ENVIRONMENTAL ASSESSMENT REPORT

IMPROVEMENT OF CHOWRASTA POURA BUS TERMINAL

Municipal Governance and Services Project (MGSP)

Bangladesh Municipal Development Fund (BMDF)

June 2018

CHOWMUHANI MUNICIPALITY, BEGUMGONJ, NOAKHALI

EXECUTIVE SUMMARY

Introduction: Chowmuhani Municipality is a Class "A" Municipality having an area of 20.70 sq km. The total area of the Municipality is divided into nine administrative wards with a total population of 117000 (Municipality data, 2018). Recently, the Municipality has prepared its Capital Investment Plan (CIP) for its infrastructural development following a participatory approach with the technical assistance from Bangladesh Municipal Development Fund (BMDF) and identified the Improvement of Chowrasta Bus Terminal as the first priority work (CIP No. 36) for ensuring smooth and easy communication of all people who are living within the Municipality and in different parts of the Noakhali region and regularly travelling to the main town of the Begumganj Upazilla as well as different parts of the Country for trade, business, administrative services and daily necessities.

Location of the subproject: The Chowrasta Bus Terminal is situated at Ward No. 3 which is at the northern side of Chowmuhani Municipality and near the Zero Point or Chowrasta crossing where the Noakhali-Feni national highway and regional highways such as Maijdee-sonapur, Maijdee-chowmuhani, laxmipur-chowmuhani roads are crossed with each other. There is temporary dumping ground, sweeper colony and Kuripara residential area at the north side, Poura Kitchen market at the south side, water treatment plant and kuripara residential area at the east side and Laksham road at the west side of the bus terminal. It is located at the heart of the town and the coordinate of the bus terminal is $22^0 56' 47''$ N and $91^0 6' 19''$ E.

Justification of selecting the subproject: The transportation system of Chowmuhani Municipality is mainly dependent on road and railway system. Transportation through water system is not available within and around this Municipality area. The road system is the main communication system of the Municipality by which the Municipality is connected with different sub-districts and districts of greater Noakhali. Chowmuhani Municipality is the head quarter of Begumganj sub-district and the main center of trade and business of sub-district as well as greater Noakhali areas. It also serves as the main town of administrative work and other public services and facilities of the people. The proposed subproject named Chowrasta Bus Terminal is the central bus terminal of the Municipality as well as the key terminal through which inter and intra district buses moves at different parts of the district and the country. It is situated beside the Noakhali-Feni National Highway and connected with four key routes of the Noakhali region through four Ragional Highways such as Laksham-Sonaimurhi from North, Maijdee-Sonapur from South, Feni from East and Laxmipur from West. A total of 35 travel agencies have been providing services through this bus terminal and carrying passengers to Dhaka, Chittagong, Sylhet, Rajshahi, Rangpur, Barishal and Khulna divisions of the country. The specific routes through which inter-district buses moves include: Sonapur-Choumuhani-Dhaka, Raipur-Chowmuhani-Dhaka, Laxmipur-Chowmuhani-Dhaka, Chowmuhani-Rajshahi, Chowmuhani-Rangpur, Chowmuhani-Sylhet, Chowmuhani-Comilla, Chowmuhani-Dhaka, Chowmuhani-Chittagong, Raipur-Chowmuhani-Chittagong, Sonapur-Chowmuhani-Chittagong, Ramganj-Chowmuhani-Chittagong, Chowmuhani-Feni, Raipur-Chowmuhani-Laxmipur, Raipur-Chowmuhani-Feni,

Maijdee-Chowmuhani-Feni, Feni-Chowmuhani-Barishal-Khulna, and Chowmuhani-Raipur. The specific local route through which local buses, maxi and CNG moves include: Chowmuhani-Maijdee -Sonapur, Chowmuhani-Chandraganj, Chowmuhani-Sonaimurhi, Chowmuhani-Senbagh and Chowmuhani-Chatkhil. About 503 inter-district buses, 75 intra-district or local buses, 100 maxis, 5000 CNG driven auto rickshaws, 1000 easy bikes, 70 micro-bus and 600 motorized rickshaws move through this bus terminal for carrying passengers and goods. It is estimated that around 8000 people have been using front side of this terminal per day at present for moving at different local, regional and national areas. It is expected that it will serve the increasing demand of future increased population and around 10000 people will travel through this bus terminal after its completion.

Further, the Municipality is the owner of the land and presently using the bus terminal with old and damaged infrastructure and facilities. In fact, after completion of the sub-project, a well-designed structure will facilitate a modern user friendly bus terminal where all the essential facilities for both bus operators as well as passengers (male, female and disabled) will be available. Thus a passenger or a bus operator who will come for travel will enjoy modern facilities and traffic congestion free movement. Moreover, it will create an employment opportunity through jobs and business facilities in the bus terminal areas and within the Municipality. The Municipality will also get huge revenue from the proposed bus terminal.

Hence, considering the overall benefits, the construction of the proposed bus terminal is justified and will be one of the key income generating establishments for Chowmuhani Municipality.

Objective of the study: The general objective of the study is to determine the major environmental impacts that might be happened due to the implementation of the subproject and to recommend possible mitigation measures to avoid or reduce identified adverse environmental impacts and to enhance positive impacts. The specific objectives include:

- Identifying existing environment condition at the sub-project areas for environmental components viz. air, noise, water, land, soil, biological and socio-economic aspects;
- Prediction and evaluation of positive and negative impacts that may result from the proposed sub-project;
- Undertaking public consultation and disclosure of project-related information;
- Formulation of an environmental management plan (EMP) to eliminate or minimize the adverse impacts of the project on the surrounding environment and affected communities;
- Preparing occupational health and safety to minimize any accident or emergency situation;
- Proposing plans for the post project monitoring, ongoing consultation and disclosure, EMP implementation, and institutional arrangement/organizational arrangement; and
- Suggestion and recommendation for abatement/mitigation/management measures to ensure environmental, biological, health and social compatibilities and also to comply with the National Environmental legal requirements and national Environmental Quality standards.

Methodology of the study: This is a qualitative study. However, both quantitative and qualitative data are collected and analyzed to achieve the objective of the study and show the baseline information of the study areas. Quantitative data are collected from secondary sources and qualitative data are collected from primary sources using different qualitative approach and methods. The approach and methods those are applied during the assessment include: (i) Consultation with stakeholders and community people; (ii) Focus Group Discussion; and (iii) Field visit and observation.

Findings of environmental impact assessment: The **environmental screening, field observation** and **community consultation** have identified that the proposed bus terminal has an insignificant ecological impact as no tree and vegetation need to be cleaned and impact on aquatic environment at the surrounding areas might be minimum as there is no water body adjacent to the subproject site and a well-constructed drainage system at two sides of bus terminal which are connected with main drainage system of the Municipality. The bus terminal may have temporary and localized negative impact on physicochemical environment during construction and operational phases due to dismantling of existing structures, movement of vehicles and using of different machines for piling, welding and drilling. It is anticipated that the air pollution and water logging will be insignificant due to taking necessary measures and existing drainage system. However, the noise pollution, water pollution, solid waste pollution and construction waste might have moderate level of impact on the environment due to use of heavy machines, spillage of oil and lubricant to nearby water bodies due to washing and cleaning of buses, generation of waste due to scrap, spare parts, tires and tube, battery and filter replacement, residuals of food packaging materials and debris from dismantling of damaged structures etc during construction and operational phases. The subproject might have negative socio-economic impact due to traffic congestion and health and safety issues of workers and labors during construction phase. However, there is no archaeological and historical place within the subproject influence areas. In addition, it has a positive impact on the local and regional economy due to generation of employment opportunity at the terminal premises and surrounding areas as well as the terminal will facilitate the trade and business of the people living in the different parts of the district through ensuring easy and traffic congestion free movement at the operational phase.

The bus terminal has a positive impact on the community people by creating employment opportunity during construction and operational phase. It will create employment opportunity by engaging as labor, and shop owner and shop keepers in shops to be operated within the bus terminal. In addition, local people may install different types of shops at the surrounding areas of the bus terminal to meet the demand of the passengers travelling through the bus terminal. The bus terminal will ease the transportation facilities for the community people who will have to move different sub-districts and main town for service, trade and business and others daily needs.

Conclusion and recommendations: On the basis of the overall environmental analysis, it may be concluded that the attitude of the community people towards the construction of the proposed Bus Terminal is positive and the subproject stands environmentally sound and sustainable when the

recommended mitigation measure and environmental management processes are adopted properly. The adverse environmental impacts from the project will mostly take place during the construction stage. The benefits of the subproject will be significant by creating employment and business opportunities during the construction and operational phases. There is no significant cumulative adverse impact during operation that is identifiable at this stage. However, following key recommendations are made for smooth construction and successful operation of the bus terminal**:**

- Bus terminal should have provisions for temporary parking of drop-off vehicles and supporting vehicles to travel to the main town.
- A well-defined solid waste collection and disposal system should be in place at the bus terminal.
- All waste water should be discharged to the soak pit. In the absence of such system in the vicinity of the terminal the adequate septic tanks should be constructed.
- No service of vehicles and refueling should be allowed inside the premises of the terminal. For any emergency repair, special bays should be provided.
- An oil and fuel spill contingency plan should be prepared.
- Fire prevention and fighting equipment should be provided and maintained as well as terminal staff should be trained in fire prevention and fighting.
- Vehicles should not be allowed to park with their engines are running.
- The entire area of the bus terminal, driveways and parking lots should be paved.
- Landscaping and plantation should be undertaken to improve the aesthetic quality of the bus terminal.
- Encroachment of outside terminals should be prevented to ease the pressure on traffic.
- Bus terminal should have facilities for washing, prayer, toilet, waiting, shopping, meals and snacks.
- Contractor will ensure availability of the PPEs and first-aid box, safe water supply and sanitation facilities to the workers.
- The surrounding people should be informed about the construction and operation of the bus terminal.
- Above all, the EMP should be followed and mitigation measures should be monitored as per EMP and monitoring plan.

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ABBREVIATION

AP	Affected People
BBS	Bangladesh Bureau of Statistics
BDT	Bangladesh Taka
BMDF	Bangladesh Municipal Development Fund
BOQ	Bill of Quantity
CIP	Capital Investment Plan
DOE	Department of Environment
ECA	Environmental Conservation Act
ECoP	Environmental Code of Practice
ECR	Environmental Conservation Rules
EMF	Environmental Management Framework
EMP	Environmental Management Plan
ES	Environmental Screening
FGD	Focus Group Discussion
GOB	Government of Bangladesh
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GW	Ground Water
HBB	Herringbone Bond
IUCN	International Union for Conservation of Nature
MD	Managing Director
MGSP	Municipal Governance and Services Project
NGO	Non-Governmental Organization
OP	Operational Policy
PIU	Project Implementation Unit
PMU	Project Management Unit
PPE	Personal Protective Equipment
RCC	Reinforced Concrete Cement
SPW	Supply Water

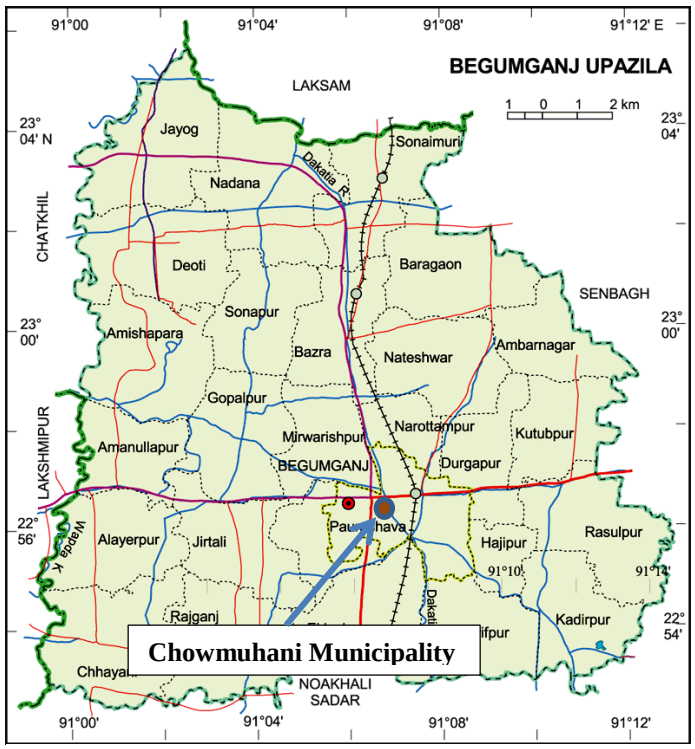
ULB	Urban Local Body
WB	World Bank

1. INTRODUCTION

1.1 Background of the Municipality and the Sub-project

The Chowmuhani Municipality is the main town of Begumganj Upazilla of Noakhali District and the core commercial center of greater Noakhali. It is the largest and oldest Municipality in the district. This "A" class Municipality is established in 1973. The Begumganj Upazilla is located between 22°57′ north latitudes and between 91°6′ east longitudes and the Municipality is bounded by Jamidar hat at East, Banglabazar at West, Bajra at north and Begumganj Sadar at South. The total area of this Municipality is 20.70 square kilometer. The total area of the Municipality is divided into nine administrative Wards and 23 Mahallas. (Source: The Municipality Data 2018, Population and Housing Census 2011 and https://en.wikipedia.org/wiki/Begumganj_Upazila)

According to the Population and Housing Census 2011, the total households of the Municipality are 13919 and the total population is 80001 of which 42062 are male and 37939. The average size of the household is 5.4. The population density of the Municipality is 5517 per sq. km. However, the Municipality data 2018 shows that the total population is around 117000.



Map 1: Location map of Chowmuhani

As a "Category A" Municipality as well as the main town of the Begumganj Upazilla, the Chowmuhani Municipality has been improving its infrastructural development for ensuring the necessary services to its inhabitants and taking new initiatives to meet the growing demand of the people. Recently, the Municipality has prepared its Capital Investment Plan (CIP) for its infrastructural development following a participatory approach with the technical assistance from Bangladesh Municipal Development Fund (BMDF) and identified the Improvement of Chowrasta Bus Terminal as a one of the priority work (CIP No.36) for ensuring smooth and easy communication of all people who are living in different parts of the Municipality as well as the people of greater Noakhali who are travelling to Dhaka, Chittagong, Sylhet, Khulna, Rangpur and Rajshahi divisions using the Chowrasta Bus Terminal as a transit point.

The Municipality has already submitted an application for sub-credit to BMDF seeking financial support in improving the Chowrasta Bus Terminal. The significant features of the subproject are given in **Table 1-1** as below:

Table 1-1: The significant features of the proposed subproject

Name of the Sub-Project	Improvement of Chowrasta Bus Terminal
Name of District	Noakhali
Name of ULB	Chowmuhani Municipality under Begumganj Upazilla
Location of the Bus Terminal	Kuripara, Alipur under Ward number 03.
Service Areas	Primarily, the total Municipality and Upazilla area, But, ultimately, different Upazillas and districts of greater Noakhali.
Types of Vehicles served	Inter-district buses
Structural Design Option	Brick, RCC and steel structure mixed design
Total Land Area	7900 sqm or 1.95 acre
Land Acquisition	Chowmuhani Municipality is the legal owner of the land
Estimated Cost	BDT 100 millions
Subproject duration	15 months
Tentative Starting date	October 2018
Tentative Completion date	December 2019

1.2 Justification of Selecting the Subproject

The transportation system of Chowmuhani Municipality is mainly dependent on road and railway system. Transportation through water system is not available within and around this Municipality area. The road system is the main communication system of the Municipality by which the Municipality is connected with different sub-districts and districts of greater Noakhali. Chowmuhani Municipality is the head quarter of Begumganj sub-district and the main center of trade and business of sub-district as well as greater Noakhali areas. It also serves as the main town of administrative work and other public services and facilities of the people. The proposed subproject named Chowrasta Bus Terminal is the central bus terminal of the Municipality as well as the key terminal through which inter and intra district buses moves at different parts of the district and the country. It is situated beside the Noakhali-Feni National Highway and connected with four key routes of the Noakhali region through four Ragional Highways such as Laksham-Sonaimurhi from North, Maijdee-Sonapur from South, Feni from East and Laxmipur from West. A total of 35 travel agencies have been providing services through this bus terminal and carrying passengers to Dhaka, Chittagong, Sylhet, Rajshahi, Rangpur, Barishal and Khulna divisions of the

country. The specific routes through which inter-district buses moves include: Sonapur-Choumuhani-Dhaka, Raipur-Chowmuhani-Dhaka, Laxmipur-Chowmuhani-Dhaka, Chowmuhani-Rajshahi, Chowmuhani-Rangpur, Chowmuhani-Sylhet, Chowmuhani-Comilla, Chowmuhani-Dhaka, Chowmuhani-Chittagong, Raipur-Chowmuhani-Chittagong, Sonapur-Chowmuhani-Chittagong, Ramganj-Chowmuhani-Chittagong, Chowmuhani-Feni, Raipur-Chowmuhani-Laxmipur, Raipur-Chowmuhani-Feni, Maijdee-Chowmuhani-Feni, Feni-Chowmuhani-Barishal-Khulna, and Chowmuhani-Raipur. The specific local route through which local buses, maxi and CNG moves include: Chowmuhani-Maijdee -Sonapur, Chowmuhani-Chandraganj, Chowmuhani-Sonaimurhi, Chowmuhani-Senbagh and Chowmuhani-Chatkhil. For having a total impression of vehicle and passengers transit at the proposed terminal point , a traffic survey and stakeholder (Line Men) consultation was done during the report preparation. About 503 inter-district buses, 75 intra-district or local buses, 100 maxis, 5000 CNG driven auto rickshaws, 1000 easy bikes, 70 micro-bus and 600 motorized rickshaws move through the road in front of bus terminal. It is estimated that around 8000 people have been using this point per day at present for moving at different local, regional and national areas. The existing conditions of bus terminal is inaccessible, hence usually no bus enter or park inside the existing terminal. But after improvement of the proposed bus terminal inter district buses will enter for transit passengers and park when needed.

Further, the Municipality is the owner of the land and presently using the bus terminal with old and damaged infrastructure and facilities. In fact, after completion of the sub-project, a well-designed structure will facilitate a modern user friendly bus terminal where all the essential facilities for both bus operators as well as passengers (male, female and disabled) will be available. Thus a passenger or a bus operator who will come for travel will enjoy modern facilities and traffic congestion free movement. Moreover, it will create an employment opportunity through jobs and business facilities in the bus terminal areas and within the Municipality. The Municipality will also get huge revenue from the proposed bus terminal.

Hence, considering the overall benefits, the construction of the proposed bus terminal is justified and will be one of the key income generating establishments for Chowmuhani Municipality.

1.3 Policy Legal and Administrative Framework

There are some environmental laws and regulations under the environmental legal framework of Bangladesh for environmental protection and natural resources conservation. In addition, there are also some safeguard policies of World Bank to prevent and mitigate undue harm to people and their environment in the development process. All the subprojects to be prepared and implemented under the BMDF should be in compliance with these environmental laws and policies of Bangladesh and World Bank. The proposed subproject will also be prepared and implemented in compliance with these laws and policies. The environmental laws and regulations of Bangladesh and the safeguard policies those are applicable to this subproject are given as below:

National Environmental Laws and Regulations:

- National Environmental Policy 1992
- Bangladesh Environmental Conservation Act (ECA) 1995 amended 2002
- Environmental Conservation Rules (ECR) 1997 amended 2003
- National Land-use Policy 2001
- Bangladesh Labor Action 2006
- Bangladesh National Building Code

World Bank Safeguard Policies:

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.04 Natural Habitats
- OP/BP 4.11 Physical Cultural Resources

Now, as per the environmental management framework of BMDF, it is required to conduct an environmental impact assessment of the proposed bus terminal in accordance with the legal regulatory framework of the Government of Bangladesh and World Bank policies. Therefore, the Chowmuhani Municipality has deployed an individual consultant to carry out the environmental impact assessment of the proposed bus terminal as a subproject.

