Savar area.

Groundwater is abundant in Bangladesh. Water tables are generally shallow and aquifers are productive. The water table at Savar Upazilla is shallow; however the main aquifer providing water supply is found at a depth of greater than 50 m. Arsenic contamination is generally not present in the subproject area[4].

A lots of textile industries are present in the Pourashava area. However, only Ofaz Uddin Spining Mill road is the industrial area under this subproject. They are disposing there industrial effluent into the nearby khal through drain which is finally meet with the connected river of respective khal. In addition to the point sources, the discharge from non-point sources include those from engine boats, shipping (oil and grease) and run off from agricultural activities containing pesticides and chemical fertilizer residues are also drained into the khal and river. Resulting, the water quality of surface water bodies (Kornapara Khal, Oicha Nuabda Khal and Arapara Khal) of subproject area is badly degraded.

4.1.1.4 *Flooding, water logging, and drainage pattern*

As per flood zoning map of Bangladesh (shown in Figure 4-3), this area is considered as a flood free zone. Inundation occurs in some parts of the Pourashava due to localized storm that is affecting the drainage system of the Pourashava and creating a worse environment for the commercial and residents living in those areas. Water logging, drainage congestion and lack of proper outfall for the existing drains are the main problems. Kornapara Khal, Oicha Nuabda Khal and Arapara Khal flowing through the Pourashava are supposed to serve the purpose of primary drains. But due to encroachments and illegal filing it is not possible to connect most of the drains with the Bangshi River. Moreover, unplanned substandard drainage system in term of low discharge capacity and durability. Additionally, absence of proper initiative for cleaning and maintenance of existing drainage system. The other likely causes for water logging in Savar are the closing of road culverts by unplanned construction works in front of them or insufficient section of the culverts. Some areas of the Pourashava are subject to water logging.

[4] Master Plan, 2013, Savar Pourashava, Dhaka

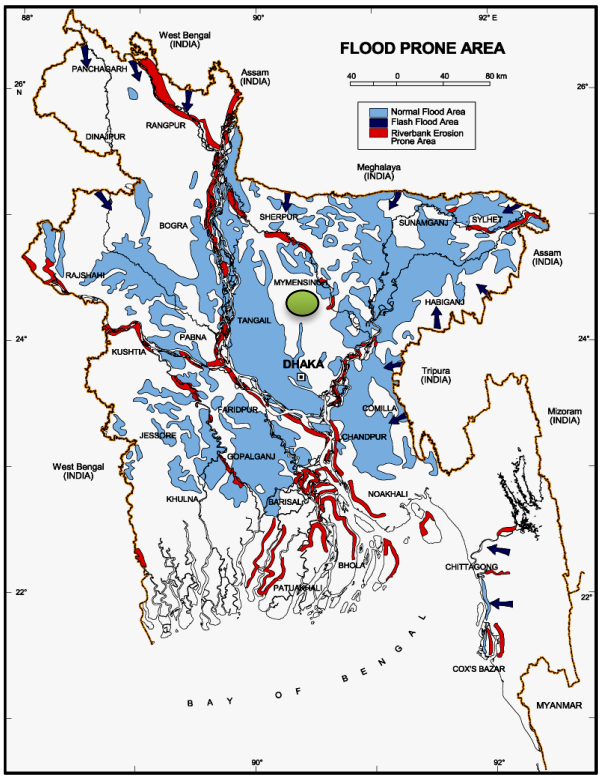

Figure 4-1: Subproject Site Location (Green Circle) on Flood Zone Map of Bangladesh

4.1.1.5 Air quality and dust

Generally, within Bangladesh there are two major sources of air pollution: industrial emissions and vehicular emissions. Since there is number of heavy industry in and around the subproject area and heavy vehicle usage is normal phenomena, density of population is high rather than any other town in Bangladesh due to the workers of the industries in the surrounding area are living around the area, air quality of the area is moderately deteriorated. Nevertheless, the main sources of air pollution are non-point sources such as open burning and block smoke emission from using of vehicles. In addition, during construction period use of subproject vehicles and construction equipment may degrade the air quality. However, proper implementation of mitigation measure which are addressed in the EMP is good enough to control the expected air pollution to be raised from construction activities. There are currently no air quality monitoring stations are in operation within the Pourashava limit. Ambient air quality measurements are essential to provide a description of the existing conditions or the baseline against which changes can be measured and to assist in the determination of potential impacts of the proposed subproject. Hence, baseline air quality will be measured by the subproject contractors prior to commencement of work. Following Table shows the Bangladesh National Ambient Air Quality Standard comparing the WHO Guideline standard.

Parameter	Environmental Conservation Rules,1997				WHO
	microgram/m^3				
	Industrial	Commercial and Mix use	Residential and Rural area	Sensitive area	
SPM	500	400	200	100	-
PM 2.5	65				10
PM10	150				20
SO_2	120	110	80	30	20
NO_2	100	100	80	30	40
Pb	0.5				

4.1.1.6 Noise level

Subproject components are in the built-up part of Savar Pourashava, which mainly buildup with residential and commercial activities. The volume of traffic that passes through these sections is not significant and traffic jams are not frequent. However vehicular movement can be considered as major cause of noise pollution especially particular area adjacent to the main road, near bazar area and industrial area. In addition to noise generated by the vehicle, noise also generated by the existing factories and industries in nearby the sub-project area Furthermore, sophisticated machineries will be used at construction period which will produce little significant noise. But it would be temporary and site specific. Even, if proper measure are taken it would be within tolerable limit. Noise level has been monitored at the various locations of the subproject sites during day time of 7 July 2018. The results show that time weighted average value of the noise monitored at the subproject area mostly exceeded the standard fixed for the respective areas. Results of the noise level monitored along with details of the measurement locations have been showed in Table 4.3.

Table 4-2: Ambient Noise Quality Analysis

Noise level measurement locations	**GPS Co-ordinate**	**Day-time Noise Level**			
		Measurement Time	**Equivalent Noise Level, Leq (dB)**	**Max (dB)**	**Min (dB)**
Savar Laboratory College	23°50’41’’ N 90°15’04’’ E	10:20 AM	74.68	84.5	65.3
Baitul Mamur Jame Masjid	23°50’40’’ N 90°15’08’’ E	10:35 AM	78.29	90.3	62.3
Mamtaz Cottage (near drain outfall)	23°50’37’’ N 90°15’14’’ E	11:45 AM	73.66	81	50
H/O Engg. Rashid	23°50’25’’ N 90°15’09’’ E	12:05 PM	80.18	94.1	64.4

Bank Colony Girls School	23°50'32'' N 90°15'07'' E	12:10 PM	72.58	86.1	62
Ulail Bazar	23°49'31'' N 90°15'25'' E	12:45 PM	81.61	94.5	78
Savar Residential Model school	23°51'09'' N 90°14'59'' E	3:15 PM	76.16	83.5	60.4

		Bangladesh (DoE) Standard
Zone	Max	Min
Industrial	75	70
Commercial	70	60
Mixed Area	60	50
Residential Area	55	45
		World Bank Standard
Industrial	70	70
Commercial, Residential, Educational	55	45

4.1.2 Biological Environment

4.1.2.1 *Flora and fauna*

Flora

Savar Pourashava partly belongs to the low lying area and partly belonging to the great alluvial plain formed under the influence of the Dhaleshwari and Bangshi River is very rich in respect of varieties of flora and fauna. In the sub-project influence area (SPIA), the dominant floral types are the Kochuripana (Water hyacinth), Chechra (Schenoplectus articulatus), Kolmi (Ipomoea sp), Tamarind (Tamarindus indica), Jackfruits (Artocarpus heterophyllus), Am (Mangifera indica). A sizeable number of fruit and timber trees with economic value have been observed in the subproject homestead area. The fruit trees include jackfruit, mangoes, litchi, banana, coconut, blackberry etc. and timber trees include mehegoni, neem, rain tree, koroi etc. Considerable number of trees and bushes in the SPIA site provide habitat for birds and other animals. The composition of plant species includes low growing grasses, trees, herbs and shrubs. From filed visit it is revealed that, predominant species are those of cultivated and natural grown, vegetables and trees. A detailed list of terrestrial floral species found in the subproject area is shown in following table