2. OBJECTIVE AND METHODOLOGY

2.1. Objective of the study

The general objective of the study is to determine the major environmental impacts that might be happened due to the implementation of the subproject and to recommend possible mitigation measures to avoid or reduce identified adverse environmental impacts and to enhance positive impacts. The specific objectives include:

- a detailed portrayal of the existing environment condition at the sub-project areas for environmental components viz. air, noise, water, land, soil, biological and socio-economic aspects;
- prediction and evaluation of positive and negative impacts that may result from the proposed sub-project;
- consideration of alternatives;
- undertaking public consultation and disclosure of project-related information;
- grievance redress mechanism;
- formulation of an environmental management plan (EMP) to eliminate or minimize the adverse impacts of the project on the surrounding environment and affected communities;
- preparing occupational health and safety to minimize any accident or emergency situation;
- proposing plans for the post project monitoring, ongoing consultation and disclosure, EMP implementation, and institutional arrangement/organizational arrangement;
- Obtaining approval from the World Bank and DOE; and
- Suggestion and recommendation for abatement/mitigation/management measures to ensure environmental, biological, health and social compatibilities and also to comply with the National Environmental legal requirements and national Environmental Quality standards.

2.2. Scope and methodology of the study

2.2.1. Scope of the study

This study includes different dimensions of environmental issues those need to be considered at different stages of selecting, implementing, and operating the subproject following the environmental policies of Government of Bangladesh and World Bank. Addressing the environmental issues in this subproject includes a series of tasks to be carried out by the study. The scope and methods of this Environmental Assessment includes:

- Baseline survey data acquisition of the baseline both environmental and social to carry out the Environmental Assessment;
- Understanding the technical aspects of the proposed sub-project through gathering and analyzing primary and secondary data;

- Explore the present environment condition of subproject influence areas through reconnaissance survey and in consultation with community people;
- Identification of potential environmental impacts and evaluating the consequences through using given environmental screening format;
- Categorize the pollutions that may come out during pre-construction, construction and operation phases at subproject site and surrounding areas through key informant interview and field observation;
- Discuss with the people living in the sub-project area about the mitigation measures suggested to avert the negative environmental impacts and to enhance the positive environmental impacts through stakeholders' consultations and general public consultation; and
- Assess the institutional aspects, and develop Environmental Management and Monitoring Plan for the subproject in consultation with Mayor and other PIU members , and based on the findings of the study.

2.2.2. Methods of the study

The study is qualitative in nature and different qualitative methods are used to gather information. Both primary and secondary information are collected, analyzed and used to fulfill the requirements of the study. The primary information is collected following qualitative technique as given below:

- Consultation with stakeholders and community people;
- Key Informant Interview;
- Focus Group Discussion; and
- Field visit and observation.

Consultation with stakeholders and community people: Consultative meeting with different stakeholders such as Ward Councilors, representatives of Bus Owners' Association, representatives of Workers' Association, civil society members, representatives of business men surrounding the bus terminal, community leaders and representative of community people is done to exercise the environmental screening using prescribed form of BMDF and filled in the screening form as per their information and opinion. Before starting the screening exercise, the participants are informed about the details of the project information and the way of implementing the subproject.

Key Informant Interview: In-depth interviews are done with Line Man of the bus terminal and Ward Councilor of the respective Ward where the bus terminal is situated to know about the types of vehicles hauling through the bus terminal, numbers of travel agencies have been getting services from the bus terminal and numbers of different types of vehicles of the travelling agencies are deployed for carrying passengers through this bus terminal.

Focus group discussion: Two focus group discussions (FGD) are organized separately with male community participants and female community participants, mainly the people who are residing adjacent to the proposed subproject to know their attitudes towards the proposed subproject, its potential impact and their feedback, and suggestions on mitigating the potential negative impacts and enhancing the positive impacts of the subproject.

Field visit and observation: Field visit and observation of different environmental features are done by the consultant to understand the overall environmental situation of the subproject areas and the potential impacts of the subproject on it during pre-construction, construction and operational stages.

In addition, some quantitative information are collected from secondary sources to complement the qualitative information. The secondary information is collected by reviewing national, district and municipality level document and different websites.

3. SUBPROJECT DESCRIPTION

3.1. Name of the subproject

The name of the subproject is “Improvement of Chowrasta Bus Terminal”.

3.2. Brief description of the subproject

The proposed subproject named Improvement of Chowrasta Bus Terminal is situated at Kuripara of Alipur area under the Ward No. 03 of Chowmuhani Municipality and at the northern side of the Municipality. It is located near the Zero Point or Chowrasta crossing where the Noakhali-Feni national highway and regional highways such as Maijdee-sonapur, Maijdee-chowmuhani, laxmipur-chowmuhani roads crossed with each other. There is temporary dumping ground, sweeper coloy and Kuripara residential area at the north side, Poura Kitchen market at the south side, water treatment plant and kuripara residential area at the east side and Laksham road at the west side of the bus terminal. It is located at the heart of the town.

The total area of the proposed bus terminal is 7900 square meters or 1.95 acres. There would be one exit way and one entry way for inter-district buses. In addition, there would be separate entry and exit ways for private car, rickshaw or CNG, and passengers. The features and services to be available at the bus terminal area include:

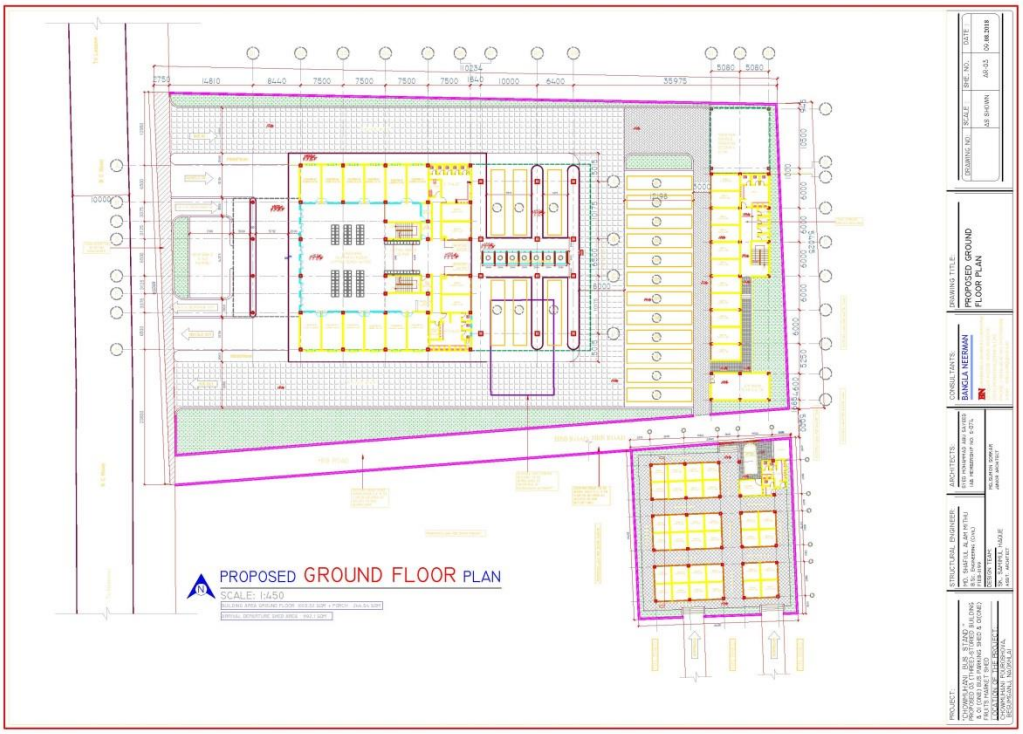
- Entry porch;
- Ticket counters;
- Firefighting room;
- ATM Booth;
- Information room;
- Waiting area;
- Separate toilet for male, female and disable for passengers;
- Arrival and departure shade;
- Bus parking area;
- Internal drive ways;
- Service area (Vehicle servicing, vehicle washing, repair shop etc)
- Electro-mechanical room,
- Separate toilet for drivers, helpers and contractors;
- Fruit shops,
- Boundary wall all around the premises;
- RCC drain all around the premises;
- Lighting (at the premises and boundary)

In addition, the **3-storied terminal building** will be renovated and will have different service areas. The floor wise details of the terminal building of the subproject are as below:

Ground floor: The approximate size of the ground floor is 1003 sqm.

- Entry pouch;
- Ticket counters inter-district (12 nos);
- Ticket counters local (7 nos.)
- Firefighting room;
- ATM Booth;
- Main entry car, CNG and rickshaw;
- Pedestrian area;
- Information room;
- Waiting area;
- Separate toilet for male (3 nos.), female (3 nos.) and disable (1 no.);
- Arrival and departure shade (6 nos.);
- Bus parking area (12 nos.);
- Internal road;
- Shops (4 nos.);

The plan of ground floor of the Bus Terminal is given as below:



Floor plan 1: The proposed ground floor plan of terminal building

First Floor: The approximate size of the first floor is 1003.32 sqm.

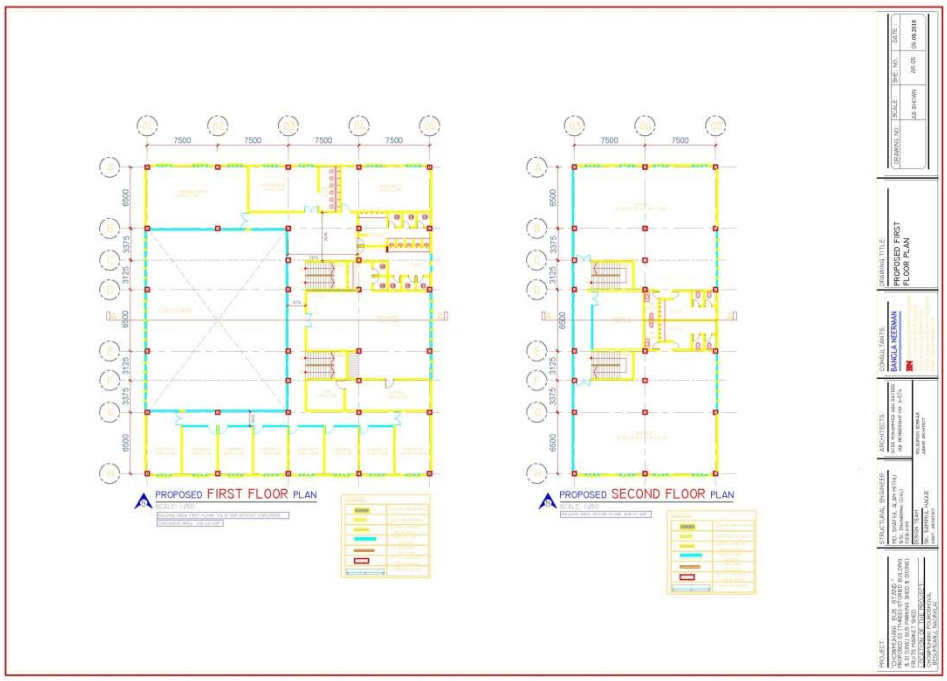
- Office rooms;
- Male toilet (3 nos.) and female toilets (3 nos.);
- Wash and toilet (2 nos.);

- Kitchen and store room;
- Prayer room;
- Concourse area;
- Passage area; and
- Ticket counter-inter district (8 nos.)

Second floor: the approximate size of the second floor is 505.45 sqm.

- Office rooms;
- Toilets; and
- Passage area and lobby.

The plan of first and second floor of the Bus Terminal is given as below:



Floor plan 2: The proposed first and second floors' plan of terminal building

Again, there will a **2-storied service building** at the back side of the terminal building. The floor wise detail of the service building is given as below:

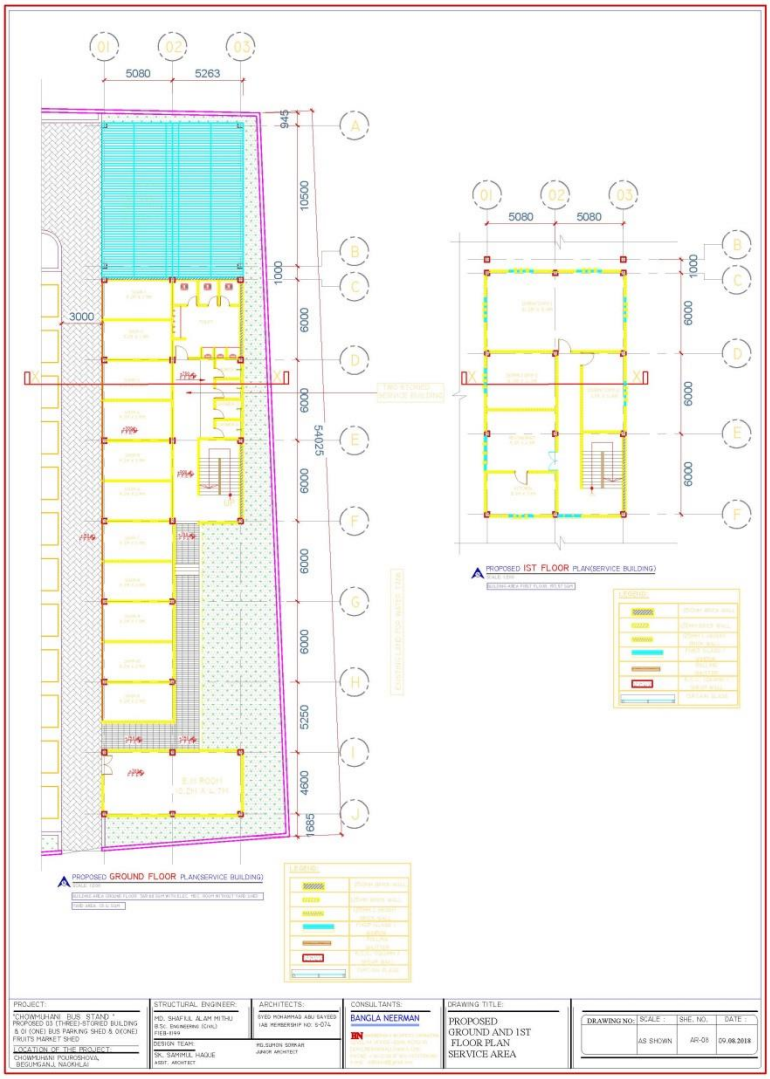
Ground floor: The approximate size of the ground floor with yard is 490.82 sqm.

- Shops (11 nos.);
- Toilet and shower zone;
- Electro-mechanical room;
- Landscaping area;
- Yard area; and
- Service stairs.

First floor: The approximate size of the first floor of the service building is 193.57 sqm.

- Dormitory (3 nos.);
- Kitchen;
- Restaurant; and
- Passage.

The plan of ground and first floor of the service building is given as below:



Floor plan 3: The proposed ground and first floor plan of service building

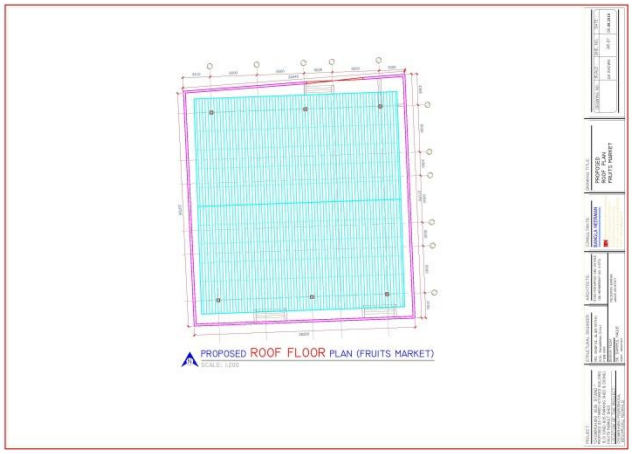
In addition, there will be a **3-storied fruit shop** at the south-east corner of the bus terminal. It will include:

- Shops (33 nos.);
- Male toilet (2 nos.) and female toilet (1 no.);
- Electro mechanical room;
- Landscaping; and
- Passage area.

The plan of ground floor of the fruit shop is given as below:

Floor plan 4: The proposed ground floor of the fruit shop

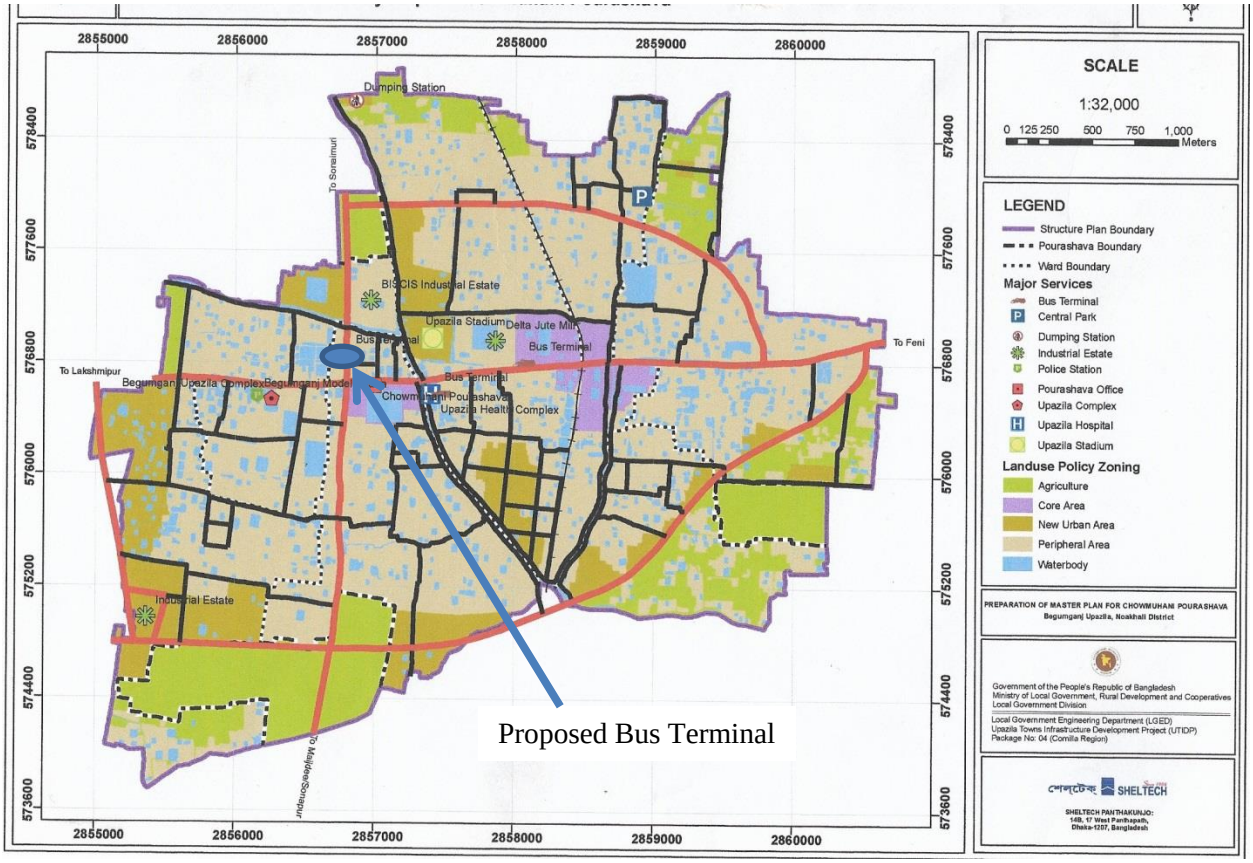
The plan of top floor of the fruit shop is given as below:



Floor plan 5: The proposed top floor of the fruit shop

3.3. Location of the subproject

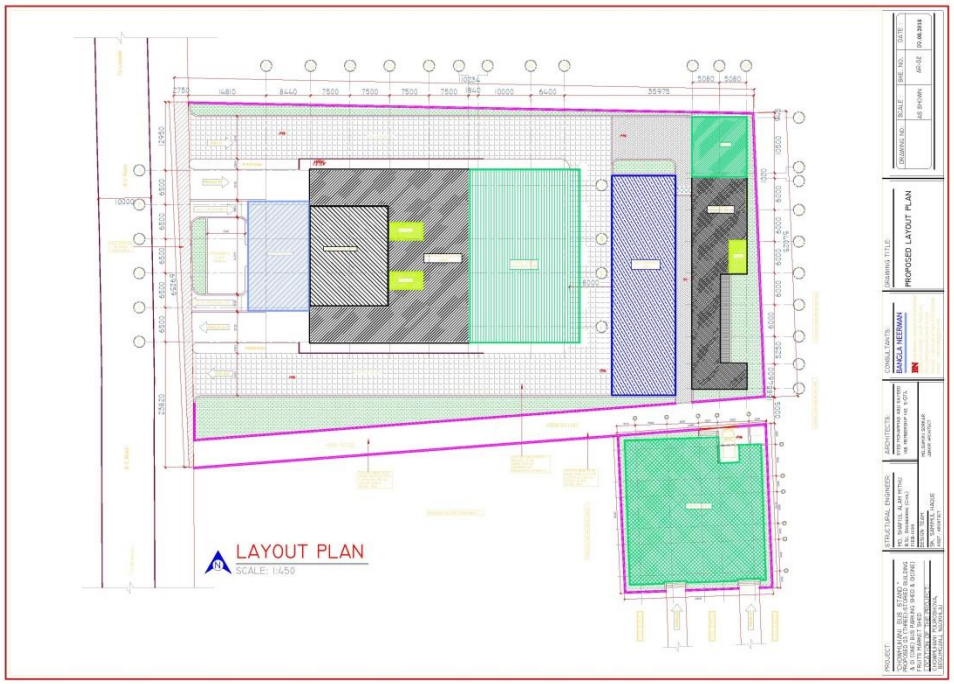
The Chowrasta Bus Terminal is situated at Ward No. 3, at the northern side of Chowmuhani Municipality and near the Zero Point or Chowrasta crossing where the Noakhali-Feni national highway and regional highways such as Maijdee-sonapur, Maijdee-chowmuhani, laxmipur-chowmuhani roads crossed with each other. There is temporary dumping ground, sweeper coloy and Kuripara residential area at the north side, Poura Kitchen market at the south side, water treatment plant and kuripara residential area at the east side and Laksham road at the west side of the bus terminal. It is located at the heart of the town. The coordinate of the location of the bus terminal is the coordinate of the bus terminal is $22^0 56' 47''$ N and $91^0 6' 19''$ E. The location map of the proposed bus terminal is given as below:



Map 2: Location map of Chowrasta Poura Bus Terminal

3.4. Layout of the subproject

The layout plan of the proposed Chowrasta Poura Bus Terminal is given as below:



Detail layout plan 1: Layout plan of the proposed Chowrasta Poura Bus Terminal with service building and fruit shop

3.5. Ownership of the subproject land

The Chowmuhani Municipality is the legal owner of the proposed land where the proposed Bus Terminal will be constructed. No land acquisition is required.

3.6. Present condition of the proposed subproject's site

The present condition of the existing bus terminal where the proposed subproject will be implemented is very bad. Water logging and muddy situation are prevailing all over the bus terminal. The driveways, parking lots and pavement within the bus terminal are out of service due to this water logging and muddy situation. Although the terminal building is moderate but the septic tank of the toilet, at a corner of the bus terminal is damaged. There is a boundary wall at three sides of the bus terminal keeping the front side open for the movement of vehicles. Sporadic solid wastes are found all over the bus terminal areas. Buses are parking here and there on the road sides in front of the bus terminal and there is no facility for washing the buses and changing oils and lubricants. During the rainy season, water clogging becomes too worst within the terminal areas and the passengers suffer a lot. There is a functional RCC drainage system at the south side of the bus terminal. The **Picture 1**, **Picture 2**, **Picture 3** and **Picture 4** show the present condition of different parts of the Bus Terminal.

Picture 1: Present condition of bus terminal

Picture 2: Present condition of bus terminal

Picture 3: Present condition of bus terminal

Picture 4: Present condition of bus terminal

The front side of the bus terminal is fully open and there is gate for entry or exit of the vehicles. There is no space for parking connecting vehicles to carry the passengers from bus terminal to main town and these vehicles are parking at the side of the main road resulting traffic congestion at the terminal areas.

At present, 308 buses, 246 trucks, 295 pick-ups, 134 private cars, 110 lorries, 196 covered vans, 1497 CNG driven auto rickshaws, 554 motorized rickshaws, 132 maxis, 457 easy bikes, 71 man-driven rickshaw and 51 vans move per day through the road in front of the bus terminal for carrying passengers and goods. Due to the unsuitable condition of the bus terminal, no vehicles except truck entered into the bus terminal.

3.7. Key components of the subproject

The construction of Chowrasta Bus Terminal requires a series of activities at three different stages namely pre-construction phase, construction phase and operational phase. The key activities to be carried out at pre-construction phase include: (i) dismantling of existing terminal building, (ii)

removal of debris and salvaged materials, (iii) removal of existing electric and water supply lines, (iv) providing temporary boundary wall/fencing, (v) providing temporary electric and water supply lines, (vi) construction of temporary separate labor sheds for men and women labors, (vii) construction of separate toilet facilities for men and women labors and (viii) construction of temporary office for supervision of construction activities.

The proposed Bus Terminal design should include the following components:

- Existing capacity and future demand estimation: In addition to operational requirements, terminal planning and designing should also factor in the estimates for existing capacity and future (horizon year) demand. The considerations for future expansion ;
- Wide station platform (5 to 6 meter wide) and open air to allow good air circulation;
- Multiple stopping bays (up to 4 buses can stop at the same time);
- Passing Lane to allow overtaking at stations;
- A special gate to allow wheelchair to enter into bus terminal;
- Tactile ground surface indicator/paving for visually impaired users;
- Lane separator with guard-rail;
- Real time passenger information system;
- A large area for parking buses;
- Good pavement quality;
- Vehicle cleaning and washing system;
- Maintenance and repair area (workshop);
- Administrative office for operators, and employee facilities;
- Ensuring planned and streamlined traffic circulation, and provision of amenities for passengers, rest areas, and other facilities for bus drivers, as well as workshop and workshop space for operators;
- Integrating multi-modal accessibility and feeder infrastructure: Integrating provisions for feeder modes—like cycle rickshaws, auto rickshaws, buses, private vehicles etc.—in the facility design, ensures improved accessibility and conflict free circulation. Planned allocation of space for such modes helps reduce delays, and improves level of service for passengers. The aim is to facilitate seamless transfers, in order to create the impression that the journey is continuous (and without breaks).

Primary elements to be considered with regard to a bus terminal's infrastructure development can be classified for three different user types. These include passengers, terminal staff and bus staff.

A. Passenger areas

- Ticketing and queuing;
- Passenger waiting areas;
- Passenger conveniences (drinking water facilities and toilets);
- Passenger circulation;
- Boarding/Departing areas;

- Facility entry;
- Tourist information;
- Security, including CCTV cameras;
- Dormitories and lodging (if required);
- Toilets (Male and Female);
- Concourse;
- Free Wi-Fi facility in waiting area;
- Eateries;
- Baggage trolleys.

B. Areas for terminal staff

- Revenue office;
- Security and information;
- Ticketing booths;
- Resting rooms;
- Staff conveniences (drinking water facilities and toilets);
- Canteen;
- Maintenance staff (chairs and lockers);
- Control room (CCTV surveillance).

C. Areas for bus staff

- Canteen;
- Resting areas;
- Lodging areas (if required);
- Bus staff conveniences (drinking water facilities and toilets).

Bus maintenance Facilities: This relates to the bus maintenance infrastructure at the terminal, and can be classified into two broad categories:

- On site - Maintenance/breakdown facilities are provided inside the terminal boundary. Provisions include reserved parking bays for breakdown vehicles, space for a mini workshop, room for tools etc
- Off Site – Maintenance/breakdown facilities are not provided inside the terminal boundary but sourced off site, usually to local, privately operated repair workshops in the terminal's vicinity.

In addition, the key activities of construction phase include: (i) layout and cast in-situ RCC piling works, (ii) earthwork and excavation for RCC pile cap, grade beam and column, (iii) construction of multi storied building with associated civil works, (iv) construction of separate toilets for male and female outside of main building, (v) construction of road pavement for passengers and vehicles, (vi)construction of water tank, septic tank and soak well, (vii) construction of solar energy facilities, (viii) electricity connection and other ancillary works and (ix) provision for workers' health and safety.

Further, the key activities of operational phase include: (i) collection and disposal of solid waste, (ii) management of waste water and its treatment, (iii) regular maintenance of drainage system surrounding the bus terminal, (iv) traffic control at the bus terminal and surrounding areas, and (v) safety and security of passengers at the bus terminal.

3.8. Technical components incorporations in the design:

It is revealed from the site visits and detail scrutinizing of drawings submitted by the Chowmuhani Municipality, the proposed sub-project would be beneficial to the citizens of the Municipality and will serve the purpose for which this is undertaken.

The followings are the findings:

a) Separate approach for Bus, Car, Light vehicle, and pedestrian provided.
b) Parking for rickshaws and light vehicle provided in the design but there is no provision for car parking in the design. There is scope to provide some parking which may be modified during the 'Good for Construction' set.
c) Total floor area and height of the building is within the permissible limit.
d) The HFL of the surroundings considered to determine the plinth level.
e) The entry to the terminal building is through a big linear drop off with shaded porch capable of sheltering cars and pedestrians during inclement weather.
f) The entry of the terminal is through a lofty, double height and commodious concourse, which is an essential part of design for building of this type. The area is naturally ventilated, measures of which has been properly taken and has also seating arrangements.
g) The concourse is flanked by ticket counters, in the form of rooms, for inter district coach services, to be rented out to different companies.
h) The followings facilities are in vantage points and easy accessible from concourse: Information desk, Security, ATM booth and Fire control room. There are also several shops/ concessions proposed in the ground floor.
i) Toilet both male and female along with a disable one and janitor closet provided in the ground floor.
j) Two drinking water fountain proposed in ground floor.
k) In total six number of bus bays, three on each side, may be classified as arrival and departure, with side platforms, to function properly and provide ease to the users. All these bus bays are covered with a metal shed to assure convenience to the users and make usable through-out the year.
l) Several bus ticket counters for local services proposed in the design.
m) Provision of two stairs provided to serve the upper floors.
n) The width of the stairs satisfies the code.
o) The building is naturally ventilated and appropriate measures are taken to function accordingly.
p) The building is barrier free only at ground floor. Since the plinth is just 150 mm high from the drop off level instead of a ramp a slope will be sufficient. The upper floors of the building are not accessible, since there is no provision for elevator.
q) Provision for garbage collection point proposed to construct with accessible by garbage collection van.

r) Prayer area with ablution, terminal office, Bus owner's union office, restaurant with kitchen and other utilities and bus counters provided in first floor.
s) Leasable commercial area with dedicated toilets provided in second floor.
t) The yard is designed in such a way to assure easy movements of bus, with facility for ingress and egress. Though this is not a terminus, halting facility of twelve buses also proposed in the site plan in case of exigency.
u) The roof has adequate area to place solar panel to satisfy electrical code, which needs to be provided.
v) A yard to capable service and repair two buses simultaneously has been provided at the back, eastern side of the site.
w) A spare parts market along with toilets provided for bus drivers in the service building.
x) The first floor of the service building has a dormitory for the bus drivers/ security personnel along with dining facility.
y) The fruit market is a small single storied market, naturally ventilated, under a metal shed with thirty two fruit shops.
z) The project being annex of the bus terminal, the site is also small in nature, with an approach road of 5 m wide and most of the customers will be pedestrian, no separate parking has been considered for the market.
aa) The main entry is from north and two existing entry from adjoining market from south being maintained for access to the customers.
bb) The width of the corridors are wide enough to comply BNBC and BMDF design guidelines.
cc) Provision for loading/ unloading bay proposed in the design.
dd) The garbage facility proposed adjoining to the loading bay.

3.9. Category of the subproject

Environmental Screening (ES) for the Chowrasta Bus Terminal has been conducted with the purpose of fulfilling the requirements of Government of Bangladesh (GOB) and the World Bank (WB). Environmental Screening ensures that environmental issues are properly identified in terms of extent of negative and positive impacts. Environmental Screening Checklist, as adopted in Appendix C of the Environmental Management Framework (EMF) of the MGSP, was administered for identifying the impacts and their extents.

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

There is no name of Bus Terminal in the ECR 1997 of DoE. Considering the environmental impacts, the construction of Chowrasta Bus Terminal can be considered as Orange B as per ECR-97*(Multistoried Commercial Building)*. According to the WB classification, it is of Category B.

3.10. Analysis of alternatives

The analysis of alternative of the subproject is done from three main perspectives such as location, design and technology or method of construction. The analysis of alternative of the subproject is given as below:

(a) Analysis of alternative location

Table 3-1: Analysis of alternative location

Location	Advantage	Disadvantage
Alternative 1: Poura Bus Terminal	▪ Located at main business area of Chowmuhani Bazar. ▪ No land requisition is required. ▪ There is no tree to be felled down. ▪ The land is owned by the Municipality.	▪ Inadequate size of land for vehicle movement and other necessary facilities. But there is no available additional land to be acquired. ▪ Requires movement of vehicles to bus terminal through the main town that may causes heavy traffic congestion in the main town. ▪ Replacement of existing shop owners is required.
Alternative 2: Chowrasta Bus Terminal	▪ Located near the chowrasta crossing which is the key area of vehicle movement. ▪ There is no tree at the terminal areas. ▪ Have adequate size of land for vehicle movement and other necessary facilities. ▪ No need to move the vehicles through main town which will reduce traffic congestion.	▪ Traffic congestion at terminal area.

- No land acquisition is required.
- No need to construct any bypass to avoid traffic congestion at the main town.
- No replacement is required.
- The land is owned by the Municipality.

Selected location: **Alternative 2.**

(b) Analysis of alternative design: A user-friendly design is required for constructing of bus terminal at any alternative locations of the Chowmuhani Municipality. The proposed RCC frame structure and herringbone bond design will cover all the expected facilities as desired by Chowmuhani Municipality.

(c) Analysis of alternative technology or method of construction: Reinforced Concrete Cement **(**RCC) construction costs are higher than herringbone bond (HBB). On the other hand, during repairing of RCC work at bus terminal premises will take longer time than the HBB option. HBB terminal will have low cost and will take less time for repairing than RCC. However, the proposed bus terminal will have a three-storied terminal building, so mixed structure (HBB, RCC and steel truss) is prepared.

(d) No subproject scenario: If subproject like proposed Chowrasta Bus terminal is not implemented, the existing traffic congestion in the bus terminal area will further aggravated with time. The proposed bus terminal, locating at the entrance of the Municipality and adjacent of the main road**,** will serve as key transportation point of all parts of the greater Noakhali region. The absence of suitable bus terminal is severely affecting the transportation of people and goods with the Chowmuhani Municipality as well as the other Upazilas / Districts from all other parts of the region.

(e) Conclusion: The Chowrasta Bus Terminal at the end of the northern side of the Chowmuhani Municipality is then finally selected by the Chowmuhani Municipality authority.

3.11. Estimated cost of the subproject

The estimated cost of the proposed Chowrasta Bus Terminal is BDT 100 million.

3.12. Schedule of implementation

The proposed subproject will be started on October 2018 and will be completed by the end of December 2019. Therefore, the subproject will be implemented within a period of 15 months.

4. BASELINE ANALYSIS OF ENVIRONMENTAL CONDITION

4.1. Physicochemical Environment

4.1.1.Important environmental features

Important environmental features in influence areas (1 km around the subproject site) were observed through field observation. Detail observation and assessment were made on identified key environmental features like drainage congestion, waste water discharge, solid waste disposal and management, water contamination, air pollution, soil degradation, odor spreading around and traffic movement etc. in and around the catchment or influenced areas of the sub project. Moreover, land use pattern of the influence areas were also observed and found human settlement, offices, commercial establishments, health care facilities, educational institutions, landfill, ponds and agricultural lands as depicted **Table 4-1** as given bellow. As an essential ingredient, an engineering and topographical survey was done which might require minor adjustment during the construction phase.

Table 4-1: Land use and important environmental features around one kilometer distance from the proposed Bus Terminal

Sides/Direction	Important Environmental and Infrastructural Features
North	Sweeper colony, Bangladesh Small and Cottage Industries Corporation (BSCIC) industrial area, Rural Electrification Board (REB) Office, Noakhali khal, Temporary solid waste dumping ground of the Municipality, Jamaipara, Truck terminal, Noada-Sonaimurhi khal, Rashedia madrasa, Gonipur residencial area, Agricultural land, Fecal sludge management plant, Permanent solid waste dumping ground and Agricultural land.
North-West	Kalapole khalparh residential area, Abdul Malek Ukil Medical College, Agricultural land, Globe agrovat, Miroarishpur residential area, Government primary school and Mosques (3).
West	Laksam road, Power Grid Company of Bangladesh (PGCB), Power Development Board (PDB), Textile Engineering Hostel, Samsher Ali Darbesh Majar, CNG filling station, Central community center, Uttar Nasirpur residential area, and Agricultural land.
West-South	Chowrasta Jamemasjid, Apon Nibash Housing, Zilla Parishad Market, Begumganj Cultural Academy, Jalal Uddin College, Begumganj Upazilla Complex, Food Go-Down, Begumganj Thana Complex, and Mosques (2).
South	Chowrasta Hakars' Market, Poura Kitchen Market, Feni Road, Government Technical High School, Pourabhavan, Begumganj Dighi, Textile

	Engineering College, Noakhali Public School, Begumganj Court Complex, TSC, Kasemmiar Housing, Doctors' Para Housing, Aponnibash Housing, Alipur Residential Area, Agricultural Land, Jainal Abedin Memorial Academy, and Government Primary School.
South-East	Upazilla Health Complex (10 beded), Poura Grave Yard, Karimpur Residential Area, Noakhali Rail Line and Hazipur Residential Area.
East	Water Treatment Plant, Poura Mahashasan, Kuripara Residential Area, Kuripara Kali Mondir, J.K. Model Primary School, Mosques (2), Noakhali Khal, Begumganj Stadium, Begunganj Pilot High School, Delta Jute Mills, Gonipur Residential Area, Fire Service and Civil Defence Station, Banijja Bitan Bus Terminal, Hakars' Market, Chowmuhani Public Hall and Morshed Alam Complex.
North-East	Part of BSCIC, Noakhali Khal, Nadana-Sonaimurhi Khal, Ganipur Residential Area, and Agricultural Land.

4.1.2. Transportation facilities, road network and traffic volume

Railway and road are the major mode of transportation in the Municipality. There is no waterway within the Municipality and its surrounding areas. There are 3.78 km railway track that passes through the center of Chowmuhani Bazar. The rail network has connected Chowmuhani Municipality with Laksham, Maijdee and the rest of the country. There is about 0.5 acres railway terminal in Chowmuhani Municipality near Chowmuhani Bazar.

According to the Municipality sources, the length of the total road of the Municipality is 134 km amongst which 45 km pucca road, 59 km cement concrete road, 0.25 km semi-pucca road and 29.75 km kutcha road. Besides, the Municipality has 17 bridges and 78 culverts. In addition, there are 7.85 km road which is under R&H connecting Feni, Maijdee, Sonaimurhi and Laxmipur. There are one central bus terminal, two town level bus terminals, seven CNG stands and 26 rickshaw stands in the Municipality area. The proposed subproject is the improvement of central bus terminal.

Two major roads that pass through the heart of the Municipality form an intersection at the center of the town known as Zero Point or Chowmuhani Chowrasta. The intersection at Zero Point makes four routes at four different directions. The four routes coming from different directions are: Laksham-Sonaimurhi from North, Maijdee-Sonapur from South, Feni from East and Laxmipur from West. The Maijdee-Chowmuhani road from South and Feni-Chowmuhani road from East constitute Noakhali-Feni National Highway. The Laxmipur-Chowmuhani road and Begumgonj-Sonaimurhi-Ramgonj road are the Regional Highways meet at Chowmuhani from West and North respectively.