Name of Trees	Scientific Name	Name of Trees	Scientific Name
Mango	*Mangifera indica*	Guava	Psidium guajava
Kodbel	*Feronia limonia*	Dumor	Ficushispida
Sajina	*Moringa oleifera*	Akashmoni	*Acacia auriculiformis*
Atafal	*Annona reticulate*	Rain Tree	*Samanea saman*
Sobeda	*Manilkara sapota*	Shimul	*Bombax ceiba*
Date Palm	Phoenix	Supari	*Areca catechu*

Lichi	*Lichi chinensis*	Papaya	*Carica Papaya*
Bel	*Aegle marmelos*	Banana	*Musa Sapientum*
Shishu	Dalbergia sisoo	Bakul	*Mimosas eleng*
Jackfruit	*Artocarpus heterophyllus*	Jaw	*Casuarina littorea*
Mahogany	*Swietenia macrophylla*	Boroi	*Zizyphusm auritiana*
Neem	*Azadirachta indica*	Jambura	*Citrus grandis*
Babla	*A. nilotica*	Kamranga	*Averrhoa carambola*
Jarul	*Lagerstroemia speciosa*	*Eucalyptus*	*Eucalyptus teritocornis*
Tetul	*Tamarindus indica*		

Fauna

Lots of common local birds- such as Crow, Doel, Shalik, Hawk, Crow, Sparrow, Bulbuli, Cuckoos, Tia, Parrot, Chil and Dove etc. were found during the site visit. Fish diversity in rivers and streams is decreasing due to heavy pollution in the aquatic bodies from domestic and industrial effluent. Snakes of various species are reported, through having a decreasing trend. Field mouse and shrew are commonly available.

4.1.3 SOCIO-ECONOMIC ENVIRONMENT

4.1.3.1 *Land use*

Savar Pourashava is mixed land use pattern of residential, commercial, industrial, agricultural and institutional land use, open space, water bodies and road network. The Pourashava area consist of 9 wards and their land use is totally different from each other. The total area of Savar Pourashava is 14.08 sq.km of which 54.85% is residential, 4.56% is commercial, 2.08% industrial, 24.55% is agricultural, 2.93% is institutional, 0.67% road network and others is 10.36% e.g. open space and water bodies[5].

However, the subproject sites are located mostly in the core area of the semi urban and urban area of the Pourashava. The built up infrastructure includes office buildings, personal homes, supermarkets, local bazar, spinning malls, dyeing factory, local administrative offices, NGO Offices, hospitals, clinics, etc.

4.1.3.2 *Area and population*

Savar Pourashava occupies an area of 14.08 km^2 with population of 296,851. It is consist of 9 wards and density of population per sq.km is 7435[6].This subproject goes through the Ward number 2,4,5,6 & 7. As per information by the municipality, considering the ward population about 95,000 people will benefit directly and many others indirectly.

4.1.3.3 *Education*

Savar Pourashava has an average literacy rate of Average literacy 74.9 %, male 78.2%, female 71.1 %.)[7]. There are a significant amount government and private schools and colleges present in the city. Adjacent to the Savar Municipality reputed public university Jahangir Nagor is located. In addition to, this public university there is one well known private medical college

[5] Website, savarmunicipality.gov.bd/, Savar Pourashava, Dhaka
[6] BBS, 2011, Bangladesh Brue of Statistics

(Enam Medical College) and private university Gonobishobidaloy is also adjacent to the Savar Municipality. Furthermore, students of the Savar municipality has great opportunities to take all of the educational facilities from Dhaka city as it is very close to the Dhaka city and it is also a Upazilla under Dhaka districts.

4.1.3.4 *Tribal communities*

This is no significant tribal population present in the Municipality. So, there is no expectation of affecting tribal communities through the sub-project.

4.1.3.5 *Archeological/Historical places*

Within the influence area of the subproject, no real historical sites identified. Religious center (such as Mosques and Temple), community centers, educational institutions, and bazars bring cultural value for the community people.

4.1.3.6 *Land acquisition and resettlement*

There is no question of land acquisition because all of the proposed location is solely owned by the municipality and it is goes within the existing right way of the Pourashava.

4.1.3.7 *Local economies such as employment, livelihood*

The subproject area is inhabited by the people of mixed occupations. Though it is not site specific but the overall generic picture of the employment in the Pourashava area are: Agriculture 20.46%, non-agricultural laborer 3.09%, industry 2.82%, commerce 20.55%, transport and communication 5.75%, service 28.74%, construction 2.84%, religious service 0.18%, rent and remittance 2.67% and others 12.90%[8].

4.1.3.8 *Housing pattern and ownership*

In the subproject area maximum people live on their own houses but a few in rented houses. However, this rented people are mostly outsider people of the Savar Pourashava who are living in the Savar area for the employment purpose. Indeed, these particular people's area garments workers. Additionally, as more urbanization more households will reside in the rented house in future.

4.1.3.9 *Solid waste management*

The daily waste generation of the Savar Municipality is 51,016 kg per day on very rough per capita basis considering 0.40 kg/capita/day form industry and households[9]. However, there is no integrated solid waste management system of the Savar Pourashava. Hence, proper management of this solid waste is now one of the prime concerns for Savar municipality. Savar municipal authority has a small number of trucks (5 trucks) and waste collecting vans (50 vans) for collecting more than 50% of generated wastes in municipality and dispose in to the

[8] Master Plan, 2013, Savar Pourashava, Dhaka.
[9] Web site: www.researchgate.net/figure/Waste-disposal-sites-at-Savar Municipality_fig4_235997047, A Case Study on Savar Municipality, Solid Waste Management In Sub-Urban Area:

designated dumpsite at Kamalpur beside the krishibid Khamar. Remaining part of generated waste take place on the road side and lowland area which is spread bad smelling from the leachates water thereby surrounding environment has been degrading for long time.

4.1.3.10 *Sanitation facilities*

Sanitation scenario of Savar Pourashava is satisfactory. Most of the household (54%) has either single pit or twin pit latrine. As most of the household have minimal income level so they can afford pit latrine facilities. There are 45% household who have modern sanitation facilities means septic tank with flash. There are also small amount of household who have not hygienic sanitation facilities. As per CIP, currently 200 numbers of single pit latrine, 466 numbers of two pit latrine and 4411 numbers of septic tank with flash is reported[10].

[10] Capital Investment Plan (CIP), 2018, Savar Municipality, Savar, Dhaka.

5 ENVIRONMENTAL SCREENING

Environmental Screening (ES) for the subproject have been conducted with the purpose of fulfilling the requirements of GOB and WB. ES ensures that environmental issues are properly identified in terms of extent of the impacts. Environmental Screening Checklist, as adopted in Appendix C of the Environmental Management Framework of the MGSP, was administered for identifying the impacts and their extents. The screening data and information for the **BC Road and RCC Drain** have 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	9
➢ Clearing of vegetation	Significant □	Moderate □	Minor □√		
➢ Potential impact on species of Aquatic (i.e., water) environment	significant □	Moderate □	Minor □ √		

The subproject sites are developed land of Pourashava and having comprising of mixed land use pattern of residential, commercial and industrial activities. However, due to site clearing work total nine numbers of trees will be cut down at GYM Moar Road (6), Engr. Rashid House Road (1) and at Ofaz Uddin Road (2) respectively. Cut down trees are: Mango, Mahogany, Coconut and Jarul. The trees to be cut down are small in size in term of length and diameter. Additionally, cut down trees does not bring the religious and cultural value. In the different section of the Habib Tower Road and Dagormora Mosque Road few vegetation clearing work is needed. Except road side low land there are no surface water bodies. Hence, except throwing of waste materials in to the road side low land there will have no adverse impact on the aquatic environment. Seeing the number of trees and quantity of vegetation clearing work overall ecological impact is minor.