Both motorized and non-motorized vehicles are operated in all the roads of the Municipality. The motorized vehicles are mostly inter-district passenger buses carrying passengers from greater

Noakhali to Dhaka, Chittagong, Sylhet, Rajshahi, Ranpur and Khulna divisions, and trucks and lorry mainly carry agro and industrial products. In addition, CNG driven auto rickshaws, private cars, motorcycles and battery-engine driven rickshaws are operated within the Municipality areas to meet the local demand. The non-motorized vehicles mainly man-driven rickshaws and vans are operated mainly short distance and meet the local demand for carrying passengers and goods. (Source: Field Survey, 2018)

4.1.3. Climate

Lying South of the tropical of cancer, the Municipality enjoys typical tropical monsoon climate with a very high humidity throughout the year. It is distinguished by its heavy rainfall and even temperature. In a year, there are three well marked seasons: winter from November to February, summer from March to May and rainy season from June to October. (Source: Master Plan of Chowmuhani Municipality, 2013)

The **rainfall** data of Chowmuhani Municipality is represented by that of Noakhali. The monthly average rainfall always lies between 200 mm to 300 mm. (Source: Master Plan of Chowmuhani Municipality, 2013)

The **humidity** is very high throughout the year, never falling below 70 per cent. Taking the district as a whole, the annual percentage of the humidity is 83.4. Generally, the lowest humidity, that is 75 per cent, is recorded in the months of February and April, and the highest, that is 89 per cent, is recorded in July and August. (Source: Master Plan of Chowmuhani Municipality, 2013)

The normal minimum **temperature** of the Municipality lies between 13.5^0C and 25.6^0C whereas the coldest month is January. On the other hand, the maximum average temperature lies between 25.5^0C and 32.3^0C whereas the hottest months are of April and May. (Source: Master Plan of Chowmuhani Municipality, 2013)

The whole district is particularly free from **drought**. However, it is a land of annual inundation of the rivers. But, water subsides rapidly and the damage caused is not very high. The whole Noakhali district including Chowmuhani Municipality often faced **cyclones and floods** from the ancient times. The remarkable cyclones that occurred in these areas around the liberation of the country are in the year 1960, 1961, 1963, 1965, 1966, 1968, 1970, 1988, 1991, 1997 and 2008 overflows vast tracts, drowning men and cattle, destroying crops and often leaving them a residue of salt which interferes with cultivation for some times. (Source: Master Plan of Chowmuhani Municipality, 2013)

4.1.4. Topography and drainage

The Chowmuhani Municipality is mainly medium highland excepting some low lying strips including canals. Generally much of the Municipality area is under agricultural area characterized by crop production. However, a significant portion of it is urbanized with scattered clusters. Here, the road level is not very high than the surrounding areas except Noakhali-Feni National High Way

and Lakshmipur-Sonaimurhi/Laksam road passing through the heart of Chowmuhani Municipality. The height of the road varies from 1 meter to 3 meters compared to the adjacent lands. Land level survey shows that almost all areas of the Municipality has an average RL of 3.75 mPWD. These areas are free from normal flood. Only minor water logging is occurred during the rainy season that does not stay for long.

The lowest spot height is +1.81 mPWD at Ward number 01 and the highest spot height is +9.45 mPWD at Ward number 04 in Chowmuhani Municipality. Average land height of the Municipality is +3.75 mPWD.

The drainage system of the Municipality can be classified into two parts namely natural and man-made drainage system. The natural drainage system, comprising the natural khals, has fall into nearby or far off rivers. Natural khals act as primary drain and drain out all storm and domestic water which finally discharged into Dakatia River which is the nearest river of Chowmuhani Municipality and meets with lower Meghna at 15 to 20 km down to south. Existing 33.35 km natural khals and 1657 large ponds and ditches act as the local outfalls of the existing available drain. These also serve as storage and retention area for storm water during rainy monsoon.

The man-made drains are constructed by the Municipality and a total of 12.442 km drain in Municipality area is used to collect waste water from residential areas and commercial establishments.

4.1.5. Geology and soil

The Tripura Hills of India that spurs project into the east of the Noakhali district are of upper primary (Pleistocene) formation and generally of dull reddish color. Unconsolidated sediments underlie the rest of the district. They are mainly recent and sub recent in age. The major part of the new flood plain sediment was deposited by the old Brahmaputra River that charged its course to the west of the Madhupur Tract some 200 years ago. The rest of the sediments were laid down principally by the Meghna River and by minor rivers draining from the Tripura Hills. Silt and clay sized particles predominate in most sediment. The southern part of the district where the Chowmuhani Municipality lies, has recent tidal sediments that are mainly silty in nature.

Almost all soils have young alluvial sediments of recent origin. The soil consists admixture of sand and clay in varying proportions. They occupy very gently undulating topography consisting of broad low flood plain ridges and shallow basins. Most ridge soils are silty which occur clays in the basins. The soils are seasonally flooded, mainly by rain water, but all, except a few basins, soils become dry during the summer. The range from olive to dark grey in color and most are finely mottled, but mainly become acid when dry. Lower layers are mainly neutral to moderately alkaline in reaction with young tidal sediments and soils in the south and south-west are slightly calcareous and some are saline to vary degree. All soils appear to be rich in weather able minerals.

4.1.6. Hydrology and water resources

There are a numbers of small khals within the Chowmuhani Municipality that drains out the storm and other water generated from households and commercial establishments. The khals are Noakhali khal, WAPDA khal and Chatarpaya khal which act as the natural drainage of the Municipality. These khals are linked with Bay of Bengal through Dakatia and Meghna rivers. Most of the portions of the khals have lost their navigability due to sedimentation and narrowing by unauthorized encroachments. The total volume of the natural khals is 89.15 acres. In addition, there are 1657 ponds and ditches covering an area about 569.53 acres. These serves as storage and retention area for storm water during monsoon. (Source: Master Plan of Chowmuhani Municipality, 2013)

4.1.7. Air quality and dust

The Chowmuhani Municipality is one of the most developed area and many activities are performed inside the Poura areas. In the peak period, it remains very busy. The bazar and the market places remain over crowded in most of the time of the day. The profile of the Municipality is mainly urban area, which has mix of semi-densely settlements and commercial areas. The major sources of air pollution noted within the area include normal vehicular pollution in roads as well as commercial activities, and domestic emissions. In some areas, poultry and livestock farming is observed that causes air pollution. In addition, some major industrial activities are also reported in the area. Energy supplies are not good in the area, and therefore, diesel-fired small power generating sets are common in the urban areas of the study area. There are no dust preventive measures and technologies in Municipal area. Moreover, to evaluate the existing condition of air quality, contractor will perform the air quality test prior to construction. Following **Table 4-2** shows the Bangladesh National Ambient Air Quality Standard comparing the WHO Guideline standard.

Table 4-2: 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	.5				

4.1.8. Noise level

Particular areas adjacent to the main roads have some noise pollution created by the movement of heavy vehicles near Chowrasta bus terminal, Hakar's Market, Zero point, Chowmuhani bazar, etc. In these locations, traffic congestion is very high which creates noise pollution in the town. As a part of the baseline study, noise level measurement was done at different locations inside and around the proposed subproject site. The purpose of ambient noise level measurement is to determine sound intensity at the subproject locations. Noise level measurement was performed during daytime with a sound level meter. The 2-minute continuous noise level measurements were carried out at the selected locations in 'A' weighting and slow response mode with 1 sec interval, and the average noise levels (L_{ave}) as well as the maximum noise levels (L_{max}) were determined. **Table 4-3** and **Table 4-4** show the summary of noise level measurements carried out in different locations in and around the study area during daytime and nighttime respectively. The tables also show the Bangladesh noise level standards for mixed areas during daytime and nighttime.

Table 4-3 : Noise level measurements during daytime at the selected locations of the bus terminal

Noise level measurement locations	GPS Co-ordinate	Day-time		Bangladesh standard for mixed areas (dBA),L_{max}
		Average Noise level (dBA),L_{ave}	Maximum Noise level (dBA),L_{max}	
Outside of Bus Terminal (North)	$22^0 56' 47.4''$ N $91^0 6' 19''$ E	51.8	65.7	60
Outside of Bus Terminal (South)	$22^0 56' 46.8''$ N $91^0 6' 18.8''$ E	55.4	70.9	60
Outside of Bus Terminal (East)	$22^0 56' 46.3''$ N $91^0 6' 19''$ E	57.0	71.0	60
Outside of Bus Terminal (West)	$22^0 56' 47.2''$ N $91^0 6' 17.2''$ E	79.2	87.0	60
Inside the Bus Terminal	$22^0 56' 47''$ N $91^0 6' 19''$ E	52.6	66.2	60

Source: Field Survey, June 2018

Table 4-4 : Noise level measurements during night time at selected locations of the bus terminal

Noise level measurement locations	GPS Co-ordinate	Night-time		Bangladesh standard for mixed areas (dBA),L_{max}
		Average Noise level (dBA),L_{eq}	Maximum Noise level (dBA),L_{max}	
Outside of Bus Terminal (North)	$22^0 56' 47.4''$ N $91^0 6' 19''$ E	47.4	59.9	50
Outside of Bus Terminal (South)	$22^0 56' 46.8''$ N $91^0 6' 18.8''$ E	45.3	55.0	50
Outside of Bus Terminal (East)	$22^0 56' 46.3''$ N $91^0 6' 19''$ E	45.8	55.6	50
Outside of Bus Terminal (West)	$22^0 56' 47.2''$ N $91^0 6' 17.2''$ E	64.6	77.2	50
Inside the Bus Terminal	$22^0 56' 47''$ N $91^0 6' 19''$ E	46.3	57.6	50

Source: Field Survey, June 2018

4.1.9. Water Quality

The surface water of pond and khals in the Municipality is free from salinity. The ground water level is found between 40 ft to 50 ft during dry season and 30 ft to 35 ft during wet season. The ground water contains excessive of Iron and Arsenic (Source: DPHE, Chowmuhani 2009). It is reported that nearly 60% of the tube wells are arsenic contaminated and the provision of tube well is not possible because of the presence of salinity in the ground water at the power level. The sources of surface water (ponds, khals and ditches) are contaminated by industrial waste, domestic waste, human waste and extensive use of fertilizer in the agricultural lands. However, the drinking water supply through the treatment at different water treatment plants shows different results. The result of water quality test of the Municipality is given in **Table 4-5** as below:

Table 4-5: The results of water quality parameters

Sl #	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis method	LOQ
			GW			
01	Arsenic (As)	0.05	<0.001	mg/L	AAS	0.0001
02	Chloride	150-600	0	mg/L	Titrimetric	0.5
03	Coliform (Faecal)	0	0	N/100ml	MFM	0
04	Iron (Fe)	0.3-1	0.82	mg/L	UVS	0.1
05	Manganese (Mn)	0.1	<0.01	mg/L	AAS	0.01
06	pH	6.5-8.5	7.52	-	pH Meter	-

(Source: DPHE, 2018)

The urban dwellers of the Municipality mainly depend on Ground Water. The ground water extracts by the Municipality by deep production well and supplied by pipe water supply system after treatment in Water Treatment Plants. In some cases people install hand tube well for fulfilling their domestic requirements.

4.1.10. Traffic situation at the proposed bus terminal areas

Based on the interview with the lineman, it is found that 503 inter-district buses , 75 intra-district or local buses, 100 maxis, 5000 CNG driven auto rickshaws, 1000 easy bikes, 70 micro-bus and 600 motorized rickshaws move through this road in front of bus terminal and use this point as transit. In addition, for assessment of traffic intensity, a traffic survey was conducted to find the movement of vehicles per day in front of this bus terminal. A day-long, from 6:00am to 9:00pm, traffic survey was conducted for this study and it is reported that 308 buses, 246 trucks, 295 pick-ups, 134 private cars, 110 lorries, 196 covered vans, 1497 CNG driven auto rickshaws, 554 motorized rickshaws, 132 maxis, 457 easy bikes, 71 man-driven rickshaw and 51 vans move

through the road in front of the bus terminal. Due to the unsuitable condition of the bus terminal, no vehicles except truck entered into the bus terminal. Most of the vehicles halt beside the road, and drop passengers here and move towards the destination. The **Table 4-5** shows the detail traffic survey result at the bus terminal area and other one area which is given as below:

Table 4-5: Details of traffic survey at the bus terminal area

Location	Direction of movement	Bus	Truck	Pick-up	Easy bike	Maxi	Motorized rickshaw	Man-driven rickshaw	Van	Motor cycle	Auto Rickshaw (CNG)	Private car	Lorry	Covered Van
Chowrasta Bus Counter	Incoming	273	243	260	528	162	544	79	53	413	1448	239	116	210
	Outgoing	342	248	330	385	101	563	63	48	522	1545	29	104	182
Average		**308**	**246**	**295**	**457**	**132**	**554**	**71**	**51**	**468**	**1497**	**134**	**110**	**196**
Abdul Malek Ukil Medical College	Incoming	258	225	257	305	0	338	36	37	442	621	119	62	235
	Outgoing	344	254	351	275	98	286	75	43	331	925	269	18	196

4.2. Biological Environment

4.2.1. Floral habitat and diversity (terrestrial and aquatic)

The plant life is confined generally to variations belonging to the lower gangetic plane and of other districts in the southern region of the country. There is no organized forestry in the district. However, all homesteads are usually covered by dense and lush green foliage of wide variety of trees. In the farmlands varieties of crops namely local Hybrid and HYV rice, jute, vegetables, spices, pulses, oilseeds, etc. are produced.

Most of the trees grown in homestead forests are fruits bearing. Mangoes, although poor in quality, grow in abundance. Almond or badam (Arachis hypogea) grow in unusually. Other common trees are gab (*Dioaspyros precatorius*), jack fruit *(Artocarpus heterophyllus),* black berry *(Syzygium cumini),* tamarind *(Tamarindus indica),* jalpai (*Elaeocarpus tectorius*), bel (*aegle marmelos*), chalta (*Dillenia indica*), boroi, guava (Psidiumguagava), etc. banana (Banana musa sapientum) is seen almost everywhere but their quality is rather poor. Litchi (Litchi chinensis), Kamranga (Averrho karmbola), ata, haritaki (Terminalia chebula), amloki (Phyllanthus emblica), etc. grow abundantly. Indigenous timber trees include koroi, sheel koroi *(Albizia procera*). garjan(*Dipterocarpus turbinatus),* jarul (*Iegerstroemia speciosa*), shimul (Bombax ceiba), etc. however, various exotic trees like teak, mahagoni(Swietenia macrophylla), sissu (Dalbergia sissoo), etc. have been in produced as wayside trees as well as farm forestry.

The luxuriant growth of palms is the most characteristic feature of the vegetation. Supari (Areca catechu) plantations are more and more abundant towards the north and the west of the district and grows almost in forest. Cocoanuts are grown abundantly throughout the district. Toddy palms or tal *(Borassus flabellifer)* and date palms or khejur are also very common.

Shady trees include banyan or bat *(Ficus benghalensis),* pipal *(Ficus religiosa)* and nim *(Azadirachta indica).* There are several varieties of cane, a good deal of bamboo of different varieties and thatching grass or chhan although their plantations are gradually decreasing steadily.

4.2.2. Faunal habitat and diversity (terrestrial and aquatic)

Owing to the absence of organized forest and other natural conditions, any kind of large or medium carnivores are no longer seen in the district. However, the following mammals are still seen the district although their number is gradually decreasing: jackel *(Canis aureus), f*ox *(Vulpes bengalensis),* large Indian civet or bagdas *(Viverra zibetha),* ottar or ud *(Lutra lutra),* lrrawaddy, kat biral *(Callosciurus pygerythrus),* bengal mongoose or beji *(herpestes edwards),* different kind of rats and several species of bats.

Almost all varieties of birds that are seen all over Bangladesh are also commonly seen in Noakhali. Many kinds of clourful and singing birds are seen in the district. These include the national bird robin magpie *(Copsychus saularis), k*okil *(Cuculus microplerus),* halde pakhi *(Oriolus xanthornus),* kingcrow or finga *(Dicrurns adsimilis),* myna *(Sturnus malabarica),* shalik *(Acridotheres tristis)),* redvented bulbul *(Pycnotus cafer),* tuntuni *(Orthotomus sutorious),* shama *(Copsyehus malabaricus),* sparrow *(Passer domesticus),* flowerpecker *(Dicacum erythrochynchos),* babui(Plocus phillippinus) *famous for artistic nest building on the* several species of pheasants quails (Eudynamis scolopscea), pigeons and doves.

The reptiles include different species of snakes, lizards and tortoises. The snakes include different varieties of cobra, urgabora, dughadabora, kuchiabora and jinlabora, all poisonous. The lizards include gecko, calotis, wall lizard and monitor lizard. There are amphibnians like toad, frogs and tree frogs.

There are many species of sea and fresh water fish available in the district. The list of the varieties is too long to find place in this volume. The popular varieties include the carp tribe *(Cyprinidoes),* ruhi *(Labeo rohita),* katla *(Catla catla),* mrigel *(Cirrhinus mrigala)* and kalabaush *(labeo* calbasu). airh (Mystusaor), tengra (Mystus vittatus) of several types, magur (Clarias batrschus), singi (Saccobranchus *fossilis)* and koi *(Mystus vittatus)* are considered to be delicious, shoul *(Channa striatus),* boal *(Wallago attu), g*azar *(Channa marulius)* and pabda (Ompok pabda) are available in abundance. Prawn, cry fish *(icha)* and crabs are also found muralla, punti, khoksha, bain and chela are small fish and are found all over the district in abundance.

Exotic fishes like grass carp *(Cteopharyngoden idellus),* silver carp *(Hypophthal micthys molitrix),* telapia *(Oreochromis mossambicus),* nilotica *(Oreochromis niloticus),* etc. have also been introduced for commercial pisciculture in ponds and tanks.

4.3. Socioeconomic Environment

4.3.1. Status of land use pattern, housing and built-up infrastructure

According to the Master Plan of the Municipality, the highest land use of the Municipality goes to agricultural (39.65%). The second major land use is residential area and it occupies about 31.17%

of the Municipality areas. Besides, there are about 16.82% water bodies, about 2.92% circulation network, about 2.47% commercial establishments and otherwise about 1.65% lands are being used for education, green space, recreational facilities etc. In addition, vacant land is significance in percentage (2.36%).

According to the Population and Housing Census 2011, the highest percentage of general households by type of structure of the Municipality is kutcha (49.6%). The percentage of other general household by the type of structure of the Municipality are 26.3% percent semi-pucca households, 23.5% pucca households and only 0.7% jhupri households.

In addition, the average household size of the Municipality is 5.4. The percentage of tenancy of households in the Municipality area shows that 65.4% people live in own house, 32% people live in rented house and 2.6% people live in rent free house.

There are also markets, shops, educational institutes, private and government offices, business establishments, industries etc in the influence areas of the subproject.

4.3.2. Beneficiary population

All the people living in Chowmuhani Municipality will be benefited by the bus terminal. Therefore, a total of 117000 people of the municipality will be benefited just after the construction of the bus terminal (Municipality Data, 2018). Considering the current average growth rate of population in urban areas of the country as 3.2 percent per year, the estimated number of the people of the Municipality will be 191880 in 2031 and 266760 in 2041. All these people will be benefitted from the proposed bus terminal. In addition, a significant number of people who will be travelling from the different parts of greater Noakhali through this bus terminal to different parts of the country will also be benefitted.

4.3.3. Educational status

As per the Population and Housing Census 2011, the literacy rate among the people aged 7 years and above of Chowmuhani Municipality is 67.2. The literacy rate among the male is higher than the female. The literacy rate among the male is 68.3 whereas it is 65.9 among the female. There are four colleges (one government and three non-government colleges), eight high schools (two government and six non-government schools), 29 primary schools (15 government and 14 non-government primary schools), 30 madrasas, one textile engineering colleges, two technical institutes, one technical school and college, one art school, one cultural academy, one public hall, one Fazil madrasa, and one agricultural training institute which are providing educational supports and services to the inhabitants in Municipality areas.

4.3.4. Livelihood and economic situation

In Chowmuhani Municipality, only 2.21% people are engaged in agricultural activities including farmers and laborers for their livelihood although 39.65% of the Municipality area is under agriculture. Among the male income earner, over 24.65% are engaged in trading, 7.58% are

working in private company, 2.06% are labor, 1.25% are in public services and 2.21% are day labor (agriculture).

The Municipality is well known for industrial establishments in Noakhali region. Delta Jute Mills is the largest and oldest individual industry. The second largest industrial establishment is BSCIC. Besides, other small and processing establishments include Oil Mills (7), Printing Press (20), Rice Mills (40), Flour Mills (27), Ata Mills (15), Saw Mills, small scale factories etc.

The commercial activities of the Municipality are dominated by both wholesale and retail business. The Municipality is the largest wholesale market of the region. The major part of trade and commerce of the Municipality is conducted through hat/bazar where agricultural produces, consumer items, merchandise for household and other farm and non-farm items are traded. The market/bazar performs significant role in the economy of the Municipality.

4.3.5. Land acquisition and resettlement

The land of the subproject site is legally owned by Municipality. Hence, land acquisition is not required. However, there is an existing Bus Terminal which will be improved keeping the terminal building untouched and demolishing some semi-pucca structures. There are no shops found during field survey by the Consultant.

4.3.6. Tribal communities

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

4.3.7. Cultural heritage and protected areas

Within the influence area of the subproject, there is no protected area and no important historical sites identified during the field visit.

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. A participatory approach is followed in identifying the impacts and the list of participants who attended in the screening exercise is attached as **Annexure 1**.The screening data and information for the **Chowrasta Poura Bus Terminal** with allied works have been formulated and are shown as below.

5.1. Potential Environmental Impact during Construction Phase

(A) Ecological Impacts:

- Felling of trees : Significant □ Moderate □**Minor** □√
  Number of trees : 0
- Clearing of vegetation : significant□ Moderate □**Minor** □√
- Potential impact on aquatic species environment : Significant □ Moderate □**Minor** □√

The proposed bus terminal will be constructed at the place where there is an existing bus terminal. There is no tree in the terminal areas even in the areas to be extended. There is no vegetation to be cleaned. There is no water body adjacent to the proposed bus terminal.