(b) Physicochemical Impacts:

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

This subproject package made up of road and drain component with different seven location. There will have impact on the physicochemical parameter i.e. air and noise quality due to use of hydraulic excavator, mechanical compaction machine, concrete mixer machine, vibrator machine, and mobilization of the equipment, vehicles movement for the transportation of the materials. However, the potential impact on air and noise from these subproject activities is manageable because these impact are site specific and context of impact is limited. Moreover, the construction work will be performed section wise to minimize the impact. So, anticipated impact on noise and air is considered as moderate. Road side storage of excavated soil, generated construction like dismantling debris can disturb the adjacent to the subproject community by clogging the surface drainage system. Additionally these generated debris may also get worse condition for the road side water bodies if not properly collected and disposed. In addition, aesthetic landscape value and surrounding environment may be degraded from the improper collection and disposal of the generated wastes materials. Generally there will be no drainage congestion or water logging except road side storage of construction material because most of earth work will be performed at dry season. Even there will provision for pump to drain off the 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 □

Since the subproject area is busy and developed urban area. Therefore, the subproject activities will have likely impact on the traffic congestion due to restriction of the free movement of the motorized vehicles during construction phase. Hence, the construction work should be performed section wise with keeping provision for normal traffic operation. The local people can use the connecting roads. Hence, using of the connecting road will diversify the traffic volume. The pedestrians, cycle rider, biker can easily use the road at construction period. The medium to heavy motorized vehicles can use the alternative road during drain construction work. In addition, the Pourashava authority will inform local people to use connecting and other adjacent road during construction period to avoid any traffic congestion. In addition, the traffic signs and cautionary sign will be used to minimize traffic congestion and to control the traffic.

The proposed construction activities does not require use of heavy equipment and construction work will follow simple procedure with commonly used equipment. Hence, anticipated impact on health and safety is moderate. There are some educational institutes at Habib Tower Road and GYM Moar Road. So, construction work (drain) adjacent to the educational institutes may cause safety risks to the public especially for school going kids. Therefore, construction activities adjacent to the educational institutes should be performed within very short time considering safety issues/site fencing. There is no archaeological and historical site within the influence area. The subproject has positive impact by generating work opportunities for the local people.

2) Potential Environmental Impact during Operational Phase:

(d) Ecological Impacts:

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

At operation phases, there will be no likely impact on the ecology due to road construction work. On the other hand, as the drains are designed only for the storm water, there will not be any impact on the aquatic environment if the drains are to be used properly. However, dumping of solid wastes and discharge of household and industrial wastewater directly into the drains may create pollution in the aquatic environment of the outfall.

(e) Physicochemical Impacts:

- Potential air quality — Improvement □ No-improvement □ Deterioration □√
- 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 □ Minor improvement □√ Minor □

During operation phase, improved and widened road may increase traffic volume. This may degrade the air quality and noise level due to black smoke emission and un-due use of hydraulic horn from the vehicles. The new drain will minimize drainage congestion and water logging problem. The storm water to be discharged through the drain may degrade the water quality of the outfall if it carries pollutants from any sources. Pollution from solid waste will be improved by restricting the throwing of the household waste material in to the drain.

(f) Socio-economic Impacts:

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

After completion, these roads will improve the transportation facilities. By providing uniform pavement, it will also enhance traffic safety. New drain will improve drainage facilities and prevent the accumulation of the stagnant water on the road surface. This will prevent formation of muddy and slippery surface on the road. Consequently, it will enhance traffic safety.

3) Summary of the Possible Environmental Impacts of the Subproject:

The ecological impact due to the subproject implementation is minor. Though, it is limited; however, the possible disturbances of the aquatic environment due to the discharge of the waste water may have ecological impact. There will be temporary negative impacts on air and noise quality during construction. Solid wastes generated from the construction activities should be disposed in a designated dump site. Some earthwork will be involved; however, no agricultural productive soil will be used for the purpose. The inputs will be mainly at construction phase and limited within the subproject boundary. Moreover, mitigation measures will be taken according to the EMP for minimizing the air, dust, and noise pollution.

During operational phase, the waste water to be discharged may disturb the aquatic environment of the outfalls as the drains may carry pollutants and solid wastes especially plastics and polythene which can block the outfalls

The socio-economic component mainly includes health and safety and employment generation. Safety concern is an important issue during both the construction and operation phases. This subproject will have positive impacts in terms of the generation of the employment and business activities by supplying construction materials and equipment.

SPECIFIC IMPACT, MITIGATION AND ENHENCEMENT MEASURES

The impacts, which are likely to be arisen in the different phases of the subproject are identified in this section. In addition, evaluation of these impacts was done mentioning their origin and characteristics along with their probable mitigation/enhancing measures.

5.1 Impact Due to Subproject Location/ Preconstruction Phase

5.1.1 Disorder of Earth Surface

Cause of Impact

Since it is an improvement subproject, the existing damaged BC and HBB road will be replaced by new BC road on the existing place. So, widening of the road is not major issues, but to provide uniform road width, at few section of the different roads earth work need to be felled up. This land filling will be from its original level which will not disrupt the natural surface of earth and obstruct the natural drainage system of the area.

Mitigation Measure

The subproject intervention will not create any water logging and drainage problem as the Pourashava authority collects the soil to develop the area by carried sand from different places. Cross drainage works should be constructed to bypass the surface water and other discharges if required.

5.1.2 Construction of Labor Shed

Cause of Impact

The precise locations of construction camps for the proposed subproject will be decided by the contractor with the assistance of the Engineer of the Pourashava. During site visit, tentative one site office, one labor shed and one stack yard is recommended by Pourashava at vacant place near Vagolpur at ward no. 06. However, the siting of the camps may cause a number of issues such generation of sewage, sold waste. The people and the changes they bring can have impacts on the local communities and social structures. Most important aspects are:

pollution risk of soil and surface water due to sanitation of the labor camps and wastes from the camps

Mitigation Measures

To meet the workers basic needs labor shed will be constructed which will contains adequate ventilation facilities and standard living condition and it never be overcrowded. In addition, safe potable drinking water will be provided. Furthermore, contractor will construct two sanitary latrine considering 15 persons for one toilet at the labor shed (one for male and other for female).Proper health and safety of workers will be ensured through providing health and hygiene training to the workers by the Municipality and the contractor. Waste bins will be present at the labor shed, and the workers will be encouraged to dispose of all their garbage at the waste bins. All the waste will be collected daily and taken to the Municipality dump site at kalampur.

5.1.3 Ecological Impact Due to Felling of Trees and Clearing of Vegetation

Cause of Impact

During site visit it was counted that at different subproject sites total 9 numbers of planted and trees to be chopped down. Medium quantity vegetation clearing is also needed.

Mitigation Measures

45 nos. of trees will be planted to compensate the cut down trees (preferably local fruits, flowers, medicinal and ornamental trees- Mango, Jackfruit, Neem, Amloki, Horitoki, Sonalu, Palash, Krishnachura, Mahogany, kathbadam, at the one side of the Habib Tower Road anywhere suitable Pourashava owned places within the influence area of the subproject. Planting trees will enhance the ecological balance of the subproject area after their successful growth.

5.2 Impact at Construction Phase

5.2.1 Earth Work and Site Clearing Work for the Site Clearing

Cause of Impact

Each development project more or less requires site preparation. The preparation works for road and drain generally includes-cut and filling work, soil export or import work and demolition of the existing brick drain, damaged BC and HBB road. The mentioned activities will arise the following impact- noise, generation of dust, soil erosion, drainage congestion and safety concern.