(B) Physico-Chemical Impacts:

- Noise pollution : Significant □**Moderate** √□Insignificant□
- Air pollution : Significant □Moderate □**Insignificant**□√
- Drainage congestion : Very likely □**Likely**□√Unlikely □
- Water pollution : Significant □**Moderate**□√Insignificant □
- Solid waste pollution :Significant □**Moderate** □√Insignificant □
- Construction wastes : Significant □**Moderate**□√Insignificant □
- Water logging : Significant □Moderate □ **insignificant** □√

The subproject will have temporary and localized negative impact on physico-chemical environment during construction and operational phases due to the dismantling of existing structures, movement of vehicles for carrying construction materials and equipment, and using of welding and drilling machine, pile rig, winch machine, concrete mixer and vibrator machine etc. The anticipated impact on noise is considered as moderate as there are some residential houses. Construction activities such as transportation of sand, stones, brick cheeps, debris etc will generate dust that may cause air pollution and anticipated impact of it is considered as minor. Construction activities will also generate solid wastes due to removing of existing one storied building that have

temporary and localized impacts on drainage system if not properly re-used and or disposed-off. Since the mostly HBB construction work will be covered in the dry season, hence the probable drainage congestion and water logging that can occur during earth cutting for HBB and excavated for foundation building from erratic rainfall is minor. In addition, there is well constructed and functional drain around the proposed site which will ensure the removal of storm water and reduce the chance of water logging and contamination of adjacent water bodies. Primarily, the subproject will have no adverse impact on the other physicochemical components. Moreover, proper silencer and muffler are to be used in all categories of machineries to be used during construction period to avoid uneven sounds.

(C) Socio-Economic Impacts:

- Traffic congestion **: Likely** □√ Unlikely □
- Health and safety : Significant □ **Moderate** □√ Insignificant □
- Impact on archaeological : Significant □ Moderate □**Insignificant** □√
- Impact on historical : Significant □ Moderate □ **Insignificant** □√
- Employment generation : Significant □ **Moderate** □√ Insignificant □

Due to transportation of the construction materials and equipment as well as debris to be produced during pre-construction and construction phases, the subproject will have likely temporary negative impact in traffic congestion. So proper traffic management is required during pre-construction and construction phases. However, it is anticipated that the subproject activities will have moderate impact on the local traffic system. Demolition of the toilet, building work will be performed with the conventional equipment and skilled labor. Hence, anticipated impact on health and safety is considered as moderate. However, in case of any accident such as falling from the height during brick work, plastering work, painting work, glass fitting work etc. may cause severe impact on health and safety. So, personal protection equipment use will minimize the impact. There is no archaeological and historical site within the influence area. Further, it has moderate positive impact by generating employment opportunity for the local people as labors for construction of works will be hired locally and there is a chance of installing different kind of shops, restaurants etc around the subproject site .

5.2. Potential Environmental Impact during Operational Phase

(A) Ecological Impacts:

- Potential impact on species of aquatic : Significant □ Moderate □**Minor** □√

During operational phase, the subproject activities do not have any likely impacts on the surrounding ecological environment. There will be a well-constructed drainage system surrounding the subproject site.

(B) Physico-Chemical Impacts:

- Potential air quality & noise level : Improvement □√**No-improvement**□ Deterioration □
- Drainage congestion : Improvement □ Minor Improvement □√**No Impact** □
- Risk of water pollution : Significant □√**Moderate**□ Minor □
- Pollution from solid waste : Improvement □√ **No-improvement**□ Deterioration □

During operational phase, there is no such possibility to improve the air quality, noise pollution due to public gathering and use of hydraulic horn in vehicles which may create moderate noise nuisance to the passengers and pedestrians. As there is a provision of managing solid waste to be generated at the bus terminal is in design and there is a well-constructed RCC drain around the bus terminal, so there may have no chance for drainage congestion. However, proper management of solid waste using waste bins, collecting waste from bins and disposal of waste at landfill, and maintenance of drainage system to be ensured during operational phase. If the waste bins are not used properly and wastes are thrown here and there may pollute the surrounding environment. In addition, as the waste water with oil and lubricants to be generated from washing of vehicles will be discharged at running river through storm drain may moderately pollute water.

(C) Socio-Economic Impacts:

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

The bus terminal have a provision of proper traffic management in place which will have significant positive impact on reducing traffic congestion at the bus terminal as well as surrounding areas. However, it may create traffic congestion due to improper parking of the vehicles and ignoring of the traffic rules. So, proper traffic management plan is required during operational phase. In addition, the bus terminal should have a provision of proper security system with CCTV camera in and around the terminal and will have residential facilities for the passengers travelling to distance place which will improve the security and safety of passengers. However, during operational phase, possible accidents and social risks due to causalities at terminal, fire hazard, short-circuit and other vulnerability may also have negative socio-economic impacts. The bus terminal will have significant positive impact by providing job and business facilities and resource mobility. There is a provision of establishing different types of shops at the terminal building in order to meet the demand of huge numbers of passengers to be travelled through this bus terminal.

5.3. Summary of Possible Environmental Impacts of the Subproject

The ecological impact is not significant due to the construction activities but there will be some impacts on the physico-chemical parameter of environment during construction period. Generation of solid waste during construction works may temporarily pollute the surrounding environment and may create localized hazards. The anticipated impact on physicochemical components is

mainly site specific and will be within the bus terminal boundary. Also, during construction phase, any failure of mechanical equipment may cause severe accidents to the workers. The generated waste (from any means) shall be managed in proper way. There may be some problems, like use of hydraulic horn by drivers during Operation Phase.

Wastes generation from leakage of fuel, scrap and used tires & tubes from vehicles at terminal are significant issues which should be handled and disposed-off properly by placing waste bins inside the bus terminal, seepage of fuel, lubricants can be collected in a particular container and transfer those for reusing in the factories. This subproject has positive impacts in terms of the generation of the employment opportunities due to construction activities, supplying of the materials at construction phase and by providing transport facilities at operation phase. On the other hand, some landscaping and tree plantation works will enhance the ecological condition of the terminal area.

6. IDENTIFICATION OF MAJOR SUB-PROJECT ACTIVITIES

6.1. Major Activities during Pre-Construction Phase

As the proposed subproject will be implemented at the place of existing bus terminal and there are some damaged structures those need to be removed, so some pre-construction activities will be carried out for preparing the site ready for proposed construction activities. The major pre-construction activities to be carried out are as below:

- Dismantling of existing damaged structures;
- Removal of debris and salvaged materials;
- Removal of existing electric and water supply lines;
- Providing temporary boundary/fencing;
- Providing temporary electric and water supply lines;
- Construction of temporary separate labor sheds for male and female laborers;
- Construction of separate toilet facilities for male and female laborers and
- Construction of temporary office for supervision of construction activities.

6.2. Major Activities during Construction Phase

During the construction phase, following major subproject activities to be carried out:

- Layout and cast in-situ RCC piling works where necessary;
- Earthwork and excavation for RCC pile cap, grade beam and Column;
- Construction of multi storied building with associated civil works;
- Construction of separate toilets for male and female outside of main building;
- Construction of road pavement for passengers;
- Construction of water tank, septic tank and soakage well;
- Construction of solar energy facilities;

- Electricity connection and other ancillary works; and
- Provision for workers' health and safety.

6.3. Major Activities during Operational Phase

The major activities to be considered during operational phase are as below:

- Collection and disposal of solid waste;
- Management of waste water
- Management of fecal sludge
- Maintenance of drainage system;
- Traffic control; and
- Safety and security mechanism.

7. ASSESSMENT OF IMPACTS AND ITS MITIGATION & ENHANCEMENT MEASURES

7.1. Potential Significant Environmental Impacts and Its Mitigation & Enhancement Measures during Pre-Construction Phase

7.1.1. Impact due to demolished works

The proposed subproject is the rehabilitation of existing bus terminal with damaged structures. The existing old building and almost damaged toilet will have to be dismantled. The demolition works need simple procedure and manual equipment like; hammer, mechanical drill machine, steel cutter etc. Though the demolition work is not massive and the impact will not be severe, but the demolition materials shall be managed properly. The materials like bricks, shutter, reinforcement, wooden doors, windows etc. are to be reused and the wastes and debris shall be disposed properly. During demolition of structures, the creation of dust and noise will be there and will have an impact on workers and community people living at adjacent areas.

To avoid or reduce the environmental impacts of the demolition works, following measures should be taken:

- Electric high power line which has been passed over the terminal should be relocated to avoid any electrical accident inside bus terminal.
- Site should be fenced to protect from strong winds and to contain dust;
- Electrical line of the existing building shall be cut off before the starting of demolition works;
- Demolition work is to be started from roof and then side brick wall;
- No demolition works should be done at night to avoid noise pollution;
- No wastes materials and debris shall be burned on the site;
- No encroachment of adjacent road and private property by the debris;

- Water will be sprayed to control the dust to be generated during demolition;
- Ensure re-use of the materials and disposal of the wastes to landfill area;
- Demolished waste material should be transported through truck covered by tarpaulin; and
- Proper safety measures should be taken by the worker to avoid unwanted accidents.

7.1.2. Impact due to demolition of septic tank and transportation of fecal sludge

There are existing toilets and a damaged septic tank those need to be demolished. The demolition of toilets may have negative impact on environment by creating noise and dust as well as opening of fecal sludge during demolition and transportation may create air pollution. It is anticipated that proper measures should be taken by the authority to minimize its impacts on people and environment. Following measures should be taken to avoid or reduce the environmental impacts:

- Fecal sludge need to be collected by using the mechanical suction pipe;
- The collected fecal sludge must be transferred to selected hole with proper treatment to avoid bad odor by using a vacuum truck;
- During the entire processes personal protective equipment (PPEs) must be used who is associates with this work.

7.2. Potential Significant Environmental Impacts and Its Mitigation & Enhancement Measures during Construction Phase

7.2.1. Pollution from the construction materials and equipment

A wide variety of construction materials and equipment will be used during construction of the bus terminal which required to be dumped at the site. Dumping of the construction spoils such as accidental leakage of the oil, grease, and fuel in equipment yards might have a significant hazard. Surface water and soil quality might be polluted from these contaminants. Dumping of construction material such as sand, brick chips, cement etc might have a significant impact on air quality. The people to be engaged for the construction activities may also impede the physical and human habitats of the area. Following measures should be taken to avoid or minimize the potential impacts:

- 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;
- Raised platform (brick soling with neat cement finishing to keep the materials) shall be constructed prior to start working (to be included with environmental safeguard items in the bidding document).
- Leakage fuel and lubricants from equipment will be collected by separate container for reuse or safe disposal. So that it cannot be spread and pollute adjacent areas.

7.2.2. Impact due to waste disposal

Solid waste will be generated during construction works and in the labor shade and kitchen. A huge quantity of bore whole waste such as slurry, the mixture of sand, clay and water will come out. The improper solid waste management activities during construction period may damage both the construction site, labor shared areas and local environment. Following measures should be taken to avoid or minimize the potential impacts:

- Within the construction site, a number of waste bins will have to be provided by the contractor,
- The Contractor will be responsible to deposit the every generated waste in a safe place and that will be carried by conservancy unit of the Municipality to the dumping yard or landfill site.
- Contactor will carry out the pile slurry to a safe place and that safe place shall be selected earlier (before pile diving).

7.2.3. Impact due to labor camp and its sanitary latrine

Two separate labor camps, one for male and another for female will be constructed at the site before starting the construction activities. If the labor camps are not constructed with minimum raised platform and not cleaned properly, that will create health hazard to the laborers. Improper sanitary facilities may cause health hazards to the laborers and that may reduce the work efficiency. Following measures should be taken to avoid or minimize the health hazard:

- Two labor camps with raised platform should be constructed at the separate sides of the site with separate toilet facilities to ensure the safety and security of female workers.
- The contractor will install separate sanitary latrines for male and female workers. The latrines should have washing facilities (availability of water and soap).
- The labor shed shall be with the facilities like; mosquito nets, cooking arrangement, water supply, waste bins, lighting etc.
- A temporary drain for the kitchen waste water is to be provided and rain water drainage around the camp site is to be provided for easy surface runoff.

7.2.4. Impact due to inadequate drinking water supply

Safe drinking water supply is important for the construction workers such as labors, engineers, supervisors during construction work. If sufficient drinking water is not supplied during construction, it may cause health damage to them. Following measures should be taken to ensure safe drinking water at place:

- The contractor will install tube well as considered in the BOQ (environmental safeguard component) prior to starting the construction works;
- The water quality will have to be tested for its quality judgment in a regular interval.

7.2.5. Planning for transportation before starting works

During construction phase, some additional traffic will be accumulated for bringing the construction material and equipment. This traffic may cause temporary congestion on the roads nearby subproject areas. It is anticipated that the subproject activities will not create any severe impact on the local traffic system, because movement of the vehicles and equipment will be only for a short time and as per requirement. The on-site subproject activities do not have any impact on the local traffic system during construction phase, because the works will be done in a confined area. However, during operation phase, improper and roadside parking may create localized traffic congestion. Following measures should be taken to avoid or reduce the impacts:

- Any materials required for construction should be transported at night time (within 10.00 pm – 6.00 am) to avoid local traffic congestion;
- Proper vehicle movement schedule should be maintained in consultation with local people;
- Unloading of materials should be done inside project areas;
- Traffic control manpower will be deputed during construction and operation period;
- Control sign should be provided to regulate traffic movement;
- Safety arrangement should be inserted in the safeguard cost in BOQ.

7.2.6. Impact due to earth work

The proposed bus terminal construction work consists of earth cutting, earth filling, land dressing and removal of unsuitable or any hazardous materials. Some areas have to excavate for pile cap, basement floor and septic tank construction. In addition, some areas need to be filled with soil. These works lead dust blowing, noise and vibration which may cause air pollution, noise pollution and discomfort to adjacent residential areas includes pedestrians. All those including the excavation and trenching are hazardous nature of construction activities that involve soil removal. If proper measures are not taken it may cause damage to construction site road and other underground utilities. Following measures should be taken to avoid or reduce the impacts:

- Earthwork activities should be done in dry season;
- The contract should not be allowed to collect top soil to filling the low land. Local sand can be collected to fill in the lowland of the bus terminal;
- Water spray should be continued during work or day time to control dust spreading;
- Inspection of the trenches should be done at the start of each shift;
- Adequate safety barriers should be provided with clear visible signs to alert both drivers and pedestrians;
- Adequate light should be provided to the barriers and signs to make them clearly visible at night from a distance sufficient to respond;
- Temporary arrangement should be in place for pedestrian and vehicular traffic at site; and
- Excavated earth should be retained in safer places so that pedestrians can walk smoothly.

7.2.7. Clogging of water inside the construction site

During foundation, construction work, earth excavation is essential. This earth work may lead the chances of stagnation of storm water into the excavated pit resulting it as the mosquito breeding in the subproject area. Following measures should be taken to avoid or reduce the impacts:

- Earthworks should be done during dry season; and
- During foundatio work, temporary drainage system will have to be provided and should be connected with existing drainage system to run out the storm water. If necessary, a submergible pump should be there to pump out the water inside the pit.

7.2.8. Clogging of local drain water

There is a possibility to clog the local drain with construction materials kept at the subproject site as well as by the debris to be produced during demolition work and solid waste to be produced at labor camps. Following measures should be taken to avoid or reduce the impacts:

- Construction materials should be kept within a corner of construction area; and
- Contractor will ensure proper disposal of construction wastes and that should not be disposed to the local drains.

7.2.9. Impact on air quality due to dust and emission of carbon dioxide

Different construction activities such as pile diving & casting, machinery movement, handling of construction materials (stone/brick chips, sand, cement), rod fabrication, movement of trucks with construction materials etc. may generate dust and damage the air quality. The air quality in the area can be affected by emission of carbon dioxide of the construction trucks and other equipment that uses gasoline and the unpleasant smell of paint and thinners that will be use during painting. This might affect the health of the people passing by or living and working within the area. Following measures should be taken to avoid or reduce the impacts:

- Water should be sprayed to control the dust at day time;
- The trimming activity using odorless paints should be minimized;
- The condition of combustion-engine powered machine should be maintained.
- Low-sulfur fuels should be used; and
- Construction material should be transported through truck covered by tarpaulin.

7.2.10. Impact on noise level

Different activities during construction work such as movement of vehicles, concrete mixer machine, vibrator machine and crushing bricks at site may generate a significant level of noise. Pile diving, concrete casting, cutting of steel for reinforcement etc. may also cause noise hazard. Following measures should be taken to avoid or reduce the impacts:

- Construction materials should be transported with scheduled time;

- All powered mechanical equipment and machinery should be fitted with noise abating gear such as mufflers for effective sound reducing device;
- The use of personal protective equipment like helmet, goggles, ear plug, gloves, safety boot etc. should be ensured;
- The crushing of bricks/ stones should not be allowed at the project site. Broken brick or stone chips should be collected from distanced source to the subproject site for construction purpose; and
- Separate batch plant might be used for concreting work (Ready Mix Concrete if available).

7.2.11. Impact on surface water quality

There is no water body adjacent to the subproject site. However, dust to be produced during demolition, the small debris during excavation, slight amount of cement that will flow with the air, construction waste, pile waste, effluent from work camps, food wastes etc. can affect the quality of surface water of the nearby water sources. Improper storage of different construction supplies such as steel bars, fine sand, considerable gravel and alike will affect the quality of the run-off water that will run down on drainage areas. Following measures should be taken to avoid or reduce the impacts:

- Water should be sprayed to control the dust;
- Waste material in any form should not be thrown in water body or unspecified places;
- Proper construction management including waste management, training of operators and workers will be provided to avoid pollution of water bodies or nearby habitants; and
- Waste bins are to be provided at different location of working and living places.

7.2.12. Contingency planning for any uneven situation

There are so many unwanted happenings may occur during construction periods. Proper contingency planning is required for overcoming any unwanted situation, otherwise, that will hamper the progress of works. As a precaution, proper contingency planning is essential for smooth progress. Following measures should be taken to avoid or reduce the impacts:

- All the emergency telephone numbers of all the departments like Police station, fire service and civil defense, truck and bus stands, hospitals, clinics, etc. should be available at site;
- There should be standby transport facilities to deal any accidental case;
- There should be a provision for fast-aid box and emergency on-call physician; and
- The storage of the construction materials should be done in such a way that it might not create obstacle for movement of vehicles and pedestrians.

7.2.13. Occupational health and safety

The occupational health and safety is an important issue for any construction activities. It primarily focuses on work equipment and protective gears to avoid or minimize the risks. The Contractor

should give especial attention on workers' health and safety during construction work. The most important risks associated with the construction activities are listed below:

- Risks of using of the machineries in motion such as steel cutter, glass cutter etc.;
- Risk of falling from the height during chipping, plastering work, painting work etc.;
- Risk from drop down of the materials from the height during chipping, plastering work, painting work etc.;
- Risk from mechanical failure of the equipment such as pile rig and winch machine;
- Risk from the traffic collision or accidents during operation of the equipment such as hydraulic excavator, steel cutter, pile rig, winch machine, welding machine, and vehicles movement for the transportation activities of the subproject;
- Risks from head loads for carrying soil, construction materials and construction equipment;
- Risk associated to the sudden bad weather working conditions such as storm, thunder storm and earth quake etc.
- Exposure to the sunlight- workers are being exposed to the sun for long hours;
- Exposure to the high temperature, and humidity for a long time resulting in dehydration; and
- Contact with the hazardous substances and wastes pose risks of the infections and diseases.

General requirements for the workers' health and safety

The key salient features of the general requirements for the workers' health and safety are presented in **Table 7.1**.

Table 7-1: Issues and requirements for the workers' health and safety

Issues	Requirements
Health and Hygiene	• Protection against dust and furnace by using of the nose masks and covering of the head and body; • Laborers will use proper safety belts during work at high altitude • Ensure availability and using proper PPE (helmet, gloves, safety glass, safety shoes etc.) of all workers during work. • Provide construction workers with basic information on infectious diseases including HIV/AIDS • Proper scaffolding should be made available during construction • Proper disposal of the wastes and effluents; • Introduce waste bins for the solid waste management system.