Mitigation Measures

Cutting and filling operation should be kept minimum. During earth work, loss of top soil will be avoided. In addition, for backfilling work use of sand will be ensured. The subproject contractor should ensure construction of proper drainage facility. Regular water sprinkle should be ensured by the contractor to minimize elusive dust emission. Cover the exposed earth works with much fabric to minimize the dust. Moreover, proper care will be taken by the contractor during earth work and disposal work to avoid any undue disturbances to the nearby people. As a part of safe working procedures contractor should be ensured used of PPEs as per requirement. Undertaking construction work during dry seasons to minimize the water

congestion. The heavy equipment should be operated at day time. The generated waste from the dismantling work will be deposed regularly and quickly in to the designated dump site of Pourashava at Kalampur.

5.2.2 Pollution from the Construction Materials' Transportation and Storage

Cause of Impact

Lack of proper guideline for the construction material transportations, handling and storage may lead the occupational health and safety risk. On the contrary, dumping of the construction spoils, including accidental leakage of the oil, grease, and fuel in equipment yards is a significant hazard. These substances can be washed-out by the storm water and can be discharged in the surface water. Even the people to be engaged for the construction activities and local communities might endanger the physical and human habitats of the area.

Mitigation Measures

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 and to minimize any health risk. Fuels, lubricants, and other hazardous materials should store over raised platforms and not directly on the ground. Place storage areas for fuels and lubricants away from any drainage leading to water bodies. Maintain adequate moisture content of sand during transportation, compaction and handling. Carry the materials especially loose soil and sand with adequate cover. Contractor will responsible to avoid head loads for carrying soil, construction materials and construction equipment and disposal of the wastes at the designated dump site which is at Kalampur.

5.2.3 Sourcing, Extraction and Use of Construction Materials

Cause of Impact

Construction materials such as rough stone, ballast and bitumen required for construction of the roads and drain subproject will be obtained from quarries and bitumen dealers. Since considerable quantities of these materials will be required for construction of the roads and drains, though it is very limited, however the availability and sustainability of such resources at the extraction sites will be negatively affected, as they are not renewable in the short term. Beyond this, destruction of natural resource like use of trees for cooking purpose may create negative impact local environment.

Mitigation Measures

The contractor will source construction materials such as sand, ballast and hard core from registered quarry of Sylhet and local sand mining firms. Since, such firms are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated. Contractor will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the contractor shall consider reuse of construction materials and use of recycled materials. This will lead to reduction in the amount of raw materials extracted from natural resources as well as reducing impacts at the extraction sites. Contractor will avoid use of wood based cooking system and will ensure use of LPG gas in the cap site.

5.2.4 Air Quality and Dust

Cause of Impact

The air quality in the subproject area may slightly deteriorate for the time being during construction activities. The major construction activities from which air emission mostly dust emission may occur are; unpaved road width, transportation of construction materials (especially fine aggregate), Opening-up of cement bags and empting the cement in order to mix with other construction material; black smoke emission from the subproject vehicles and equipment's, handling of sand, stone/brick chips may contain loose dust particles. These activities will temporally disturb the nearby resident and associates construction worker by creating eye irritation, skin irritation, respiratory difficulties and difficulties of breathing. However, emissions are temporary and not expected to contribute significantly to the ambient air quality and will be within prescribed limits.

Mitigation Measures

Regular sprinkling of water to be done on open surface and dust grounds until paving is done. 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 and should be located far from the local residents. Contractor will responsible to ensure that all subproject vehicles and equipment are in good operating condition. Even periodically air quality test near subproject vehicles will be performed. The subproject management and contractor to enforce strictly use of personal protective as per requirement especially mask and proper clothing to minimize the skin irritation, respiratory difficulties and difficulties of breathing.

5.2.5 Noise and Vibration

Cause of Impact

The noise and vibration generated from different stationary (concrete mixture machine, vibrator, asphalt plant, road cutter and excavator etc.) and mobile sources (movement of the construction vehicles) during construction period may have adverse impacts on the existing acoustic environment. Prolonged exposure to such high noise might create disturbances, hearing difficulties, discomfort, loss of concentration, etc. among the workers, and nearby resident. However, anticipated impact is short term and site specific.

Mitigation Measures

Transportation of the construction materials and noisy construction work have to be carried during the scheduled times, and mainly during the day. Even transportation of construction materials have to be carried with scheduled time. Where applicable and possible exceptionally noisy machines to be fitted with noise abating gear such as mufflers for effective sound reduction. Providing suitable hearing protection to all workers exposed to noise levels where it is more than regulatory limit.

5.2.6 Water Quality

Cause of Impact

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 water bodies.

Mitigation Measure

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. In addition, construction waste will carefully remove and taken to the dump site near Kalampur (not in the water bodies or lowland), for which contractor will be responsible.

5.2.7 Drainage and Impact on Surface Water

Cause of Impact

The potential impacts on local hydrology are mainly those of altered patterns as a result of onside construction and earthwork activities. The proposed subproject will affect natural drainage, surface and ground water quality if not managed the construction works properly. There could be siltation of water system or drainage from uncovered piles of construction materials.

Mitigation Measure

To avoid the drainage problem, earthwork of the subproject will mostly cover in the dry season. Additionally surface drainage shall be controlled to divert surface runoff away from the construction area. Even at construction sites pumping provision will be ensured by the contractor. Stock piling of spoil soil shall be selected at a safe distance from the drainage system. Containment of sanitary waste from camp site should be adequately disposed off to avoid surface and ground water contamination.

5.2.8 Impact on Host Comminutes from out sides Worker

Cause of Impact

The differences in the cultures of workers (in case hiring is required) and local community may create some problems. Therefore, the unknown identity of the hired labor to the host communities has possibilities to create social crisis by involving with local politics, eve teasing or sexual abuse the campsite female worker or campsite nearby neighboring people may be affected.

Mitigation measures

The subproject proponent and his organization have practice of working with the workers of different cultures. It is recommended to aware of the out sides workers about the social & religious actability in the area so that they could maintain those when they will have touch with local community. Moreover, contractor will responsible to closely monitor the worker movement as they do not involve with social crisis in the subproject area.

5.2.9 Community Health and Safety

Cause of Impact

In the subproject sites at different locations adjacent to the drain alignment different types of establishment (School, residents and business center) is observed. During construction period, access into these establishment will impede. However it will be short term. Poor safety signage and lack of barriers at work site may create hazard to nearby existing establishment as well as community people.

Mitigation measures

Cautionary sign at all sites should be visible to public and construction work near sensitive area like educational institute, business center has to be done within short time with proper fencing and safety measure. Bamboo made temporary access towards the establishment shall be provide if required. Since, at GYM Moar road and Habib Tower road considerable amount of educational institute observed hence, to avoid any health hazard from the construction equipment on the local community people especially for the school going kids location of concrete mixture machine rod cutter and brick breaking machine, shall be located at least 100m away from the nearest community and educational institutes.

5.2.10 Occupational Health, Aesthetics and Safety

Cause of Impact

Construction workers are more likely to face occupational health hazards such as minor or major injuries due to lack of general safety requirements and precautions applicable while working at construction sites, and handling with machines and equipment, use of equipment and driving vehicles and so on. Poorly designed temporary labor camp and sanitation facilities may pose a health threat and nuisance to the workers. Uncontrolled vending of food and drinking water at the work site may also pose a risk with respect to the transmission of contagious diseases like Typhoid, Diarrhea, Malaria, and Dengue in particular. Moreover, construction workers will be required to handle hazardous materials such as cement, bitumen, chemicals, fuels, and so on which will increase health risks of the workers if personal protective equipment are not used.

Mitigation Measures

- Provision of proper training to all workers for handling the construction equipment;
- Provision of cautionary and guiding signage in local and English language indicating the hazard associated with the site;
- Provision of the adequate latrines and separate toilets for the women;
- Wastewater from the toilet should be disposed off in septic tanks and soak pits and; should not be allowed to accumulate at labor camp site or construction site ;
- Dustbins should be provided at labor camps for collection of waste and waste should be regularly disposed off;
- Temporary storm water drainage system should also be provided at camp site so as to drain the storm water and prevent accumulation of storm water at site and thus breeding of mosquitoes/flies will be minimized;
- Provision of personal protective equipment like safety jackets, helmets, gumboots, gloves, face mask, ear buds, goggles, safety shoes etc as per requirement and nature of job in which they are involved;
- Job rotation should be carried out for workers exposed to high noise and dust areas;
- Provision of First aid facility at the site and the labor camp;
- Labor camps should be located at neat and clean location with no water logging issues;

- Proper sanitation facility including toilets, bathing facility and washing facility should be provided at camp site for workers;
- Clean drinking water supply should be provided to labor;
- Brest feeding facility should be provided for kids if female workers are employed;
- Regular inspection for hygiene and safety in labor camps should be done;
- Construction debris should not be allowed to enter into aquaculture ponds and as well as any surface water bodies which located along the road;
- Entrance to any road/structure should not be blocked for construction material;
- 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)

5.2.11 Traffic Management

All of the subproject sites area busy area except Engr. Rashid House and Dagormora Mosque Road. Though these are the busy area of the Pourashava but motorize vehicles movement is not huge except Ofaz Uddin Road and Razlak Firm Road. However, there is adequate connecting road and alternative road for the all sites except Ofaz Uddin Road. Hence, Ofaz Uddin Road will have severe impact on traffic during construction phase. However, length of this road is only 330m. It will be completed within short time. In addition, to minimize the impact subproject activities will be performed section wise. The Pourashava will encourage local people for using of the connecting and diversion road which will diversify the traffic and will reduce the negative impact on the local traffic system.

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.
- At the points where traffic is to deviate from its normal path (whether on temporary diversion or part of the width of the carriageway), the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums, or a similar device to the directions of the vehicles.
- At night, the passage shall be delineated with lanterns or other suitable light source.

- For regulation of traffic, the flagmen shall be equipped with red and green flags especially near at intersection.
- For notification of construction activities, at least two signs shall be put up for each road, one close to the point of carriageway begins, and another will put on the end of the carriageway.

5.3 Impact on Operation and Maintenance

Cause of Impact

Once in operation the improved roadways may be responsible for an increase in noise and air emissions from increased vehicular traffic. There will be a tendency for increasing speed because of an improved driving surface, resulting possibilities of accidents. During operation phase, the throwing of waste material into the drain and silted up of outfall by various wastes may crates water stagnant in the drain and backflow of the drain.

Mitigation Measures

To control the probable accident beater traffic management need to be ensured. As a part of traffic management improved signage and speed barker near sensitive area need to be constructed. Establish a program of regular visual inspection of drain to identify problems early, before they become critical (breakage, plugging, etc.). Perform repairs on street drains promptly, and clear sediment and other material that could cause blockage. Limit entry of waste oil and grease to drains

6 ENVIRONMENTAL MANAGEMENTPLAN (EMP)

The Environmental Management Plan (hereinafter, the Plan or EMP) aims to ensure the compliance of all activities undertaken during the preconstruction, construction and the operation of this subproject with the environmental safeguard requirements of WB and the Government of Bangladesh. Furthermore, it aims at integrating the environmental components of the subproject with existing initiatives and programs in these fields. The plan consists of mitigation, monitoring and institutional measures to be taken during preconstruction, construction and operation to minimize adverse environmental impacts, offset them, or reduce them to acceptable levels.

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 personnel responsible for subproject implementation. It will also be made available to the public. The final assessment report will also be uploaded in the, Savar Pourashava website, BMDF website and the World Bank website after approval.

6.2 Grievance Redress Mechanism

The project-specific Grievance Redress Mechanism (GRM) will be established by the PIU of Savar 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 is 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.

BMDF 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 has been conducted by the PIU of Savar Pourashava and will be involved the APs and Grievance Redress Committee (GRC) headed by the Mayor/Panel Mayor of Savar Pourashava. With the facilitation of Consultant, the Mayor/Panel Mayor nominated the GRC members and included representative from the Government Agencies, local NGO, and Civil Society. The GRC has been formed and established at Savar Pourashava. The grievance box will be delivered to the Pourashava to receive complaints. The grievance response focal point will be available at Pourashava for instant response to an aggrieved person. The Focal Point of GRC committees will collect the written complaints or suggestions from the box, and produce them to the GRC for hearing and resolution. The members of the committee are:

1. Md. Nazrul Islam, Panel Mayor, Savar Municipality, Chairman of GRC
2. Md. Abbas Ali, Councilor, Savar Municipality, Member of GRC
3. Councilor, Respective Ward, Member of GRC
4. Reserved Councilor, Respective Ward, Member of GRC
5. Md. kaykobad, NGO Worker, Member of GRC
6. Shoriful Imam, Executive Engineer, Savar Pourashava, Member Secretary of GRC

6.3 Grievance Resolution Process

In case of grievances that are immediate and urgent in the opinion of the complainant, the contractor and PIU on-site personnel will provide the most easily accessible or first level of contact for quick resolution of grievances.

The phone number of the PIU official should be made available at the construction site signboards. The contractors and PIU safeguard focal person can immediately resolve on-site in consultation with each other, and will be required to do so within 7 days of receipt of a complaint/grievance.

All grievances that cannot be redressed within 7 days at site will be reviewed by the grievance redress cell (GRC) headed by Mayor of the Pourashava with support from PIU designated safeguard focal person. The PIU designated safeguard focal person will be responsible to see through the process of redressed of each grievance.

The PIU designated safeguard focal person will refer any unresolved or major issues to the PMU, BMDF. The PMU of BMDF in consultation with the MD of BMDF will resolve them within 30 days.

If the appellant is still not satisfied, he or she has the right to take the case to the public courts. Savar Pourashava should also 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 Savar Pourashava.

The number of grievances recorded and resolved and the outcomes will be disclosed in the PMU office, Pourashava office, and on the web, as well as reported in monitoring reports submitted to WB on a quarterly year basis.

6.4 Institutional Concern Person for Environmental Safeguard Compliance

The Pourashava Officials, especially engineer in charge will be responsible for supporting the construction supervision with the facilitation of BMDF. The civil works contractors will implement the environmental mitigation measures. The BMDF, with the help of Environmental Specialist will submit the monthly monitoring reports on Environmental Compliances to the World Bank