Issues	Requirements
Safety and Fast Aid Box	• Using of the personal protective equipment (helmet, gloves, goggles, nose mask, safety boots); • Precautions during work on or near machineries in motion; • Head loads are prohibited; • First aid facilities should be provided and maintained; • The first aid kit should include adhesive bandages, regular strength pain medication, gauze, and low grade disinfectant.
Compensation for Accidents at Work	• Contractors will bear medical treatment costs. If any sever accidents such as loss of hands, legs or loss of working ability or any case of death needs compensation-(the amount of the compensation should be fixed considering the type of accidents).
Dust and Fumes	• For any dust, fumes, or other impurities likely to be injurious to the workers, effective measures shall be taken to prevent their accumulation and its inhalation by the workers.
Over-crowding	• No labor room should be over-crowded, the labor camp should be provide 15 ft x 30 for male and 12 ft x 15 ft for female workers.

7.2.14. Impact on local community

The construction of bus terminal can cause air pollution and noise pollution during construction phase due to blow of dust during demolition work, emission of gases during vehicle movement, generation of high sound during using equipment for brick breaking, mixing etc that may affect community people living surrounding the construction site. In addition, there might be a conflict with community people in any uncertain events. Following measures should be taken to avoid or minimize the impacts:

- Community people should be oriented to use masks during their movement near construction site;
- Construction equipment and machineries should not be used at night;
- Orientation and training will be provided to the contractors, supervisors and workers, on health, safety and environment including sexual diseases control (as of BOQ);
- Liaison with the communities will be maintained throughout the construction phase;
- Grievance redress mechanism has been established at the sub-project site; and
- A detail disclosure on sub-project to be hanged at the visible side where community can see and read.

7.2.15. Labor influx and anticipated impacts

The bus terminal has a positive impact on labor engagement since it will attract employment of local labor. The labor influx will be minimum, because of the most of the works will be done by the local laborers and there is very limited chance of engagement of outside laborers. So, the labor influx issue will minimum in the construction of sub-project. There is a chance to avoid female workers from poor households to be employed in construction activities. Following measures should be taken to avoid or minimize the impacts:

- Laborers from the local community should be employed in construction activities; and
- Female laborers from poor households should be given highest priority to employ in construction activities.

7.3. Potential Significant Environmental Impact and Its Mitigation & Enhancement Measures during Operational Phase

In general, there are some maintenance activities involved that causes adverse environmental impacts during operational phase. Following activities are involved in bus maintenance in a bus terminal:

- Painting and paint removal;
- Washing and cleaning;
- Parts cleaning;
- Fueling and fuel storage;
- Changing of oil;
- Battery replacement;
- Tire replacement; and
- Filter replacements.

Painting and paint removal: Painting and paint removal operations include bus painting, paint removal, and touchup operations. The types and quantities of waste generated by these operations depend on the painting and paint removal methods and materials used. Wastes generated from painting include leftover paints and paint wastes.

Following three practices should be existed to reduce wastes and to minimize the impacts from painting operations:

- Minimizing overspray using high-transfer-efficiency equipment,
- Using alternative coatings,
- Maintaining rigid inventory control ,

Washing and cleaning: Wastes can be generated by bus and engine washing and cleaning operations include hazardous and nonhazardous wastewater and sludge. The Waste water can contains a significant amount of oil. Wastes generated from aqueous (potassium permanganate)

cleaning include detergent-bearing wastewater and waste sludge. Following measures should be taken to avoid or minimize the impacts:

- A separation tank or an oil/water separator can be used to separate the oil from the wash water. Separated oily water can be processed offsite by waste oil reclaimed. The sludge from the washing operation can be dewatered (dried) to reduce its volume.
- Sludge from bus washing operations is disposed to garbage first and then to the Municipal landfills.

Battery replacement: On a weight basis, used batteries are one of the largest categories of hazardous waste generated from vehicles. Usually, lead acid batteries contain lead and sulfuric acid. The Bus Operators change, repair and inject acid water in the battery within the bus terminal where every possibility of leakage of hazardous water on the surface of the bus terminal. Following measures should be taken to avoid or minimize the impacts:

- Strong monitoring system should be developed by Municipality for safer replacement of batteries.
- A designated corner should be marked in the bus terminal for replacing, acid water injection etc.
- Full restriction on disposing any damaged battery inside the bus terminal premises.

Oil change: Bus maintenance requires changing of oil. Used oil includes many related substances such as used motor oil, transmission fluid, lubricating oil, and others. Many of the bus operators do these types of work inside the bus terminal. Following measures should be taken to avoid or minimize the impacts:

- Changing of motor oil should be done in an off-site.
- The used oil is stored and sold to an oil recycler or reclaimer to be used as a fuel.
- Disposing of used oil and transmission fluid by installing a used oil furnace.

Tire Replacement: Usually Bus operators dispose old, used and torned tires in the bus terminal which create environmental hazards. Retreading is the most common form of tire recycling. Tires that are in poor condition are used for asphalt paving, brake lining, bumpers, boiler fuel, and new tires. Many landfills do not allow tire disposal because tires never decompose; they collect gases released by decomposing garbage, and then gradually float up to the surface of the landfill. Following measures should be taken to avoid or minimize the impacts:

- Tires should be "stockpiled" as part of solid waste management;
- Burning of tire can release toxic chemicals; and
- Tire recycling, as is practiced can alleviate the stockpiling issue.

Filter replacements: Bus maintenance requires changing air, fuel, and oil filters. Most Bus Operators observed that drain, crush, and drum their used air filters and dispose of them nearby places or drainage system of the terminal. The oil filters should be crushed to achieve maximum

oil release prior to disposal and to reduce waste volume. Drained oil filters typically are stored in bins for recycling.

7.3.1. Air quality degradation

The emission of carbon dioxide of buses, dust created from the movement of buses and unpleasant smell of paints and thinners that will be used during painting, and bad odor from the wastes materials can affect the air quality. This might affect the health of the people passing by or living and working within the area. Following measures should be taken to minimize the impacts:

- Avoid maximum speed movements in the site since this will make the dust go in the air;
- Odorless and lead free paints available in the bus terminal should be used;
- The condition of combustion-engine powered machine should be maintained.
- Low-sulfur fuels should be used
- Control any likely bad odor generated from the waste materials; and
- Ensure effective solid waste management facilities.

7.3.2. Noise pollution

Use of hydraulic horns by the buses can create noise pollution. Use of loud speaker and overcrowded during peak-hours can create noise nuisance to the passengers and pedestrians. Following measures should be taken to minimize the impacts:

- The traffic control authority should control the use of hydraulic horn in buses and minimize the traffic congestion at peak-hours; and
- Use of loud- speaker should be minimized.

7.3.3. Solid wastes generation and disposal

Solid wastes such as leftover food, foils, bottle and plastic from food and drink can be generated at bus terminal as well as fruits market by passengers, fruits buyers-sellers and the worker. If these generated solid wastes are not disposed properly, it will create unhygienic environment at the bus terminal and passengers will feel discomfort. Solid waste will also generate from to scrap, discarded spare parts, tires and tube, battery and filter replacement and debris from dismantling of damaged structures etc. during construction and operational phases. Following measures should be taken to minimize the impacts:

- Ensuring replacement of any vehicular parts at the designated places fixed in the design
- Sufficient numbers of waste bins would be in place at bus terminal, passengers lounge and ticket counters
- Collection of solid waste by the primary collectors and dumping into secondary dumping station near the terminal and monitoring by the Bus Terminal Management Committee
- From the secondary dumping station, all those will be carried out by the Municipality dumping truck to the landfill areas.

- Biodegradable waste can be recycled as organic manure.

A small amount of solid waste and waste water will be generated from the labor's shed due to cooking, use of toilets and so on. Cooking related waste will be dumped at bin at primary level, then to secondary dumping station and then crude dumping at Municipality landfill areas by dumping vehicles.

Existing unplanned landfill at the north side of the proposed bus terminal should be cleaned and shift all the debris/ non-biodegradable to the Municipal proposed landfill areas.

7.3.4. Traffic congestion

There is a possibility of traffic congestion at the front side of the bus terminal. The proposed bus terminal will be the main bus terminal of the town and it will play as key transit point of all buses coming from different parts of greater Noakhali as well as the people of the Municipality. As a result, people will use auto-rickshaw, easy-bike, non-motorized rickshaw, van etc. for local transportation from and to the bus terminal and can use the road side for loading and unloading passengers. It may cause traffic congestion. Further, buses carrying the passengers may stop at the road side for loading and unloading the passengers that may also cause traffic congestion. In addition, trucks those carrying goods to and from the town will also use the main route for transportation and can use the bus terminal side for interim stop and can cause traffic congestion. Following measures should be taken to minimize the impacts:

- Loading and unloading of passengers should be done at the entrance gate bus terminal and within the bus terminal; and
- Proper traffic control mechanism should be in place.

7.3.5. Accident due to fire hazard and electric short circuit

All the vehicles are fuel and lubricant dependents which are susceptible to fire accident. Other than this, the proposed terminal building will have Food Shops, Electrical items where food shops owners will use stoves, gas cylinders and electric items. This may cause a fire hazard.

- Firefighting devices will be fixed at strategic points in all floors of the terminal and other strategic points.
- Provide training on device use to the staffs who will be on duty at the building. Emergency numbers displayed at prominent locations.
- There could also be regular fire drills. Installation of smoke detectors at all strategic points.
- There will be two water reservoirs where one will be used for firefighting purposes.

7.3.6. Waste water disposal

Waste water will be generated in the bus terminal building from wash room, floor cleaning, food shops etc. These can cause environmental pollution and public health concerns if not properly maintained. It is estimated that after completion of the terminal, around 10000 people will use this

terminal per day for moving at different local, regional and national areas. It is assuming that out of 10000 people 20% (2000) will use wash room and will generate 15 liter waste water (considering their time constraints during travel time) which will be 30m3 (approx.)/ day. The full time staffs will be about 100 persons who will generate at a rate of 20 liter waste water per day which will be 2m3. Hence, the total waste water from wash rooms, floor cleaning will be (30+2)=32m3 (approx.).

On the other hand Waste water can be generated by bus and engine washing and cleaning operations include hazardous and nonhazardous wastewater and sludge. The Waste water can contains a significant amount of oil. Wastes generated from aqueous (potassium permanganate) cleaning include detergent-bearing wastewater and waste sludge. Following measures should be taken to avoid or minimize the impacts:

The washing of vehicles within the bus terminal can produce waste water mixed with oils and lubricants. Leakage of vehicles can also leave oil and lubricants at the bus terminal that needs to be washed out for maintaining cleanliness of the bus terminal. This waste water can be linked with local drain and decrease the water quality of outfall. Following measures should be taken to minimize the impacts:

- Separate pipe lines to be provided from the terminal building to the soak pit.
- Another soak pit has been to be provided to accommodate only vehicle servicing waste water near the designated yard for bus servicing at the north- eastern corner of the proposed bus terminal.

Provision of soak pit is to be provided for disposal of waste water to be generated. On the bottom of soak pit 1.5 m depth filter bed (Sylhet Sand and brick chips, 1:1 proportion) is preferable.

7.3.7. Fecal sludge management

Fecal sludge will be generated from toilets of the bus terminal. About 2100 users will generate fecal sludge 84 m3 per year which will be discharge to the septic tank by separate pipe line. If the septic tank is not cleaned in regular interval or broken, it can be overflowed or exposed and cause environmental pollution. Following measures should be taken to minimize the impacts:

- The Municipality’s conservancy unit will clean the septic tanks in every year or need based with maintaining hygiene and safety
- The collected fecal sludge must be transported to vacant places near the landfill area by using mechanical sucker and vacuum truck and will be covered by earth to control odor and safe environment.

7.3.8. Disable people’s facilities:

The terminal building will be barrier free only at ground floor. Since the plinth will be just 150 mm high from the drop off level instead of a ramp a slope will be sufficient. The upper floors of the building will not be accessible for disabled peoples, since there is no provision for elevator.

Toilets for both male and female along with a disable one and janitor closet provided in the ground floor.

7.3.9. Impact on local community

The bus terminal has a positive impact on the community people by creating employment opportunity during operational phase. The community people will get the chance to work with buses and other vehicles. It will also create employment opportunity by engaging in shops to be operated within the bus terminal. In addition, local people may install different types of shops at the surrounding areas of the bus terminal to meet the demand of the passengers travelling through the bus terminal. The bus terminal will ease the transportation facilities for the community people who will have to move different sub-districts and main town for service, trade and business and others daily needs.

ENVIRONMENTAL MANAGEMENT PLAN

The objective of the environmental management plan (EMP) is to record environmental impacts resulting from the sub-project activities and to ensure implementation of the identified "mitigation measures", in order to reduce adverse impacts and enhance positive impacts. Besides, it would also address any unexpected or unforeseen environmental impacts that may arise during construction and operational phases of the sub-projects. The identified potential environmental impacts and its mitigation and enhancement measures are given in a matrix as below:

Table 8-1: EMP matrix of the proposed Bus Terminal

The anticipated environmental impacts and corresponding mitigation and enhancement measures have been outlined in **Table 8-1.**

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
Pre-construction phase						
Environmental clause in the contract	• Include environmental clauses in bid and contract document.	At the Chowmuhani Municipality		Before bidding or contract	PIU of Chowmuhani Municipality	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Construction vehicles and machinery	• Trial run of vehicles and machinery to be used to confirm that their conditions, level of emissions of pollutants and noise level will not cause serious damages to the surrounding environment.	At the construction site, or vehicle depot		Before the commencement of construction	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Demolition of existing building	• Site should be fenced to protect from strong winds and to contain dust; • Electric power and services shall be cut off before the starting of demolition works; • Demolition work is to be started from roof and then side brick wall; • No demolition works should be done at night to avoid noise pollution; • No wastes materials and debris shall be burned on the site;	At the Construction site		During site preparation	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
	• No encroachment of adjacent road and private property by the debris; • Water will be sprayed to control the dust to be generated during demolition; • Ensure re-use of the materials and disposal of the wastes to landfill area; • Demolished waste material should be transported through truck covered by tarpaulin; • Proper safety measures should be taken by the worker to avoid unwanted accidents.					
Demolition of septic tank and transportation of fecal sludge	• Fecal sludge need to be collected by using the mechanical suction pipe and vacuum truck; • The collected fecal sludge must be transferred to selected hole with proper treatment to avoid bad odor by using a vacuum truck; • During the entire processes personal protective equipment (PPEs) must be used who is associates with this work.	At the Construction site		During site preparation	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Tree Plantation	• There is no need to cut the trees for Bus terminal. However, to enhance the ecological condition of the area. Chowmuhani Municipality has a plan to plant trees at the boundary of the proposed subproject site.	At the Chowmuhani Municipality areas		During Design	PIU of Chowmuhani Municipality	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Air, Water and Noise Quality Laboratory Test	• The base line condition of Air, Water and Noise quality of proposed bus terminal should be tested in laboratory.	Proposed site		Pre-construction	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
Construction phase						
Pollution from the construction materials and equipment	• 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; • Raised platform (brick soling with neat cement finishing to keep the materials) shall be constructed prior to start working (to be included with environmental safeguard items in the bidding document). • Leakage fuel and lubricants from equipment will be collected by separate container for reuse or safe disposal. So that it cannot be spread and pollute adjacent areas.	At the Construction site		During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Solid Waste disposal	• Within the construction site, a number of waste bins will have to be provided by the contractor, • The Contractor will be responsible to deposit the every generated waste in a safe place and that will be carried by conservancy unit of Chowmuhani Municipality to the dumping yard • Contactor will carry out the pile slurry to a safe place and that safe place shall be selected earlier (before pile diving).	At the Construction site	9000.00	During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Labor camp and its	• Two labor camps with raised platform should be constructed at the separate sides of the site with separate toilet facilities to ensure the safety and security of female workers.	At the Labor camp and construction site	170000.00	During construction period	Contractor	PIU of Chowmuhani Municipality and PMU

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
Sanitary latrine	• The contractor will install separate sanitary latrines for male and female workers. The latrines should have washing facilities (availability of water and soap). • The labor shed shall be with the facilities like; mosquito nets, cooking arrangement, water supply, waste bins, lighting etc. • A temporary drain for easy surface runoff of the kitchen waste water and rain water around the camp site is to be provided.					of MGSP under BMDF
Drinking water supply	• The contractor will install tube well as considered in the BOQ (environmental safeguard component) prior to starting the construction works; • The water quality will have to be tested for its quality judgment in a regular interval.	At the Labor camp and construction site	30000.00	During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Transportation before starting works	• Any materials required for construction should be transported at night time (within 10.00 pm – 6.00 am) to avoid local traffic congestion; • Proper vehicle movement schedule should be maintained in consultation with local people; • Unloading of materials should be done inside project areas; • Traffic control manpower will be deputed during construction and operation period; • Control sign should be provided to regulate traffic movement; • Safety arrangement should be inserted in the safeguard cost in BOQ.	At the Construction site		During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
Pollution from fuel and lubricants	• Raised platform (brick soling with neat cement finishing) shall be constructed prior to start working (to be included with environmental safeguard items in the bidding document). • Leakage fuel and lubricants from equipment will be collected by separate container for reuse or safe disposal. So it cannot be spread and pollute adjacent areas.	At the Construction site	20000.00			
Earth work	• Earthwork activities should be done in dry season; • Contactor should use proper measures during earth cutting or earth excavation works and that is to be included in the structural design; • Water spray should be continued during work or day time to control dust spreading; • Inspection of the trenches should be done at the start of each shift; • Adequate safety barriers should be provided with clear visible signs to alert both drivers and pedestrians; • Adequate light should be provided to the barriers and signs to make them clearly visible at night from a distance sufficient to respond; • Temporary arrangement should be in place for pedestrian and vehicular traffic at site; • Excavated earth should be retained in safer places so that pedestrian can walk smoothly.	At the Construction site	12000.00	During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Clogging of water inside the	• Earthworks should be done during dry season; • During excavation of earth work, temporary drainage system will have to be provided and should be connected with existing drainage system	At the Construction site	6000.00	During construction period	Contractor	PIU of Chowmuhani Municipality and PMU

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
construction site	to run out the storm water. If necessary, a submergible pump should be there to pump out the water inside the pit.					of MGSP under BMDF
Clogging of local drain water	• Construction materials should be kept within a corner of construction area; • Contractor will ensure proper disposal of construction wastes and that should not be disposed to the local drains.	At the Construction site		During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Air quality due to dust and emission of carbon dioxide	• Water should be sprayed to control the dust at day time; • The trimming activity using odorless paints should be minimized; • The condition of combustion-engine powered machine should be maintained. • Low-sulfur fuels should be employed; • Construction material should be transported through truck covered by tarpaulin. • The construction period condition of Air, Water and Noise quality of proposed bus terminal should be tested in laboratory	At the Construction site and surrounding areas	105000.00	During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Noise level	• Construction materials should be transported with scheduled time; • All powered mechanical equipment and machinery should be fitted with noise abating gear such as mufflers for effective sound reducing device; • The use of personal protective equipment like helmet, goggles, ear plug, gloves, safety boot etc. should be ensured; • The crushing of bricks/ stones should not be allowed at the project site. Broken brick or stone	At the Construction site and surrounding areas		During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
	chips should be collected from distanced source to the subproject site for construction purpose. • Separate batch plant might be used for concreting work (Ready Mix Concrete if available).					
Noise level Measurement	• Noise level measurement- it can be measured from the recognized environmental survey company, public institute/ university	At the Construction site and surrounding areas	30000.00	Two times during construction phase and one time after construction	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Surface water quality	• Water should be sprayed to control the dust; • Waste material in any form should not be thrown in water body or unspecified places; • Proper construction management including waste management, training of operators and workers will be provided to avoid pollution of water bodies or nearby habitants. • Waste bins are to be provided at different location of working and living places.	At the Construction site and surrounding areas		During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Water Quality test (Surface and Ground Water)	• Water quality (pH, DO, TDS, BOD, Turbidity, NH3). It can be measured from the recognized environmental survey company, public institute/ university	Bus terminal adjacent drain and underground water measurement	24000.00	One time before starting the construction and two times during construction phase	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
Uneven situation	• All the emergency telephone numbers of all the departments like Police station, fire service and civil defense, truck and bus stands, hospitals, clinics, etc. should be available at site; • There should be standby transport facilities to deal any accidental case; • There should be a provision for fast-aid box and emergency on-call physician. • The storage of the construction materials should be done in such a way that it might not create obstacle for movement of vehicles and pedestrians.	At the Construction site and surrounding areas	9000.00	During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Tree Plantation	• 30 no. of trees will be planted around the Bus Terminal for beautification	At the Construction site and surrounding areas	15000.00	At the end of construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Occupational health and safety	• Protection against dust and furnace by using of the nose masks and covering of the head and body; • Labors will use proper safety belts during work at high altitude • Ensure availability and using proper PPE (helmet, gloves, safety glass, safety shoes etc.) of all workers during work. • Provide construction workers with basic information on infectious diseases including HIV/AIDS • Proper scaffolding should be made available during construction • Proper disposal of the wastes and effluents;	At the Construction site and surrounding areas	270000.00	During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
	• Introduce waste bins for the solid waste management system. • Using of the personal protective equipment (helmet, gloves, goggles, nose mask, safety boots); • Precautions during work on or near machineries in motion; • Head loads are prohibited; • First aid facilities should be provided and maintained; • The first aid kit should include adhesive bandages, regular strength pain medication, gauze, and low grade disinfectant. • 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). • For any dust, fumes, or other impurities likely to be injurious to the workers, effective measures shall be taken to prevent their accumulation and its inhalation by the workers. • No labor room should be over-crowded, the labor camp should be provide 15 ft x 30 for male and 12 ft x 15 ft for female workers.					