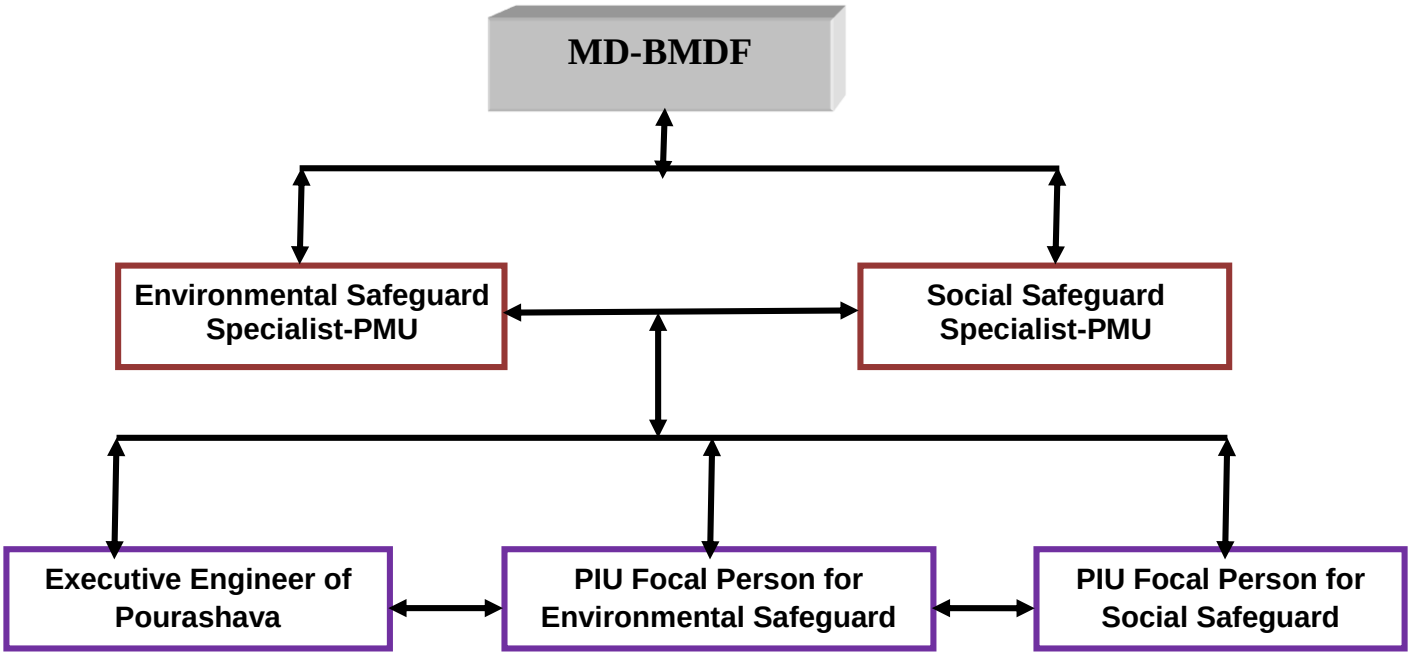

Figure 6-1: Environmental and Social Management Team (Tentative)

6.5 Capacity Building

A training program has been developed by the PMU of BMDF to build the capability of PIU of Savar Pourashava. In addition, the hired consultants of Savar Pourashava was also there. Under this training program PMU was organize an introductory course for the training of the Savar Pourashava officials, preparing them on: (i) Environmental Screening, (ii) EMP Implementation, including environmental monitoring requirements related to mitigation measures; and (iii) taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of the implementation. The contractor should be also included in the training program to enhance the Environmental awareness and orientation among the workers

6.6 **Environmental Management Action Plan**

The environmental management action plan has been outlined in ***Table 7.1 and Table 7.2.*** The mitigation measures as well as responsible parties to implement of the EMP are also incorporated in action plan.

Table 6-1: Anticipated Impacts during Construction and Corresponding Mitigation Measures with Monitoring guide line)

Activity/ Issues	Potential Impact	Proposed Mitigation &Enhancement Measure	Monitoring Method	Frequency of Monitoring	Responsible for Monitoring	
					Implement	Supervision
At Pre-construction stage						
Construction and operation of labor shed for the workers (Workforce and labor shed management)	Generation of sewage and solid waste may cause water/ environmental pollution/	• Ensure construction of the labor shed and stockyard at the designated place (Vacant Place at Vagolpur at ward no. 06.); • 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 the wastes) disposal at the dumping yard is located at the kalampur. • Ensure emptying and cleaning of the waste bins regularly; • Drum trucks are available in the Pourashava. Hence, drum truck should be used for transportation of the wastes; • Cleanliness of premises and workers living places and at the Labor Shed; • Arrangement of the proper ventilation and temperature at the Labor Shed; • Protection against dust by using masks and covering of the head and body; • Proper disposal of the wastes and effluents;	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF

	Health Hazard of Labor	• Conduct formal and unofficial discussion to increase awareness about hygiene practices among the workers; • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Ensure that all site personnel have a basic level of environmental awareness training. If necessary, the environmental management specialist and/or a translator shall be called to the sites to further explain aspects of environmental or social behavior that are unclear. • Comply with requirements of Government of Bangladesh Labor law of 2006 and all applicable laws and standards on worker's Health and Safety; • Provide construction workers and local people with basic information on infectious diseases including HIV/AIDS • Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal	Visual Observation	Regularly and As per requirement	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	Possible development of labor camp into permanent settlement	• Contractor to remove labor camp at the completion of contract.	Visual Observation	End of the Construction work	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	Outside labor force causing negative impact on health	• Ensure that contractor employ local work force to provide work opportunity to the local people and conduct formal	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava

	and social well-being of local people	and unofficial awareness program for the health and social well-being of the local people.				Secondarily by PMU of BMDF
At Construction Stage						
General construction works (Site Clearing, Earth work, Backfilling, fueling of subproject vehicles etc)	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.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	Community health and safety: work will impede the access into the establishment. Poor safety signage and lack of barriers at work site may create hazard to nearby existing establishment.	• Provide safety signage at all sites visible to public; • Location of concrete mixture machine and brick breaking machine, shall be located at least 100m away from the nearest community. • Use small mechanical excavators to attain faster trenching progress. • Construction work adjacent to the establishment has to be performed quick and within less time. • Ensure proper fencing and barrier. • Ensure use of bamboo made access to continue safely access in to establishment if required.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	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 soil and sand for transportation, compaction, bed preparation, backfilling and handling; • Ensure contractor sprinkle and cover stockpiles of loose materials (e.g., fine aggregates);	Visual Observation/Analytical	Regularly and Periodically	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF

	Traffic congestion, effect on traffic and pedestrian safety	• Ensure schedule deliveries of material/ equipment during off-peak hours; • Avoid road side storage of the construction materials; • Place cautionary sign for the pedestrian and safety traffic movement. • Inform the local people about subproject activities and inspire them use to alternative road to avoid traffic jam. • Increase workforce in front of critical areas such as institutions, establishment, hospitals, and schools.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	Noise pollution	• Check and maintenance the equipment properly; • Avoid using of construction equipment producing excessive noise at night; • Avoid prolonged exposure to noise (produced by equipment) by the workers; • Regulate use of horns and avoid use of hydraulic horns in subproject vehicles. • Any noise generating equipment should be performed after office or school hour. • Arrange ear plugging or ear muff if noise level at the construction site is severe.	Visual Observation/Analytical	Regularly and Periodically	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	Water and soil pollution	• Prevent discharge of fuel, lubricants, chemicals, and wastes into adjacent water bodies and soil; • Vehicle maintenance and refueling should be confined to the designated areas with sealing to prevent the spillage of lubricants and fuels on the water bodies and soil; • Restrict disposal of any construction waste into the nearby water bodies.	Visual Observation/ Analytical	Regularly/ Periodically	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF

		• Location of stockyards for construction materials shall be identified at a safe distance from watercourses.				
	Accidents	• Conduct formal and informal discussion for creating awareness about the accident; • Provides PPEs and ensure using of the personal protective equipment by the workers. • Maintain the register to record accidental events if occur;	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	Spills and leaks of oil, toxic chemicals	• Proper handling of lubricating oil and fuel so that it does not fall on the soil and adjacent water bodies; • Collection and disposal of spills; • Waste petro-chemicals must be properly collected, stored and not directly disposed on the ground.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
Potential Impact of BC road Construction						
Dismantle work/ Excavation/Earth work/	Generation of solid and construction waste due to the dismantle works; Generation of loose soil due to the earth excavation work and earth work.	• Cover expose construction wastes and loose dry soil with fabric; • Disposal of soil and construction wastes at Kalampur dumping site.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
IGS (improve sub grade) /sand filling	Air and dust pollution affecting nearby settlement	• Maintain adequate moisture content of the soil during construction transportation, compaction and handling; • Carry the materials especially loose soil and sand with adequate cover.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
Setting up and operation of asphalt plant	Possible degradation of the air quality by the suspended particles and increase of the	• Locate plant away from residential settlements; • Consider use of emulsified bitumen.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by

	noise level from asphalt plant affecting nearby settlements.					PMU of BMDF
	Possible water pollution (surface and ground water) by bitumen and solvents.	• Avoid spills and proper collection and disposal of the generated spills.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	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.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
Potential impact of RCC Drain						
Dismantling work for site clearing and excavation work	Generation of loose and clay soil due to the earth excavation work.	• Cover exposed loose dry soil and wastes materials before disposal; • Disposal of soil and construction wastes at existing dumping site Kalampur which is located Beside the Krishibid khamar.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	Accidents from careless use of hydraulic excavator and hammer if needed.	• Carefully handle of the hydraulic excavator and hammer if needed.				
	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 due to black smoke emission from excavator.	• Regular maintenance of the equipment.				

Sand filling /Back filling work	Air and dust pollution affecting nearby settlement	• Maintain adequate moisture content of soil and sand during transportation, compaction and handling; • Carry the materials especially loose soil and sand with adequate cover.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
Cutting & welding of the reinforcement for RCC work	Noise pollution due to using of rod cutter and welding machine	• Avoid using of rod cutter and welding machine at night; • Avoid prolonged exposure to noise (produced by equipment) by workers.	Visual Observation/ Analytical	Regularly/Periodically	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	Potential health and safety risks from rod cutter and welding machine if any	• Ensure use of the personal protective equipment (helmet, goggles, gloves, safety boot); • Availability and access to first-aid equipment and medical supplies in case of any accidents.	Visual Observation	Regularly	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
RCC (reinforcement cement 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.	Visual Observation/ Analytical	Regularly/Periodically	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF
	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 time; • Inform local people about casting work and potential impacts.	Visual Observation/ Analytical	Regularly/Periodically	Contractor	Primarily by PIU of Pourashava Secondarily by PMU of BMDF

Table 6-2 Anticipated Environmental Impacts during Operation Phase and Corresponding Mitigation and Enhancement Measures

Activity / Issues	Potentials Impacts	Proposed Mitigation and Enhancement Measures	Responsible Parties
Operation of the BC road	Increase in traffic speed and accidents; Increased traffic congestion due to movement of increased number of vehicles; Damage to road by movement of heavy vehicles; spillage of water to bitumen road surface.	• Better traffic management; • Control heavy traffic movement that may exceed load carrying capacity of the road; • Ensure notification sign for speed reduce just in front of educational institute and healthcare services point; • .	Primarily by Pourashava

	Increased air and noise pollution affecting surrounding areas	• Traffic management, increased vehicle inspection	
Operation of the 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.	Primarily by Pourashava
	Blockage in the drain due to disposal of solid waste/debris	• Creation of awareness, introduce SWM system and install and maintenance cover in open manholes; • Regular maintenance / cleaning of the drain; • Stop throwing of the wastes materials in to the drain by the community people.	
	Possible backflow of water due to blockage in the drain and at outfall	• Proper maintenance and cleaning of the drain and outfall on regular basis.	

Most of the monitoring parameter evaluation will be done by visual observation except noise, air, and water quality parameter. These parameter will be monitored by analytically. Hence, analytical monitoring guideline are shown below in tabular form

Matrix Table of Monitoring Plan (Analytical Monitoring during construction and operation phase)

Monitored Parameter/ Issues	Monitoring Method/Key Aspects	Location of Monitoring	Period & Monitoring Frequency
Noise level measurement	• Through digital instruments	• Sub-project site	• Three times at construction phase and one time at operation phase; • Reporting: Once in a month and immediately after measurement
Ambient air quality/ Stack Emission	• Visually-black smoke; • Sampling; • Analysis at laboratory; • Data analysis of merits determination by using quality standards; • Through digital instruments.	• Sub-project site	• Three times at construction phase and one time at operation 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.	• At intake and outfall	• Two times at construction phase and one time at operation phase; • Reporting: Once in a month and immediately after measurement

6.7 Environmental Safeguard Cost during Construction Phase

Considering the environmental impacts and their mitigation measures for these subprojects, several items are included in the BOQ to address these issues. The estimated cost to implement the EMP is elaborated in ***Table*.7-3**

Table 6-3: Environmental Management Budget

Item No.	Description of the Items	Costs (Tk)
1	Establishment of labor camp (male shed - 15 ft x 30 ft and female shed 12 ft x 15 ft1) with living arrangement, drinking water facilities, cooking arrangement, mosquito net,, waste bin etc.	200,000.00
2	Masonry pucca platform (at least 100 sft size), providing brick soling and net cement finishing for keeping fuel and lubricants for machineries.	15,000.00
3	Dust suppression measures by water spraying throughout the construction period in and around the subproject site, uncovered aggregates and loose materials such as stockpiles of the sands, excavated earth etc.(2 times/day) (Depending on the site condition and length 2 unit is considered as per BMDF rate schedule)	20,000.00
4	Noise level measurement. It can be measured from the pre-approved public institute/ university two times during construction phase @Tk. 800.00 per measurement (4*8,000.00 Tk) and **one time after construction**	32,000.00
5	Air quality (SPM, PM10, and PM 2.5) measurement- it can be measured from the recognized environmental survey company, public institute/ university three times during construction phase and **one time after construction**	120,000.00
6	Water quality(pH, NH_3, BOD_5, COD, TDS,)- it can be measured two from the recognized environmental survey company, public institute/ university two times during construction phase and **one time after construction (**3*5*3400**)**	51000.00
7	Wastes disposal facility during the construction period; collection, transportation, and dumping of the wastes at Kalampur dumpsite and providing 9 bins (400 litre size) to be provided.	67,500.00
8	Water supply (at the labor sheds):1nos. of tube well	40,000.00
9	Sanitation facilities (at the labor sheds): 2nos. of the toilets preferably portable toilets (1 no. for women and 2nos. for men) @ 25,000.00 (2* 25,000.00 Tk)	50,000.00
10	Providing PPE like hand gloves, spectacles for eye protection, helmets, masks, visible jacket, ear plug, safety boots for at least 30 person (25 for workers and 5 for visitor) and one first aid box with necessary medicine	102,500.00
11	Tree plantation for ecological enhancement work- preferably local fruits, flowers, medicinal and ornamental trees- (including protection and conservation during project defect liability period) 27 nos. of the trees @Tk 500.00 per tree (27* 500.00)	13,500.00
12	Cautionary Sign 7 nos.	28,000.00
	Total	**739500.00**

7 PUBLIC CONSULTATION AND PARTICIPATION

7.1 Objective and Methodology

Public Participation and Consultation are vital components for the success of any development subproject, to ensure two way communications between the subproject sponsor and relevant stakeholders, accountability and transparency in the development process.

For determining the environmental and social impacts associated with subproject implementation, the GOB and WB give great importance on involving primary and secondary stakeholders of the subproject area. In order to collect local knowledge for baseline conditions, understand perceptions of the community regarding impact significance, and propose meaningful mitigation measures, participation of stakeholders is an integral part of the EA process. For conducting this EA, an attempt has been made to consult with a full range of stakeholders and Pourashava officials to obtain their views on subproject interventions.

The Public Consultation were conducted on 7 July 2018, through a mix of conventional approach which involved as participatory, focus group discussions (FGD) and one-to one interviews, during the environmental study of the proposed subproject in conformity with the WB's and DOE's environmental guidelines. However, for better understanding the socio-economic and environmental condition four focus group discussion has been conducted in the subproject study area (**Figure-8-1).**

The public consultations were conducted with the following objectives:

(i) To introduce awareness of the stakeholders about the subproject and to collect their opinion, suggestions for planning and designing of the subproject ;

(ii) To identify the need and concern of the public;

(iii) To assess cultural patterns and behavior of local communities. Stakeholder consultation, was targeted at people/communities who may – directly or indirectly, positively or negatively- be affected by the outcomes of a subproject. The consultations were conducted at two different tiers of stakeholders: local people and Pourashava Officials;

(iv) To identify the conflict issues in advance & to find acceptable solutions;

(v) To gather local knowledge before decision making of the proposed subproject;

Figure 7-1: Public consultation with local people, Pourashava officials and other stakeholders.