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
Impact on local community	▪ Community people should be oriented to use masks during their movement near construction site; ▪ Construction equipment and machineries should not be used at night. ▪ Orientation and training will be provided to the contractors, supervisors, and workers, on health, safety and environment including sexual diseases control. Liaison with the communities will be maintained throughout the construction phase. ▪ Grievance redress mechanism has been established at the sub-project site.	At the Construction site and surrounding areas		During construction period	Contractor	PIU of Chowmuhani Municipality and PMU of MGSP under BMDF
Total Cost During Construction			**700000.00**			
Operation phase						
Air quality degradation	• Avoid maximum speed movements in the site since this will make the dust go in the air; • Odorless paints available in the bus terminal should be used; • The condition of combustion-engine powered machine should be maintained. • Low-sulfur fuels should be employed; • Avoid any likely bad odor generated from the waste materials; • Ensure effective solid waste management facilities. • The operational phase condition of Air, Water and Noise quality of proposed bus terminal should be tested in laboratory	At the bus terminal		During operational period (2 times per year)	Bus Owners' Association and Workers' Association/ Municipality	PIU of Chowmuhani Municipality

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
Air, Water and Noise level	• Laboratory test in a renowned University laboratory, Institutions etc.	At the bus terminal	110000.00			
Noise pollution	• The traffic control authority should control the use of hydraulic horn in buses and minimize the traffic congestion at peak-hours. • Use of loud- speaker should be minimized.	At the bus terminal		During operational period	Bus Owners' Association and Workers' Association	PIU of Chowmuhani Municipality
Solid wastes generation and disposal	• Sufficient numbers of waste bins would be in place at bus terminal. • Solid wastes to be generated at bus terminal and fruits market would be collected and disposed in garbage bin at the corner of the bus terminal and finally to landfill area.	At the bus terminal	120000.00	During operational period	Bus Owners' Association	PIU of Chowmuhani Municipality
Traffic congestion	• Transit of passengers should be done at the selected places of bus terminal. • Proper traffic control mechanism should be in place.	At the bus terminal	60000.00	During operational period	Bus Owners' Association and Workers' Association	PIU of Chowmuhani Municipality
Accident due to fire hazard and electric short circuit	• Fire extinguisher should be used and be placed at the stair-case at the terminal building. • Touching electrical appliances with wet hands should be prohibited with properly visible danger sign. • Faulty or malfunctioning electrical products should not be used. • Training should be provided to use firefighting equipment when necessary.	At the bus terminal	10000.00	During operational period	Bus Owners' Association and Workers' Association	PIU of Chowmuhani Municipality

Issues/ Environmental impact	Mitigation and enhancement measures to be taken	Location	Cost (BDT)	Timing	Responsible organization	
					Implementation	Supervision/ Monitoring
	• Regularly checking and maintenance the electrical line of the bus terminal should be done.					
Waste water disposal	• Separate sewer lines would be in place for waste water to be generated from wash rooms, floor cleaning at bus terminal; • Provision of soak pit is to be provided for disposal of waste water to be generated. On the bottom of soak pit 1.5 m depth filter bed (Sylhet Sand and brick chips, 1:1 proportion) is preferable; • The waste water will generate from vehicle servicing yard which will be discharge through separate pipeline near vehicle servicing yard into separate soak pit.	At the bus terminal		During operational period	Bus Owners' Association and Workers' Association	PIU of Chowmuhani Municipality
Fecal sludge management	• The Municipality's conservancy unit will collect sludge from the septic tank at regular interval by mechanical sucker and vacuum truck; the sludge collectors must have to maintain hygiene and safety manure. • The collected fecal sludge will be transported to Municipality designated areas and will be covered by earth for preventing bad odor.	At the bus terminal	60000.00	During operational period	Conservancy Unit of the Municipality	PIU of Chowmuhani Municipality
Total Cost During Operation (Tentative)			**300000.00**			

8.1. Environmental Monitoring Plan

The Environmental Monitoring is important to record environmental impacts resulting from the subproject activities and to ensure implementation of the mitigation measures identified earlier in order to reduce adverse impacts and enhance positive impacts from the subproject activities. The environmental monitoring should be done at both constructional and operational phases.

Environmental monitoring requires a set of indicators that could be conveniently measured, assessed and evaluated periodically to observe the trends of change in base line environmental quality.Table 8-3 and 8-5 summarizes the potentially significant environmental impacts needs to be monitored during the constructional and operational phases.

The following environmental monitoring plan should be adopted to monitor the activities mentioned in the environmental management plan.

8.1.1. Monitoring during construction phase

The mitigation or enhancement measures outlines in EMP should be monitoring during construction period with regular interval in order to ensure its effective implementation to avoid the adverse effect of subproject activities and to gain the positive impacts resulting for the activities. The environmental monitoring plan during the construction period is given in **Table 8-2** as below:

Table 8-2: Environmental Monitoring Plan during construction phase (Visual observation)

Monitored Parameter/ Issues	Monitoring Method/ Key Aspects	Location of Monitoring	Frequency of Monitoring
Safety orientation and training of workers	Frequency of training & orientation of workers for safety	Subproject site	• Once in a month • Reporting: Once in a month
Personal Protective Equipment	Ensure every single person involved in the activities wear and use safety equipment	Subproject site	• Daily • Reporting: Once in a month
Worker's health	Monitoring process of worker's health	Subproject site	• Daily • Reporting: Once in a month
Sanitation & drinking water facility to the workers	Availability of safe drinking water and sanitation to the workers	Subproject site	• Daily • Reporting: Once in a month
Incident record and reporting	Documented record of all incident, accident, its remedial process	Subproject site	• Daily • Reporting: Once in a month
Site security/ Fencing at the site	Isolation of site from general access by fencing, restriction of the un-authorized entry in the site.	Subproject site	• Daily • Reporting: Once in a month

Bulletin/ announcement boards/ prohibition signs	Visible in good condition or not	Subproject site	• Daily • Reporting: Once in a month
Equipment /vehicles	-Switched-off diesel engines when not in use; -Search any possible leakage; -Fuelling.	Subproject site	• Daily • Reporting: Once in a month
Dust	Dust is visible or not	Subproject site	• Daily • Reporting: Once in a month
Oily waste generation and disposal	Quantity of oily waste, storage and disposal	Subproject site	• Daily • Reporting: Once in a week
Solid waste generation	Quantity of solid wastes and disposal	Subproject site	• Daily • Reporting: Once in a month
Gender equity	Direct survey in the field by interviews with the women in order to ensure that there is no any gaps between man and women	Subproject site	• Daily • Reporting: Once in a month
Child labor	No child will be engaged in the activities	Subproject site	• Daily • Reporting: Once in a month
Handling of hazardous materials	Fuelling, storage, operation	Subproject site	• Daily • Reporting: Once in a month

Environmental parameters to be monitored during construction phase are given in **Table 8-3** as below:

Table 8-3: Environmental parameters need to be monitored (during construction phase)

Monitored Parameter / Issues	Monitoring Method/Key Aspects	Location of Monitoring	Period & Monitoring Frequency
Air quality (SPM, PM_{10}, and $PM_{2.5}$)	• Visually-black smoke; • Sampling; • Analysis at laboratory; • analysis of merits determination by using quality standards; • Through digital instruments.	Subproject site	• Two times during construction period and one time after construction; • Reporting: Immediately after analysis and once in a month as a regular basis

Noise level	• Through digital noise level meter	Subproject site	• Two times during construction period and one time after construction; • Reporting: Immediately after measurement and once in a month as a regular basis.
Water Quality	• Visually-black smoke; • Sampling; • Analysis at laboratory; • analysis of merits determination by using quality standards; • Through digital instruments	Subproject site	• Two times during construction period and one time after construction; • Reporting: Immediately after measurement and once in a month as a regular basis.

8.1.2. Monitoring during operational phase

Environmental monitoring during operational phase is limited to a number of impact parameters to see the actual performance of the subproject. Monitoring of some issues might be necessary during the operational period as given in **Table 8-4** as below.

Table 8-4: Environmental Monitoring plan during operational phase (Visual observation)

SL No	Issue	Key aspects	Monitoring frequency per year
1	Complain from local people	Any significant complain from local people and it's remedial procedure	4
2	Local drainage system	Maintaining proper drainage	4
3	Solid Waste Management	Proper management of solid wastes	4

Environmental parameters to be monitored during operational phase are given in **Table 8-5** as below:

Table 8-5: Environmental parameters need to be monitored (during operational phase)

Parameter	Location	Monitoring frequency per year
Air quality (SPM, PM_{10}, and $PM_{2.5}$)	At the Bus Terminal	2
Water quality (BOD, pH, DO, TDS, Turbidity, NH_3)	At the nearby, surface water, ground water and drain water	2
Noise and Vibration	At the Bus Terminal	2

8.2. Grievance Redress Mechanism

The project-specific Grievance Redress Mechanism (GRM) will be established by the PIU of Chowmuhani Municipality to receive, evaluate, and facilitate the solution of affected people's (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) and they operate it 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.

8.2.1. Grievance redress committee (GRC)

Chowmuhani Municipality has formed a Grievance Redress Committee (GRC) headed by The Mayor. With the facilitation of Consultant, the Mayor nominated the GRC members and included representative from the Government Agencies, local NGO, and Civil Society. The GRC will nominate a focal person. Complaints will be received through drop box, by post, email and website of the Municipality. The grievance box will be set up at construction site to received complaints. The grievance response focal point will be available at the Municipality for recording the complaints and necessary response to an aggrieved person. It will receive complaints or suggestions, and produce them to the GRC for hearing and resolution. If any complaint is not resolved at Municipality level then the complaint will be produced to MD-BMDF. If it is not resolved by the MD-BMDF, then the subproject will be dropped.

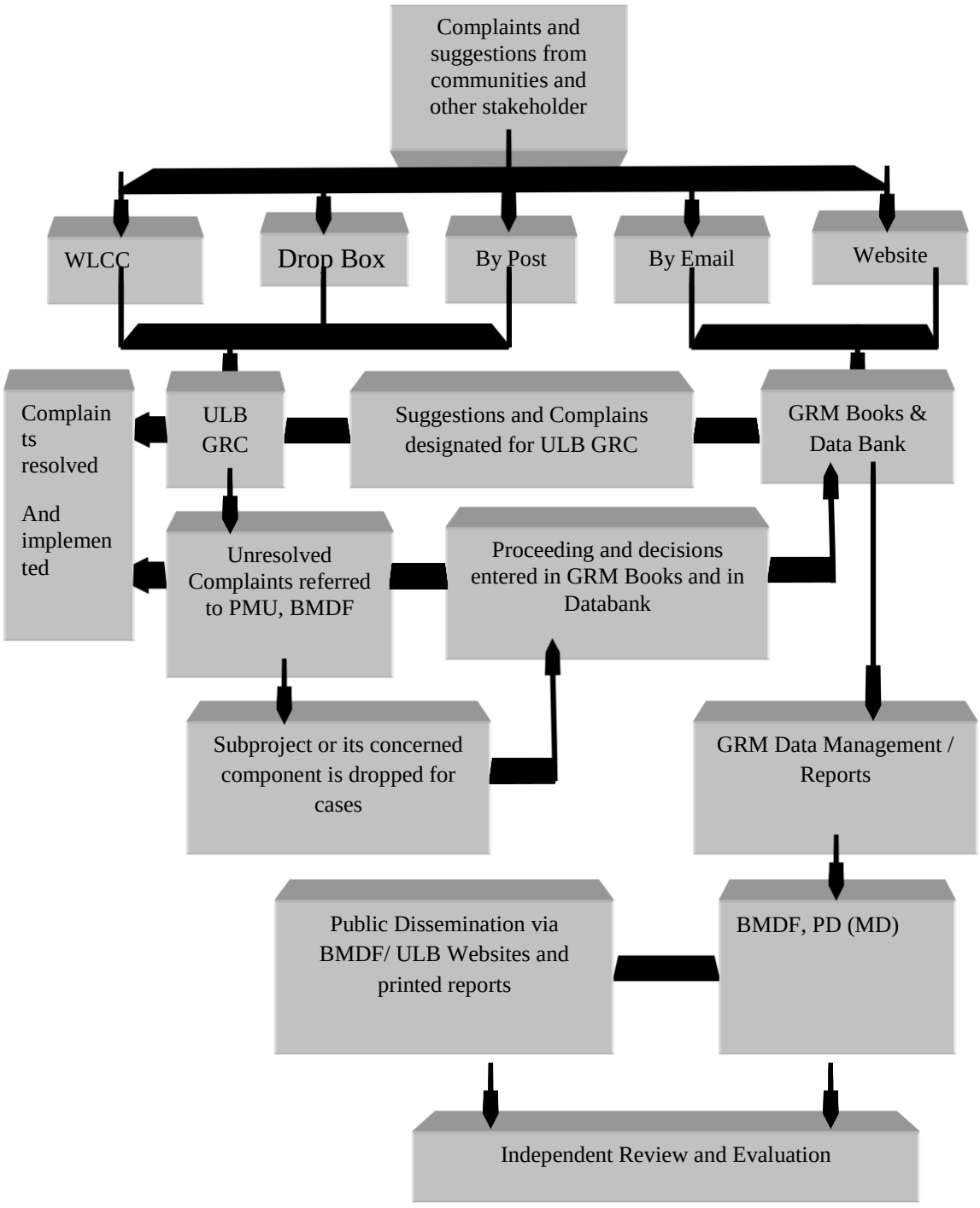
The structure of the GRC and membership are given as below:
Chairman : ULB Mayor
Member-Secretary : Head of the Engineering Section of ULB

Member : Representative from local administration
: Teacher from a local educational institution
: Representative of a local NGO
: Representative of civil society
: Female ward councilor (of respective area)

The list of GRC members along with the notification from the Mayor is attached in **Annexure 2.**

8.2.2. Grievance resolution process

The grievance resolution process that is given in flow chart as below will be followed for this subproject.



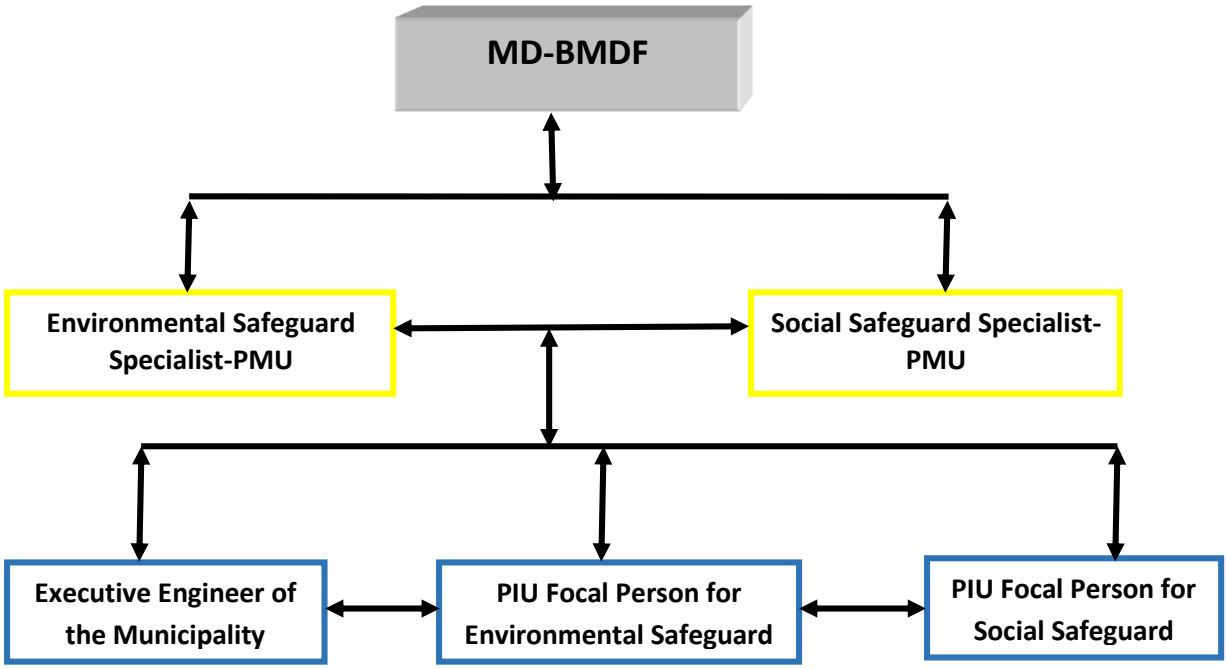
Flow diagram 8-1: Grievance resolution process

Note: If the appellant is still not satisfied, he or she has the right to take the case to the public courts. Chowmuhani Municipality should also publish the outcome of the cases on the public notice boards. All costs involved in resolving the complaints (meetings, consultations, communication, and information dissemination) will be borne by the Chowmuhani Municipality. The Municipality authority will try to resolve the issues (in most of the cases, in amicable settlement) within shortest possible time. However, the public court system is always open to resolve the issues.

8.3. Institutional Arrangement for Implementation of EMP

The Environmental Safeguard Compliance issues are directly vested the Municipality Officials; especially the Executive Engineer 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 Safeguard Specialist will submit the monthly monitoring reports on Environmental Compliances to the World Bank.



Flow diagram 8-2: Institutional arrangement for implementation of EMP

8.4. Capacity Building

A two-day long training program in participation of PIU members of Chowmuhani Municipality was organized by the PMU of BMDF to build the capability of PIU of Chowmuhani Municipality. The

Consultant, hired by the Chowmuhani Municipality also participated in the training program. The PMU of BMDF organized this training program in order to enhance their capacity to conduct Environmental Assessment and Social Impact Assessment to be done for any proposed subproject. A series of sessions were conducted by the Specialists of the PMU of BMDF. The major sessions includes: (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 PIU of Chowmuhani Municipality will organized an orientation of contractor, workers and other support staff on environmental issues to be considered and mitigation measures to be taken during pre-construction, construction and operational phases before deploying to the work sites in order to achieve the expected standards.

8.5. Estimation of Environmental Safeguard Cost of EMP

Considering the environmental impacts and their mitigation measures for the subproject, several items are included in the BOQ for the environmental management. **Table 8-1** presents the estimated cost during construction and operation. Cost during construction phase will be included in BOQ but Cost during operation phase will be bearded by Chowmuhani Municipality or Bus Owners' Association.

Note: The environmental safeguard compliance issues and cost (Like solid waste management, water supply, traffic monitoring, drain cleaning, test of environment parameter etc.) are to be done by Bus Owners' Association and that is to be supervised by Chowmuhani Municipality.

8. COMPLIANCE WITH ENVIRONMENTAL CODE OF PRACTICES

The environmental code of practices (ECoPs) provides guidelines for environment management of the subprojects to be implemented in different urban local bodies (ULBs) under MGSP. The main objective of the ECoP is to manage construction operations in harmony with the environment in an effort to contribute to the well-being of the community and the environment by (i) minimizing pollution, (ii) sustaining eco-systems, (iii) conserving cultural heritage, and (iv) enhancing amenity. In compliance with ECoP, following issues associated with the proposed subproject are addressed during environmental assessment:

- Planning and design of the subproject;
- Site preparation;
- Construction camps;
- Borrow areas;
- Topsoil salvage, storage and replacement;
- Waste management;
- Water bodies;
- Water quality;
- Drainage;

- Public health and safety;
- Material storage, transport and handling;
- Vegetation management; and
- Natural habitat.

In this assessment, it is found that some of the issues are not relevant to this subproject. The issues those are found as relevant are addressed properly in this report.

PUBLIC CONSULTATION AND ACCESS TO INFORMATION

10.1. Introduction

Pubic Consultation is an effective tool for maintaining communication among the Municipality authority, BMDF as funding authority, different stakeholders of the subproject and community people where the subproject will be implemented. It helps to facilitate and streamline decision making as well as fosters an atmosphere of common understanding among individuals, group and organizations that could be affected or be affected by the subproject. It also ensures the transparency of the subproject at all levels of planning, design, construction and operation. It is a continuous process by which opinion from public is sought on matters affecting them. Hence, as a part of IEE/EIA, an effective public consultation and access to information is important.

10.2. Objectives

The main objectives of the public consultation and access to information under this subproject are: (i) to generate public awareness by providing information about the subproject to all stakeholders, particularly the subproject affected persons (PAPs) in a timely manner, and (ii) to provide opportunity to the stakeholders to raise their opinions and concerns on different aspects of the subproject.

10.3. Methodology

Public consultation about the planning, design, implementation and operation is done at different stages following different participatory methods. The methods followed in public consultation are: (1) consultative meeting with different stakeholders, (ii) Focus group discussion with community people through the participation of male participants, and (iii) Focus group discussion with community people through the participation of female participants, girls and boys, and disable people.

One consultative meeting was organized at community level through the participation of concern Councilors of Chowmuhani Municipality, representatives of Bus Owners' Association, representatives of Workers' Association, local leaders, community elites and representatives of business men surrounding the bus terminal. The participants were informed about the detail design and activities of subproject going to be implemented. Environmental screening of the subproject was also done in this meeting using the prescribed form mentioned in EMF of BMDF. They were asked to share their opinion, feedback and suggestions on environmental and social impacts of the subprojects as well as the mitigation measures to avoid or reduce the potential impacts. The list of participants of stakeholders' meeting is attached as **Annexure 3.**

Picture 5: Participants at stakeholders' meeting

One focus group discussion was organized with male community participants from different professions residing surrounding the subproject site. The participants were informed about the detail design and activities of subproject going to be implemented and asked about their opinion, feedback and suggestions on environmental and social impacts of the subprojects as well as the mitigation measures to avoid or reduce the potential impacts. The list of participants of FGD with male is attached as **Annexure 4.**

Picture 6: Participants at FGD with male group

Another focus group discussion was organized with female community participants living around the subproject site. The participants were also informed about the detail design and activities of subproject going to be implemented and asked about their opinion, feedback and suggestions on environmental and social impacts of the subprojects as well as the mitigation measures to avoid or reduce the potential impacts on women's point of view. In this session, boy and girls, and disable people were also present. The list of participants is attached as **Annexure 5.**

Picture 7: Participants at FGD with female group

Special efforts were made to include the elderly, women, and vulnerable groups and to allow them to express their views regarding the subproject implementation. In all cases, the impression of stakeholders and general mass regarding sub-project implementation was positive.

10.4. Issues Raised by the Participants

Following issues were raised during community consultation:

- Noise pollution due the construction activities;
- Air pollution due to blowing of dust, sand, cement and gravel sacks;
- Traffic congestion;
- Solid waste management;
- Social security

10.5. Feedback, Suggestions and Recommendations of the Participants

Local people are very much interested and felt encouragement about the construction of an well designed bus terminal with all facilities for the passengers and to create employment opportunity by keeping scope of shops within the bus terminal building. They are encouraged and ready to provide necessary social supports in constructing the bus terminal at the selected site. They suggested making the bus terminal environment friendly considering and addressing all assumed adverse effects related to abovementioned issues with the implementation of potential mitigation and enhancement measures during both construction and operational phases. Participants requested the Municipality authority to maintain the quality of the construction work of the building. Adjacent community peoples of the proposed site requested the Municipality authority to keep the noise level low and keep the construction work stopped after 10:00 pm at night, restrict the workers to visit adjacent community, use quality construction materials, ensure proper traffic management and restrict the vehicles to stand at road side, ensure proper solid waste management

to be produced by the passengers, and honor the communities' comfort and over tranquility of the environment.

10.6. 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 (both English and Bangla) will also be uploaded in the Chowmuhani Municipality website, BMDF website and the World Bank website after approval.

9. CONCLUSION AND RECOMMENDATIONS

11.1. Conclusion

On the basis of the analysis, it may be concluded that the project stands environmentally sound and sustainable when the recommended mitigation measure and environmental management processes are adopted properly. The adverse environmental impacts from the project will mostly take place during the construction stage. The benefits of the subproject will be significant by creating employment and business opportunities during the construction and operational phases. There is no significant cumulative adverse impact during operation that is identifiable at this stage. The construction impacts should be very predictable and manageable, and with appropriate mitigation measures. The subproject is expected to have a small "environmental footprint". No endangered or protected species of flora or fauna are reported at the subproject site. The proposed project activities have no significant adverse environmental impact so far as a time bound execution program with application of advanced construction technology is ensured. The mitigation measures are well within such codes and practices of construction and operation of the proposed project.

11.2. Recommendation

The attitude of the community people towards the improvement of the Chowrasta Bus Terminal is positive as well as they have some recommendations to minimize the social impacts of the bus terminal during its construction and operation. The Government of Bangladesh and World Bank have some legal and social safeguard compliances issues those are applicable during constructing and operating the proposed bus terminal. Considering the above-mentioned issues and findings of the study, following key recommendations are made for smooth construction and successful operation of the bus terminal:

- Bus terminal should have provisions for temporary parking of drop-off vehicles and supporting vehicles to travel to the main town.
- A well-defined solid waste collection and disposal system should be in place at the bus terminal.

- All waste water should be discharged to the Municipal sewer system. In the absence of such system in the vicinity of the terminal the septic tanks should be constructed.
- No service of vehicles and refueling should be allowed inside the premises of the terminal. For any emergency repair, special bays should be provided.
- An oil and fuel spill contingency plan should be prepared.
- Fire prevention and fighting equipment should be provided and maintained as well as terminal staff should be trained in fire prevention and fighting.
- Vehicles should not be allowed to park with their engines are running.
- The entire area of the bus terminal, driveways and parking lots should be paved.
- Landscaping and plantation should be undertaken to improve the aesthetic quality of the bus terminal.
- Encroachment of outside terminals should be prevented to ease the pressure on traffic.
- Bus terminal should have facilities for washing, prayer, toilet, waiting, shopping, meals and snacks.
- Contractor will ensure availability of the PPEs and first-aid box, water supply and sanitation facilities to the workers.
- The surrounding people should be informed about the construction and operation of the bus terminal.
- Above all, the EMP should be followed and mitigation measures should be monitored as per EMP.

10. REFERENCES

1. Bangladesh Bureau of Statistics. Bangladesh Population and Housing Census 2011. Community Report: Noakhali.
2. Bangladesh Bureau of Statistics. District Statistics 2011: Noakhali.
3. Bangladesh Municipal Development Fund. Environmental Management Framework, 2017.
4. Chowmuhani Municipality Data, 2018.
5. Chowmuhani Municipality. Municipality Development Plan, 2013.
6. https://en.wikipedia.org/wiki/Begumganj_Upazila dated on June 11, 2018.

ANNEXURES

Annexure 1: List of participants attended at environmental screening exercise

Name of subproject: Improvement of Chowrasta Bus Terminal

Package number:

Name of ULB: Chowmuhani Pourashava **Name of district:** Noakhali

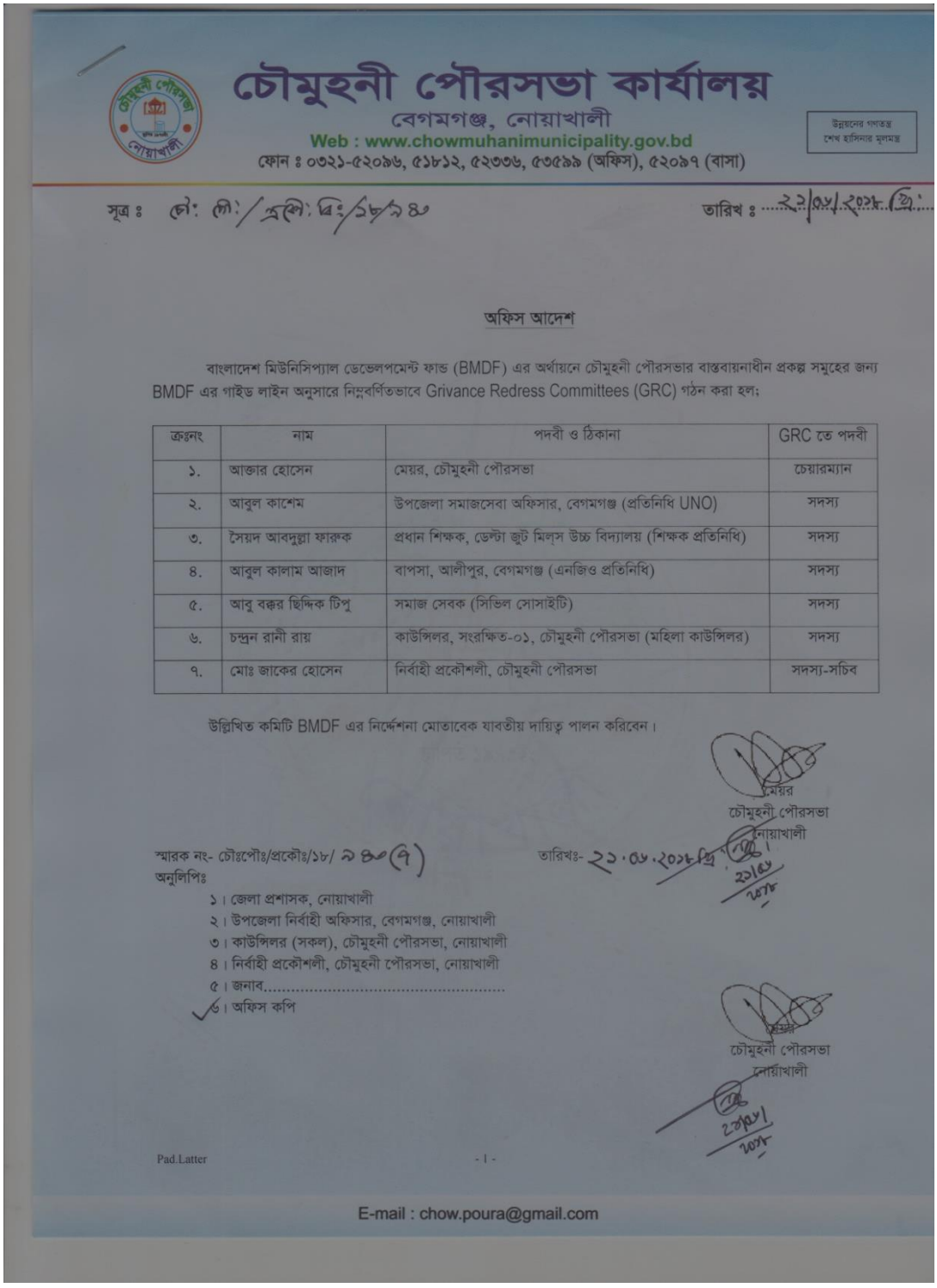
Name of place: Bus Terminal, Alipur **Date:** 04.06.2018

Level of participants: Local stakeholders, community members, WLCC/CBO

Attendance of local participants in Environmental screening exercise

Sl No.	Name	Gender	Social status	Contact number	Signature/LTI
১.	মো: [illegible]	পুরুষ	ব্যবসা	[illegible]	[illegible]
২.	[illegible]	〃	ব্যবসা	[illegible]	[illegible]
৩.	মো: [illegible]	〃	〃	[illegible]	[illegible]
৪.	এ কে আজাদ	〃	চাকুরী	[illegible]	[illegible]
৫.	[illegible]	পুরুষ	চাকুরী	01839702008	[illegible]
৬.	মো: কামাল [illegible]	〃	[illegible]	01827479406	[illegible]
৭.	মুর্শিদা বেগম	মহিলা	চাকুরী	01911701970	মুর্শিদা
৮.	মো: শহিদুল ইসলাম	পুরুষ	চাকুরী	01813094673	[illegible]
৯.	আতাউর রহমান [illegible]	〃	ব্যবসা	[illegible]	[illegible]
১০.	মেহেরুন নেছা	মহিলা	চাকুরী	01916385444	[illegible]
১১	হেলেনা বেগম	মহিলা	〃	01965684188	Helena
১২	[illegible]	[illegible]		[illegible]	[illegible]

Annexure 2: The list of GRC along with the notification from the Mayor



চৌমুহনী পৌরসভা কার্যালয়

বেগমগঞ্জ, নোয়াখালী

Web : www.chowmuhanimunicipality.gov.bd

ফোন ঃ ০৩২১-৫২০৯৬, ৫১৮১২, ৫২৩৩৬, ৫৩৫৯৯ (অফিস), ৫২০৯৭ (বাসা)

উন্নয়নের গণতন্ত্র
শেখ হাসিনার মূলমন্ত্র

সূত্র ঃ চৌঃ পৌঃ/প্রকৌঃ বিঃ/১৮/২৪৩ তারিখ ঃ ২১/০৮/২০২৮ খ্রিঃ

অফিস আদেশ

বাংলাদেশ মিউনিসিপ্যাল ডেভেলপমেন্ট ফান্ড (BMDF) এর অর্থায়নে চৌমুহনী পৌরসভার বাস্তবায়নাধীন প্রকল্প সমূহের জন্য BMDF এর গাইড লাইন অনুসারে নিম্নবর্ণিতভাবে Grivance Redress Committees (GRC) গঠন করা হল:

ক্রঃনং	নাম	পদবী ও ঠিকানা	GRC তে পদবী
১.	আক্তার হোসেন	মেয়র, চৌমুহনী পৌরসভা	চেয়ারম্যান
২.	আবুল কাশেম	উপজেলা সমাজসেবা অফিসার, বেগমগঞ্জ (প্রতিনিধি UNO)	সদস্য
৩.	সৈয়দ আবদুল্লা ফারুক	প্রধান শিক্ষক, ডেল্টা জুট মিল্স উচ্চ বিদ্যালয় (শিক্ষক প্রতিনিধি)	সদস্য
৪.	আবুল কালাম আজাদ	বাপসা, আলীপুর, বেগমগঞ্জ (এনজিও প্রতিনিধি)	সদস্য
৫.	আবু বক্কর ছিদ্দিক টিপু	সমাজ সেবক (সিভিল সোসাইটি)	সদস্য
৬.	চন্দ্রন রানী রায়	কাউন্সিলর, সংরক্ষিত-০১, চৌমুহনী পৌরসভা (মহিলা কাউন্সিলর)	সদস্য
৭.	মোঃ জাকের হোসেন	নির্বাহী প্রকৌশলী, চৌমুহনী পৌরসভা	সদস্য-সচিব

উল্লিখিত কমিটি BMDF এর নির্দ্দেশনা মোতাবেক যাবতীয় দায়িত্ব পালন করিবেন।

মেয়র
চৌমুহনী পৌরসভা
নোয়াখালী

স্মারক নং- চৌঃপৌঃ/প্রকৌঃ/১৮/ ২৪৩(৭) তারিখঃ- ২১.০৮.২০২৮ খ্রি.

অনুলিপিঃ

১। জেলা প্রশাসক, নোয়াখালী
২। উপজেলা নির্বাহী অফিসার, বেগমগঞ্জ, নোয়াখালী
৩। কাউন্সিলর (সকল), চৌমুহনী পৌরসভা, নোয়াখালী
৪। নির্বাহী প্রকৌশলী, চৌমুহনী পৌরসভা, নোয়াখালী
৫। জনাব.....
৬। অফিস কপি

চৌমুহনী পৌরসভা
নোয়াখালী

Pad.Latter - 1 -

E-mail : chow.poura@gmail.com

Annexure 3: List of participants at stakeholders' meeting

Name of subproject: Improvement of Chowrasta Bus Terminal

~~Package number~~:

Name of ULB: Chowmuhani Pourashava

Name of district: Noakhali

Name of place: Busterminal, Alipur

Date: 04.06.2018

Level of participants: Community leaders, relevant government official, CBOs, and others

Attendance of Stakeholders' meeting

Sl No.	Name	Gender	Social status	Contact number	Signature/LTI
১	আবুল হোসেন	পুরুষ	[illegible]	01711702109	
২	[illegible]	মহিলা	কাউন্সিলর ১,২,৩	01717383217	
৩	[illegible] রহমান [illegible]	পুরুষ	ব্যবসা	01712730210	
৪	মো: [illegible]	"	[illegible]	[illegible]8180548 99	
৫	মো: [illegible]	"	[illegible]	0182747948	
৬	[illegible]	পুরুষ	[illegible]	01839702008	
৭	[illegible]	পুরুষ	[illegible]	01716225697	
৮	এ কে আজাদ	পুরুষ	[illegible]	01712086663	
৯	মো: [illegible]	পুরুষ	[illegible]	01811268081	
১০	মো: [illegible]	ঐ	[illegible]	018211554222	
১১	হেলেনা বেগম	মহিলা	কাউন্সিলর ৭,৮,৯	01963568488	Helena
১২	[illegible]	পুরুষ	TLCC সদস্য	01818835615	

Annexure 4: Attendance of community people in FGD (male)

Name of subproject: Improvement of Chowrasta Bus terminal

~~**Package number:**~~

Name of ULB: [redacted] Chowmuhani Paurashava **Name of district:** [redacted] Noakhali

Name of place: Bus terminal, Alipur **Date:** 05.04.2018

Level of participants: Community people (Male group)

Attendance of Community People in FGD

Sl No.	Name	Gender	Social status	Contact number	Signature/LTI
০১.	আবদুল গনি	male	ব্যবসা	–	আবদুল গনি
০২.	মোঃ নিজাম উদ্দিন	"	ব্যবসা	01819069223	[illegible]
০৩.	মোঃ আহাম্মদ হোসেন	"	সার্ভিস	–	[illegible]
০৪.	আব্দুল ওমর	"	[illegible]	01719577661	[illegible]
০৫.	আব্দুর রহমান চৌধুরী	male	অবসরপ্রাপ্ত	01826065090	[illegible]
০৬.	হুমায়ুন কবির	"	ব্যবসা	–	হুমায়ুন কবির
০৭.	সাইফুল ইসলাম সাজু	"	ছাত্র	–	[illegible]
০৮.	আলমগীর হোসেন	"	ছাত্র	01747078469	[illegible]
০৯.	মোঃ আলাউদ্দিন	"	"	–	[illegible]
১০.	নূর হোসেন	"	"	01726081799	নুর হোসেন
১১	মোঃ নিজাম উদ্দিন	"	ব্যবসা	01819069223	[illegible]
১২	মুহাম্মদ রফিকুল ইসলাম	"	কাউন্সিলর	0171100446 86	[illegible]
১৩	[illegible]	"	[illegible]	01811605162	Bulbul
১৪	মো. রফিক হোসেন	"	নি: প্রধান	01711-703135	[illegible]

Annexure 5: Attendance of community people in FGD (female)

Name of subproject: Improvement of Chowrasta Bus Terminal

Package number:

Name of ULB: Chowmuhani Pourashava, Begumgonj Name of district: Noakhali

Name of place: Bus Terminal, Alipur Date: 04.06.2018

Level of participants: Community People (Female group)

Attendance of Community People in FGD

Sl No.	Name	Gender	Social status	Contact number	Signature/LTI
০১.	ফরিদা ইয়াছমিন	Female	চাকরী	01854199584	ফরিদা
০২.	শাহীন সুলতানা	"	গৃহিনী	01815256739	শাহীন সুলতানা
০৩.	জেছমিন আক্তার	"	চাকুরী	01857987848	জেছমিন আক্তার
০৪.	দেলোয়ারা	"	চাকুরী	01846350972	দেলোয়ারা
০৫.	বিবি হাওয়া	"	গৃহিনী	0188386224 5	বিবি হাওয়া
০৬.	পারুল	"	গৃহিনী	018322295 71	পারুল
০৭.	বিবি হাজেরা	"	গৃহিনী	01825297306	বিবি হাজেরা
০৮.	মর্জিনা আক্তার	"	WLCC সদস্য	018456280 68	মর্জিনা
০৯.	[illegible]	"	TLCC member	01914307753	Poly
১০.	প্রতিভা রানী দাস		কাউন্সিলর ৪,৫,৬	01715678711	[illegible] 4.06.18
১১.	চন্দন কান্তি রায়	"	১,২,৩,	01717383 217	[illegible]