7.2 Issues discussed in FGDs and Meetings

The following issues were raised by the proposed subproject neighbor's community who were interviewed during public participation of the proposed subproject.

- General perception about the subproject and the awareness about the proposed subproject.
- Impact of the subproject on the environmental parameter like physical, ecological and social environment.
- The participants raised the issues related to the infrastructure development of Savar Pourashava.
- They emphasized on the subproject selection for the future development and also discussed about the procedure for the quality construction work.
- In the FGD, the participants discussed the requirements for the Pourashava future development through a list of the subprojects.
- The Key participants list of Focus Group discussion in the subproject study area is attached in the Appendix-2.

7.3 Feedback, Suggestions, and Recommendations of the Participants

In each of the consultation, participants were encouraged to share their observations, suggestions, and experiences on various environmental and safety issues and suitable mitigation and enhancement measures. The participants' feedback, suggestions, and recommendations from FGD can be cited:

- For the better traffic operation in the subproject area and to respite from water logging problem, subproject area peoples are highly interested about this subproject. They also said, they would help the Pourashava to implementing the subproject activities.
- All the proposed infrastructure implementation is badly needed for Savar Pourashava, all will provide benefit, no major environmental concern
- All the participants felt that the proposed road construction subproject will facilitate a better traffic system. However, it was felt that accidents might increase in number if a high standard of engineering design is not followed. Participants mentioned that safety measures are especially important for social institutions like schools, hospitals
- They are thinking that, due to implementation of this subproject few part of land may need to be acquired. According to the participants, this can be mitigated through proper compensation and amicable assistance to the affected persons.
- People expect employment generation for them from upcoming project
- Awareness and extent of the project and development components;
- All development works are essential but sound design and construction is necessary so that they are not affected by environmental pollution.
- Most of the participants expressed that the number of subprojects that have been selected for each financial year is not adequate.
- The participants also addressed the solid waste management issue to reduce environmental and public health hazards.
- Major problem is drainage congestion, less cleaning, drains are filled with solid waste
- The causes of water logging problem is mainly the inadequate drainage network, seasonal sub-mergence, clogging due to garbage dumping
- Special safety measures should be taken to avoid land subsidence due to heavy construction activities
- Flooding and water logging both affect access to key activities
- Traffic management is important
- During construction period public safety and workers' safety is important
- Participants suggested signage (speed limits, warnings etc.), pedestrian crossings in front of social institutions and to ensure that there are footpaths along the road
- The proposed road and drain construction subproject do not pass any protected or ecological critical area.

- They have suggested that, dust suppression, noise mitigation and road safety should be considered.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

Based on the field reconnaissance, primary and secondary information collected from different authorities and internet (web sites), it may be concluded that the subproject stands environmentally sound and sustainable when the recommended mitigation measure and environmental management processes are adopted properly.

Benefits in the subproject area will be in significant except for some short terms employment and business opportunities during the construction phase. However, the needs of road to the subproject area are obvious and for that the communication system of the areas will be developed. Developed communication system will directly influence the growth of economy of the subproject area as well as reduce the traffic congestion. Additionally, formation of drain will complete the existing drainage network. Hence, water logging problem in the subproject area will be minimized. However, major improvements in quality of life and public welfare will result once the scheme is in operation.

8.2 Recommendations

Recommendations made for the subproject development on the basis of EA study are given below:

- Severe weather conditions would have an impact on the road and drain construction activities. The construction activities may even have to be stopped during these storms. So it is recommended that commencing construction in early winter season may help to take the benefit of full dry spell of the season
- Proposed environment management plan should be implemented strictly both during operation and construction phase of the subproject
- In order to enhance the occupational health and worker safety during the construction period, construction equipment would have to be kept in good order. Adequate safety measures should be taken and safety related equipment including personal protective and safety equipment (PPE), etc. must be provided in order to reduce the potential for accidents.
- Compensatory plantation should be carried out for trees to be fell for off-site development minimum in ratio of 1:5

- Suggestions & requests made by public for water supply and employment shall be taken into consideration.
- Proper training of maintaining environment, health and safety should be given to subproject management unit in both construction an operation phase
- Environmental monitoring should be conducted as proposed in environment management plan.

APPENDIX

Appendix 1: List of the Participants

Attendance of Local Participants in the Screening Exercise
Local Stakeholders, Community Members and WLCC/CBO. (Ward no-05)

Name of Subproject's:

Package: BMDF/SAVAR /2017-2018 W-01

Name of ULB : Savar Upazila: Savar

District : Dhaka Date : 07.07.2018

SL#	Name	Gender	Social Status	Contact Number	Signature
1	মোঃ [illegible]	M	শিক্ষক	01817573275	[illegible]
2	[illegible]	M	[illegible]	01716822560	[illegible]
3	[illegible]		শিক্ষক	01917-408063	[illegible]
4	[illegible]	M	শিক্ষক	7246989	[illegible]
৮	মোঃ আব্দুর রশীদ	M	ব্যবসা	01817094163	[illegible]
৯.	মোঃ [illegible]	M	ব্যবসা	01911804950	[illegible]
১০.	মোঃ [illegible]	M	ব্যবসা	01915632016	[illegible]
১১	[illegible]	M	[illegible]	0167494042	[illegible]
১২	[illegible]	M	ব্যবসা	01631013824	[illegible]
১৩	মোছাঃ [illegible]	F	ব্যবসা	01977942793	[illegible]
১৪	[illegible]	F	[illegible]	01678703935	[illegible] Hossain
১৫	[illegible]	F	[illegible]	029989695	Zahirul
১৬	[illegible]	F	[illegible]	01610959452	[illegible]
১৭	[illegible]		[illegible]	01711510198	[illegible]
১৮	[illegible]	F	[illegible]	[illegible]	[illegible]

[illegible]
09/09/18
কাউন্সিলর - 5
সাভার পৌরসভা, সাভার, ঢাকা।

[illegible]
9/9/18
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Assistant Engineer
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[illegible]
9.9.18
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Executive Engineer
Savar Pourashava
Savar, Dhaka.

Attendance of Local Participants in the Screening Exercise
Local Stakeholders, Community Members and WLCC/CBO. (Ward no-[redacted])

Name of Subproject's:

Package: BMDF/SAVAR /2017-2018 W- 01

Name of ULB : Savar Upazila: Savar

District : Dhaka Date : 07.07.2018

SL#	Name	Gender	Social Status	Contact Number	Signature
১	[redacted]	M.	[redacted]	01611660[redacted]	[redacted]
২	[redacted]		[redacted]	02922[redacted]	[redacted]
৩	[redacted]		[redacted]	[redacted]	[redacted]
৪	[redacted]		[redacted]	01813 80[redacted]	[redacted]
৫	[redacted]		[redacted]	01711[redacted]	[redacted]
৬	[redacted]		[redacted]	0992228[redacted]	[redacted]
৭	[redacted]		[redacted]	01717 31[redacted]	[redacted]
৮	[redacted]		[redacted]	01[redacted]	[redacted]
৯	[redacted]		[redacted]	01[redacted]	[redacted]
১০	[redacted]	M	[redacted]	01715176208	[redacted]
১১	[redacted]	M	[redacted]	01918[redacted]	[redacted]
১২	[redacted]		[redacted]	[redacted]	[redacted]
১৩	[redacted]	M	[redacted]	01712791[redacted]	[redacted]
১৪	[redacted]		[redacted]	01[redacted]	[redacted]
১৫	[redacted]		[redacted]	01076[redacted]	[redacted]
১৬	[redacted]		[redacted]	01936[redacted]	[redacted]

খন্দকার শাহ্ মাহ্মুদুল হোসেন বিপ্লু
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